

INTERNATIONAL CODE COUNCIL 2012 - 2014 CODE DEVELOPMENT CYCLE Group B (2013)

PROPOSED CHANGES TO THE 2013 EDITIONS OF THE

ADMINISTRATIVE PROVISIONS[®]

INTERNATIONAL ENERGY CODE[®]

- *Commercial*
- *Residential*

INTERNATIONAL EXISTING BUILDING CODE[®]

INTERNATIONAL FIRE CODE[®]

ICC PERFORMANCE CODE[®]

INTERNATIONAL RESIDENTIAL CODE[®]

- *Building*
- *Mechanical*
- *Plumbing*

PROPERTY MAINTENANCE CODE[®]

SWIMMING POOL AND SPA CODE[®]

WILDLAND-URBAN INTERFACE CODE[®]



April 21st – April 30th, 2013
Sheraton Dallas Hotel
Dallas, TX

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By

International Code Council, Inc.

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INTRODUCTION

The proposed changes published herein have been submitted in accordance with established procedures and are distributed for review. The publication of these changes constitutes neither endorsement nor question of them but is in accordance with established procedures so that any interested individuals may make their views known to the relevant code committee and others similarly interested. In furtherance of this purpose, the committee will hold an open public hearing at the date and place shown below for the purpose of receiving comments and arguments for or against such proposed changes. Those who are interested in testifying on any of the published changes are expected to be represented at these hearings.

This compilation of code change proposals is available in electronic form only. As part of ICC's green initiative, ICC will no longer print and distribute this document. The compilation of code change proposals will be posted on the ICC website, and CD copies will be distributed to all interested parties on our list.

2013 ICC COMMITTEE ACTION HEARINGS

These proposed changes will be discussed in public hearings to be held on April 21st, 2013 through April 30th, 2013 at the Sheraton Dallas Hotel, Dallas, Texas. The code committees will conduct their public hearings in accordance with the schedule shown on page xlii.

REGISTRATION AND VOTING

All members of ICC may vote on any assembly motion on proposed code changes to all International Codes. **For identification purposes, eligible voting members must register, at no cost, in order to vote.** The registration desk will be open in the lobby of the convention center according to the following schedule:

Saturday, April 20 th	4:00 pm to 6:00 pm
Sunday, April 21 st through Tuesday, April 30 th	7:30 am to 5:00 pm

Council Policy #28-Code Development (page xii) requires that ICC's membership records regarding ICC members reflect the eligible voters 10 days prior to the start of the Code Development Hearings. This process includes new as well as changes to voting status. Section 5.7.4 of CP #28 (page xxii) reads as follows:

- 5.7.4 Eligible Voters:** All members of ICC in attendance at the public hearing shall be eligible to vote on floor motions. Each member is entitled to one vote, except that each Governmental Member Voting Representative in attendance may vote on behalf of its Governmental Member. Code Development Committee members shall be eligible to vote on floor motions. Application, whether new or updated, for ICC membership must be received by the Code Council ten days prior to the commencement of the first day of the public hearing.

As such, new membership applications as well as renewal applications must be received by ICC's Member Services Department by April 11th, 2013. These records will be used to verify eligible voter status for the Code Development Hearings. Members are strongly encouraged to review their membership records for accuracy well in advance of the hearings so that any necessary changes are made prior to the April 11th, 2013 deadline. For information on application for new membership and membership renewal, please go to www.iccsafe.org/membership/join.html or call ICC Member Services at 1-888-ICC SAFE (422-7233)

It should be noted that a corporate member has a single vote. Only one representative of a corporate member will be issued a voting badge. ICC Staff will be contacting corporate members regarding who the designated voting representative will be.

ADVANCED REGISTRATION

You are encouraged to advance register by filling out the registration form available at www.iccsafe.org/springhearings.

CODE DEVELOPMENT PROCESS SCHEDULE

As noted in the posted Advisory Statement of February 4, 2009, the revised Code Development Process includes maintaining the current 3-year publication cycle with a single cycle of code development between code editions. The schedule for the 2012 -2014 Code Development Cycle is the first schedule for the revised code development process (see page ix).

PROCEDURES

The procedures for the conduct of the public hearing are published in *Council Policy #28-Code Development (CP#28)* ("Procedures") on page xv. The attention of interested parties is specifically directed to Section 5.0 of the Procedures. These procedures indicate the conduct of, and opportunity to participate in the ICC Code Development Process. Please review these procedures carefully to familiarize yourself with the process.

There have been a number of revisions to the procedures prior to the start of the Group A hearings. Included among these revisions are the following:

- | | |
|---------------------------------------|--|
| Section 1.6: | Recording. This section was revised to clarify that ICC maintains sole ownership in the content of the hearings and has the right to control its subsequent distribution. In addition, the technology references were updated, using the term "recording" to replace "videotaping". |
| Section 2.4 | Emergency Procedures. This section was revised create a 'metric' to aid in the determination of when an issue rises to the level of concern appropriate to an emergency amendment. Furthermore, it now stipulates a process by which a proposed Emergency Amendment is reviewed by the ICC Codes and Standards Council who is responsible for the implementation and oversight of ICC's Code Development Process. |
| Section 3.3.1
&
Section 6.4.1 | Proponent. An e-mail address for each code change/public comment proponent will be published in the monograph, unless the proponent requests otherwise. |
| Section 3.3.5.3
&
Section 6.4.5 | Substantiation. ICC evaluates whether substantiating material is germane, but the amendment makes it clear that ICC does not in all circumstances evaluate substantiating material for quality or accuracy. |
| Section 3.3.5.6 | Cost Impact. The proponent should submit information that supports their claim regarding cost impact. Any information submitted will be considered by the code development committee. This language is intended to emphasize the need to provide information on how the proposed change will affect the cost of construction. |
| Section 3.6.3.1 | If a proposed new standard is not submitted in at least draft form, the corresponding code change proposal shall be considered incomplete and shall not be processed. |
| Section 4.5.1 | Standards referenced in the I-Codes. The deadline for availability of updated referenced standards and receipt by the Secretariat is December 1 st of the third year of each code cycle. For the 2012/2013 cycle, the deadline is December 1 st , 2014. |

- Section 5.2.2 **Conflict of interest.** The original language, “Violation thereof shall result in the immediate removal of the committee member from the committee.” was removed because there was no mechanism to enforce it. The recourse for someone who feels this section has been violated is to appeal.
- Section 5.4.2 **Open meetings.** A provision has been added that stipulates that participants shall not advocate a position on specific code changes with Committee Members other than through the methods provided in this policy.
- Section 5.4.3
&
Section 7.3.3 **Presentation of Material at the Public Hearing.** All participants are to make it clear what interests they are representing. This disclosure provides additional information upon which to evaluate the testimony.
- Section 5.7 **Assembly consideration.** A successful assembly action will no longer be the initial motion at the Final Action Consideration.
- Section 5.7.3 **Assembly action.** A successful assembly action shall be a majority vote of the votes cast by eligible voters, rather than a 2/3 majority (see below).
- Section 5.7.4 **Eligible voters.** This section is revised to clarify that each member, including Governmental Member Voting Representatives, gets only one vote.
- Section 7.4 **Eligible voters.** This section requires that all Governmental Membership applications must be received by April 1 of the year of the Final Actions for a Governmental Member to be eligible to vote at the Final Action Hearings.

ASSEMBLY ACTION

The procedures regarding assembly action at the Code Actions Hearings have been revised (see Section 5.7 of CP #28 on page xxii). Some important items to note regarding assembly action are:

- A successful assembly action now requires a simple majority rather than a 2/3 majority.
- After the committee decision on a code change proposal is announced by the moderator, any one in the assembly may make a motion for assembly action.
- After a motion for assembly action is made and seconded, the moderator calls for a floor vote in accordance with Section 5.7.2. *No additional testimony will be permitted.*
- A code change proposal that receives a successful assembly [action](#) will be placed on the Final Action Hearing Agenda for individual consideration.

GROUP A, GROUP B AND GROUP C CODE CHANGES

Note that, for code changes submitted to the 2012 I-Codes for the development of the 2015 Edition of the I-Codes, there will be three groups of code development committees and they will meet in separate years. The groupings are as follows:

Group A Codes (Heard in 2012)	Group B Codes (Heard in 2013)	Group C Codes (Heard in 2014)
<i>International Building Code Committees:</i> <i>IBC-Fire Safety (Chapters: 7- 9, 14, 26 and App. D)</i> <i>IBC-General (Chapters: 2-6, 12, 13, 27-34, App. A, B, C, F, H, K)</i> <i>IBC-Means of Egress (Chapters: 10, 11 and App. E)</i> <i>IBC-Structural (Chapters: 15-25 and App. G,I, J, L, M)</i>	<i>Administrative Provisions (Chapter 1 all codes except IgCC, IRC, IECC , ISPSC, Performance Code, designated definitions, and administrative update of referenced standards, including administrative updates of referenced standards in IgCC)</i> <i>(Administrative Code Committee)</i>	<i>International Green Construction Code Committees:</i> <i>IgCC—Energy/Water Committee (Chapters: 6 and 7)</i> <i>IgCC—General Committee (Chapters:2-5, 8-11 and Appendices)</i>
<i>International Fuel Gas Code (IFGC Committee)</i>	<i>International Energy Conservation Code (Commercial Energy Committee – see Note) (Residential Energy Committee – see Note)</i>	
<i>International Mechanical Code (IMC Committee)</i>	<i>International Existing Building Code (IEBC Committee)</i>	
<i>International Plumbing Code (IPC Committee)</i>	<i>International Fire Code (IFC Committee)</i>	
<i>International Private Sewage Disposal Code (IPC Committee)</i>	<i>International Performance Code (ICC Performance Code Committee)</i>	
	<i>International Property Maintenance Code (IPMC/IZC Committee)</i>	
	<i>International Wildland-Urban Interface Code (IFC Committee)</i>	
	<i>International Zoning Code (IPMC/IZC Committee)</i>	
	<i>International Residential Code Committees:</i> <i>IRC-B (Chapters: 1-10 and App. E, F, G,H, J, K, L, M, O)</i> <i>IRC-M/P (Chapters: 12-33 and App. I, P)</i> <i>IRC-E (Chapter 11 – see Note)</i>	
	<i>International Swimming Pool and Spa Code (ISPSC) Committee</i>	

NOTE: Residential Energy Committee is responsible for Chapter 11 of the IRC and the Residential Provisions of the IECC.

GROUP B CODE DEVELOPMENT COMMITTEE RESPONSIBILITIES

Some sections of the International Codes have a letter designation in brackets in front of them. For instance, Section 415.1 of the IBC has a [F] in front of it, meaning that this section is the responsibility of the IFC Code Development Committee.

Code change proposals submitted for such code sections that have a bracketed letter designation in front of them will be heard by the respective committee responsible for such code sections. Because different committees will meet in different years, some proposals for a given code will be heard by a committee in a different year than the year in which the primary committee for this code meets.

The code change proposals pertaining to the codes from Group A will be assigned their traditional code change prefix. In the example above, the code change proposal would be identified as G-XX because Chapter 4 of the IBC is the responsibility of the IBC – General committee. This item would then be placed on the agenda of the IFC committee.

Note that there are several in the Group B codes that have already received code changes during the Group A hearings. In particular, there were several code change proposals in the IBC-Structural hearing order that were changes to the International Existing Building Code (marked with prefix “EB”). These are changes to sections of the existing building code that were the responsibility of the IBC-Structural Code Development Committee. A complete summary of the Group A and Group B and Group C Code Development Committees’ responsibilities can be viewed at the ICC Website: http://www.iccsafe.org/cs/codes/Documents/2012-13cycle/GroupA-B_CDC-Responsibilities.pdf.

ANALYSIS STATEMENTS

Various proposed changes published herein contain an “analysis” that appears after the proponent’s reason. These comments do not advocate action by the code committees or the voting membership for or against a proposal. The purpose of such comments is to identify pertinent information that is relevant to the consideration of the proposed change by all interested parties, including those testifying, the code committees and the voting membership. Staff analyses customarily identify such things as: conflicts and duplication within a proposed change and with other proposed changes and/or current code text; deficiencies in proposed text and/or substantiation; text problems such as wording defects and vagueness; background information on the development of current text; and staff’s review of proposed reference standards for compliance with the Procedures. Lack of an analysis indicates neither support for, nor opposition to a proposal.

REFERENCE STANDARDS

Proposed changes that include the addition of a reference to a new standard (i.e. a standard that is not currently referenced in the I-Codes.) will include in the proposal the number, title and edition of the proposed standard. This identifies to all interested parties the precise document that is being proposed and which would be included in the referenced standards chapter of the code if the proposed change is approved. Section 3.6.3.1 of CP #28 now requires that a code change proposal will not be processed unless a consensus draft of the standard has been provided. Proponents of code changes which propose a new standard have been directed to forward copies of the standard to the Code Committee. An analysis statement will be posted on the ICC website providing information regarding standard content, such as enforceable language, references to proprietary products or services, and references to consensus procedure. The analysis statements for referenced standards will be posted on or before April 1st, 2013. This information will also be published and made available at the hearings.

REFERENCED STANDARDS UPDATES

Administrative updates of any standards already referenced in any of the I-Codes will be contained in a code change proposal for consideration by the Administrative Code Development Committee. The Administrative Code Development Committee is a Group B committee which will conduct hearings on the administrative provisions (Chapter 1 and certain definitions) of all I-Codes, and the referenced standards update. Therefore, this committee will conduct its code development hearing during these code development hearings.

It should be noted that, in accordance with Section 4.5.1 of CP #28 (see page xviii), standards promulgators will have until December 1, 2014 to finalize and publish any updates to standards in the administrative update. If the standard update is not finalized and published by December 1, 2014, the respective I-Codes will be revised to reference the previously listed year edition of the standard.

MODIFICATIONS

Those who are submitting a modification for consideration by the respective Code Development Committee are required to submit a Copyright Release in order to have their modifications considered (Section 3.3.4.5 of CP #28). It is preferred that such release be executed in advance – the form is at

<http://www.iccsafe.org/cs/codes/publicforms.htm>. Copyright release forms will also be available at the hearings. Please note that an individual need only sign one copyright release for submittals of all code change proposals, modifications, and public comments in this code change cycle for which the individual might be responsible.

Please be sure to review Section 5.5.2 of CP #28 for the modification process. The Chair of the respective code development committee rules a modification in or out of order. That ruling is final, with no challenge allowed. The proponent submitting a modification is required to supply 20 printed copies. The minimum font size must be 16 point.

Example:

Original code change proposal.

The original code change proposal requested the following change to Section 305.3 of one of our I-Codes: (Note that the example is fictional.)

PM10-13 305.13

Proponent: John West representing self

Revise as follows:

305.3 Interior surfaces. All interior surfaces, including windows and doors, shall be maintained in good and clean condition. Peeling, chipping, flaking or abraded paint shall be repaired, removed or covered. Cracked or loose plaster, ~~decayed wood~~ and other defective surface conditions shall be corrected. Surfaces of porous materials made of or containing organic materials, such as but not limited to wood, textiles, paint, cellulose insulation, and paper, including paper-faced gypsum board, that have visible signs of mold or mildew shall be removed and replaced or remediated in an approved manner.

Exception: Porous materials that do not contain organic materials, such as clean unpainted bricks and concrete.

Proposed modification:

A modification to the code change proposal is proposed:

1. To add “and sanitary” after “clean” in the first sentence.
2. To add “or water permeable” after “porous” in the third sentence.
3. Delete “in an approved manner.” in the last sentence.
4. Delete the proposed new exception.

The modification should read as follows. Note that the font style is Ariel, and the font size is 16 pt. The ~~cross-out~~, underline format is removed from the text of the original proposal and the requested revisions in the original proposal are made and shown as original text. The modification to the original proposal is shown with ~~cross-out~~, underline format applied to the changes proposed in the modification.

Example of proposed modification:

PM10-13
305.13

Proponent: Sam Sumter representing self

Modify the proposal as follows:

305.3 Interior surfaces. All interior surfaces, including windows and doors, shall be maintained in good, ~~and clean~~ and sanitary condition. Peeling, chipping, flaking or abraded paint shall be repaired, removed or covered. Cracked or loose plaster and other defective surface conditions shall be corrected. Surfaces of porous or water permeable materials made of or containing organic materials, such as but not limited to wood, textiles, paint, cellulose insulation, and paper, including paper-faced gypsum board, that have visible signs of mold or mildew shall be removed and replaced or remediated ~~in an approved manner.~~

~~Exception:~~ ~~Porous materials that do not contain organic materials, such as clean unpainted bricks and concrete.~~

***Note:** The modification should be able to be shown on the overhead screen on a single page. Only show the pertinent part of the code change proposal that shows the intended revisions. The entire code change proposal need not be shown.*

CODE CORRELATION COMMITTEE

In every code change cycle, there are code change proposals that are strictly editorial. The Code Correlation Committee approves all proposals deemed editorial. A list of code correlation committee actions are shown at the end of this document (CCC-1).

ICC WEBSITE – [WWW.ICCSAFE.ORG](http://www.iccsafe.org)

This document is posted on the ICC Website, www.iccsafe.org. While great care has been exercised in the publication of this document, errata to proposed changes may occur. Errata, if any, will be identified in updates posted prior to the Code Development Hearings on the ICC website at <http://www.iccsafe.org>. Users are encouraged to periodically review the ICC Website for updates to the 2012 - 2014 Code Development Cycle-Group B (2013) Proposed Changes. Additionally, analysis statements for code changes which propose a new referenced standard will be updated to reflect the staff review of the standard for compliance with Section 3.6 of the Procedures.

PROPONENT CONTACT INFORMATION

For most of the code change proposals, an e-mail address for the proponent has been provided.

2012 - 2014 ICC CODE DEVELOPMENT SCHEDULE

(Updated December 12, 2012)

STEP IN CODE DEVELOPMENT CYCLE	DATE		
	2012 – Group A Codes IBC, IFGC, IMC, IPC, IPSDC	2013 – Group B Codes Admin, ICCPC, IEBC, IECC, IFC, IPMC, IRC, ISPSC, IWUIC, IZC	2014 – Group C Code IgCC
2012 EDITION OF I-CODES PUBLISHED	April 30, 2011		March 31, 2012
DEADLINE FOR RECEIPT OF APPLICATIONS FOR ALL CODE COMMITTEES	June 1, 2011 for the 2012/2013/2014 Cycle (updated to July 1 for IECC and IRC – Energy; August 1 for IgCC and ISPSC) June 2, 2014 for the 2015/2016/2017 Cycle. Call for committee to be posted in January/2014.		
DEADLINE FOR RECEIPT OF CODE CHANGE PROPOSALS	January 3, 2012	January 3, 2013	January 6, 2014
WEB POSTING OF “PROPOSED CHANGES TO THE I-CODES”	March 12, 2012	March 11, 2013	March 10, 2014
DISTRIBUTION DATE OF “PROPOSED CHANGES TO THE I-CODES” (CD only)	April 2, 2012	April 1, 2013	April 1, 2014
COMMITTEE ACTION HEARING (CAH)	April 29 – May 6, 2012 Sheraton Dallas Hotel Dallas, TX	April 21 – 30, 2013 Sheraton Dallas Hotel Dallas, TX	April 27 – May 4, 2014 Memphis Cook Convention Center Memphis, TN
WEB POSTING OF “REPORT OF THE COMMITTEE ACTION HEARING”	June 8, 2012	May 31, 2013	June 6, 2014
DISTRIBUTION DATE OF “REPORT OF THE COMMITTEE ACTION HEARING” (CD only)	June 29, 2012	June 21, 2013	June 27, 2014
DEADLINE FOR RECEIPT OF PUBLIC COMMENTS	August 1, 2012	July 15, 2013	July 16, 2014
WEB POSTING OF PUBLIC COMMENTS “PUBLIC COMMENT AGENDA”	September 10, 2012	August 28, 2013	August 27, 2014
DISTRIBUTION DATE OF “PUBLIC COMMENT AGENDA” (CD only)	October 1, 2012	September 16, 2013	September 17, 2014
PUBLIC COMMENT HEARING (PCH) ANNUAL CONFERENCE DATES NOTED BY AC	October 24 – 28, 2012 Oregon Convention Center Portland, OR AC: October 21 - 24	October 2 – 10, 2013 Atlantic City Convention Center Atlantic City, NJ AC: September 29 – October 2	October 1 – 7, 2014 Greater Fort Lauderdale Broward County Convention Center For Lauderdale, FL AC: September 28 – October 1

Notes:

- Be sure to review the document entitled “Group A, Group B and Group C Code Development Committee Responsibilities” posted at www.iccsafe.org/responsibilities which identifies committee responsibilities which are different than Group A, B and C codes which may impact the applicable code change cycle and resulting code change deadline. This document is also linked from the Public Code Change Proposal Form. As an example, throughout Chapter 9 of the IBC (a Group A code), there are numerous sections which include an “[F]” which indicates that the provisions of the section are maintained by the Fire Code Development Committee (a

Group B code).

- The International Green Construction Code (IgCC) and International Swimming Pool and Spa Code (ISPSC) were subjected to a full cycle of code development in 2011 resulting in 2012 editions published in March/2012.
- Group B “Admin” includes code change proposals submitted to Chapter 1 of all the I-Codes except the IECC, IgCC, IRC, ISPSC, and the ICCPC and the administrative update of referenced standards in all the 2012 I-Codes. Proposed changes to Chapter 1 of the IECC, IgCC, IRC, ISPSC and ICCPC will be considered by the applicable Code Development Committee.
- Final Action Hearing note: The dates indicated for the Final Action Hearings are based on an assumed start of the hearings on the Wednesday of the respective Annual Conference. Public comment volume may dictate that the Final Action Hearing on one or more of the codes be held on Monday afternoon (with the code completed in the Monday session) in order for the Final Action Agenda for all the codes to be completed in the time allotted. Be sure to consult the posted Final Action Hearing Schedule.
- A comprehensive review of the 2012 – 2014 code groupings will be performed no later than upon receipt of IgCC code change proposals in January/2014 with the potential for 2015 – 2017 code groupings to change. Any changes will be posted at that time. The 2015 – 2017 Cycle will begin with Group A code change proposals due January 5, 2015.
- This updated schedule utilizes the revised hearing terms noted in the cdp ACCESS report, as follows:

Old term

Code Development Hearing
Report of the Public Hearing
Final Action Agenda
Final Action Hearing

Revised term

Committee Action Hearing
Report of the Committee Action Hearing
Public Comment Agenda
Public Comment Hearing

2012 - 2014 STAFF SECRETARIES

GROUP A (2012)

IBC-Fire Safety Chapters 7, 8, 9, 14, 26	IBC-General Chapters 1-6, 12, 13, 27-34	IBC-Means of Egress Chapters 10, 11	IBC-Structural Chapters 15-25	IFGC
Ed Wirtschoreck ICC Chicago District Office 1-888-ICC-SAFE, ext 4317 FAX: 708/799-0320 ewirtschoreck@iccsafe.org	Beth Tubbs ICC Northbridge Field Office 1-888-ICC-SAFE, ext 7708 FAX: 419/ 730-6531 btubbs@iccsafe.org	Kim Paarlberg ICC Indianapolis Field Office 1-888-ICC-SAFE, ext 4306 FAX: 708/799-0320 kpaarlberg@iccsafe.org	Alan Carr ICC NW Resource Center 1-888-ICC-SAFE, ext 7601 FAX: 425/637-8939 acarr@iccsafe.org	Gregg Gress ICC Chicago District Office 1-888-ICC-SAFE, ext 4343 FAX: 708/799-0320 ggress@iccsafe.org
IMC	IPC/IPSDC			
Gregg Gress ICC Chicago District Office 1-888-ICC-SAFE, ext 4343 FAX: 708/799-0320 ggress@iccsafe.org	Fred Grable ICC Chicago District Office 1-888-ICC-SAFE, ext 4359 FAX: 708/799-0320 fgrable@iccsafe.org			

GROUP B (2013)

ADMINISTRATIVE Chapter 1 All Codes Except IRC	IEBC	IECC-Commercial	IECC-Residential	IFC
Kim Paarlberg ICC Indianapolis Field Office 1-888-ICC-SAFE, ext 4306 FAX: 708/799-0320 kpaarlberg@iccsafe.org	Beth Tubbs ICC Northbridge Field Office 1-888-ICC-SAFE, ext 7708 FAX: 419/ 730-6531 btubbs@iccsafe.org	Kermit Robinson Whittier Office 1-888-ICC-SAFE, ext 3317 FAX: 562/699-4522 dmevers@iccsafe.org	Dave Bowman ICC Chicago District Office 1-888-ICC-SAFE, ext 4323 FAX: 708/799-0320 dmevers@iccsafe.org	Bill Rehr/ Beth Tubbs ICC Chicago District Office 1-888-ICC-SAFE, ext 4342 FAX: 708/799-0320 brehre@iccsafe.org btubbs@iccsafe.org
ICC PC	IPMC	IRC-Building	IRC Mechanical	IRC Plumbing
Beth Tubbs ICC Northbridge Field Office 1-888-ICC-SAFE, ext 7708 FAX: 419/ 730-6531 btubbs@iccsafe.org	Ed Wirtschoreck ICC Chicago District Office 1-888-ICC-SAFE, ext 4317 FAX: 708/799-0320 ewirtschoreck@iccsafe.org	Larry Franks/ Allan Bilka ICC Birmingham District Office 1-888-ICC-SAFE, ext 5279 FAX: 205/592-7001 lfranks@iccsafe.org abilka@iccsafe.org	Gregg Gress ICC Chicago District Office 1-888-ICC-SAFE, ext 4343 FAX: 708/799-0320 ggress@iccsafe.org	Fred Grable ICC Chicago District Office 1-888-ICC-SAFE, ext 4359 FAX: 708/799-0320 fgrable@iccsafe.org
ISPSC	IWUIC	IZC		
Fred Grable ICC Chicago District Office 1-888-ICC-SAFE, ext 4359 FAX: 708/799-0320 fgrable@iccsafe.org	Bill Rehr ICC Chicago District Office 1-888-ICC-SAFE, ext 4342 FAX: 708/799-0320 brehre@iccsafe.org	Ed Wirtschoreck ICC Chicago District Office 1-888-ICC-SAFE, ext 4317 FAX: 708/799-0320 ewirtschoreck@iccsafe.org		

2012 - 2014 STAFF SECRETARIES (continued)

GROUP C (2014)

IgCC-General	IgCC-Energy/Water
Allan Bilka ICC Chicago District Office 1-888-ICC-SAFE, ext 4326 FAX: 708/799-0320 abilka@iccsafe.org	Fred Grable ICC Chicago District Office 1-888-ICC-SAFE, ext 4359 FAX: 708/799-0320 fgrable@iccsafe.org

cdp ACCESS Update

During the December/2012 winter meeting, the International Code Council Board of Directors approved the cdp ACCESS Steering Committee's final recommendations. The Board authorized staff to proceed with the initiative to increase participation in ICC's core function: Code Development.

The cdp ACCESS Steering Committee's final recommendations outline several key elements for expanding participation in the ICC Code Development Process, including:

- Online collaboration for stakeholders in the development of Code Change and Public Comment submittals as well as collaboration in preparation for participating at hearings.
- Online submittal of Code Change and Public Comment submittals utilizing a database of current I-Code text to facilitate the process.
- Establishing a two-week period following the Committee Action Hearing for online voting on assembly motions by all ICC Members. Successful assembly motions will continue to result in an automatic public comment. Committee recommendations remain as the initial motion for the Public Comment Hearing.
- Establishing a two-week period following the Public Comment Hearing for online voting by Governmental Members based on the actions that occurred on the Individual Consideration Agenda at the Public Comment Hearing. The online voting ballot will include the results from the Public Comment Hearing and access to video and other content of record from the hearing. The results will be added to the vote count from the Public Comment Hearing to determine the final disposition of the code change.

A flow chart has been created to illustrate the new process – see page xiii

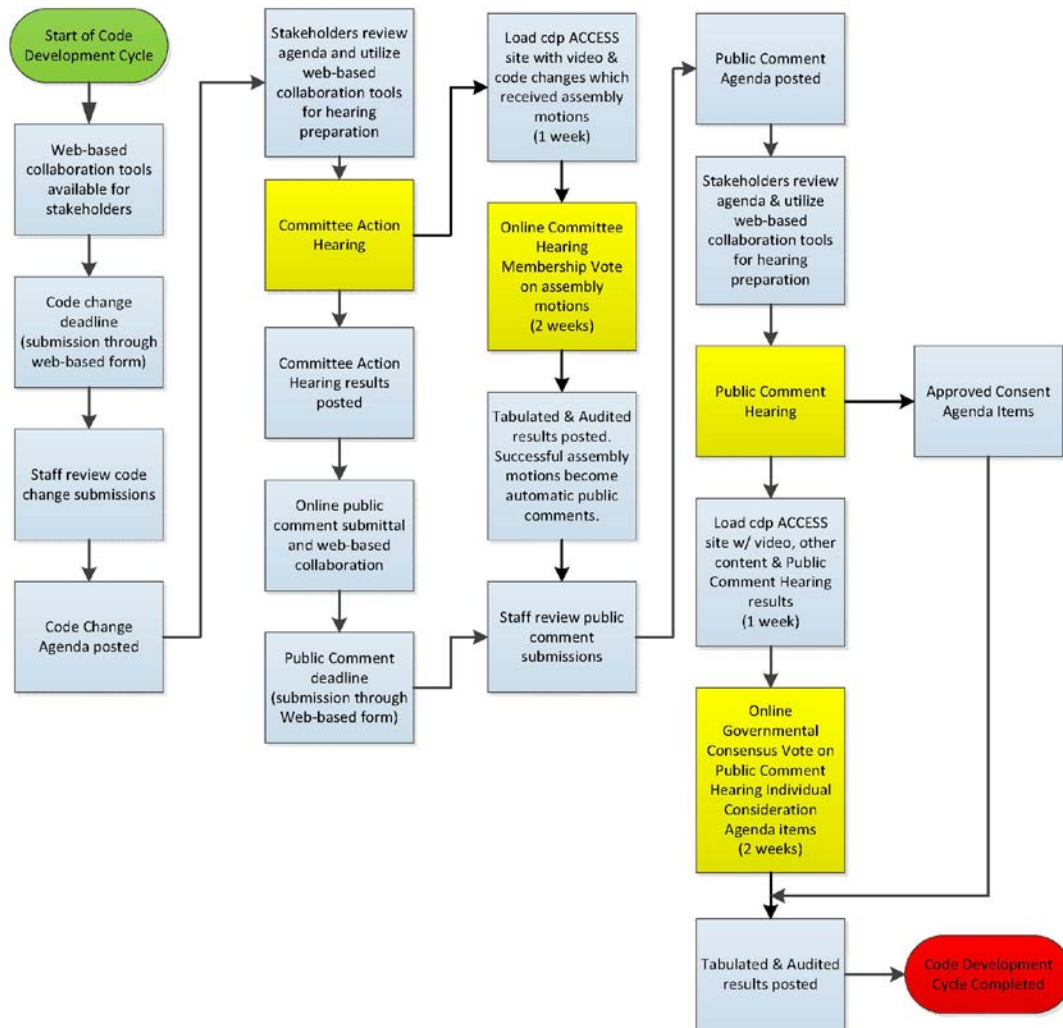
As outlined in the Steering Committee's reports, the required registration periods for in-person and online voting participants will be increased, and the new system will use state-of-the-art security technology to help preserve the integrity of ICC's governmental consensus Code Development Process. The in-person and online voting processes will maintain compliance with federal guidelines for consensus and accessibility.

Several steps will be taken over the next few months to prepare for testing online voting on a handful of code changes in October at the Public Comment Hearings, formerly called Final Action Hearings, in Atlantic City. Testing also will include submitting code changes and public comments online as well as collaboration tools. The 2014 cycle for the development of the 2015 *International Green Construction Code* will use the new cdp ACCESS online and in-person process. We anticipate that the system will go live on November 15, 2013 to support the 2014 cycle. cdp ACCESS will be online in 2015 for development of all the 2018 I-Codes

For additional information on cdp ACCESS, be sure to visit the website at:

<http://www.iccsafe.org/cs/cdpACCESS/Pages/default.aspx>

cdp ACCESS Flow Chart





CP# 28-05 CODE DEVELOPMENT

Approved: 9/24/05

Revised: 12/6/12

CP # 28-05 is an update to ICC's *Code Development Process for the International Codes* dated May 15, 2004.

1.0 Introduction

- 1.1 **Purpose:** The purpose of this Council Policy is to prescribe the Rules of Procedure utilized in the continued development and maintenance of the International Codes (Codes).
- 1.2 **Objectives:** The ICC Code Development Process has the following objectives:
 - 1.2.1 The timely evaluation and recognition of technological developments pertaining to construction regulations.
 - 1.2.2 The open discussion of proposals by all parties desiring to participate.
 - 1.2.3 The final determination of Code text by public officials actively engaged in the administration, formulation or enforcement of laws, ordinances, rules or regulations relating to the public health, safety and welfare and by honorary members.
- 1.3 **Code Publication:** The ICC Board of Directors (ICC Board) shall determine the title and the general purpose and scope of each Code published by the ICC.
 - 1.3.1 **Code Correlation:** The provisions of all Codes shall be consistent with one another so that conflicts between the Codes do not occur. Where a given subject matter or code text could appear in more than one Code, the ICC Board shall determine which Code shall be the primary document, and therefore which code development committee shall be responsible for review and maintenance of the code text. Duplication of content or text between Codes shall be limited to the minimum extent necessary for practical usability of the Codes, as determined in accordance with Section 4.4.
- 1.4 **Process Maintenance:** The review and maintenance of the Code Development Process and these Rules of Procedure shall be by the ICC Board. The manner in which ICC codes are developed embodies core principles of the organization. One of those principles is that the final content of ICC codes is determined by a majority vote of the governmental and honorary members. It is the policy of the Board that there shall be no change to this principle without the affirmation of two-thirds of the governmental and honorary members responding.
- 1.5 **Secretariat:** The Chief Executive Officer shall assign a Secretariat for each of the Codes. All correspondence relating to code change proposals and public comments shall be addressed to the Secretariat.
- 1.6 **Recording:** Individuals requesting permission to record any meeting or hearing, or portion thereof, shall be required to provide the ICC with a release of responsibility disclaimer and shall acknowledge that ICC shall retain sole ownership of the recording, and that they have insurance coverage for liability and misuse of recording materials. Equipment and the process used to record shall, in the judgment of the ICC Secretariat, be conducted in a manner that is not disruptive to the meeting. The ICC shall not be responsible for equipment, personnel or any other provision necessary to accomplish the videotaping. An unedited copy of the recording shall be forwarded to ICC within 30 days of the meeting. Recordings shall not otherwise be copied, reproduced or distributed in any manner. Recordings shall be returned to ICC or destroyed upon the request of ICC.

2.0 Code Development Cycle

- 2.1 **Intent:** The code development cycle shall consist of the complete consideration of code change proposals in accordance with the procedures herein specified, commencing with the deadline for submission of code change proposals (see Section 3.5) and ending with publication of final action on the code change proposals (see Section 7.6).
- 2.2 **New Editions:** The ICC Board shall determine the schedule for publishing new editions of the Codes. Each new edition shall incorporate the results of the code development activity since the last edition.
- 2.3 **Supplements:** The results of code development activity between editions may be published.
- 2.4 **Emergency Action Procedures:**
 - 2.4.1 **Scope:** Emergency actions are limited to those issues representing an immediate threat to health and safety that warrant a more timely response than allowed by the Code Development Process schedule.
 - 2.4.2 **Initial Request:** A request for an emergency action shall be based upon perceived threats to health and safety and shall be reviewed by the ICC Codes and Standards Council for referral to the Board of Directors for action with their analysis and recommendation.
 - 2.4.3 **Board and Member Action:** In the event that the ICC Board determines that an emergency amendment to any Code or supplement thereto is warranted, the same may be adopted by the ICC Board. Such action shall require an affirmative vote of at least two-thirds of the ICC Board.

The ICC membership shall be notified within ten days after the ICC Boards' official action of any emergency amendment. At the next Annual Business Meeting, any emergency amendment shall be presented to the members for ratification by a majority of the ICC Governmental Member Representatives and Honorary Members present and voting.

All code revisions pursuant to these emergency procedures and the reasons for such corrective action shall be published as soon as practicable after ICC Board action. Such revisions shall be identified as an emergency amendment.

Emergency amendments to any Code shall not be considered as a retro-active requirement to the Code. Incorporation of the emergency amendment into the adopted Code shall be subjected to the process established by the adopting authority.

3.0 Submittal of Code Change Proposals

- 3.1 **Intent:** Any interested person, persons or group may submit a code change proposal which will be duly considered when in conformance to these Rules of Procedure.
- 3.2 **Withdrawal of Proposal:** A code change proposal may be withdrawn by the proponent (WP) at any time prior to Final Action Consideration of that proposal. A withdrawn code change proposal shall not be subject to a public hearing, motions, or Final Action Consideration.
- 3.3 **Form and Content of Code Change Submittals:** Each code change proposal shall be submitted separately and shall be complete in itself. Each submittal shall contain the following information:
 - 3.3.1 **Proponent:** Each code change proposal shall include the name, title, mailing address, telephone number, and email address of the proponent. Email addresses shall be published with the code change proposals unless the proponent otherwise requests on the submittal form.
 - 3.3.1.1 If a group, organization or committee submits a code change proposal, an individual with prime responsibility shall be indicated.
 - 3.3.1.2 If a proponent submits a code change on behalf of a client, group, organization or committee, the name and mailing address of the client, group, organization or committee shall be indicated.

- 3.3.2 Code Reference:** Each code change proposal shall relate to the applicable code sections(s) in the latest edition of the Code.
- 3.3.2.1** If more than one section in the Code is affected by a code change proposal, appropriate proposals shall be included for all such affected sections.
- 3.3.2.2** If more than one Code is affected by a code change proposal, appropriate proposals shall be included for all such affected Codes and appropriate cross referencing shall be included in the supporting information.
- 3.3.3 Multiple code change proposals to a code section.** A proponent shall not submit multiple code change proposals to the same code section. When a proponent submits multiple code change proposals to the same section, the proposals shall be considered as incomplete proposals and processed in accordance with Section 4.3. This restriction shall not apply to code change proposals that attempt to address differing subject matter within a code section.
- 3.3.4 Text Presentation:** The text proposal shall be presented in the specific wording desired with deletions shown struck out with a single line and additions shown underlined with a single line.
- 3.3.4.1** A charging statement shall indicate the referenced code section(s) and whether the proposal is intended to be an addition, a deletion or a revision to existing Code text.
- 3.3.4.2** Whenever practical, the existing wording of the text shall be preserved with only such deletions and additions as necessary to accomplish the desired change.
- 3.3.4.3** Each proposal shall be in proper code format and terminology.
- 3.3.4.4** Each proposal shall be complete and specific in the text to eliminate unnecessary confusion or misinterpretation.
- 3.3.4.5** The proposed text shall be in mandatory terms.
- 3.3.5 Supporting Information:** Each code change proposal shall include sufficient supporting information to indicate how the proposal is intended to affect the intent and application of the Code.
- 3.3.5.1 Purpose:** The proponent shall clearly state the purpose of the proposed code change (e.g. clarify the Code; revise outdated material; substitute new or revised material for current provisions of the Code; add new requirements to the Code; delete current requirements, etc.)
- 3.3.5.2 Reasons:** The proponent shall justify changing the current Code provisions, stating why the proposal is superior to the current provisions of the Code. Proposals which add or delete requirements shall be supported by a logical explanation which clearly shows why the current Code provisions are inadequate or overly restrictive, specifies the shortcomings of the current Code provisions and explains how such proposals will improve the Code.
- 3.3.5.3 Substantiation:** The proponent shall substantiate the proposed code change based on technical information and substantiation. Substantiation provided which is reviewed in accordance with Section 4.2 and determined as not germane to the technical issues addressed in the proposed code change may be identified as such. The proponent shall be notified that the proposal is considered an incomplete proposal in accordance with Section 4.3 and the proposal shall be held until the deficiencies are corrected. The proponent shall have the right to appeal this action in accordance with the policy of the ICC Board. The burden of providing substantiating material lies with the proponent of the code change proposal. All substantiating material published by ICC is material that has been provided by the proponent and in so publishing ICC makes no representations or warranties about its quality or accuracy.
- 3.3.5.4 Bibliography:** The proponent shall submit a bibliography of any substantiating material submitted with the code change proposal. The bibliography shall be published with the code change and the proponent shall make the substantiating materials available for review at the appropriate ICC office and during the public hearing.

3.3.5.5 Copyright Release: The proponent of code change proposals, floor modifications and public comments shall sign a copyright release reading: "I hereby grant and assign to ICC all rights in copyright I may have in any authorship contributions I make to ICC in connection with any proposal and public comment, in its original form submitted or revised form, including written and verbal modifications submitted in accordance Section 5.5.2. I understand that I will have no rights in any ICC publications that use such contributions in the form submitted by me or another similar form and certify that such contributions are not protected by the copyright of any other person or entity."

3.3.5.6 Cost Impact: The proponent shall indicate one of the following regarding the cost impact of the code change proposal: 1) the code change proposal will increase the cost of construction; or 2) the code change proposal will not increase the cost of construction. The proponent should submit information to support either assertion. Any such information will be considered by the code development committee. This information will be included in the bibliography of the published code change proposal.

3.4 Number: One copy of each code change proposal, two copies of each proposed new referenced standard and one copy of all substantiating information shall be submitted. Additional copies may be requested when determined necessary by the Secretariat to allow such information to be distributed to the code development committee. Where such additional copies are requested, it shall be the responsibility of the proponent to send such copies to the respective code development committee. A copy of the code change proposal in electronic form is preferred.

3.5 Submittal Deadline: Each code change proposal shall be received at the office of the Secretariat by the posted deadline. Such posting shall occur no later than 120 days prior to the code change deadline. The submitter of a proposed code change is responsible for the proper and timely receipt of all pertinent materials by the Secretariat.

3.6 Referenced Standards: In order for a standard to be considered for reference or to continue to be referenced by the Codes, a standard shall meet the following criteria:

3.6.1 Code References:

3.6.1.1 The standard, including title and date, and the manner in which it is to be utilized shall be specifically referenced in the Code text.

3.6.1.2 The need for the standard to be referenced shall be established.

3.6.2 Standard Content:

3.6.2.1 A standard or portions of a standard intended to be enforced shall be written in mandatory language.

3.6.2.2 The standard shall be appropriate for the subject covered.

3.6.2.3 All terms shall be defined when they deviate from an ordinarily accepted meaning or a dictionary definition.

3.6.2.4 The scope or application of a standard shall be clearly described.

3.6.2.5 The standard shall not have the effect of requiring proprietary materials.

3.6.2.6 The standard shall not prescribe a proprietary agency for quality control or testing.

3.6.2.7 The test standard shall describe, in detail, preparation of the test sample, sample selection or both.

3.6.2.8 The test standard shall prescribe the reporting format for the test results. The format shall identify the key performance criteria for the element(s) tested.

3.6.2.9 The measure of performance for which the test is conducted shall be clearly defined in either the test standard or in Code text.

3.6.2.10 The standard shall not state that its provisions shall govern whenever the referenced standard is in conflict with the requirements of the referencing Code.

3.6.2.11 The preface to the standard shall announce that the standard is promulgated according to a consensus procedure.

3.6.3 Standard Promulgation:

- 3.6.3.1** Code change proposals with corresponding changes to the code text which include a reference to a proposed new standard or a proposed update of an existing referenced shall comply with this section. The standard shall be completed and readily available prior to Final Action Consideration based on the cycle of code development which includes the proposed code change proposal. In order for a new standard to be considered for reference by the Code, such standard shall be submitted in at least a consensus draft form in accordance with Section 3.4. If a new standard is not submitted in at least draft form, the code change shall be considered incomplete and shall not be processed. Updating of standards without corresponding code text changes shall be accomplished administratively in accordance with Section 4.5.
- 3.6.3.2** The standard shall be developed and maintained through a consensus process such as ASTM or ANSI.

4.0 Processing of Proposals

- 4.1 Intent:** The processing of code change proposals is intended to ensure that each proposal complies with these Rules of Procedure and that the resulting published proposal accurately reflects that proponent's intent.
- 4.2 Review:** Upon receipt in the Secretariat's office, the code change proposals will be checked for compliance with these Rules of Procedure as to division, separation, number of copies, form, language, terminology, supporting statements and substantiating data. Where a code change proposal consists of multiple parts which fall under the maintenance responsibilities of different code committees, the Secretariat shall determine the code committee responsible for determining the committee action in accordance with Section 5.6.
- 4.3 Incomplete Proposals:** When a code change proposal is submitted with incorrect format, without the required information or judged as not in compliance with these Rules of Procedure, the Secretariat shall notify the proponent of the specific deficiencies and the proposal shall be held until the deficiencies are corrected, with a final date set for receipt of a corrected submittal. If the Secretariat receives the corrected proposal after the final date, the proposal shall be held over until the next code development cycle. Where there are otherwise no deficiencies addressed by this section, a proposal that incorporates a new referenced standard shall be processed with an analysis of referenced standard's compliance with the criteria set forth in Section 3.6.
- 4.4 Editorial:** The Chief Executive Officer shall have the authority at all times to make editorial and format changes to the Code text, or any approved changes, consistent with the intent, provisions and style of the Code. An editorial or format change is a text change that does not affect the scope or application of the code requirements.
- 4.5 Updating Standards:**
 - 4.5.1 Standards referenced in the I-Codes:** The updating of standards referenced by the Codes shall be accomplished administratively by the Administrative code development committee in accordance with these full procedures except that the deadline for availability of the updated standard and receipt by the Secretariat shall be December 1 of the third year of each code cycle. The published version of the new edition of the Code which references the standard will refer to the updated edition of the standard. If the standard is not available by the deadline, the edition of the standard as referenced by the newly published Code shall revert back to the reference contained in the previous edition and an errata to the Code issued Multiple standards to be updated may be included in a single proposal.
- 4.6 Preparation:** All code change proposals in compliance with these procedures shall be prepared in a standard manner by the Secretariat and be assigned separate, distinct and consecutive numbers. The Secretariat shall coordinate related proposals submitted in accordance with Section 3.3.2 to facilitate the hearing process.
- 4.7 Publication:** All code change proposals shall be posted on the ICC website at least 30 days prior to the public hearing on those proposals and shall constitute the agenda for the public hearing. Code change proposals which have not been published shall not be considered.

5.0 Public Hearing

- 5.1 Intent:** The intent of the public hearing is to permit interested parties to present their views including the cost and benefits on the code change proposals on the published agenda. The code development committee will consider such comments as may be presented in the development of their action on the disposition of such proposals. At the conclusion of the code development committee deliberations, the committee action on each code change proposal shall be placed before the hearing assembly for consideration in accordance with Section 5.7.
- 5.2 Committee:** The Code Development Committees shall be appointed by the Board of Directors.
- 5.2.1 Chairman/Moderator:** The Chairman and Vice-Chairman shall be appointed by the Steering Committee on Councils from the appointed members of the committee. The ICC President shall appoint one or more Moderators who shall act as presiding officer for the public hearing.
- 5.2.2 Conflict of Interest:** A committee member shall withdraw from and take no part in those matters with which the committee member has an undisclosed financial, business or property interest. The committee member shall not participate in any committee discussion or any committee vote on the matter in which they have an undisclosed interest. A committee member who is a proponent of a proposal shall not participate in any committee discussion on the matter or any committee vote. Such committee member shall be permitted to participate in the floor discussion in accordance with Section 5.5 by stepping down from the dais.
- 5.2.3 Representation of Interest:** Committee members shall not represent themselves as official or unofficial representatives of the ICC except at regularly convened meetings of the committee.
- 5.2.4 Committee Composition:** The committee may consist of representation from multiple interests. A minimum of thirty-three and one-third percent (33.3%) of the committee members shall be regulators.
- 5.3 Date and Location:** The date and location of each public hearing shall be announced not less than 60 days prior to the date of the public hearing.
- 5.4 General Procedures:** *The Robert's Rules of Order* shall be the formal procedure for the conduct of the public hearing except as a specific provision of these Rules of Procedure may otherwise dictate. A quorum shall consist of a majority of the voting members of the committee.
- 5.4.1 Chair Voting:** The Chairman of the committee shall vote only when the vote cast will break a tie vote of the committee.
- 5.4.2 Open Meetings:** Public hearings of the Code Development Committees are open meetings. Any interested person may attend and participate in the Floor Discussion and Assembly Consideration portions of the hearing. Only eligible voters (see Section 5.7.4) are permitted to vote on Assembly Considerations. Only Code Development Committee members may participate in the Committee Action portion of the hearings (see Section 5.6). Participants shall not advocate a position on specific code changes with Committee Members other than through the methods provided in this policy.
- 5.4.3 Presentation of Material at the Public Hearing:** Information to be provided at the hearing shall be limited to verbal presentations and modifications submitted in accordance with Section 5.5.2. Each individual presenting information at the hearing shall state their name and affiliation, and shall identify any entities or individuals they are representing in connection with their testimony. Audio-visual presentations are not permitted. Substantiating material submitted in accordance with Section 3.3.4.4 and other material submitted in response to a code change proposal shall be located in a designated area in the hearing room and shall not be distributed to the code development committee at the public hearing.
- 5.4.4 Agenda Order:** The Secretariat shall publish an agenda for each public hearing, placing individual code change proposals in a logical order to facilitate the hearing. Any public hearing attendee may move to revise the agenda order as the first order of business at the public

hearing, or at any time during the hearing except while another proposal is being discussed. Preference shall be given to grouping like subjects together, and for moving items back to a later position on the agenda as opposed to moving items forward to an earlier position. A motion to revise the agenda order is subject to a 2/3 vote of those present and voting.

5.4.5 Reconsideration: There shall be no reconsideration of a proposed code change after it has been voted on by the committee in accordance with Section 5.6; or, in the case of assembly consideration, there shall be no reconsideration of a proposed code change after it has been voted on by the assembly in accordance with Section 5.7.

5.4.6 Time Limits: Time limits shall be established as part of the agenda for testimony on all proposed changes at the beginning of each hearing session. Each person requesting to testify on a change shall be given equal time. In the interest of time and fairness to all hearing participants, the Moderator shall have limited authority to modify time limitations on debate. The Moderator shall have the authority to adjust time limits as necessary in order to complete the hearing agenda.

5.4.6.1 Time Keeping: Keeping of time for testimony by an individual shall be by an automatic timing device. Remaining time shall be evident to the person testifying. Interruptions during testimony shall not be tolerated. The Moderator shall maintain appropriate decorum during all testimony.

5.4.6.2 Proponent Testimony: The Proponent is permitted to waive an initial statement. The Proponent shall be permitted to have the amount of time that would have been allocated during the initial testimony period plus the amount of time that would be allocated for rebuttal. Where the code change proposal is submitted by multiple proponents, this provision shall permit only one proponent of the joint submittal to be allotted additional time for rebuttal.

5.4.7 Points of Order: Any person participating in the public hearing may challenge a procedural ruling of the Moderator or the Chairman. A majority vote of the eligible voters as determined in Section 5.7.4 shall determine the decision.

5.5 Floor Discussion: The Moderator shall place each code change proposal before the hearing for discussion by identifying the proposal and by regulating discussion as follows:

5.5.1 Discussion Order:

1. *Proponents.* The Moderator shall begin by asking the proponent and then others in support of the proposal for their comments.
2. *Opponents.* After discussion by those in support of a proposal, those opposed hereto, if any, shall have the opportunity to present their views.
3. *Rebuttal in support.* Proponents shall then have the opportunity to rebut points raised by the opponents.
4. *Rerebuttal in opposition.* Opponents shall then have the opportunity to respond to the proponent's rebuttal.

5.5.2 Modifications: Modifications to proposals may be suggested from the floor by any person participating in the public hearing. The person proposing the modification is deemed to be the proponent of the modification.

5.5.2.1 Submission and Written Copies. All modifications must be written, unless determined by the Chairman to be either editorial or minor in nature. The modification proponent shall provide 20 copies to the Secretariat for distribution to the committee.

5.5.2.2 Criteria. The Chairman shall rule proposed modifications in or out of order before they are discussed on the floor. A proposed modification shall be ruled out of order if it:

1. is not legible, unless not required to be written in accordance with Section

- 5.5.2.1; or
2. changes the scope of the original proposal; or
3. is not readily understood to allow a proper assessment of its impact on the original proposal or the code.

The ruling of the Chairman on whether or not the modification is in or out of order shall be final and is not subject to a point of order in accordance with Section 5.4.7.

5.5.2.3 Testimony. When a modification is offered from the floor and ruled in order by the Chairman, a specific floor discussion on that modification is to commence in accordance with the procedures listed in Section 5.5.1.

5.6 Committee Action: Following the floor discussion of each code change proposal, one of the following motions shall be made and seconded by members of the committee.

1. Approve the code change proposal as submitted (AS) or
2. Approve the code change proposal as modified with specific modifications (AM), or
3. Disapprove the code change proposal (D)

Discussion on this motion shall be limited to Code Development Committee members. If a committee member proposes a modification which had not been proposed during floor discussion, the Chairman shall rule on the modification in accordance with Section 5.5.2.2 If a committee member raises a matter of issue, including a proposed modification, which has not been proposed or discussed during the floor discussion, the Moderator shall suspend the committee discussion and shall reopen the floor discussion for comments on the specific matter or issue. Upon receipt of all comments from the floor, the Moderator shall resume committee discussion.

The Code Development Committee shall vote on each motion with the majority dictating the committee's action. Committee action on each code change proposal shall be completed when one of the motions noted above has been approved. Each committee vote shall be supported by a reason.

The Code Development Committee shall maintain a record of its proceedings including the action on each code change proposal.

5.7 Assembly Consideration: At the conclusion of the committee's action on a code change proposal and before the next code change proposal is called to the floor, the Moderator shall ask for a motion from the public hearing attendees who may object to the committee's action. If a motion in accordance with Section 5.7.1 is not brought forward on the committee's action, the results of the public hearing shall be established by the committee's action. If a motion in accordance with Section 5.7.1 is brought forward and is sustained in accordance with Section 5.7.3, both the committee's action and the assemblies' action shall be reported as the results of the public hearing.

5.7.1 Floor Motion: Any attendee may raise an objection to the committee's action in which case the attendee will be able to make a motion to:

1. Approve the code change proposal as submitted from the floor (ASF), or
2. Approve the code change proposal as modified from the floor (AMF) with a specific modification that has been previously offered from the floor and ruled in order by the Chairman during floor discussion (see Section 5.5.2) or has been offered by a member of the Committee and ruled in order by the Chairman during committee discussion (see Section 5.6), or
3. Disapprove the code change proposal from the floor (DF).

5.7.2 Discussion: On receipt of a second to the floor motion, the Moderator shall place the motion before the assembly for a vote. No additional testimony shall be permitted.

5.7.3 Assembly Action: A successful assembly action shall be a majority vote of the votes cast by eligible voters (See 5.7.4).

5.7.4 Eligible Voters: All members of ICC in attendance at the public hearing shall be eligible to vote on floor motions. Each member is entitled to one vote, except that each Governmental Member

Voting Representative in attendance may vote on behalf of its Governmental Member. Code Development Committee members shall be eligible to vote on floor motions. Application, whether new or updated, for ICC membership must be received by the Code Council ten days prior to the commencement of the first day of the public hearing.

- 5.8 Report of the Public Hearing:** The results of the public hearing, including committee action and successful assembly action, shall be posted on the ICC website not less than 60 days prior to Final Action Consideration except as approved by the ICC Board.

6.0 Public Comments

- 6.1 Intent:** The public comment process gives attendees at the Final Action Hearing an opportunity to consider specific objections to the results of the public hearing and more thoughtfully prepare for the discussion for Final Action Consideration. The public comment process expedites the Final Action Consideration at the Final Action Hearing by limiting the items discussed to the following:

- 6.1.1** Consideration of items for which a public comment has been submitted; and
- 6.1.2** Consideration of items which received a successful assembly action at the public hearing.

- 6.2 Deadline:** The deadline for receipt of a public comment to the results of the public hearing shall be announced at the public hearing but shall not be less than 30 days from the availability of the report of the results of the public hearing (see Section 5.8).

- 6.3 Withdrawal of Public Comment:** A public comment may be withdrawn by the public commenter at any time prior to Final Action Consideration of that comment. A withdrawn public comment shall not be subject to Final Action Consideration. If the only public comment to a code change proposal is withdrawn by the public commenter prior to the vote on the consent agenda in accordance with Section 7.3.4, the proposal shall be considered as part of the consent agenda. If the only public comment to a code change proposal is withdrawn by the public commenter after the vote on the consent agenda in accordance with Section 7.3.4, the proposal shall continue as part of the individual consent agenda in accordance with Section 7.3.5, however the public comment shall not be subject to Final Action Consideration.

- 6.4 Form and Content of Public Comments:** Any interested person, persons, or group may submit a public comment to the results of the public hearing which will be considered when in conformance to these requirements. Each public comment to a code change proposal shall be submitted separately and shall be complete in itself. Each public comment shall contain the following information:

- 6.4.1 Public comment:** Each public comment shall include the name, title, mailing address, telephone number and email address of the public commenter. Email addresses shall be published with the public comments unless the commenter otherwise requests on submittal form.

If group, organization, or committee submits a public comment, an individual with prime responsibility shall be indicated. If a public comment is submitted on behalf a client, group, organization or committee, the name and mailing address of the client, group, organization or committee shall be indicated. The scope of the public comment shall be consistent with the scope of the original code change proposal, committee action or successful assembly action. Public comments which are determined as not within the scope of the code change proposal, committee action or successful assembly action shall be identified as such. The public commenter shall be notified that the public comment is considered an incomplete public comment in accordance with Section 6.5.1 and the public comment shall be held until the deficiencies are corrected. A copyright release in accordance with Section 3.3.4.5 shall be provided with the public comment.

- 6.4.2 Code Reference:** Each public comment shall include the code change proposal number and the results of the public hearing, including successful assembly actions, on the code change proposal to which the public comment is directed.

- 6.4.3 Multiple public comments to a code change proposal.** A proponent shall not submit multiple public comments to the same code change proposal. When a proponent submits multiple

public comments to the same code change proposal, the public comments shall be considered as incomplete public comments and processed in accordance with Section 6.5.1. This restriction shall not apply to public comments that attempt to address differing subject matter within a code section.

6.4.4 Desired Final Action: The public comment shall indicate the desired final action as one of the following:

1. Approve the code change proposal as submitted (AS), or
2. Approve the code change proposal as modified (AM) by one or more specific modifications published in the Results of the Public Hearing or published in a public comment, or
3. Disapprove the code change proposal (D)

6.4.5 Supporting Information: The public comment shall include in a statement containing a reason and justification for the desired final action on the code change proposal. Reasons and justification which are reviewed in accordance with Section 6.4 and determined as not germane to the technical issues addressed in the code change proposal or committee action may be identified as such. The public commenter shall be notified that the public comment is considered an incomplete public comment in accordance with Section 6.5.1 and the public comment shall be held until the deficiencies are corrected. The public commenter shall have the right to appeal this action in accordance with the policy of the ICC Board. A bibliography of any substantiating material submitted with a public comment shall be published with the public comment and the substantiating material shall be made available at the Final Action Hearing. All substantiating material published by ICC is material that has been provided by the proponent and in so publishing ICC makes no representations or warranties about its quality or accuracy.

6.4.6 Number: One copy of each public comment and one copy of all substantiating information shall be submitted. Additional copies may be requested when determined necessary by the Secretariat. A copy of the public comment in electronic form is preferred.

6.5 Review: The Secretariat shall be responsible for reviewing all submitted public comments from an editorial and technical viewpoint similar to the review of code change proposals (See Section 4.2).

6.5.1 Incomplete Public Comment: When a public comment is submitted with incorrect format, without the required information or judged as not in compliance with these Rules of Procedure, the public comment shall not be processed. The Secretariat shall notify the public commenter of the specific deficiencies and the public comment shall be held until the deficiencies are corrected, or the public comment shall be returned to the public commenter with instructions to correct the deficiencies with a final date set for receipt of the corrected public comment.

6.5.2 Duplications: On receipt of duplicate or parallel public comments, the Secretariat may consolidate such public comments for Final Action Consideration. Each public commenter shall be notified of this action when it occurs.

6.5.3 Deadline: Public comments received by the Secretariat after the deadline set for receipt shall not be published and shall not be considered as part of the Final Action Consideration.

6.6 Publication: The public hearing results on code change proposals that have not been public commented and the code change proposals with public commented public hearing results and successful assembly actions shall constitute the Final Action Agenda. The Final Action Agenda shall be posted on the ICC website at least 30 days prior to Final Action consideration.

7.0 Final Action Consideration

7.1 Intent: The purpose of Final Action Consideration is to make a final determination of all code change proposals which have been considered in a code development cycle by a vote cast by eligible voters (see Section 7.4).

7.2 Agenda: The final action consent agenda shall be comprised of proposals which have neither an assembly action nor public comment. The agenda for public testimony and individual consideration shall be comprised of proposals which have a successful assembly action or public comment (see Sections

5.7 and 6.0).

7.3 Procedure: *The Robert's Rules of Order* shall be the formal procedure for the conduct of the Final Action Consideration except as these Rules of Procedure may otherwise dictate.

7.3.1 Open Meetings: Public hearings for Final Action Consideration are open meetings. Any interested person may attend and participate in the Floor Discussion.

7.3.2 Agenda Order: The Secretariat shall publish an agenda for Final Action Consideration, placing individual code change proposals and public comments in a logical order to facilitate the hearing. The proponents or opponents of any proposal or public comment may move to revise the agenda order as the first order of business at the public hearing, or at any time during the hearing except while another proposal is being discussed. Preference shall be given to grouping like subjects together and for moving items back to a later position on the agenda as opposed to moving items forward to an earlier position. A motion to revise the agenda order is subject to a 2/3 vote of those present and voting.

7.3.3 Presentation of Material at the Public Hearing: Information to be provided at the hearing shall be limited to verbal presentations. Each individual presenting information at the hearing shall state their name and affiliation, and shall identify any entities or individuals they are representing in connection with their testimony. Audio-visual presentations are not permitted. Substantiating material submitted in accordance with Section 6.4.4 and other material submitted in response to a code change proposal or public comment shall be located in a designated area in the hearing room.

7.3.4 Final Action Consent Agenda: The final action consent agenda (see Section 7.2) shall be placed before the assembly with a single motion for final action in accordance with the results of the public hearing. When the motion has been seconded, the vote shall be taken with no testimony being allowed. A simple majority (50% plus one) based on the number of votes cast by eligible voters shall decide the motion.

7.3.5 Individual Consideration Agenda: Upon completion of the final action consent vote, all proposed changes not on the final action consent agenda shall be placed before the assembly for individual consideration of each item (see Section 7.2).

7.3.6 Reconsideration: There shall be no reconsideration of a proposed code change after it has been voted on in accordance with Section 7.3.8.

7.3.7 Time Limits: Time limits shall be established as part of the agenda for testimony on all proposed changes at the beginning of each hearing session. Each person requesting to testify on a change shall be given equal time. In the interest of time and fairness to all hearing participants, the Moderator shall have limited authority to modify time limitations on debate. The Moderator shall have the authority to adjust time limits as necessary in order to complete the hearing agenda.

7.3.7.1 Time Keeping: Keeping of time for testimony by an individual shall be by an automatic timing device. Remaining time shall be evident to the person testifying. Interruptions during testimony shall not be tolerated. The Moderator shall maintain appropriate decorum during all testimony.

7.3.8 Discussion and Voting: Discussion and voting on proposals being individually considered shall be in accordance with the following procedures:

7.3.8.1 Allowable Final Action Motions: The only allowable motions for final action are Approval as Submitted, Approval as Modified by one or more modifications published in the Final Action Agenda, and Disapproval.

7.3.8.2 Initial Motion: The Code Development Committee action shall be the initial motion considered.

7.3.8.3 Motions for Modifications: Whenever a motion under consideration is for Approval as Submitted or Approval as Modified, a subsequent motion and second

for a modification published in the Final Action Agenda may be made (see Section 6.4.3). Each subsequent motion for modification, if any, shall be individually discussed and voted before returning to the main motion. A two-thirds majority based on the number of votes cast by eligible voters shall be required for a successful motion on all modifications.

7.3.8.4 Voting: After dispensing with all motions for modifications, if any, and upon completion of discussion on the main motion, the Moderator shall then ask for the vote on the main motion. If the motion fails to receive the majority required in Section 7.5, the Moderator shall ask for a new motion.

7.3.8.5 Subsequent Motion: If the initial motion is unsuccessful, a motion for one of the other allowable final actions shall be made (see Section 7.3.8.1) and dispensed with until a successful final action is achieved. If a successful final action is not achieved, Section 7.5.1 shall apply.

7.3.9 Proponent testimony: The Proponent of a public comment is permitted to waive an initial statement. The Proponent of the public comment shall be permitted to have the amount of time that would have been allocated during the initial testimony period plus the amount of time that would be allocated for rebuttal. Where a public comment is submitted by multiple proponents, this provision shall permit only one proponent of the joint submittal to waive an initial statement.

7.3.10 Points of Order: Any person participating in the public hearing may challenge a procedural ruling of the Moderator. A majority vote of the eligible voters as determined in Section 5.7.4 shall determine the decision.

7.4 Eligible voters: ICC Governmental Member Representatives and Honorary Members in attendance at the Final Action Hearing shall have one vote per eligible attendee on all International Codes. Applications for Governmental Membership must be received by the ICC by April 1 of the applicable year in order for its designated representatives to be eligible to vote at the Final Action Hearing. Applications, whether new or updated, for governmental member voting representative status must be received by the Code Council thirty (30) days prior to the commencement of the first day of the Final Action Hearing in order for any designated representative to be eligible to vote. An individual designated as a Governmental Member Voting Representative shall provide sufficient information to establish eligibility as defined in the ICC Bylaws. The Executive Committee of the ICC Board, in its discretion, shall have the authority to address questions related to eligibility. Decisions of the Executive Committee shall be final and not appealable pursuant to CP 1, other than claims of fraud or misrepresentation, supported by reasonably credible evidence, that were material to the outcome of the Final Action Hearing.

7.5 Majorities for Final Action: The required voting majority based on the number of votes cast of eligible voters shall be in accordance with the following table:

Committee Action (see note)	Desired Final Action		
	AS	AM	D
AS	Simple Majority	2/3 Majority	Simple Majority
AM	2/3 Majority	Simple Majority to sustain the Public Hearing Action or; 2/3 Majority on additional modifications and 2/3 on overall AM	Simple Majority
D	2/3 Majority	2/3 Majority	Simple Majority

7.5.1 Failure to Achieve Majority Vote: In the event that a code change proposal does not receive any of the required majorities for final action in Section 7.5, final action on the code change proposal in question shall be disapproval.

7.6 Publication: The Final action on all proposed code changes shall be published as soon as practicable after the determination of final action. The exact wording of any resulting text modifications shall be made available to any interested party.

8.0 Appeals

8.1 Right to Appeal: Any person may appeal an action or inaction in accordance with CP-1.

2013 ICC CODE DEVELOPMENT CYCLE CROSS INDEX OF PROPOSED CODE CHANGES

Some of the proposed code changes include sections that are outside of the scope of the chapters or the code listed in the table of 2012-2014 Staff Secretaries on page x. This is done in order to facilitate coordination among the International Codes which is one of the fundamental principles of the International Codes.

Listed in this cross index are proposed code changes that include sections of codes or codes other than those listed on page viii. For example, IEBC Section 804.4.5 is proposed for revision in code change F59-13 Part II, which is to be heard by the IFC Committee. This section of the IEBC is typically the responsibility of the IEBC Committee as listed in the table of 2012-2014 Staff Secretaries. It is therefore identified in this cross index. Another example is Section 605.11.3.2 of the International Fire Code. The International Fire Code is normally maintained by the IFC Committee, but Section 605.11.3.2 will be considered for revision in proposed code change RM96-13 which will be placed on the IFC Committee agenda. In some instances, there are other subsections that are revised by an identified code change that is not included in the cross index. For example, numerous sections in Chapter 9 of the International Building Code would be revised by the proposed changes to Chapter 9 of the IFC and all sections of the IECC – Residential Provisions have revisions to the duplicate section in Chapter 11 of the IRC as noted in each code change proposal. This was done to keep the cross index brief enough for easy reference.

This information is provided to assist users in locating all of the proposed code changes that would affect a certain section or chapter. For example, to find all of the proposed code changes that would affect Chapter 4 of the IECC-Commercial Provisions, review the proposed code changes in the portion of the monograph for the IECC-Commercial Code Development Committee (listed with a CE prefix) then review this cross reference for Chapter 4 of the IECC-Commercial for proposed code changes published in other code change groups. While care has been taken to be accurate, there may be some omissions in this list.

Letter prefix: Each proposed change number has a letter prefix that will identify where the proposal is published. The letter designations for proposed changes and the corresponding publications are as follows:

PREFIX	PROPOSED CHANGE GROUP (see monograph table of contents for location)
ADM	Administrative
E	International Building Code - Means of Egress
EB	International Existing Building Code
CE	International Energy Conservation Code – Commercial
RE	International Energy Conservation Code – Energy
F	International Fire Code
FG	International Fuel Gas Code
FS	International Building Code - Fire Safety
G	International Building Code – General
GEW	International Green Construction Code – Energy/Water
GG	International Green Construction Code – General
M	International Mechanical Code
PC	ICC Performance Code
P	International Plumbing Code
PSD	International Private Sewage Disposal Code
PM	International Property Maintenance Code
RE	International Residential Code - Building
RM	International Residential Code - Mechanical
RP	International Residential Code - Plumbing
S	International Building Code – Structural
SP	International Swimming Pool and Spa Code
WUIC	International Wildland-Urban Interface Code
Z	International Zoning Code

International Building Code	
Section #	Code Change #
101.2	ADM1 Part I, ADM2 Part I
101.3	ADM6 Part I, ADM8 Part I
101.4.7 (New)	ADM11
101.4.7 (New)	ADM12
102.6	ADM17
102.6.1 (New)	ADM17
102.6.2 (New)	ADM17
103.2	ADM18 Part I
104.2.1 (New)	ADM19
104.8	ADM21 Part I
104.10	ADM22 Part I
104.11	ADM23 Part I
104.12 (New)	ADM24 Part I
104.13 (New)	ADM24 Part I
105.1	ADM22 Part I
105.2	ADM27 Part I, ADM28
106.1	ADM22 Part I
107.1	ADM40 Part I, ADM41 Part I
107.1.1 (New)	ADM42
107.2	ADM44
107.2.5 (New)	ADM45
107.2.6 (New)	ADM44
107.3.4	ADM22 Part I
107.3.4.1	ADM46
107.6 (New)	ADM47 Part I
108.2	ADM48
110.1	ADM22 Part I
111.1	ADM49 Part I
114.1	ADM50 Part I
115.2	ADM22 Part I
202	ADM5 Part I, ADM11, ADM12, ADM22 Part I, ADM46, ADM51 Part I, ADM52 Part I, ADM54 Part I, ADM55 Part I, ADM58 Part I, ADM59 Part I, ADM60 Part I, F2,F3, F4,F6, F7, F8,F111,F299
Table 307.1(1)	F288, F289, F290, F291, F292
Table 307.1(2)	F292
Table 307.1(3)	F293
307.5	F288
402.7.3	F59
403.3	F139
403.3.3	F139
403.3.4	F139
403.4.8 through 403.4.8.2	F59
403.4.8.2, 403.4.8.3 (New)	F55
403.4.9, 403.4.9.1	F59
404.7	F59
405.8 through 405.8.2	F59
405.9, 405.9.1	F59
412.3.4	F59
Table 414.2.5 (1)	F297, CCC 13-G1
408.4.2	F59

International Building Code <i>(continued)</i>	
Table 414.5.1	F199, G6
414.5.3	F298, G6
414.5.3.1, 414.5.3.2 (New)	F59
414.5.4	F59
414.7.4 (New)	F59
415.10.10, 415.10.10.1	F59
415.10.10.3	F262
421.8	F59
501.2	F43 Part II
806.1	F106, F109, F110, F111
806.1.1	F109
806.1.2	F106, F109
806.2	F106, F109, F110
806.3	F109
806.4	F110
Chapter 9	See IFC Proposed Changes to IFC Chapter 9
901.5	ADM22 Part I
901.8	F115
904.5 through 904.10	ADM43, Part II (Heard by IFC Committee)
909.20.6.2	F59
909.21.5	F59
1001.2, 1001.3	F207
1004.3	ADM22 Part I
1703.4.1	ADM22 Part I
1703.6	ADM22 Part I
1703.6.1	ADM22 Part I
1704.2	ADM22 Part I
1704.2.4	ADM22 Part I
1707.1	ADM22 Part I
1803.6	ADM22 Part I
2702.1 through 2702.2.20	F56
2702.1	F52, F53
2702.1.2 (New)	F53, F54, F58
2702.1.3 through 2702.1.6 (New)	F53
2702.3 (New)	F57
2702.2	F58
2702.2.1 through 2702.2.3	F58, F59
2702.2.4 through 2704.2.8	F59
2702.2.14	F58, F59
2702.2.15 through 2702.2.18	F59
2702.2.19, 2702.2.20	F58, F59
2702.2.21	F58, F59, F60
2702.2.22 through 2702.2.24	F58
3306.8	ADM22 Part I
3401.2	ADM22 Part I
G104.1	ADM22 Part I
J106.1	ADM22 Part I
K103.2	ADM22 Part I

ICC PERFORMANCE CODE	
101.2.2	ADM6 Part I, ADM8 Part I
102.1	ADM1 Part I
103.3.1	ADM22 Part I
103.3.1.1	ADM22 Part I
103.3.1.2	ADM22 Part I
103.3.1.3	ADM22 Part I
103.3.1.4	ADM22 Part I
103.3.1.5	ADM22 Part I
103.3.1.6	ADM22 Part I
103.3.1.7	ADM22 Part I
103.3.1.8	ADM22 Part I
103.3.1.9	ADM22 Part I
103.3.4.1.4	ADM22 Part I
103.3.1.4.6	ADM22 Part I
103.3.4.2.3	ADM22 Part I
103.3.8.3	ADM22 Part I
103.3.9.1.4	ADM22 Part I
103.3.9.2.3	ADM22 Part I
103.3.10.1	ADM22 Part I
103.3.13.1	ADM50 Part I
INTERNATIONAL ENERGY CONSERVATION CODE—COMMERCIAL PROVISIONS <i>(Note: All changes listed for IECC-Commercial will be heard by the IECC-Commercial committee)</i>	
C101.2	ADM1 Part II
C103.1	ADM40 Part II, ADM41 Part II
C103.4	ADM30 Part II
C103.6 (New)	ADM47 Part II
C108.2	ADM22 Part II
C202	ADM51 Part II, ADM52 Part II, ADM53 Part II, ADM55 Part II, ADM57 Part II, ADM60 Part II
C404.7	SP19 Part II
C407.3	ADM52 Part II
INTERNATIONAL ENERGY CONSERVATION CODE—RESIDENTIAL PROVISIONS <i>(Note: All changes listed for IECC-Residential will be heard by the IECC-Residential committee)</i>	
R101.2	ADM1 Part III, CE3 Part II
R101.4	CE4 Part II
R101.4.2	CE6 Part II, CE7 Part II, CE8 Part II, CE9 Part II, CE10 Part II,
R101.4.3	CE11 Part II, CE15 Part II, CE16 Part II
R101.4.4	CE19 Part II, CE20 Part II
R101.4.5	CE19 Part II, CE20 Part II
R101.4.6	CE19 Part II
R101.5.1	CE22 Part II
R101.5.2	CE23 Part II
R102.1	CE28 Part II, CE29 Part II
R102.1.1	CE29 Part II, CE30 Part II, CE31 Part II, CE32 Part II, CE33 Part II,
R102.1.1 (New)	CE34 Part II

INTERNATIONAL ENERGY CONSERVATION CODE—RESIDENTIAL PROVISIONS

(continued)

R103.1	ADM40 Part III, ADM41 Part III
R103.2	ADM53 Part III
R103.2	CE35 Part II
R103.2.1 (New)	CE35 Part II
R103.2.1 (New)	CE37 Part II
R103.2.1.1	CE35 Part II
R103.2.1.2	CE35 Part II
R103.2.2 (New)	CE35 Part II
R103.2.2.1 (New)	CE35 Part II
R103.2.2.2 (New)	CE35 Part II
R103.2.3 (New)	CE35 Part II
R103.2.4 (New)	CE35 Part II
R103.2.5 (New)	CE35 Part II
R103.3	CE35 Part II
R103.4	ADM30 Part III
R103.6 (New)	ADM47 Part III
R104.1	CE38 Part II
R104.1.1	CE39 Part II
R104.2 (New)	CE38 Part II
R104.2	CE35 Part II
R104.2.1 (New)	CE39 Part II
R104.2.2 (New)	CE39 Part II
R104.3	CE38 Part II
R104.3.1	CE40 Part II
R104.3 (New)	CE39 Part II
R104.3.1 (New)	CE38 Part II
R104.3.1 (New)	CE39 Part II
R104.3.2 (New)	CE38 Part II
R104.3.3 (New)	CE38 Part II
R104.3.4 (New)	CE38 Part II
R104.3.5 (New)	CE38 Part II
R104.3.6 (New)	CE38 Part II
R104.4	CE39 Part II
R104.5	CE38 Part II, CE39 Part II, CE41 Part II
R104.5.1 (New)	CE41 Part II
R104.6	CE39 Part II
R104.7	CE39 Part II
R104.8	CE38 Part II, CE39 Part II
R104.8.1	CE39 Part II
R106.2	CE43 Part II
R108.2	ADM22 Part III
R108.4	CE44 Part II
R202	ADM51 Part III, ADM52 Part III, ADM53 Part III, ADM55 Part III, ADM57 Part III, ADM60 Part III, CE4 Part II, CE7 Part II, CE8 Part II, CE9 Part II, CE15 Part II, CE35 Part II, CE41 Part II, CE46 Part II, CE47 Part II, CE48 Part II, CE49 Part III, CE52 Part II, CE58 Part II, CE59 Part II
R402.1	CE23 Part II
Table R402.1.1	RB96 Part II
R402.1.2	CE177 Part II
R402.1.3.1 (New)	CE84 Part II

INTERNATIONAL ENERGY CONSERVATION CODE—RESIDENTIAL PROVISIONS	
<i>(continued)</i>	
R402.2.3	CE127 Part II
R402.3.2	CE161 Part II
R402.3.3	CE160 Part II
R402.3.6	CE4 Part II
R403.4.1	CE280 Part III
R403.4.1.1 (New)	CE280 Part III
R403.4.1.2 (New)	CE280 Part III
Table R403.4.2	CE273 Part III
R403.4.3	CE283 Part II
R403.9	SP19 Part III
R404.1	CE285 Part II
R404.2.5	CE127 Part II
R403.9	SP19 Part III
Chapter 5(RE) (New)	CE4 Part II
Chapter 5(RE) (New)	CE34 Part II
INTERNATIONAL EXISTING BUILDING CODE	
101.2	ADM1 Part I
101.3	ADM8 Part I
101.4	ADM9
101.4.1 (New)	ADM9
101.4.1	ADM17
101.4.2 (New)	ADM10
101.4.2.1 (New)	ADM10
101.4.2.2 (New)	ADM10
103.2	ADM18 Part I
104.2.1 (New)	ADM19
104.6	ADM22 Part I
104.8	ADM21 Part I
104.10	ADM22 Part I
104.11	ADM23 Part I
104.12 (New)	ADM24 Part I
104.13 (New)	ADM24 Part I
105.1	ADM22 Part I
106.1	ADM40 Part I, ADM 41 Part I
106.1.3 (New)	ADM36 Part I (Heard by the IEBC Committee)
106.2.6 (New)	ADM37 (Heard by the IEBC Committee)
106.3.4	ADM46
106.6	ADM22 Part I
106.6 (New)	ADM47 Part I
109.3.7 (New)	ADM36 Part I (Heard by the IEBC Committee)
109.3.8 (New)	ADM36 Part I (Heard by the IEBC Committee)
110.1	ADM49 Part I
110.2	ADM22 Part I
111.3	ADM22 Part I
113.1	ADM50 Part I
114.2	ADM22 Part I
115.3	ADM22 Part I
115.4	ADM22 Part I
116.5	ADM22 Part I
117.1	ADM22 Part I
117.3	ADM22 Part I

INTERNATIONAL EXISTING BUILDING CODE <i>(continued)</i>	
202	ADM46, ADM51 Part I, ADM52 Part I, ADM56 (Heard by the IEBC Committee), ADM58 Part I, ADM59 Part I, ADM60 Part I
602.4 (New)	ADM36 Part I (Heard by the IEBC Committee)
602.4.1 (New)	ADM36 Part I (Heard by the IEBC Committee)
804.2.2.2 (New)	F212 Part II
804.4.5	F59 Part II
811.1	CE3 Part III
1001.3.1.1	CE19 Part III
1001.3.1.2	CE19 Part III
1001.3.1.3	CE19 Part III
1207.1	CE6 Part III
M1308.1	RB55
M2101.6	RB55
INTERNATIONAL FIRE CODE	
101.3	ADM6 Part I, ADM8 Part I
102.3	ADM14
102.3.1 (New)	ADM14
102.3.1 (New)	ADM15
102.3.2 (New)	ADM14
102.5	ADM16
103.2	ADM18 Part I
103.4	ADM21 Part I
103.4.1	ADM21 Part I
104.3	ADM22 Part I
104.3.1	ADM22 Part I
104.7.2	ADM20, ADM22 Part I
104.9	ADM23 Part I
104.12 (New)	ADM24 Part I
104.13 (New)	ADM24 Part I
105.1.1	ADM22 Part I
105.1.4 (New)	ADM25
105.1.4 (New)	ADM26
105.1.4.1 (New)	ADM26
105.1.5 (New)	ADM25
105.4.2.2 (New)	ADM29
105.4.5	ADM30 Part I
105.6.30 (New)	ADM31 (Heard by the IFC Committee)
105.6.39	ADM31 (Heard by the IFC Committee)
105.7.9 (New)	ADM32 (Heard by the IFC Committee)
105.7.11	ADM33 (Heard by the IFC Committee)
105.7.12	ADM33 (Heard by the IFC Committee)
105.7.12 (New)	ADM34 (Heard by the IFC Committee)
105.7.13	ADM33 (Heard by the IFC Committee)
105.7.13 (New)	ADM33 (Heard by the IFC Committee)
105.7.14	ADM35 (Heard by the IFC Committee)
106.3 (New)	ADM38
106.5 (New)	ADM39
107.2.1	ADM43 Part I
107.3 (New)	ADM43 Part I
109.1	ADM50 Part I
109.2	ADM22 Part I

INTERNATIONAL FIRE CODE <i>(continued)</i>	
109.3.1	ADM22 Part I
109.3.2	ADM22 Part I
110.4	ADM22 Part I
111.2	ADM22 Part I
112.1	ADM22 Part I
113.2	ADM38
202	ADM5 Part I, ADM51 Part I, ADM52 Part I, ADM53 Part I, ADM54 Part I, ADM55 Part I
406.2	ADM43 Part II (Heard by the IFC Committee)
408.5.2	ADM43 Part II (Heard by the IFC Committee)
408.10.2	ADM43 Part II (Heard by the IFC Committee)
507.5.2	ADM43 Part II (Heard by the IFC Committee)
507.5.3	ADM43 Part II (Heard by the IFC Committee)
604.3.2	ADM43 Part II (Heard by the IFC Committee)
604.5.1.1	ADM43 Part II (Heard by the IFC Committee)
604.5.2.1	ADM43 Part II (Heard by the IFC Committee)
605.11.3.2	RM96 Part I (Heard by the IFC Committee)
606.6	ADM43 Part II (Heard by the IFC Committee)
606.15	ADM43 Part II (Heard by the IFC Committee)
609.3.3.3	ADM43 Part II (Heard by the IFC Committee)
703.1	ADM43 Part II (Heard by the IFC Committee)
703.4	ADM43 Part II (Heard by the IFC Committee)
901.6.2	ADM43 Part II (Heard by the IFC Committee)
901.6.2.1	ADM43 Part II (Heard by the IFC Committee)
904.5	ADM43 Part II (Heard by the IFC Committee)
904.6	ADM43 Part II (Heard by the IFC Committee)
904.7	ADM43 Part II (Heard by the IFC Committee)
904.8	ADM43 Part II (Heard by the IFC Committee)
904.9	ADM43 Part II (Heard by the IFC Committee)
904.10	ADM43 Part II (Heard by the IFC Committee)
907.8	ADM43 Part II (Heard by the IFC Committee)
907.8.2	ADM43 Part II (Heard by the IFC Committee)
907.8.5	ADM43 Part II (Heard by the IFC Committee)
909.20.2	ADM43 Part II (Heard by the IFC Committee)
912.6	ADM43 Part II (Heard by the IFC Committee)
913.5	ADM43 Part II (Heard by the IFC Committee)
913.5.2	ADM43 Part II (Heard by the IFC Committee)
913.5.3	ADM43 Part II (Heard by the IFC Committee)
914.3.1.2	G4 (Heard by IFC Committee)
1030.7	PM13 (Heard by IFC Committee)
1030.8	ADM43 Part II (Heard by the IFC Committee)
2006.5.3.2.2	ADM43 Part II (Heard by the IFC Committee)
2006.6.4	ADM43 Part II (Heard by the IFC Committee)
2305.2.1	ADM43 Part II (Heard by the IFC Committee)
2306.2.1.1	ADM43 Part II (Heard by the IFC Committee)
2808.6	ADM43 Part II (Heard by the IFC Committee)
5003.2.9	ADM43 Part II (Heard by the IFC Committee)
5003.3.1.1	ADM43 Part II (Heard by the IFC Committee)
5603.2	ADM43 Part II (Heard by the IFC Committee)
5704.2.11.5.1	ADM43 Part II (Heard by the IFC Committee)
5706.5.4.5	ADM43 Part II (Heard by the IFC Committee)
5806.4.8.2	ADM43 Part II (Heard by the IFC Committee)

INTERNATIONAL FUEL GAS CODE	
101.2	ADM1 Part I
101.4	ADM6 Part I, ADM8 Part I
102.3	ADM22 Part I
103.2	ADM18 Part I
103.4	ADM21 Part I
104.4	ADM22 Part I
104.8 (New)	ADM24 Part I
104.9 (New)	ADM24 Part I
105.1	ADM22 Part I
105.2	ADM23 Part I
106.1	ADM22 Part I
106.1.1 (New)	ADM26
106.1.2 (New)	ADM26
106.3	ADM22 Part I
108.1	ADM50 Part I
108.5	ADM22 Part I
108.7.2	ADM22 Part I
202	ADM51 Part I, ADM55 Part I, ADM57 Part I
412.2	F248
412.4	F248
412.5 (New)	F248
412.6	F250
412.7	F251
412.7.2	F251
412.7.4	F251
412.7.5 (New)	F251
412.8	F252
413.2.3	FG1 (Heard by IFC Committee)
413.3	FG1 (Heard by IFC Committee)
413.4.2, 413.4.3	FG1 (Heard by IFC Committee)
413.5	F253
INTERNATIONAL MECHANICAL CODE	
101.2	ADM1 Part I
101.2	ADM4
101.3	ADM6 Part I, ADM8 Part I
102.3	ADM22 Part I
103.2	ADM18 Part I
103.4	ADM21 Part I
104.4	ADM22 Part I
104.8 (New)	ADM24 Part I
104.9 (New)	ADM24 Part I
105.1	ADM22 Part I
105.2	ADM23 Part I
106.1	ADM22 Part I
106.1.1 (New)	ADM26 Part I
106.1.2 (New)	ADM26 Part I
106.3	ADM22 Part I
108.1	ADM50 Part I
108.5	ADM22 Part I
108.7.2	ADM22 Part I
202	ADM51 Part I, ADM52 Part I, ADM55 Part I, ADM57 Part I

INTERNATIONAL MECHANICAL CODE <i>(continued)</i>	
502.7.3.3.3	F261
513.4	F185
513.4.6	F184
513.4.7	F185
513.5	F186
513.5.1	F186
513.5.2	F186, F187, F188
513.5.2.1	F187
513.6.3 (New)	F189
513.7	F190
513.7.1	F190
513.7.2	F190
513.10.2	F191
513.11	F59
513.11.1 (New)	F59
513.12.1	F192
Table 1103.1	M1 (Heard by IFC Committee)
1106.5.2	F77
INTERNATIONAL PLUMBING CODE	
101.2	ADM1 Part I
101.3	ADM6 Part I, ADM8 Part I
102.3	ADM22 Part I
103.2	ADM18 Part I
103.4	ADM21 Part I
104.4	ADM22 Part I
104.8 (New)	ADM24 Part I
104.9 (New)	ADM24 Part I
105.1	ADM22 Part I
105.2	ADM23 Part I
106.1	ADM22 Part I
106.1.1 (New)	ADM26
106.1.2 (New)	ADM26
106.3	ADM22 Part I
108.1	ADM50 Part I
108.5	ADM22 Part I
108.7.2	ADM22 Part I
202	ADM55 Part I, ADM57 Part I, CE49 Part II, CE282 Part II
607.2.1	CE278 Part II, CE279 Part II, CE280 Part II, CE281
607.2.1.1 (New)	CE282 Part II
607.2.1.1 (New)	RE136
607.5	RE129, CE270 Part II, CE271 Part II, CE272 Part II, CE273 Parts II and IV
1202.1	P1 (Heard by the IFC Committee)
INTERNATIONAL PRIVATE SEWAGE DISPOSAL CODE	
101.2	ADM1 Part I
101.6	ADM6 Part I, ADM8 Part I
102.5	ADM22 Part I
103.2	ADM18 Part I
103.4	ADM21 Part I
104.4	ADM22 Part I
104.8 (New)	ADM24 Part I

INTERNATIONAL PRIVATE SEWAGE DISPOSAL CODE <i>(continued)</i>	
104.9 (New)	ADM24 Part I
105.1	ADM22 Part I
105.2	ADM23 Part I
106.1.1 (New)	ADM26
106.1.2 (New)	ADM26
108.1	ADM50 Part I
108.5	ADM22 Part I
108.7.2	ADM22 Part I
INTERNATIONAL PROPERTY MAINTENANCE CODE	
101.2	ADM1 Part I, ADM6 Part I, ADM8 Part I, ADM22 Part I
102.2	ADM5 Part I, ADM22 Part I
102.3	ADM5 Part I, ADM13
103.2	ADM5 Part I, ADM18 Part I
103.4	ADM21 Part I
103.6 (New)	ADM36 Part II(Heard by the IPMC Committee)
103.7 (New)	ADM36 Part II(Heard by the IPMC Committee)
104.2	ADM5 Part I
104.3	ADM22 Part I
104.7 (New)	ADM24 Part I
104.8 (New)	ADM24 Part I
105.1	ADM22 Part I
105.2	ADM23 Part I
105.6	ADM5 Part I
106.1	ADM50 Part I
106.1 (New)	ADM36 Part II(Heard by the IPMC Committee)
106.2	ADM5 Part I
106.3	ADM5 Part I
106.4	ADM5 Part I
106.5	ADM5 Part I
107.1	ADM5 Part I
107.2	ADM22 Part I
107.3	ADM5 Part I
107.4	ADM5 Part I
107.5 (New)	ADM5 Part I
107.6	ADM22 Part I
108.1	ADM5 Part I, ADM50 Part I
108.1.2	ADM5 Part I
108.1.3	ADM5 Part I
108.1.5	ADM5 Part I
108.2	ADM5 Part I, ADM22 Part I
108.2.1	ADM22 Part I
108.3	ADM5 Part I, ADM22 Part I
108.4	ADM5 Part I, ADM22, Part I
108.4.1	ADM5 Part I
108.5	ADM5 Part I, ADM22 Part I
108.6	ADM5 Part I, ADM22 Part I
109.1	ADM5 Part I
109.3	ADM5 Part I
109.5	ADM5 Part I, ADM22 Part I
110.1	ADM5 Part I, ADM22 Part I
110.2	ADM5 Part I

INTERNATIONAL PROPERTY MAINTENANCE CODE <i>(continued)</i>	
110.3	ADM22 Part I
110.4	ADM5 Part I
111.2	ADM5 Part I, ADM22 Part I
111.5	ADM5 Part I
111.6	ADM5 Part I
111.7	ADM5 Part I
111.8	ADM5 Part I
112.3	ADM5 Part I
112.4	ADM5 Part I
202	ADM5 Part I, ADM53 Part I, ADM55 Part I
304.3	F43 Part III
305.4 (New)	ADM36 Part II(Heard by the IPMC Committee)
305.4.1 (New)	ADM36 Part II(Heard by the IPMC Committee)
704.5 (New)	F162
INTERNATIONAL RESIDENTIAL CODE <i>(NOTE ALL CODE CHANGES LISTED FOR IRC HEARD BY AN IRC COMMITTEE)</i>	
R101.2	ADM1 Part IV, ADM2 Part II
R101.3	ADM6 Part II, ADM7, ADM8 Part II
R103.2	ADM18 Part II
R104.6	ADM22 Part IV
R104.8	ADM21 Part II
R104.11	ADM23 Part II
R104.12 (New)	ADM24 Part II
R104.13 (New)	ADM24 Part II
R105.1	ADM22 Part IV
R105.2	ADM27 Part II
R106.1	ADM40 Part IV, ADM41 Part V
R106.6 (New)	ADM47 Part V
R110.1	ADM49 Part II
R110.3	ADM22 Part IV
R111.3	ADM22 Part IV
R113.1	ADM50 Part II
R114.1	ADM22 Part IV
R202	ADM2 Part II, ADM5 Part II, ADM51 Part IV, ADM52 Part IV, ADM53 Part IV, ADM54 Part II, ADM55 Part IV, ADM58 Part II, ADM59 Part II, ADM60 Part IV, ADM61, CE47 Part III, CE48 Part III, CE49 Part III, RM31, RM32, RM37, RM77, RM82, RM85, RM97, RM97 Part I, RM98 Part I
R303.5	RM37 Part II
R303.5.1	RM37 Part II
R303.5.1	RM37 Part II
R314.5 through R314.5.3 (New)	F165 Part II
R315.1.1 (New)	F183 Part II
R315.3.1 (New)	F183 Part II
R319.1	F43, Part IV
R902.1	RM98 Part II
R902.3	RM98 Part II
R902.4	RM98 Part II
R902.16	RM98 Part II
R902.16.1	RM98 Part II
R905.16.2	RM98 Part II

INTERNATIONAL RESIDENTIAL CODE <i>(continued)</i>	
R905.16.3	RM98 Part II
R908 (New)	RM98 Part II
Chapter 11	Changes to Chapter 11 of the IRC Heard by the IECC-R/IRC-E Committee except as noted
M1308.1	RB55, RB258, RB330, RB400
M1507.1	RB55
M2101.6	RB55
M2201.6	RB193
M2302	RB448
P2603.2	RB55, RB258, RB330, RB400, RB448 Part II,
P2903.11 (New)	CE283 Part III
P2905.1 (New)	RE129
P2905.1 (New)	RE136
P2905.1 (New)	RE137
P2905.1 (New)	RE138
INTERNATIONAL SWIMMING POOL AND SPA CODE	
<i>NOTE: ALL ITEMS FOR ISPSC WILL BE HEARD BY THE ISPSC COMMITTEE.</i>	
101.2	ADM1 Part V
101.3	ADM8 Part III
102.3	ADM22 Part V
103.2	ADM18 Part III
103.4	ADM21 Part III
104.6	ADM22 Part V
104.8	ADM22 Part V
104.8	ADM23 Part III
104.13 (New)	ADM24 Part III
104.14 (New)	ADM24 Part III
105.1	ADM22 Part V
105.2	ADM22 Part V
107.1	ADM50 Part III
107.5	ADM22 Part V
107.7.2	ADM22 Part V
202	ADM51 Part V, ADM52 Part V, ADM55 Part V, ADM58 Part III, ADM59 Part III, ADM60 Part V
INTERNATIONAL WILDLAND-URBAN INTERFACE CODE	
101.2	ADM1 Part I
101.3	ADM8 Part I
101.6	ADM22 Part I
103.2	ADM18 Part I
104.3	ADM21 Part I
104.8 (New)	ADM24 Part I
104.9 (New)	ADM24 Part I
105.1	ADM22 Part I
105.2	ADM22 Part I
105.3	ADM23 Part I
108.1	ADM40 Part I, ADM41 Part I
108.9 (New)	ADM47 Part I
108.10	ADM30 Part I
109.2.2	ADM22 Part I
109.3	ADM22 Part I
109.4.1	ADM22 Part I
109.4.5.2	ADM22 Part I

INTERNATIONAL WILDLAND-URBAN INTERFACE CODE <i>(continued)</i>	
109.4.5.2.1	ADM22 Part I
109.4.5.3	ADM22 Part I
109.4.5.4	ADM22 Part I
110.1	ADM49 Part I
113.2	ADM22 Part I
114.2	ADM22 Part I
202	ADM53 Part I, ADM55 Part I
404.10.3	F59
INTERNATIONAL ZONING CODE	
101.3	ADM1 Part I
103.3	ADM22 Part I
104.7	ADM21 Part I
107.7.3	ADM22 Part I
109.1	ADM22 Part I
110.1	ADM50 Part I
202	ADM51 Part I

2013 GROUP B COMMITTEE ACTION HEARINGS SCHEDULE

April 21 – April 30, 2013

Sheraton Dallas Downtown Hotel

Unless noted by “Start no earlier than X am/pm,” each Code Committee will begin immediately upon completion of the hearings for the prior Committee. Thus the actual start times for the various Code Committees are tentative. The hearing volume is considerably higher than previous cycles. The schedule anticipates that the hearings will be completed by 3:00 pm on Tuesday, April 30th.

	Sunday April 21	Monday April 22	Tuesday April 23	Wednesday April 24	Thursday April 25
TRACK 1	Start 10 am ISPSC IRC – P End 10 pm	Start 8 am IRC – P IRC - M End 10 pm	Start 8 am IRC - M IFC (Start no earlier than 8 am) End 10 pm	Start 8 am IFC End 10 pm	Start 8 am IFC IRC - B (Start no earlier than 4 pm) End 10 pm
TRACK 2	Start 10 am IPMZC IEBC ADMIN End 10 pm	Start 8 am ADMIN IECC – R/ IRC – E (Start no earlier than 8 am) End 10 pm	Start 8 am IECC- R/ IRC – E End 10 pm	Start 8 am IECC – R/ IRC – E End 10 pm	Start 8 am IECC – R/ IRC – E IECC - C (Start no earlier than 1 pm) End 10 pm

	Friday April 26	Saturday April 27	Sunday April 28	Monday April 29	Tuesday April 30
TRACK 1	Start 8 am IRC - B End 10 pm	Start 8 am IRC - B End 10 pm	Start 8 am IRC – B End 10 pm	Start 8 am IRC – B End 10 pm	Start 8 am IRC – B Finish 3 pm
TRACK 2	Start 8 am IECC - C End 10 pm	Start 8 am IECC - C End 10 pm	Start 8 am IECC - C End 10 pm	Start 8 am IECC - C End 10 pm	Start 8 am IECC - C Finish 3 pm

Notes:

1. There are approximately 2000 code change items compared to approximately 1600 in 2012.
2. Hearing times may be modified at the discretion of the Chairman.
3. Breaks will be announced. Lunch and dinner breaks planned for each track.
4. Due to uncertainties in hearing progress, start times indicated as “Start no earlier than X am/pm” are conservatively estimated and are not intended to be scheduled hearing progress targets.

Codes: (be sure to consult the Cross Index of Proposed Code Changes for changes heard by a different committee)

ADMIN: Chapter 1 of all the International Codes except the following: IECC; IgCC; IRC; ISPSC; and ICC Performance Code (see individual code for changes to their respective Chapter 1). ADMIN also includes the administrative update to currently referenced standards in all the 2012 International Codes.

IEBC: Non-structural provisions in the International Existing Building Code

IECC – C: Commercial energy provisions in the International Energy Conservation Code (IECC) (agenda includes energy related changes to the ICC Performance Code)

IECC –R/IRC-E: Residential energy provisions of the IECC and Chapter 11 of the IRC

IFC: International Fire Code (agenda includes changes to the International Wildland-Urban Interface Code and ICC Performance Code)

IPMZC:	International Property Maintenance and Zoning Codes (no changes received to the IZC)
IRC – B:	Building provisions in Chapters 1 – 10 of the International Residential Code (IRC)
IRC – M:	Mechanical provisions in the IRC
IRC – P:	Plumbing provisions in the IRC
SPSC:	International Swimming Pool and Spa Code

2013 PROPOSED CHANGES TO THE INTERNATIONAL CODES

<u>CODE</u>	<u>PAGE</u>
Administrative Code Provisions	ADM1
International Energy Conservation Code	
Commercial.....	CE1
Residential	RE1
International Existing Building Code.....	EB1
International Fire Code	F1
International Property Maintenance Code.....	PM1
International Residential Code	
Building.....	RB1
Mechanical	RM1
Plumbing.....	RP1
International Swimming Pool and Spa Code.....	SP1
International Wildland-Urban Interface Code.....	WUIC1
Code Correlation Committee.....	CCC1

2013 PROPOSED CHANGES TO THE ADMINISTRATIVE PROVISIONS

ADMINISTRATIVE PROVISIONS COMMITTEE

Richard Thomson, Chair, CPCA

Regional Representative
New York State Department of State
Division of Code Enforcement Administration
Finger Lakes North Regional Office
Rose, NY

Neville Pereira, PE – Vice Chair

Rep: ICC Los Angeles Basin & Orange
Empire
Chapters of ICC
Building Official
City of Temple City
La Canada, CA

Anthony W. Catana, AIA LEED AP

Director of Building Technology
Spiezle Architectural Group Inc.
Trenton, NJ

Dale Engebretson, CBO

Building Official
B&F Technical Code Services, Inc
Hoffman Estates, IL

Vernon W. Hodge, CBO

Technical and Code Development Specialist
State Building Code Official
Division of Building and Fire Regulations
Virginia Department of Housing and
Community Development
Richmond, VA

Scott F. Holm, CBO, M. Ed.

Building Inspector
University of Minnesota
Minneapolis, MN

Craig Johnson

Building Official
Culver City
Culver City, CA

Robert J. Klein, CBO

Chief Building Official
Town of Hilton Head Island
Hilton Head, SC

William G. McGinness

Director of Engineering
Homeland Vinyl Products Inc.
Birmingham, AL

Barry Mooneyham

Director of Permits and Inspections
Wake County Government
Raleigh, NC

Michael O'Brian, CFO, MIFireE

Fire Chief
Brighton Area Fire Authority
Brighton, MI

Ed Peaser, CBO

Plan Review Manager
City of Scottsdale
Scottsdale, AZ

Gary M. Rogers, CBO

President/CEO
GM Rogers & Sons Const. Services
Las Vegas, NV

**William H. Stewart, III, JD, CBO, CBCO,
CHCO**

Code Enforcement Director
City of Laconia
Laconia, NH

Staff Secretariat**Kimberly Paarlberg, RA**

Senior Staff Architect
Codes and Standards Development
ICC Indiana Field Office
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TENTATIVE ORDER OF DISCUSSION 2013 PROPOSED CHANGES TO THE ADMINISTRATIVE PROVISIONS

The following is the tentative order in which the proposed changes to the code will be discussed at the public hearings. Proposed changes which impact the same subject have been grouped to permit consideration in consecutive changes.

Proposed change numbers that are indented are those which are being heard out of numerical order. Indentation **does not** necessarily indicate that one change is related to another. Proposed changes may be grouped for purposes of discussion at the hearing at the discretion of the chair. Note that some I-ADMIN code change proposals may not be included on this list, as they are being heard by other committees. Please consult the Cross Index of Proposed Changes.

ADMI-I3, Part I	ADM50-13, Part I
ADM2-I3, Part II	ADM51-13, Part I
ADM3-I3	ADM52-13, Part I
ADM4-I3	ADM53-13, Part I
ADM5-I3, Part XII	ADM54-13, Part I
ADM6-I3, Part I	ADM55-13, Part I
ADM8-I3, Part I	ADM57-13, Part I
ADM9-I3	ADM58-13, Part I
ADM10-I3	ADM59-13, Part I
ADM11-I3	ADM60-13, Part I
ADM12-I3	ADM62-13
ADMI3-I3	
ADMI4-I3	
ADMI5-I3	
ADMI6-I3	
ADMI7-I3	
ADMI8-I3, Part I	
ADMI9-I3	
ADM20-I3	
ADM21-I3, Part	
ADM22-I3, Part I	
ADM23-I3, Part I	
ADM24-I3, Part I	
ADM25-I3	
ADM26-I3	
ADM27-I3, Part I	
ADM28-I3	
ADM29-I3	
ADM30-I3, Part I	
ADM38-I3	
ADM39-I3	
ADM40-I3, Part I	
ADM41-I3, Part I	
ADM42-I3	
ADM43-I3, Part I	
ADM44-I3	
ADM45-I3	
ADM46-I3	
ADM47-13, Part I	
ADM48-13	
ADM49-13, Part I	

ADM1 – 13

PART I - IBC: [A] 101.2, ICCPC: [A] 102.1, IEBC: [A] 101.2, IFGC: [A] 101.2, IMC: [A] 101.2, IPC: [A] 101.2, IPSDC: [A] 101.2, IPMC: [A] 101.2, IWUIC: [A] 101.2, IZC: [A] 101.3;

PART II - IECC: C101.2;

PART III - IECC: R101.2;

PART IV - IRC: R101.2;

PART V - ISPSC: 101.2

THIS IS A 5 PART CODE CHANGE. PARTS I WILL BE HEARD BY THE ADMINISTRATIVE PROVISIONS COMMITTEE AS ONE CODE CHANGE. PART II WILL BE HEARD BY THE ENERGY CONSERVATION CODE-COMMERCIAL COMMITTEE. PART III WILL BE HEARD BY THE ENERGY CONSERVATION CODE-RESIDENTIAL COMMITTEE. PART IV WILL BE HEARD BY THE RESIDENTIAL CODE COMMITTEE. PART VI WILL BE HEARD BY THE SWIMMING POOL AND SPA CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

Proponent: Al Godwin, CBO, CPM, representing Aon Fire Protection Engineering Corporation.

PART I – IBC; ICCPC; IEBC; IFGC; IMC; IPC; IPSDC; IPMC; IWUIC; IZC

Revise the International Building Code as follows:

IBC [A] 101.2 Scope. The provisions of this code shall apply to the construction, *alteration*, relocation, enlargement, replacement, *repair*, equipment, use and occupancy, location, maintenance, removal and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures. The provisions shall also apply to usage of the surrounding site and access to and from the building, structure or site, as necessary to achieve the purpose of this code.

Exception: Detached one- and two-family *dwelling*s and multiple single-family *dwelling*s (*townhouses*) not more than three *stories* above *grade plane* in height with a separate *means of egress* and their accessory structures shall comply with the *International Residential Code*.

Revise the International Code Council Performance Code as follows:

ICCPC [A] 102.1 Building. Part II of this code provides requirements for buildings and structures and includes provisions for structural strength, stability, sanitation, means of access and egress, light and ventilation, safety to life and protection of property from fire and, in general, to secure life and property from other hazards affecting the built environment. This code includes provisions for the use and occupancy of buildings, structures, facilities and premises, their alteration, repair, maintenance, removal, demolition, and the installation and maintenance of all amenities including, but not limited to, such services as the electrical, gas, mechanical, plumbing, energy conservation and building transportation systems. The provisions shall also apply to usage of the surrounding site and access to and from the building, structure or site, as necessary to achieve the purpose of this code.

Revise the International Existing Building Code as follows:

IEBC [A] 101.2 Scope. The provisions of the *International Existing Building Code* shall apply to the *repair, alteration, change of occupancy, addition* and relocation of existing buildings. The provisions shall also apply to usage of the surrounding site and access to and from the building, structure or site, as necessary to achieve the purpose of this code.

Revise the International Fuel Gas Code as follows:

IFGC [A] 101.2 Scope. This code shall apply to the installation of fuel-gas *pipng* systems, fuel gas appliances, gaseous hydrogen systems and related accessories in accordance with Section 101.2.1 through 101.2.5. The provisions shall also apply to usage of the surrounding site and access to and from the building, structure or site, as necessary to achieve the purpose of this code.

Exception: Detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories high with separate means of egress and their accessory structures shall comply with the *International Residential Code*.

Revise the International Mechanical Code as follows:

IMC [A] 101.2 Scope. This code shall regulate the design, installation, maintenance, *alteration* and inspection of mechanical systems that are permanently installed and utilized to provide control of environmental conditions and related processes within buildings. This code shall also regulate those mechanical systems, system components, *equipment* and appliances specifically addressed herein. The installation of fuel gas distribution piping and *equipment*, fuel gas-fired appliances and fuel gas-fired *appliance* venting systems shall be regulated by the *International Fuel Gas Code*. The provisions shall also apply to usage of the surrounding site and access to and from the building, structure or site, as necessary to achieve the purpose of this code.

Exception: Detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories high with separate means of egress and their accessory structures shall comply with the *International Residential Code*.

Revise the International Plumbing Code as follows:

IPC [A] 101.2 Scope. The provisions of this code shall apply to the erection, installation, alteration, repairs, relocation, replacement, addition to, use or maintenance of plumbing systems within this jurisdiction. This code shall also regulate nonflammable medical gas, inhalation anesthetic, vacuum piping, nonmedical oxygen systems and sanitary and condensate vacuum collection systems. The installation of fuel gas distribution piping and equipment, fuel-gas-fired water heaters and water heater venting systems shall be regulated by the *International Fuel Gas Code*. Provisions in the appendices shall not apply unless specifically adopted. The provisions shall also apply to usage of the surrounding site and access to and from the building, structure or site, as necessary to achieve the purpose of this code.

Exception: Detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories high with separate means of egress and their accessory structures shall comply with the *International Residential Code*.

Revise the International Private Sewage Disposal Code as follows:

IPSDS [A] 101.2 Scope. The provisions of this code shall apply to the installation and maintenance of private sewage disposal systems. The provisions shall also apply to usage of the surrounding site and access to and from the building, structure or site, as necessary to achieve the purpose of this code. Septic tank and effluent absorption systems or other treatment tank and effluent disposal systems shall be permitted where a public sewer is not available to the property served. Unless specifically approved, the *private sewage disposal system* of each building shall be entirely separate from and independent of any other building. The use of a common system or a system on a parcel other than the parcel where the structure is located shall be subject to the full requirements of this code as for systems serving public buildings.

Revise the International Property Maintenance Code as follows:

IPMC [A] 101.2 Scope. The provisions of this code shall apply to all existing residential and nonresidential structures and all existing *premises* and constitute minimum requirements and standards for *premises*, structures, equipment and facilities for light, *ventilation*, space, heating, sanitation, protection from the elements, life safety, safety from fire and other hazards, and for safe and sanitary maintenance; the responsibility of *owners*, *operators* and *occupants*; the *occupancy* of existing structures and *premises*, and for administration, enforcement and penalties. The provisions shall also apply to usage of the surrounding site and access to and from the building, structure or site, as necessary to achieve the purpose of this code.

Revise the International Wildland-Urban Interface Code as follows:

IWUIC [A] 101.2 Scope. The provisions of this code shall apply to the construction, alteration, ~~movement~~, relocation, enlargement, replacement, repair, maintenance and use any building or structure or any appurtenances connected or attached to such buildings or structures. The provisions shall also apply to usage of the surrounding site and access to and from the building, structure or site, as necessary to achieve the purpose of this code.

Buildings or conditions in existence at the time of the adoption of this code are allowed to have their use or occupancy continued, if such condition, use or occupancy was legal at the time of the adoption of this code, provided such continued use does not constitute a distinct danger to life or property.

Buildings or structures moved into or within the jurisdiction shall comply with the provisions of this code for new buildings or structures.

Revise the International Zoning Code as follows:

IZC [A] 101.3 Scope. The provisions of this code shall apply to the construction, addition, alteration, moving, repair and use of any building, structure, parcel of land or sign within a jurisdiction, except work located primarily in a public way, public utility towers and poles and public utilities unless specifically mentioned in this code. The provisions shall also apply to usage of the surrounding site and access to and from the building, structure or site, as necessary to achieve the purpose of this code.

Where there is conflict between a general requirement and a specific requirement, the specific requirement shall be applicable. Where, in any specific case, different sections of this code specify different requirements, the more restrictive shall govern.

In fulfilling these purposes, this ordinance is intended to benefit the public as a whole and not any specific person or class of persons. Although, through the implementation, administration and enforcement of this code, benefits and detriments will be enjoyed or suffered by specific individuals, such is merely a byproduct of the overall benefit to the whole community. Therefore, unintentional breaches of the obligations of administration and enforcement imposed on the jurisdiction hereby shall not be enforceable in tort.

If any portion of this code is held invalid for any reason, the remaining herein shall not be affected.

PART II – IECC-COMMERCIAL

Revise the International Energy Conservation Code-Commercial as follows:

IECC [A] C101.2 Scope. This code applies to *commercial buildings* and the buildings sites and associated systems and equipment. The provisions shall also apply to usage of the surrounding site and access to and from the building, structure or site, as necessary to achieve the purpose of this code.

PART III – IECC-RESIDENTIAL

Revise the International Energy Conservation Code-Residential as follows:

IECC [A] R101.2 Scope. This code applies to *residential buildings* and the buildings sites and associated systems and equipment. The provisions shall also apply to usage of the surrounding site and access to and from the building, structure or site, as necessary to achieve the purpose of this code.

PART IV – IRC

Revise the International Residential Code as follows:

IRC R101.2 Scope. The provisions of the *International Residential Code for One- and Two-family Dwellings* shall apply to the construction, *alteration*, movement, enlargement, replacement, repair, equipment, use and occupancy, location, removal and demolition of detached one- and two-family dwellings and townhouses not more than three stories above *grade plane* in height with a separate means of egress and their *accessory structures*. The provisions shall also apply to usage of the surrounding site and access to and from the building, structure or site, as necessary to achieve the purpose of this code.

Exceptions:

1. Live/work units complying with the requirements of Section 419 of the *International Building Code* shall be permitted to be built as one- and two-family *dwellings* or townhouses. Fire suppression required by Section 419.5 of the *International Building Code* when constructed under the *International Residential Code for One- and Two-family Dwellings* shall conform to Section P2904.
2. Owner-occupied lodging houses with five or fewer guestrooms shall be permitted to be constructed in accordance with the *International Residential Code for One- and Two-family Dwellings* when equipped with a fire sprinkler system in accordance with Section P2904.

PART V – ISPSC

Revise the International Swimming Pool and Spa Code as follows:

ISPSC 101.2 Scope. The provisions of this code shall apply to the construction, alteration, movement, renovation, replacement, repair and maintenance of *aquatic vessels*. The provisions shall also apply to usage of the surrounding site and access to and from the building, structure or site, as necessary to achieve the purpose of this code.

Reason: There are various provisions in all codes that deal with the site area, yet scoping provisions over the site are not provided. The purpose of this change is to identify that the site is also regulated by these codes.

The Fire Code, Section 101.2, item 3 already lists fire hazards on the “premise.” Thus, it recognizes site as part of the code.

Examples of site requirements in various codes:

Part I –

- IBC - Area increase, exterior wall fire rating, unlimited area yards, accessibility, means of egress to a public way, etc.
- ICCPC - Section 702.3 provides for access and movement on and around the site. Section 1701.2.5 deals with vegetation outside the building.
- IEBC - Area increase, accessibility, means of egress to a public way, etc.
- IFGC - Section 404.12 specifies the minimum burial depth of gas piping. Section 404.17.1 and 404.17.1, exception 3, prohibit plastic pipe from being installed under a slab unless certain conditions are met. Thus, a change in grade or the installation of a slab are items that affect the requirements for gas piping and should be regulated.
- IMC - Section 401.4, item 2, requires that air intake openings shall be separated from any hazardous or noxious contaminant source, such as vents, streets, alleys, parking lots and loading docks, unless openings are located not less than 25 feet vertically above such locations. As such, the installation of a parking lot near a ground level air intake opening would violate the intent and purpose of this code and should be regulated.

- IPC - Sections 1303, 1303.8, 1303.9.1, 1303.9.2, and 1303.9.3 all describe “site” draining, as well as, installation and design of gray water irrigation systems. Section 1303.8 specifically states “Private sewage disposal systems in compacted areas, such as parking lots and driveways, are prohibited. Surface water shall be diverted away from any soil absorption site on the same or neighboring lots.” As such, the installation of a parking lot and/or the change in site drainage should be regulated by this code.
- IPSDC - First Section 101.2 does not have any scoping language. It starts in by saying these systems are allowed. A scoping sentence is installed but may need more work. This was tried with code change ADM1-09/10 but may have been lost in the overall size of the change.
- Second, Section 401.3.2 specifies that the area for a “replacement system” is to be protected from becoming no longer suitable such as with the installation of a parking lot. Thus, the site needs to be protected.
- IPMC – Section 302 deals specifically with the surrounding site. Thus, the scoping for surrounding site would seem appropriate. IWUI - Section 101.2 needs some corrective language to match the other codes. Section 101.6 specifically states that maintenance of the landscape materials, vegetation and defensible space are to be maintained. These are all “site” issues. Thus, the scoping for surrounding site would seem appropriate.
- IZC - Section 103.3 requires the maintenance of “parcels” of land. Section 805.4 requires the maintenance of landscaping. And, the whole book is about setbacks.

Parts II and III –

- IECC – Commercial - Section C505.6 provides for outside lighting.
- IECC – Residential - “At this time there may not appear to be any exterior yard items that need protection. However, in case I missed something or there is a provision added in the future, it would be appropriate to have this provision.”

PART IV –

- IRC - Exterior wall rating, light and ventilation, emergency escape and rescue openings to a yard or court that opens to a public way

PART V –

- ISPSC - “The code addresses multiple issues outside of the actual pool such as fences, decks, access through buildings, etc.”

Cost Impact: This will not increase the cost of construction.

ADM1-13

PART I – IBC; ICCPC; IEBC; IFCG; IMC; IPC; IPSDC; IPMC; IWUIC; IZC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-COMMERCIAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART III – IECC-RESIDENTIAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART IV – IRC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART V – ISPSC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

[A] 101.2-ADM (ALL CODES)-GODWIN

ADM2 – 13

PART I – IBC: 101.2

PART II – IRC: R101.2, R202

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE ADMINISTRATIVE PROVISIONS COMMITTEE. PART II WILL BE HEARD BY THE RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee and Virginia Building and Code Officials Association (bajnaic@chesterfield.gov)

PART I – IBC

Revise the International Building Code as follows:

IBC [A] 101.2 Scope. The provisions of this code shall apply to the construction, *alteration*, relocation, enlargement, replacement, *repair*, equipment, use and occupancy, location, maintenance, removal and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures.

Exception: Detached one- and two-family *dwellings* and multiple single-family *dwellings* (*townhouses*) not more than three *stories* above *grade plane* in height with a separate *means of egress*, and their accessory structures not more than three stories above grade plane in height, shall comply with the *International Residential Code*.

PART II – IRC

Revise the International Residential Code as follows:

IRC SECTION R202 DEFINITIONS

ACCESSORY STRUCTURE. A structure ~~not greater than 3,000 square foot (279 m²) in floor area, and not over two stories in height, the use of which~~ that is customarily accessory to and incidental to that of the dwelling(s) and which is located on the same *lot*.

IRC R101.2 Scope. The provisions of the International Residential Code for One- and Two-family Dwellings shall apply to the construction, alteration, movement, enlargement, replacement, repair, equipment, use and occupancy, location, removal and demolition of detached one- and two-family dwellings and townhouses not more than three stories above grade plane in height with a separate means of egress and their accessory structures not more than three stories above grade plane in height.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

After a thorough investigation on the history of the code change that introduced a 3,000 square foot limitation on accessory structure, the BCAC discovered that there was no technical justification provided by the original proponent to limit the size of an accessory structure. After some extensive discussion, the BCAC decided that specifying a limitation on the size of the accessory structure should be a decision left to the building official as determined by local zoning ordinances.

Cost Impact: None

ADM2-13**PART I – IBC**

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IRC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R101.2-RB-BAJNAI-BCAC

ADM3 – 13

IEBC [A] 101.2

Proponent: Jerry R. Tepe, FAIA, JRT•AIA ARCHITECT, representing The American Institute of Architects

Revise the International Existing Building Code as follows:

IEBC [A] 101.2 Scope. The provisions of the *International Existing Building Code* shall apply to the *repair, alteration, change of occupancy, addition and relocation of existing buildings.*

Exception: Detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories above grade plane in height with a separate means of egress and their accessory structures and not required to comply with the International Existing Building Code.

Reason: The IEBC was never intended to apply to one- and two-family dwellings and townhouses, yet there is often confusion due to the broad definition of existing buildings. The IEBC started with the requirements currently found in Chapter 34 of the IBC which obviously applies only to commercial buildings. The IRC does have an Appendix J which sets requirements for similar changes to these residential buildings. The intent of this change is to only clarify the scope of the IEBC and eliminate any confusion. The proposed language is taken from the IBC but does not specifically require compliance with the IRC as appendices are optional and must be adopted to be applicable.

Cost Impact: None.

ADM3-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

[A] 101.2-ADM (IEBC)-TEPE

ADM4 – 13

IMC: [A] 101.2

Proponent: Ed Flanagan and Mike Quiroz, Alaska District Council of Laborers, representing Tim Sharp, Business Mgr/Secretary-Treasurer

Revise the International Mechanical Code as follows:

IMC [A] 101.2 Scope. This code shall regulate the design, installation, maintenance, alteration, and inspection of mechanical systems, including system components, equipment, and appliances specifically addressed herein, within buildings. ~~This code shall also regulate those mechanical systems, system components, equipment, and appliances specifically addressed herein.~~ The installation of fuel gas distribution piping and equipment, fuel gas-fired appliances, and fuel gas-fired appliance venting systems within buildings shall be regulated by the International Residential Code. Exception: Detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories high with separate means of egress and their accessory structures shall comply with the International Residential Code.

Exception: Detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories high with separate means of egress and their accessory structures shall comply with the *International Residential Code*.

Reason: The proposal clarifies the scope and application of the Code to systems and parts thereof within buildings only. Some jurisdictions have cited the existing second sentence as a “catch all” which enables them to apply the Code to installation of items exterior to buildings such as the buried loop piping for ground source heat pump systems.

Cost Impact: Cost impact, if any, would be to reduce the cost of construction by allowing more open competition among contractors (both mechanical or specialty and general or utility) for installation of piping exterior to a building.

ADM4-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

101.2-ADM (IMC)-FLANAGAN-QUIROZ

ADM5 – 13

PART I - IBC: 202; IFC: 202; IPMC: [A] 102.2, [A] 102.3, [A] 103.2, [A] 104.2, [A] 105.6, [A] 106.2, [A] 106.3, [A] 106.4, [A] 106.5, [A] 107.1, [A] 107.3, [A] 107.4, [A] 107.5(New), [A] 108.1, [A] 108.1.2, [A] 108.1.3, [A] 108.1.5, [A] 108.2, [A] 108.3, [A] 108.4, [A] 108.4.1, [A] 108.5, [A] 108.6, [A] 109.1, [A] 109.3, [A] 109.5, [A] 110.1, [A] 110.2, [A] 110.4, [A] 111.2, [A] 111.5, [A] 111.6, [A] 111.7, [A] 111.8, [A] 112.3, [A] 112.4, 202

PART II – IRC: 202

Proponent: Karen Blake, representing International Municipal Lawyers Association

PART I – IBC; IFC; IPMC

Revise the International Building Code as follows:

IBC SECTION 202 DEFINITIONS

[A] OWNER. Any person, agent, operator, entity, firm or corporation having a any legal or equitable interest in the property; or recorded in the official records of the state, county or municipality as holding an interest or title to the property; or otherwise having possession or control of the property, including the guardian of the estate of any such person, and the executor or administrator of the estate of such person if ordered to take possession of real property by a court.

Revise the International Fire Code as follows:

IFC SECTION 202 GENERAL DEFINITIONS

[A] OWNER. ~~A corporation, firm, partnership, association, organization and any other group acting as a unit, or a person who has legal title to any structure or premises with or without accompanying actual possession thereof, and shall include the duly authorized agent or attorney, a purchaser, devisee, fiduciary and any person having a vested or contingent interest in the premises in question. Any person,~~ agent, operator, entity, firm or corporation having any legal or equitable interest in the property; or recorded in the official records of the state, county or municipality as holding an interest or title to the property; or otherwise having possession or control of the property, including the guardian of the estate of any such person, and the executor or administrator of the estate of such person if ordered to take possession of real property by a court.

Revise the International Property Maintenance Code as follows:

IPMC SECTION 202 GENERAL DEFINITIONS

~~**CONDEMN.** To adjudge unfit for occupancy.~~

DAYS. Calendar days.

[A] OWNER. Any person, agent, operator, entity, firm or corporation having a any legal or equitable interest in the property; or recorded in the official records of the state, county or municipality as holding an interest or title to the property; or otherwise having possession or control of the property, including the guardian of the estate of any such person, and the executor or administrator of the estate of such person if ordered to take possession of real property by a court.

IPMC SECTION 102 APPLICABILITY

IPMC [A] 102.2 Maintenance. Equipment, systems, devices and safeguards required by this code or a previous regulation or code under which the structure or *premises* was constructed, altered or repaired shall be maintained in a safe and good working order. No *owner, operator* or *occupant* shall cause any service, facility, equipment or utility which is required under this section to be removed from or shut off from or discontinued for any occupied dwelling, except for such temporary interruption as necessary while repairs or alterations are in progress where approved by the code official. The requirements of this code are not intended to provide the basis for removal or abrogation of fire protection and safety systems and devices in existing structures. Except as otherwise specified herein, the *owner* or the *owner's* designated agent shall be responsible for the maintenance of buildings, structures and *premises*.

IPMC [A] 102.3 Application of other codes. Repairs, additions or alterations to a structure, or changes of *occupancy*, shall be done in accordance with ~~the~~ locally adopted procedures and provisions of the *International Building Code, International Energy Conservation Code, International Fire Code, International Fuel Gas Code, International Mechanical Code, International Residential Code, International Plumbing Code* and NFPA 70. Nothing in this code shall be construed to cancel, modify or set aside any provision of the *International Zoning Code* or the jurisdiction's zoning ordinance.

IPMC SECTION 103 DEPARTMENT OF PROPERTY MAINTENANCE INSPECTION

IPMC [A] 103.2 Appointment and authority. The *code official* shall be appointed by the chief appointing authority of the jurisdiction and shall be authorized to carry out the provisions of this code without further local government action unless otherwise required by law.

IPMC SECTION 104 DUTIES AND POWERS OF THE CODE OFFICIAL

IPMC [A] 104.2 Inspections. The *code official* shall make all of the required inspections, or shall be permitted to accept reports of inspection by *approved* agencies or individuals. All reports of such inspections shall be in writing and be certified by a responsible officer of such *approved* agency or by the responsible individual. The *code official* is authorized to engage such expert opinion as deemed necessary to report upon unusual technical issues that arise, subject to the approval of the appointing authority.

IPMC SECTION 105 APPROVAL

IPMC [A] 105.6 Research reports. Supporting data, where necessary to assist in the approval of materials or assemblies not specifically provided for in this code, shall ~~consist of~~ be permitted to include valid research reports from *approved* sources.

IPMC SECTION 106 VIOLATIONS

IPMC [A] 106.2 ~~Notice of violation~~ Enforcement. The *code official* shall ~~serve a notice of violation or order in accordance with Section 107~~ enforce this code through any or all of the following methods:

1. By issuing a notice of violation or order under Section 107;
2. By filing suit for abatement;
3. By issuing civil penalties; or
4. By pursuing criminal sanctions.

IPMC [A] 106.3 Options for prosecution of violation. The code official shall proceed through the issuance of a notice of violation or through a citation in any of the following ways:

1. Any person failing to comply with ~~a notice of violation or order served in accordance with Section 407~~ this code, including the orders and directions of the code official, shall be deemed guilty of a misdemeanor or civil infraction as determined by the local municipality, and the violation shall be deemed a *strict liability offense*.
2. If the notice of violation is not complied with, the *code official* shall be permitted to institute the appropriate proceeding at law or in equity to restrain, correct or abate such violation, or to require the removal or termination of the unlawful *occupancy* of the structure in violation of the provisions of this code or of the order or direction made pursuant thereto.
3. Any civil action taken by the authority having jurisdiction ~~on such~~ to enforce this code on a premises shall be charged against the real estate upon which the structure is located and shall be a lien upon such real estate and in addition, constitute the personal liability jointly and severally of those responsible.

IPMC [A] 106.4 Violation penalties Separate offenses. ~~Any person who shall violate a provision of this code, or fail to comply therewith, or with any of the requirements thereof, shall be prosecuted within the limits provided by state or local laws.~~ Each day that a violation continues after due notice has been served shall be deemed a separate offense. For civil citations, separate citations shall not be necessary where so stated in the original notice.

IPMC [A] 106.5 Abatement of violation. The imposition of the penalties herein prescribed shall not preclude the legal officer of the jurisdiction from instituting appropriate action, including action to restrain, correct or abate a violation, or to prevent illegal *occupancy* of a building, structure or *premises*, or to stop an illegal act, conduct, business or utilization of the building, structure or *premises*.

IPMC SECTION 107 NOTICES AND ORDERS

IPMC [A] 107.1 Notice to person responsible. Whenever the *code official* determines that there has been a violation of this code or has grounds to believe that a violation has occurred, notice shall be given in the manner prescribed in Sections 107.2 and 107.3 to the person responsible for the violation as specified in this code. Notices for ~~condemnation~~ procedures shall also comply with Section 108.3. Failure to provide notice as required in this code does not relieve a person from civil or criminal liability for the violation, nor relieve them of responsibility for complying with this code or the orders and direction of the code official. Lack of notice to one of the responsible parties does not relieve others with notice of their obligation to comply with the code or the orders and direction of the code official.

IPMC [A] 107.3 Method of service. ~~Such notice shall be deemed to be properly served if a copy thereof is:~~ Notice shall be permitted to be served using any of the following methods:

1. Delivered personally;
2. Sent by certified or first-class mail addressed to the last known address; or
3. If the notice is returned showing that the letter was not delivered, a copy thereof shall be posted in a conspicuous place in or about the structure affected by such notice.

Such notice is effective upon actual receipt or three days after posting in the mail or after posting on the property.

IPMC [A] 107.4 Unauthorized tampering. Signs, tags or seals posted or affixed by the *code official* shall not be mutilated, destroyed or tampered with, or removed without authorization from the *code official* is unlawful and constitutes a violation of this code.

IPMC [A] 107.5 Penalties. Penalties for noncompliance with orders and notices shall be as set forth in Section 106.4.

(Renumber subsequent sections)

IPMC SECTION 108 UNSAFE STRUCTURES AND EQUIPMENT

IPMC [A] 108.1 General. When a structure or equipment is found by the *code official* to be unsafe, or when a structure is found unfit for human *occupancy*, or is found unlawful, such structure shall be ~~condemned~~ declared as such pursuant to the provisions of this code.

IPMC [A] 108.1.2 Unsafe equipment. Unsafe equipment includes, but is not limited to, any boiler, heating equipment, elevator, moving stairway, electrical wiring or device, flammable liquid containers or other equipment on the *premises* or within the structure which is in such disrepair or condition that such equipment is a hazard to life, health, property or safety of the public or *occupants* of the *premises* or structure.

IPMC [A] 108.1.3 Structure unfit for human occupancy. A structure is unfit for human *occupancy* whenever the *code official* finds that such structure is unsafe, unlawful or, because of the degree to which the structure is in disrepair or lacks maintenance, is insanitary, vermin ~~or rat~~ infested, contains filth and contamination, or lacks *ventilation*, illumination, sanitary or heating facilities or other essential equipment required by this code, or because the location of the structure constitutes a hazard to the *occupants* of the structure or to the public.

IPMC [A] 108.1.5 Dangerous *structure or premises*. For the purpose of this code, any structure or *premises* that has any or all of the conditions or defects described below shall be considered dangerous:

1. Any door, aisle, passageway, stairway, exit or other means of egress that does not conform to the *approved* building or fire code of the jurisdiction as related to the requirements for existing buildings.
2. The walking surface of any aisle, passageway, stairway, exit or other means of egress is so warped, worn loose, torn or otherwise unsafe as to not provide safe and adequate means of egress.
3. Any portion of a building, structure or appurtenance that has been damaged by fire, earthquake, wind, flood, *deterioration*, *neglect*, abandonment, vandalism or by any other cause to such an extent that it is likely to partially or completely collapse, or to become *detached* or dislodged.
4. Any portion of a building, or any member, appurtenance or ornamentation on the exterior thereof that is not of sufficient strength or stability, or is not so *anchored*, attached or fastened in place so as to be capable of resisting natural or artificial loads of one and one-half the original designed value.
5. The building or structure, or part of the building or structure, because of dilapidation, *deterioration*, decay, faulty construction, the removal or movement of some portion of the ground necessary for the support, or for any other reason, is likely to partially or completely collapse, or some portion of the foundation or underpinning of the building or structure is likely to fail or give way.
6. The building or structure, or any portion thereof, is clearly unsafe for its use and *occupancy*.
7. The building or structure is *neglected*, damaged, dilapidated, unsecured or abandoned ~~so as to become an attractive nuisance to~~ and not sufficiently secure to prevent children ~~who might play in from entering~~ the building or structure to their danger, becomes a harbor for vagrants, the homeless or criminals or immoral persons, or ~~enables not sufficiently secure to prevent~~ persons from entering ~~to resort to~~ the building or structure ~~for~~ and committing a nuisance or an unlawful act.
8. Any building or structure has been constructed, exists or is maintained in violation of any specific requirement or prohibition applicable to such building or structure provided by the *approved* building or fire code of the jurisdiction, or of any law or ordinance to such an extent as to present either a substantial risk of fire, building collapse or any other threat to life and safety.
9. A building or structure, used or intended to be used for dwelling purposes, because of inadequate maintenance, dilapidation, decay, damage, faulty construction or arrangement, inadequate light,

ventilation, mechanical or plumbing system, or otherwise, is determined by the *code official* to be unsanitary, unfit for human habitation or in such a condition that is likely to cause sickness or disease.

10. Any building or structure, because of a lack of sufficient or proper fire-resistance-rated construction, fire protection systems, electrical system, fuel connections, mechanical system, plumbing system or other cause, is determined by the *code official* to be a threat to life or health.
11. Any portion of a building remains on a site after the demolition or destruction of the building or structure or whenever any building or structure is abandoned so as to ~~constitute such building or portion thereof as an attractive nuisance or~~ become a hazard to the public or a nuisance.

IPMC [A] 108.2 Closing of vacant structures. If the structure is vacant and unfit for human habitation and *occupancy*, and is not in danger of structural collapse, the *code official* is authorized to post a placard ~~of condemnation~~ on the *premises* and order the structure closed up ~~so as not to be an attractive nuisance.~~ Upon failure of the *owner* to close up the *premises* within the time specified in the order, the *code official* shall cause the *premises* to be closed and secured through any available public agency or by contract or arrangement by private persons and the cost thereof shall be the personal responsibility of the owner and charged against the real estate upon which the structure is located and shall be a lien upon such real estate and shall be collected by any other legal resource.

IPMC [A] 108.3 Notice. Whenever the *code official* has ~~condemned~~ found a structure to be unfit for *occupancy* or a structure or equipment unsafe under the provisions of this section, notice shall be posted in a conspicuous place in or about the structure affected by such notice and served on the *owner* or the person or persons responsible for the structure or equipment in accordance with Section 107.3. Failure to receive the notice does not relieve the owner or person responsible from liability under this code, nor does that failure preclude the code official from acting to protect the public health and safety. If the notice pertains to equipment, it shall also be placed on the ~~condemned~~ unsafe equipment. The notice shall be in the form prescribed in Section 107.2.

IPMC [A] 108.4 Placarding. In addition to the procedures authorized in Section 108.2, when the code official has issued an unsafe abatement order, upon failure of the *owner* or person responsible to comply with the notice provisions within the time given, the *code official* shall post on the *premises* or on defective equipment a warning placard bearing the word "~~Condemned~~ DANGER – Unsafe/Unfit for Occupancy" and a statement of the penalties provided for occupying the *premises*, operating the equipment or removing the placard.

IPMC [A] 108.4.1 Placard removal. The *code official* shall remove the ~~condemnation~~ warning placard whenever the defect or defects upon which the ~~condemnation and placarding~~ action were based have been eliminated. Any person who defaces or removes a ~~condemnation~~ warning placard without the approval of the *code official* shall be subject to the penalties provided by this code.

IPMC [A] 108.5 Prohibited occupancy. Any occupied structure ~~condemned~~ found unsafe or unfit for human occupancy and placarded by the *code official* shall be vacated as ordered by the *code official*. ~~Any~~ It shall be unlawful for a person who shall to occupy a placarded *premises* or ~~shall to~~ operate placarded equipment, and any *owner* or any person responsible for the *premises* who ~~shall let~~ allow anyone to occupy a placarded *premises* or to operate placarded equipment shall be ~~liable for the penalties provided by a violation of~~ liable for the penalties provided by a violation of this code.

IPMC [A] 108.6 Abatement methods. The *owner*, *operator* or *occupant* of a building, *premises* or equipment deemed unsafe by the *code official* shall abate or cause to be abated or corrected such unsafe conditions either by repair, rehabilitation, demolition or other *approved* corrective action within the time and manner prescribed by the code official.

IPMC SECTION 109 EMERGENCY MEASURES

IPMC [A] 109.1 Imminent danger. When, in the opinion of the *code official*, there is *imminent danger* of failure or collapse of a building or structure which endangers life, or when any structure or part of a structure has fallen and life is endangered by the occupation of the structure, or when there is actual or potential danger to the building *occupants* or those in the proximity of any structure because of explosives, explosive fumes or vapors or the presence of toxic fumes, gases or materials, or operation of defective or dangerous equipment, the *code official* is hereby authorized and empowered to order and require the *occupants* to vacate the *premises* forthwith. The *code official* shall cause to be posted at each entrance to such structure a notice reading as follows: "This Structure Is Unsafe and Its Occupancy Has Been Prohibited by the Code Official." It shall be unlawful for any person to enter such structure except as directed by the Code Official for the purpose of securing the structure, making the required repairs, removing the hazardous condition or of demolishing the same.

IPMC [A] 109.3 Closing streets. When necessary for public safety, the *code official* shall be permitted to temporarily close structures and, as directed and authorized by the appointing authority or appropriate agency having jurisdiction, close, or order the authority having jurisdiction to close, sidewalks, streets, public ways and places adjacent to unsafe structures, and prohibit the same from being utilized.

IPMC [A] 109.5 Costs of emergency repairs. Costs incurred in the performance of emergency work ~~shall be paid by the jurisdiction~~ be the personal responsibility of the owner and responsible parties of the premises and constitute jointly and severally removal shall be charged against the real estate upon which the structure is located and shall be a lien upon such real estate. The legal counsel of the jurisdiction shall institute appropriate action against the *owner and responsible parties* of the *premises* where the unsafe structure is or was located for the recovery of such costs or through foreclosure of the lien or both.

IPMC SECTION 110 DEMOLITION

IPMC [A] 110.1 General. The *code official* shall order the *owner* of any *premises* upon which is located any structure, which in the *code official* judgment after review is so deteriorated or dilapidated or has become so out of repair as to be dangerous, unsafe, insanitary or otherwise unfit for human habitation or occupancy, ~~and such that it is unreasonable to repair the structure, to demolish and remove such structure; or if such structure is capable of being made safe by repairs, to repair and make safe and sanitary, or to board up and hold for future repair or to demolish and remove at the owner's option; or where there has been a cessation of normal construction of any structure for a period of more than two years~~ one year, the code official shall order any of the following remedies: the owner to shall demolish and remove such structure, or make the premises safe and sanitary or board up the structure until future repair. Boarding the building up for future repair shall not extend beyond one year, unless approved by the building official. If after one year the boarded structure has not been repaired or brought into compliance, the building official shall be permitted to order demolition.

IPMC [A] 110.2 Notices and orders. All notices and orders shall comply with Section 107. Failure to comply does not affect the code official's authority to act or relieve the owner or responsible party of their obligation to comply with this code, the code official's orders or to eliminate dangerous, unsafe, insanitary or conditions making a property unfit for human habitation or occupancy.

IPMC [A] 110.4 Salvage materials. When any structure has been ordered demolished and removed, the governing body or other designated officer under said contract or arrangement aforesaid shall have the right to identify and sell the salvage and valuable materials at the highest price obtainable in a commercially reasonable manner. The net proceeds of such sale, after deducting the expenses of such demolition and removal, shall be promptly remitted with a report of such sale or transaction, including the items of expense and the amounts deducted, for the person who is entitled thereto, subject to any order of a court. If such a surplus does not remain to be turned over, the report shall so state.

IPMC SECTION 111 MEANS OF APPEAL

IPMC [A] 111.2 Membership of board. The board of appeals shall consist of a minimum of three members who are qualified by experience and training to pass on matters pertaining to property maintenance and who are not employees of the jurisdiction. ~~The code official shall be an ex-officio member but shall have no vote on any matter before the board.~~ The board shall be appointed by the chief appointing authority, and shall serve staggered and overlapping terms.

IPMC [A] 111.5 Postponed hearing. When the full board is not present to hear an appeal, either ~~the appellant or the appellant's representative~~ party shall have the right to request a postponement of the hearing.

IPMC [A] 111.6 Board decision. ~~The board shall modify or reverse the decision of the code official only by a concurring vote of a majority of the total number of appointed board members. On appeal, the code official shall first produce evidence substantiating the decision, notice or order at issue. If the board determines the code official has met this burden, then the appealing party shall show why the decision, notice or order should be reverse or modified. On all issues, the appeal shall be denied unless a majority of the board votes to approve, reverse or modify. Orders to remove tenants or to demolish a building or structure shall be sustained by majority vote of those present and voting. The decision of the board shall be reduced to a writing containing facts supporting the board's decision to approve, reverse or modify the code official's decision and the board's reasoning.~~

IPMC [A] 111.7 Court review. ~~The code official and any person, whether or not a previous party of participating in~~ the appeal, shall have the right to apply to the appropriate court for a writ of certiorari to correct errors of law. Application for review shall be made in the manner and time required by law following the filing of the decision in the office of the chief administrative officer.

IPMC [A] 111.8 Stays of enforcement. Appeals of notice and orders (other than *Imminent Danger* notices—for example, stop work orders, and orders to vacate) shall stay the enforcement of the notice and order until the appeal is heard by the appeals board.

IPMC SECTION 112 STOP WORK ORDER

IPMC [A] 112.3 Written notice not required in emergencies. Where an emergency exists, the *code official* shall not be required to give a written notice prior to stopping the work.

IPMC [A] 112.4 Failure to comply. Any person who shall continue any work after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, ~~shall be liable to a fine of not less than [AMOUNT] dollars or more than [AMOUNT] dollars constitute a violation of this code, punishable as a misdemeanor offense.~~

PART II – IRC

Revise the International Residential Code as follows:

IRC SECTION R202 DEFINITIONS

OWNER. Any person, agent, operator, entity, firm or corporation having a any legal or equitable interest in the property; or recorded in the official records of the state, county or municipality as holding an interest or title to the property; or otherwise having possession or control of the property, including the guardian of the estate of any such person, and the executor or administrator of the estate of such person if ordered to take possession of real property by a court.

Reason: The intent of this proposal is to avoid lengthy and expensive litigation, during the administrative process and if a decision is challenged in an appeal. The reason for changing the definition of "Owner" is both for consistency between codes and to hold those with ownership interests responsible for maintaining the property that they legally possess (e.g., mortgage), but fail to maintain. Deleting references to "condemn" is important because the legal connotation implies that a property will be taken through eminent domain proceedings and demolished, when, in fact, it is merely uninhabitable and capable of being boarded-up for safety until repairs can be made.

IMLA members would be honored to propose suggested revisions to the International Code Council's International Property Maintenance this year, in an effort to synergize our organizations' efforts. We are hopeful that your organization would consider some of these suggestions that originate from court cases around the country so that communities can benefit from the experience of others. Municipal attorneys across the country assist building officials in carrying out their duties and are often asked to interpret and opine on code provisions as they apply in their local jurisdictions.

Our attempt at making these suggestions was for a two-fold purpose: to assist in language that might help communities avoid unnecessary litigation and to begin to develop a good relationship between our organizations that are naturally aligned to improve our communities.

We hope these comments will lead to further discussion of what may be necessary to make the best model code possible and we look forward to working with you in the future!

The International Municipal Lawyers Association (IMLA) is a non-profit, professional organization that has been an advocate and resource for local government attorneys since 1935. IMLA services as an international clearinghouse of legal information and cooperation on municipal legal matters. IMLA collects from and disseminates information to its membership across the United States and Canada and helps governmental officials prepare for litigation and develop new local laws.

Every year, IMLA's legal staff provides accurate, up-to-date information and valuable counsel to hundreds of requests from members. IMLA also provides a variety of services, publications and programs to help members who are facing legal challenges. For the past 77 years, IMLA has held cutting edge national conferences, including a Code Enforcement Conference, bringing local government attorneys together to network and propose solutions to common problems. It champions the development of fair and realistic legal solutions and provides its members with information about, and solutions to, the profusion of legal issues facing its membership today.

Cost Impact:

ADM5-13

PART I – IBC; IFC; IPMC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IRC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

[A] 101.1-ADM (IBC)-BLAKE rev.doc

ADM6 – 13

PART I - IBC: [A] 101.3; ICCPC: [A] 101.2.2; IFC: [A] 101.3; IFCG: [A] 101.4; IMC: [A] 101.3; IPC: [A] 101.3; IPSDC: [A] 101.6; IPMC: [A] 101.2

PART II – IRC R101.3

THIS IS A 2 PART CODE CHANGE. PART 1 WILL BE HEARD BY THE ADMINISTRATIVE PROVISIONS COMMITTEE AS ONE CODE CHANGE. PART II WILL BE HEARD BY THE RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

Proponent: Carl F. Baldassarra, representing Rolf Jensen & Associates, Inc.
(cbaldassarra@rjagroup.com)

PART I – IBC; ICCPC; IFC; IFCG; IMC; IPC; IPSDC; IPMC

Revise the International Building Code as follows:

IBC [A] 101.3 Intent. The purpose of this code is to establish the minimum requirements to safeguard the public health, safety and general welfare through structural strength, *means of egress* facilities, stability, sanitation, adequate light and ventilation, energy conservation; to safeguard ~~and safety to~~ life and property from fire and other hazards attributed to the built environment; and, to safeguard ~~provide safety to~~ fire fighters and emergency responders during emergency operations.

Revise the International Code Council Performance Code as follows:

ICCPC [A] 101.2.2 Fire. Part III of this code establishes requirements necessary ~~to provide an acceptable level~~ to safeguard ~~of life safety and property protection~~ from the hazards of fire, explosion or dangerous conditions in all facilities, equipment and processes.

Revise the International Fire Code as follows:

IFC [A] 101.3 Intent. The purpose of this code is to establish the minimum requirements consistent with nationally recognized good practice for providing a reasonable level to safeguard ~~of life safety and property protection~~ from the hazards of fire, explosion or dangerous conditions in new and existing buildings, structures and premises, and to safeguard ~~provide safety to~~ fire fighters and emergency responders during emergency operations.

Revise the International Fuel Gas Code as follows:

IFGC [A] 101.4 Intent. The purpose of this code is to provide minimum standards to safeguard life ~~or limb~~, health, property and public welfare by regulating and controlling the design, construction, installation, quality of materials, location, operation and maintenance or use of fuel gas systems.

Revise the International Mechanical Code as follows:

IMC [A] 101.3 Intent. The purpose of this code is to provide minimum standards to safeguard life ~~or limb~~, health, property and public welfare by regulating and controlling the design, construction, installation, quality of materials, location, operation and maintenance or use of mechanical systems.

Revise the International Plumbing Code as follows:

IPC [A] 101.3 Intent. The purpose of this code is to provide minimum standards to safeguard life ~~or limb~~, health, property and public welfare by regulating and controlling the design, construction, installation, quality of materials, location, operation and maintenance or use of plumbing equipment and systems.

Revise the International Private Sewage Disposal Code as follows:

IPSDC [A] 101.6 Intent. The purpose of this code is to provide minimum standards to safeguard life ~~or limb~~, health, property and public welfare by regulating and controlling the design, construction, installation, quality of materials, location, operation and maintenance or use of *private sewage disposal systems*.

Revise the International Property Maintenance Code as follows:

IPMC [A] 101.2 Scope. The provisions of this code shall apply to all existing residential and nonresidential structures and all existing *premises* and constitute minimum requirements and standards for *premises*, structures, equipment and facilities for light, *ventilation*, space, heating, sanitation, protection from the elements, to safeguard life safety, ~~safety~~ from fire and other hazards, and for safe and sanitary maintenance; the responsibility of *owners, operators and occupants*; the *occupancy* of existing structures and *premises*, and for administration, enforcement and penalties.

PART II – IRC

Revise the International Residential Code as follows:

IRC R101.3 Intent. The purpose of this code is to establish minimum requirements to safeguard the public safety, health and general welfare through affordability, structural strength, means of egress facilities, stability, sanitation, light and ventilation, energy conservation and safety to life and property from fire and other hazards attributed to the built environment and to safeguard ~~provide safety to~~ fire fighters and emergency responders during emergency operations.

Reason: The intent of this change is to make a minor, but important, clarification of the intent of the code. The section covering the “intent” of the IBC is often used by attorneys and others outside of the code community as the basis for various legal actions. Therefore, it is important that this section reflects both the intention of the code community and the relative level of safety that is reasonably provided through these regulations.

The proposal includes changes that make the levels of intended “safety” the same to the reader by using the same term “safeguard” (used in the first phrase) in the other two phrases. While the language using the term “safeguard” is, perhaps, somewhat vague, it is better than suggesting absolute “safety” can be provided to any person or property through the provisions of the code. There is no intention to reduce the level of safety provided by the code with this change. All users and beneficiaries of the code will be better served through this clarification.

Cost Impact: This code change proposal will not affect the cost of construction.

Staff Analysis: The section on Intent are also found in IEBC 101.3, IWUIC 101.3, IZC 101.2, IECC C101.3, IECC R101.3 and IPSDC 101.3.

ADM6-13

PART I – IBC; ICCPC; IFC; IFCG; IMC; IPC; IPSDC; IPMC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IRC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

101.3-ADM (IBC)-BALDASSARRA

ADM7 – 13

R101.3

THIS WILL BE HEARD BY THE INTERNATIONAL RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

Proponent: Matt Archer, Douglas County, CO representing Colorado Chapter Code Change Committee (marcher@douglas.co.us)

Revise the International Residential Code as follows:

IRC R101.3 Intent. The purpose of this code is to establish minimum requirements to safeguard the public safety, health and general welfare through affordability, structural strength, means of egress facilities, stability, sanitation, light and ventilation, energy conservation and safety to life and property from fire and other hazards attributed to the built environment ~~and to provide safety to fire fighters and emergency responders during emergency operations.~~

Reason: This section identifies two distinct goals of the IBC, IFC and IRC: to protect the public and their property, and to provide safety for fire fighters and emergency responders. Code requirements should be developed and enforced for the protection of everyone, and firefighters and responders will benefit from the same protections intended to serve other occupants, even in the case of an emergency. The code should not be developed to provide for a special protected class of persons exposed to hazards only in the case of an emergency. It is understandable that emergency responders should not be exposed to additional hazards that are not also present for the occupants and visitors to a residence, but they are not. The safety of the occupants of a residence and protection of their property should be declared as the clear intent of this Code. To single out firefighters and emergency responders, a class of persons highly trained and very aware of the potential hazards of their professions, is not appropriately included as a primary intent of this code.

Cost Impact: None

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R101.3-RB-ARCHER

ADM8 – 13

PART I - IBC: [A] 101.3 **ICCPC:** [A] 101.2.2; **IEBC:** [A] 101.3; **IFC:** [A] 101.3; **IFGC:** [A] 101.4; **IMC:** [A] 101.3; **IPC:** [A] 101.3; **IPSDC:** [A] 101.6; **IPMC:** [A] 101.2; **IWUIC:** [A] 101.3

PART II - IRC: R101.3;

PART III - ISPSC 101.3

Proponent: James Bela, Oregon Earthquake Awareness, representing Oregon Earthquake Awareness

PART I – IBC; IEBC; IFC; IFGC; IMC; IPC; IPSDC; IPMC; IWUIC

Revise the International Building Code as follows:

IBC [A] 101.3 Intent. The purpose of this code is to establish the ~~minimum~~ the lowest allowable requirements to safeguard the public health, safety and general welfare through: structural strength, *means of egress* facilities, stability, sanitation, adequate light and ventilation, energy conservation; and safety to life and property from fire, wind, earthquake, radon and other hazards attributed to the built environment; and also to provide safety to fire fighters and emergency responders during emergency operations.

Revise the International Code Council Performance Code as follows:

ICCPC [A] 101.2.2 Fire. Part III of this code establishes requirements necessary to provide an acceptable level of life safety and property protection from the hazards of fire, wind, earthquake, radon, explosion or dangerous conditions in all facilities, equipment and processes.

Revise the International Existing Building Code as follows:

IEBC [A] 101.3 Intent. The intent of this code is to provide flexibility to permit the use of alternative approaches to achieve compliance with ~~minimum~~ the lowest allowable requirements to safeguard the public health, safety and welfare insofar as they are affected by the *repair, alteration, change of occupancy, addition* and relocation of *existing buildings*.

Revise the International Fire Code as follows:

IFC [A] 101.3 Intent. The purpose of this code is to establish the ~~minimum~~ the lowest allowable requirements consistent with nationally recognized good practice for providing a reasonable level of life safety and property protection from the hazards of fire, explosion or dangerous conditions in new and existing buildings, structures and premises; and also to provide safety to fire fighters and emergency responders during emergency operations.

Revise the International Fuel Gas Code as follows:

IFGC [A] 101.4 Intent. The purpose of this code is to provide ~~minimum~~ the lowest allowable standards to safeguard life or limb, health, property and public welfare by regulating and controlling the design, construction, installation, quality of materials, location, operation and maintenance or use of fuel gas systems.

Revise the International Mechanical Code as follows:

IMC [A] 101.3 Intent. The purpose of this code is to provide ~~minimum~~ the lowest allowable standards to safeguard life or limb, health, property and public welfare by regulating and controlling the design, construction, installation, quality of materials, location, operation and maintenance or use of mechanical systems.

Revise the International Plumbing Code as follows:

IPC [A] 101.3 Intent. The purpose of this code is to provide ~~minimum~~ the lowest allowable standards to safeguard life or limb, health, property and public welfare by regulating and controlling the design, construction, installation, quality of materials, location, operation and maintenance or use of plumbing equipment and systems.

Revise the International Private Sewage Disposal Code as follows:

IPSDC [A] 101.6 Intent. The purpose of this code is to provide ~~minimum~~ the lowest allowable standards to safeguard life or limb, health, property and public welfare by regulating and controlling the design, construction, installation, quality of materials, location, operation and maintenance or use of *private sewage disposal systems*.

Revise the International Property Maintenance Code as follows:

IPMC [A] 101.2 Scope. The provisions of this code shall apply to all existing residential and nonresidential structures and all existing *premises* and constitute ~~minimum~~ the lowest allowable requirements and standards for *premises*, structures, equipment and facilities for light, *ventilation*, space, heating, sanitation, protection from the elements, life safety, safety from fire, wind, earthquake, radon and other hazards, and for safe and sanitary maintenance; the responsibility of *owners, operators* and *occupants*; the *occupancy* of existing structures and *premises*, and for administration, enforcement and penalties.

IPMC [A] 101.3 Intent. This code shall be construed to secure its expressed intent, which is to ensure public health, safety and welfare insofar as they are affected by the continued *occupancy* and maintenance of structures and *premises*. Existing structures and *premises* that do not comply with these provisions shall be altered or repaired to provide a ~~minimum~~ the lowest allowable level of health and safety as required herein.

Revise the International Wildland-Urban Interface Code as follows:

IWUIC [A] 101.3 Objective. The objective of this code is to establish ~~minimum~~ the lowest allowable regulations consistent with nationally recognized good practice for the safeguarding of life and property. Regulations in this code are intended to mitigate the risk to life and structures from intrusion of fire from wildland fire exposures and fire exposures from adjacent structures and to mitigate structure fires from spreading to wildland fuels. The extent of this regulation is intended to be tiered commensurate with the relative level of hazard present.

The unrestricted use of property in *wildland-urban interface areas* is a potential threat to life and property from fire and resulting erosion. Safeguards to prevent the occurrence of fires and to provide adequate fire-protection facilities to control the spread of fire in *wildland-urban interface areas* shall be in accordance with this code.

This code shall supplement the jurisdiction's building and fire codes, if such codes have been adopted, to provide for special regulations to mitigate the fire- and life-safety hazards of the *wildland-urban interface areas*.

PART II – IRC

Revise the International Residential Code as follows:

R101.3 Intent. The purpose of this code is to establish ~~minimum~~ the lowest allowable requirements to safeguard the public safety, health and general welfare through: ~~affordability~~, structural strength, means of egress facilities, stability, sanitation, light and ventilation, energy conservation; and safety to life and property fire, wind, earthquake, radon and other hazards attributed to the built environment; and also to provide safety to fire fighters and emergency responders during emergency operations

PART III – ISPSC

Revise the International Swimming Pool and Spa Code as follows:

ISPSC 101.3 Intent. The purpose of this code is to provide ~~minimum~~ the lowest allowable standards to safeguard life or limb, health, property and public welfare by regulating and controlling the design, construction, installation, quality of materials, location and maintenance or use of *aquatic vessels*.

Reason:

- (a) “the lowest allowable” better reflects the reality that the code requirements are, in fact, too low for what the public expects and believes they are actually promised in a code compliant building. Unless the memory is jogged by this “up-front” language, both the public and code officials will presume (incorrectly) that the code delivers a top quality performer with exemplary safety and “end result.” Thus individuals and consumers of code compliant products may more directly and pro-actively *determine* the quality of performance that they both desire and also really have always expected (but incorrectly) was so.
- (b) “fire,” wind, earthquake, radon are the important circumstances with respect to property damage (insurance issues and claims) and both personal injury and life safety; and they therefore should be specifically called out in the text: equally important as “fire.”
- (c) ~~affordability~~ is deleted because it is too vague, non-specific, and not really applicable; since all other fixed factors in this residential code are *prescriptively* predicated on the lowest allowable requirements.

The term “affordable housing” has specific history, connotations and difficulties: see Wikipedia “Affordable Housing:” http://en.wikipedia.org/wiki/Affordable_housing

Location, land value, system development charges, as well as property tax structure also are important factors in determining affordability; which is often most simply represented as a certain percentage of homeowner income that can be apportioned off to housing. Thus “affordability” is not just the resultant of these residential (and mostly prescriptive) building code requirements – but the implication of this present “Intent” statement is that said “affordability” is determined, promised and guaranteed by these residential code requirements.

See also: IRC-14-3FIG. R301.2(2) SEISMIC DESIGN CATEGORIES SITE CLASS D.doc

Cost Impact: The code change proposal will not increase the cost of construction.

ADM8-13

PART I – IBC; ICCPC; IEBC; IFC; IFCG; IMC; IPC; IPSDC; IPMC; IWUIC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IRC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART III – ISPSC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R101.3-RB-BELA

ADM9 – 13

IEBC: [A] 101.4, [A] 101.4.1(New)

Proponent: David S. Collins, FAIA, The Preview Group, Inc./The American Institute of Architects
(dcollins@preview-group.com)

Revise the International Existing Building Code as follows:

IEBC [A] 101.4 Applicability. This code shall establish minimum requirements for existing buildings and apply to the maintenance, repair, alteration, change of occupancy, addition and relocation of all existing buildings, regardless of occupancy, subject to the criteria of Sections 101.4.1 and 101.4.2 through 101.4.3.

IEBC [A] 101.4.1 Maintenance. Buildings and structures, and parts thereof, shall be maintained in a safe and sanitary condition. Devices or safeguards which are required by this code, the *International Building Code* and the *International Fire Code* shall be maintained in conformance with the code edition under which installed. The owner or the owner's designated agent shall be responsible for the maintenance of buildings and structures. To determine compliance with this subsection, the code official shall have the authority to require a building or structure to be reinspected. The requirements of this chapter shall not provide the basis for removal or abrogation of fire protection and safety systems and devices in existing structures.

(Renumber subsequent sections)

Reason: The language and scope of Chapter 34 included provisions for the maintenance of existing buildings:

3401.2 Maintenance.

Buildings and structures, and parts thereof, shall be maintained in a safe and sanitary condition. Devices or safeguards which are required by this code shall be maintained in conformance with the code edition under which installed. The owner or the owner's designated agent shall be responsible for the maintenance of buildings and structures. To determine compliance with this subsection, the building official shall have the authority to require a building or structure to be reinspected. The requirements of this chapter shall not provide the basis for removal or abrogation of fire protection and safety systems and devices in existing structures.

This change adds the same scope for maintenance to become part of the administrative provisions of the IEBC.

Cost Impact: The cost of providing ongoing maintenance of existing maintenance will reduce the cost to owners by preventing deterioration that cause higher costs of repairs.

ADM9-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

[A] 101.4-ADM (IEBC)-COLLINS

ADM10 – 13

IEBC: [A] 101.4.2 (New), [A] 101.4.2.1 (New), [A] 101.4.2.2 (New)

Proponent: David S. Collins, FAIA, The Preview Group, Inc./The American Institute of Architects
(dcollins@preview-group.com)

Revise the International Existing Building Code as follows:

IEBC [A] 101.4.2 Certificate of Occupancy Renewal. The owner of a building that exceeds 25,000 sf. in aggregate floor area, or has multiple tenants, or includes a place of assembly shall be responsible to file for a renewal of the certificate of occupancy no less than every five years after the original certificate of occupancy is issued. Such renewal shall document in a written statement from the owner that the safety features of the building remain in proper working order as installed when the most current permit was issued, and maintenance requirements of the applicable codes have been performed and that required testing has been performed.

IEBC [A] 101.4.2.1 Documentation. In addition to the written statement, the owner shall submit records of inspection and testing of installation equipment and systems where this code or referenced standards require periodic inspections and testing. Documents shall include evidence of all inspections and testing listed in the applicable codes; the *International Fire Code*, the *Wildland-Urban Interface Code*, the *ICC Performance Code*, and *International Plumbing Code*.

IEBC [A] 101.4.2.2 Verification. As part of the written documentation, an owner may authorize a registered design professional to maintain the records and to prepare and submit the documents and application for renewal.

Reason: One of the difficulties with achieving the levels of performance anticipated in buildings is the ongoing maintenance of a building and its systems. Chapter 34 of the IBC has for years included a maintenance provision. With the deletion of Chapter 34 from the IBC we have submitted, in a separate code change, those same criteria to be added to the IEBC. With this change, as part of the Existing Building Code there will be a means by which owners can document measures they have taken to meet the requirements of the codes such as periodic inspections and testing.

The five-year period was taken from similar provision now found in the IFC for inspection of fire escapes. While these features of existing buildings are important and must be maintained to provide the expected level of safety, there are no means for the code official to know if that test has been performed. Often facilities undertake various small projects that are not monitored and this will allow for documentation of any elements that may have been modified over a period of time to be documented.

It is the intent that the responsibility for doing all work associated with the renewal will be the burden of the owner and that the application will simply provide the code official with a record of the buildings history and document what is being done to assure that the safety features of the building are maintained.

Cost Impact: This should lower the long term cost of construction.

ADM10-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

101.4.2 (NEW)-ADM (IEBC)-COLLINS

ADM11 – 13

IBC: [A] 101.4.7 (New), 202 (New), Chapter 35

Proponent: Anthony C. Apfelbeck, CBO, CFPS, City of Altamonte Springs Building/Fire Safety Division, representing self (ACApfelbeck@Altamonte.org)

Add new text to the International Building Code as follows:

IBC [A] 101.4.7 Performance based. The provisions of the ICC Performance Code for Buildings and Facilities shall apply to all buildings constructed or maintained utilizing a performance-based design.

Add new text to the International Building Code as follows:

IBC SECTION 202 DEFINITIONS

PERFORMANCE-BASED DESIGN. An engineering approach to design elements of a building based on agreed upon performance goals and objectives, engineering analysis and quantitative assessment of alternatives against the design goals and objectives utilizing accepted engineering tools, methodologies and performance criteria.

Add standard to IBC Chapter 35 as follows:

ICCPC-15 International Code Council Performance Code for Buildings and Facilities....101.4.7

Reason: Specifically referenced in the IBC are the ICC Gas, Mechanical, Plumbing, Property Maintenance, Fire, and Energy Codes. However, currently lacking from the referenced standards in the IBC model provisions is guidance for the code official on how to deal with a performance based design approach. The ICC promulgates the International Code Council Performance Code for Buildings and Facilities which is intended to provide the designer and user with specific guidance in dealing with performance based designs. Since the ICC promulgates a complete set of codes to regulate the built environment, it makes sense that the ICCPC be included within the basic referenced provisions in section 101.4.

In order to provide clarity to the end user, the definition of Performance-Based Design has been extracted from the ICCPC and included section 202 of the IBC.

Cost Impact: This code change will not increase the cost of construction.

ADM11-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

101.4.7 (NEW) #1-ADM (IBC)-APFELBECK

ADM12 – 13

IBC: [A] 101.4.7 (New), 202 (New)

Proponent: Anthony C. Apfelbeck, CBO, CFPS, City of Altamonte Springs Building/Fire Safety Division, representing self (ACApfelbeck@Altamonte.org)

Add new text to the International Building Code as follows:

IBC [A] 101.4.7 Wildland-Urban Interface. The provisions of the International Wildland-Urban Interface Code shall apply to all matters governing the design and construction of buildings within wildland-urban interface areas.

Add new text to the International Building Code as follows:

IBC SECTION 202 GENERAL DEFINITIONS

WILDLAND-URBAN INTERFACE AREA. That geographical area where structures and other human development meets or intermingles with wildland or vegetative fuels.

Reason: Specifically referenced in the IBC are the ICC Gas, Mechanical, Plumbing, Property Maintenance, Fire, and Energy Codes. However, currently lacking from the referenced standards in the IBC model provisions is guidance for the code official on how to deal with wild-land urban interface areas. The ICC promulgates the International Wildland-Urban Interface Code which is intended to provide the designer and user with specific guidance in dealing with structures constructed in wildland-urban interface area. Since the ICC promulgates a complete set of codes to regulate the built environment, it makes sense that the IWUIC be include within the basic referenced provisions in section 101.4.

In order to provide clarity to the end user, the definition of Wildland-Urban Interface Area has been extracted from the IWUIC and included section 202 of the IBC.

Cost Impact: This code change will increase the cost of construction.

ADM12-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

101.4.7 (NEW) #2-ADM (IBC)-APFELBECK

ADM13 – 13

IPMC: [A] 102.3

Proponent: David S. Collins, FAIA, The Preview Group, Inc., The American Institute of Architects
(dcollins@preview-group.com)

Revise the International Property Maintenance Code as follows:

IPMC [A] 102.3 Application of other codes. Repairs, additions or alterations to a structure, or changes of *occupancy*, shall be done in accordance with the procedures and provisions of the *International Building Code*, the International Existing Building Code, *International Energy Conservation Code*, *International Fire Code*, *International Fuel Gas Code*, *International Mechanical Code*, *International Residential Code*, *International Plumbing Code* and NFPA 70. Nothing in this code shall be construed to cancel, modify or set aside any provision of the *International Zoning Code*.

Reason : This is a correlative change. The membership deleted Chapter 34 from the IBC, and thus the reference to the IEBC as an alternative for compliance. The Property Maintenance Code should be permitted to use the IEBC for repairs and alterations.

Cost Impact: None

ADM13-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

102.3 (NEW)-ADM (IPMC)-COLLINS.doc

ADM14 – 13

IFC: [A] 102.3, [A] 102.3.1 (New), [A] 102.3.2 (New)

Proponent: Marc Sampson, Longmont Fire Department, CO, representing Fire Marshal's Association of Colorado

Revise the International Fire Code as follows:

IFC [A] 102.3 Change of use or occupancy. No change shall be made in the use or occupancy of any structure that would place the structure in a different division of the same group or occupancy or in a different group of occupancies, unless such structure is made to comply with the requirements of this code and the International Building Code.

IFC [A] 102.3.1 Less hazardous use. Subject to the approval of the fire code official, the use or occupancy of an existing structure shall be allowed to be changed and the structure is allowed to be occupied for purposes in other groups without conforming to all of the requirements of this code and the International Building Code for those groups, provided the new or proposed use is less hazardous, based on life and fire risk, than the existing use.

IFC [A] 102.3.2 Change in use or occupancy from the *International Residential Code*. For dwellings or townhouses constructed in compliance with the *International Residential Code*, no change shall be made in the use or occupancy of a building which would result in an occupancy regulated by this code unless such building is made to comply with the requirements of this code for the applicable occupancy classification.

REASON: Currently the code contains no provision on how to transition from an IRC structure to an IBC structure. The IBC and IFC are based on 'occupancy classifications' while the IRC is not.

These revisions are proposed to the IFC to clarify the application of the code when a building constructed under the IRC undergoes a change of use or occupancy which would now place the building under the regulation of the IFC. Since a dwelling constructed under the IRC is not constructed identically to a dwelling constructed under the IFC, it creates confusion as to how to make this transition.

The 2nd sentence of Section 102.3 is placed into a separate section creating Section 102.3.1. This section states the building official can allow a change of occupancy should not be hidden within the text, but in a standalone section.

Even though the text in IFC Section 102.3 does not show [B] in the margin, the current text is identical to the IBC and IEBC. Once the revisions are approved to the IBC, IEBC and IFC, all three codes will still contain the equivalent requirements and correlate.

Cost Impact: The code change will not increase the cost of construction.

ADM14-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

102.3.1 (NEW)-ADM (IFC)-SAMPSON

ADM15 – 13

IFC: 102.3.1 (New)

Proponent: Al Godwin, CBO, CPM, representing Aon Fire Protection Engineering Corporation.

Revise the International Fire Code as follows:

IFC [A] 102.3.1 Change of character. A change in occupancy, as defined in Section 202, with no change of occupancy classification, shall not be made to any structure that will subject the structure to any special provisions of the applicable *International Codes*, without approval of the *fire code official*. Compliance shall be only as necessary to meet the specific provisions and is not intended to require the entire building be brought into compliance.

Reason: This is a correlation with code change G231-12 which was approved as submitted last cycle. Currently, IFC Section 102.3 states:

“No change shall be made in the use or occupancy of any structure that would place the structure in a different division of the same group or occupancy or in a different group of occupancies, unless such structure is made to comply with the requirements of this code and the *International Building Code*.....”

But, what about change in occupancy that does not change division or group but does change the “level of activity” as specified in the definition of Change of Occupancy?

In the 2009/2010 code cycle, Code Change EB27-09/10 added “10. Ambulatory health care facilities” to IEBC Section 902.1 (now 1002.1) under the classification of “change of character. This section in the IEBC, along with The IEBC definition of Change of Use, in general verbiage, recognizes that there are changes of use that do not involve changing occupancy groups.

IEBC Section 1001.2 states:

“**1001.2 Change in occupancy with no change in occupancy classification.** A change in occupancy, as defined in Section 202, with no *change of occupancy* classification shall not be made to any structure that will subject the structure to any special provisions of the applicable *International Codes*, including the provisions of Sections 1002 through 1011, without the approval of the *code official*. A certificate of occupancy shall be issued where it has been determined that the requirements for the change in occupancy have been met.”

This proposal is to bring those provisions from IEBC Section 1001.2 over into the IFC.

As noted in the IEBC, it is possible to change a use without changing the occupancy classification. Some examples are as follows:

1. Group A-2 bar with an occupant load of 275 to a Group A-2 bar with an occupant load of 350. Increasing occupant loads is permitted under Section 1004.2.
2. Group B office to Group B Ambulatory Health Care
3. Group B office to Group B café
4. Group F-1 factory to a Group F-1 woodworking shop.
5. Group H-3 Oxidizing gases to Group H-3 Flammable solids
6. Group M retail to Group M retail of upholstered furniture
7. Group S-1 warehouse to Group S-1 tire warehouse over 20,000 cubic feet
8. Group S-1 warehouse to Group S-1 motor vehicle repair garage
9. Group R-2 apartment to Group R-2 Live/Work unit.

Each of these classifications has particular code provisions that would apply if the occupancy had been originally identified. Some items might be fire protection, alarms, fresh air, restroom facilities, accessibility, smoke barriers, etc. The IFC currently does not specifically address these changes since they do not change Groups or change Divisions within Groups.

When making a change of character, it is not necessary to totally re-evaluate the building. Only the new applicable provisions should be addressed.

For example:

Group A-2 bar with an occupant load of 275 to a Group A-2 bar with an occupant load of 350.

Items that might require review:

Means of egress – 1004.2, to the public way
Sprinklers – 903.2.1.2, only in this space
Alarms – 907.2.1, only in this space
Restrooms – Chapter 29

Fresh air – IMC
Accessibility – see Section 3411
If food – upgrade of interceptor provisions of the IPC

Items that might not require a new review:

Height and area
Exterior walls and openings

As this is a confusing issue, the code official will need to define what items of correction are appropriate. While the wording may be new, code officials have performed this service for years. This proposal just puts it in the code.

I thought about placing the provision in Chapter 11 for existing buildings but that would require moving Section 102.3 which is also existing buildings.

Costs: Since this provision is already being enforced in this manner, there should be no increase in costs of construction.

ADM15-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

102.3.1 (NEW)-F-GODWIN

ADM16 – 13

IFC: [A] 102.5

Proponent: Anthony C. Apfelbeck, CBO, CFPS, City of Altamonte Springs Building/Fire Safety Division, representing self. (ACApfelbeck@Altamonte.org); Steve Orłowski, representing National Association of Home Builders (NAHB) (sorłowski@nahb.org)

Revise the International Fire Code as follows:

IFC [A] 102.5 Application of residential code. Where structures are designed and constructed in accordance with the International Residential Code, the provisions of this code shall apply as follows:

1. Construction and design provisions: Provisions of this code pertaining to the exterior of the structure shall apply including, but not limited to, premises identification, fire apparatus access and water supplies. ~~Where interior or exterior systems or devices are installed, construction permits required by Section 105.7 of this code shall also apply.~~
2. Administrative and operational ~~and maintenance~~ provisions: All such provisions of this code shall apply.

Reason: The purpose of this code change is to address some of the controversy that has risen since the passage of a public comment on F3-07/08. The original purpose was to clear up the vagueness between the interaction between the IRC and the IFC and how they apply to one- and two- family dwellings and townhouses. The Fire Code Committee did not approve the original proposal which clearly stated that the IFC does not regulate the construction and design features of the structure built in accordance with the International Residential Code, but it does regulate the fire protections features leading up to the structure (such as premise identification, fire protection water supplies and fire apparatus access). A public comment was submitted and approved at the final action hearing which resulted in the current code text. Unfortunately, instead of clearing up where the scope of IFC ends and the scope of IRC begins, the current language has created more controversy over which code regulates the construction, design and maintenance of interior features in one- and two- family dwellings and townhouses.

One of the significant problems with the current language is found in the last sentence of the first application, regarding the construction permits required by section 105.7. All of the required construction permits that would apply to these types of structures, as indicated in this section, are already addressed within the scope of the International Residential Code. The concept of the IRC being a single source construction code is specifically stated within the commentary to R101.1 where it states that the intent of the IRC is to be a "stand-alone residential code that establishes minimum regulations for one- and two-family dwellings and townhouses." The IFC commentary to 102.5 further emphasizes this concept by stating "The IRC is designed and intended for use as a stand-alone code for the construction of detached one- and two-family dwellings and townhouses not more than three stories in height. As such, the construction of detached one- and two-family dwellings and townhouses *is regulated exclusively by the IRC and not subject to the provision of any other I-Codes*, other than to the extent specifically referenced. The intent of providing a stand-alone residential code is that there is no need for duplicative construction or permitting requirements within the I-Codes that would require a builder or homeowner to go out and get separate permits under the IRC and IFC for the same scope of work. Approval of this proposal will ensure the intent of the IRC scope, as a stand-alone construction document, is maintained while ensuring that the exterior fire protection features are still regulated under the scope of the IFC.

Another problem with the current language is the reference to all maintenance requirements of the IFC for IRC constructed structures. Prior to the approval of the public comment on F3-07/08, there was no specific language in the IFC that required maintenance for IRC structures in accordance with the IFC. Due to the language that was approved in F3-07/08 public comment, all of the maintenance provisions in the IFC should be being applied right now.

Looking over some of the maintenance requirements for fire alarm systems and carbon monoxide detectors it raises the questions, has the fire service been enforcing these provisions and if so how. In many states, once a one- and two family dwelling or townhouse receives its certificate of occupancy there is no more involvement with the building official. The IFC states that it is the fire official's responsibility to insure existing building meet the requirements of this code and that all buildings are maintained in accordance with its provisions? How many departments have requested entry to ensure that every existing one- and two- family dwelling is equipped with a carbon monoxide detector as required by the 2012 IFC? The current language of the IFC leaves the fire service open to liability if they are not enforcing the provisions of this code as it is written and adopted. Although some of the referenced standards in the IFC do not require maintenance on some of the system in a one-and two-family dwelling or townhouse, the inference is that maintenance is required since the term "maintenance" is utilized in 102.5 (2).

Cost Impact: The code change proposal will not increase the cost of construction.

ADM16-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

[A] 102.5-ADM (IFC)-APFELBECK-ORŁOWSKI

ADM17 – 13

IBC: [A] 102.6, [A] 102.6.1 (New), [A] 102.6.2 (New); IEBC: [A] 101.4.1 (New)

Proponent: David S. Collins, FAIA, The Preview Group, Inc./The American Institute of Architects
(dcollins@preview-group.com)

Revise the International Building Code as follows:

IBC [A] 102.6 Existing structures. The legal occupancy of any structure existing on the date of adoption of this code shall be permitted to continue without change, except as is specifically covered in this code, the International Existing Building Code, the International Property Maintenance Code or the International Fire Code, or as is deemed necessary by the building official for the general safety and welfare of the occupants and the public.

IBC [A] 102.6.1 Buildings not previously occupied. A building or portion of a building that has not been previously occupied or used for its intended purpose in accordance with the laws in existence at the time of its completion shall comply with the provisions of the International Building Code or International Residential Code, as applicable, for new construction or with any current permit for such occupancy.

IBC [A] 102.6.2 Buildings previously occupied. The legal occupancy of any building existing on the date of adoption of this code shall be permitted to continue without change, except as is specifically covered in this code, the International Fire Code, or the International Property Maintenance Code, or as is deemed necessary by the building official for the general safety and welfare of the occupants and the public.

Revise the International Existing Building Code as follows:

IEBC [A] 101.4 Applicability. This code shall apply to the *repair, alteration, change of occupancy, addition* and relocation of all *existing buildings*, regardless of occupancy, subject to the criteria of Sections 101.4.1 and 101.4.2.

IEBC [A] 101.4.1 Buildings not previously occupied. A building or portion of a building that has not been previously occupied or used for its intended purpose in accordance with the laws in existence at the time of its completion shall be permitted to comply with the provisions of the laws in existence at the time of its original permit unless such permit has expired. All subsequent permits shall comply with the International Building Code or International Residential Code, as applicable, for new construction ~~or with any current permit for such occupancy.~~

IEBC [A] 101.4.2 Buildings previously occupied. The legal occupancy of any building existing on the date of adoption of this code shall be permitted to continue without change, except as is specifically covered in this code, the *International Fire Code*, or the *International Property Maintenance Code*, or as is deemed necessary by the *code official* for the general safety and welfare of the occupants and the public.

Reason : The IBC does not now have specific statements regarding the conditions of buildings that have not been or have been previously occupied. The IEBC does include specific requirements for how changes in the code are to be applied. These provisions have been added here to provide the same coverage. In addition, vague language from IBC 102.6 has been removed as likely unenforceable, and certainly would leave an owner/developer/designer in the dark. Finally, the priority for existing permits has been made superior to the current language that says if a new code is adopted it should apply unless there is a permit, which was clumsy and confusing.

Cost Impact: None

ADM17-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

102.6.1 (NEW)-ADM (IBC)-COLLINS

ADM18– 13

PART I - IBC: [A] 103.2; IEBC: [A] 103.2; IFC: [A] 103.2; IFGC: [A] 103.2; IMC: [A] 103.2; IPC: [A] 103.2; IPMC: [A] 103.2; IPSDC: [A] 103.2; IWUIC: [A] 103.2;
PART II - IRC: R103.2;
PART III - ISPSC 103.2.

THIS IS A 3 PART CODE CHANGE. PART I WILL BE HEARD BY THE ADMINISTRATIVE PROVISIONS COMMITTEE AS ONE CODE CHANGE. PART II WILL BE HEARD BY THE RESIDENTIAL CODE COMMITTEE. PART III WILL BE HEARD BY THE SWIMMING POOL AND SPA CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

THIS CHANGE WILL BE HEARD BY THE FIRE CODE COMMITTEE AS ONE CODE CHANGE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

Proponent: Thomas Peterson, Box Elder County, representing the Utah Chapter of ICC
(tpeterson@boxeldercounty.org)

PART I – IBC; IEBC; IFC; IFGC; IMC; IPC; IPSDC; IPMC; IWUIC

Revise the International Building Code as follows:

IBC [A] 103.2 Appointment. The *building official* shall be appointed by ~~the chief appointing authority of~~ the jurisdiction.

Revise the International Existing Building Code as follows:

IEBC [A] 103.2 Appointment. The *code official* shall be appointed by ~~the chief appointing authority of~~ the jurisdiction.

Revise the International Fire Code as follows:

IFC [A] 103.2 Appointment. The *fire code official* shall be appointed by ~~the chief appointing authority of~~ the jurisdiction; and the *fire code official* shall not be removed from office except for cause and after full opportunity to be heard on specific and relevant charges by and before the appointing authority.

Revise the International Fuel Gas Code as follows:

IFGC [A] 103.2 Appointment. The code official shall be appointed by ~~the chief appointing authority of~~ the jurisdiction.

Revise the International Mechanical Code as follows:

IMC [A] 103.2 Appointment. The code official shall be appointed by ~~the chief appointing authority of~~ the jurisdiction.

Revise the International Plumbing Code as follows:

IPC [A] 103.2 Appointment. The code official shall be appointed by ~~the chief appointing authority of~~ the jurisdiction.

Revise the International Private Sewage Disposal Code as follows:

IPSDC [A] 103.2 Appointment. The code official shall be appointed by ~~the chief appointing authority of~~ the jurisdiction.

Revise the International Property Maintenance Code as follows:

IPMC [A] 103.2 Appointment. The *code official* shall be appointed by ~~the chief appointing authority of~~ the jurisdiction.

Revise the International Wildland-Urban Interface Code as follows:

IWUIC [A] 103.2 Appointment. The *code official* shall be appointed by ~~the chief appointing authority of~~ the jurisdiction.

PART II – IRC

Revise the International Residential Code as follows:

IRC R103.2 Appointment. The building official shall be appointed by ~~the chief appointing authority of~~ the jurisdiction.

PART III – ISPSC

Revise the International Swimming Pool and Spa Code as follows:

ISPSC 103.2 Appointment. The *code official* shall be appointed by ~~the chief appointing authority of~~ the jurisdiction.

Reason: The process in which a jurisdiction hires or by whom a Building/Code Official is appointed, should not be dictated by ICC and should be left up to the Jurisdiction in which he/she is being employed.

Cost Impact: No cost

ADM18-13

PART I – IBC; IEBC; IFC; IFCG; IMC; IPC; IPSDC; IPMC; IWUIC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IRC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART III – ISPSC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R103.2-RB-PETERSON

ADM19 – 13

IBC: [A] 104.2.1 (New); IEBC: [A] 104.2.1(New)

Proponent: Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency (Gregory.wilson2@fema.dhs.gov); Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency (rcquinn@earthlink.net)

Revise the International Building Code and the International Existing Building Code as follows:

IBC [A] 104.2.1 (IEBC [A] 104.2.1) Determination of substantially improved or substantially damaged existing buildings and structures in flood hazard areas. For applications for reconstruction, rehabilitation, repair, alteration, addition or other improvement of existing buildings or structures located in flood hazard areas, the building official shall determine if the proposed work constitutes substantial improvement or repair of substantial damage. Applications determined to constitute substantial improvement or repair of substantial damage shall require all existing portions of the entire building or structure to meet the requirements of Section 1612 (of the International Building Code).

(Renumber subsequent sections in the IEBC)

Reason: This language is similar to R105.3.1.1, which has the building official making a finding with regard to the value of the proposed work and market value of the building. This change is also proposed for the International Existing Building Code. Application of the IBC Chapter 34 requirements for existing buildings in flood hazard areas depends on the definitions of the terms “substantial improvement” and “substantial damage.” The proposed new subsection under Section 104.2 describes what the building official does to determine whether work proposed for existing buildings meets those definitions. A number of code officials have suggested to FEMA that the simple presence of the definitions is insufficient to ensure that these determinations are made and it would be helpful if the building official's responsibilities clearly specified making these determinations.

FEMA published extensive guidance on substantial improvement and substantial damage, including a number of acceptable methods to estimate market value and project costs. Most jurisdictions require the applicant to provide an estimate of costs, which is already required by Section 105.3#5 to be included in the application.

Cost Impact: None. The proposal describes determining whether work meets definitions that are already in the IBC.

ADM19-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

104.2.1 (NEW) #1-ADM (IBC)-QUINN-WILSON

ADM20 – 13

IFC [A] 104.7.2

Proponent: Elley Klausbruckner, representing Klausbruckner & Associates Inc (ek@klausbruckner.com)

Revise the International Fire Code as follows:

IFC [A] 104.7.2 Technical assistance. To determine the acceptability of technologies, processes, products, facilities, materials and uses attending the design, operation or use of a building or premises subject to inspection by the *fire code official*, the *fire code official* is authorized to require the *owner* or agent to provide, without charge to the jurisdiction, a technical opinion and report. The opinion and report shall be prepared by a qualified engineer, specialist, laboratory or fire safety specialty organization acceptable to the *fire code official* and shall analyze the fire safety properties of the design, operation or use of the building or premises and the facilities and appurtenances situated thereon, to recommend necessary changes. The *fire code official* is authorized to require design submittals to be prepared by, and bear the stamp of, a registered design professional. The *fire code official* is authorized to require technical opinions and reports to be prepared by a registered design professional when the technical opinions and reports affect the building design or site construction, or safety systems.

Reason: Building construction and systems such as mechanical, etc. have to be designed by a design professional. The report addressing the requirements for some of these systems is the basis of their design. It is illogical to require the design to be prepared by a registered design professional but allow the report addressing the basis of the design be prepared by someone other than a registered design professional. Additionally if there are intentional acts of omission [or misleading information] in the report prepared by a registered design professional, the authority having jurisdiction can submit a complaint to the state board and the registered design professional can face disciplinary action [from fines, loss of reputation, etc. to having their license revoked]. There are no major repercussions to the preparer of these reports if they are not registered design professionals or if the Jurisdiction or state does not require educational or licensing requirements from the preparer. The added language will lend added support to the jurisdiction when a technical report is required if chosen to adopt this section as a local or state amendment.

NOTE: IFC Definition of Registered Design Professional - An individual who is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws of the state or jurisdiction in which the project is to be constructed.

Cost Impact: None

ADM20-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

[A] 104.7.2-ADM (IFC)-KLAUSBRUCKNER

ADM21 – 13

PART I - IBC 104.8; IEBC 104.8; IFC 103.4, 103.4.1; IFGC 103.4; IMC 103.4; IPC 103.4; IPSDC 103.4; IPMC 103.4; IWUIC 104.3; IZC 104.7;

PART II - IRC 104.8;

PART III - ISPSC 103.4

THIS IS A 3 PART CODE CHANGE. PARTS I WILL BE HEARD BY THE ADMINISTRATIVE PROVISIONS COMMITTEE AS ONE CODE CHANGE. PART II WILL BE HEARD BY THE RESIDENTIAL CODE COMMITTEE. PART III WILL BE HEARD BY THE SWIMMING POOL AND SPA CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

Proponent: Mike Metheny, City of Aspen Colorado, representing Colorado Chapter Code Change Committee

PART I – IBC; IEBC; IFC; IFGC; IMC; IPC; IPSDC; IPMC; IWUIC; IZC

Revise the International Building Code as follows:

IBC [A] 104.8 Liability. The building official, member of the board of appeals or employee charged with the enforcement of this code, while acting for the jurisdiction in good faith and without malice in the discharge of the duties required by this code or other pertinent law or ordinance, shall not thereby be civilly or criminally rendered liable personally and is hereby relieved from personal liability for any damage accruing to persons or property as a result of any act or by reason of an act or omission in the discharge of official duties.

IBC [A] 104.8.1 Legal defense. Any suit or criminal complaint instituted against an officer or employee because of an act performed by that officer or employee in the lawful discharge of duties and under the provisions of this code shall be defended by legal representative of the jurisdiction until the final termination of the proceedings. The building official or any subordinate shall not be liable for cost in any action, suit or proceeding that is instituted in pursuance of the provisions of this code.

Revise the International Existing Building Code as follows:

IEBC [A] 104.8 Liability. The code official, member of the Board of Appeals, or employee charged with the enforcement of this code, while acting for the jurisdiction in good faith and without malice in the discharge of the duties required by this code or other pertinent law or ordinance, shall not thereby be rendered civilly or criminally liable personally and is hereby relieved from personal liability for any damage accruing to persons or property as a result of any act or by reason of an act or omission in the discharge of official duties.

IEBC [A] 104.8.1 Legal defense. Any suit or criminal complaint instituted against an officer or employee because of an act performed by that officer or employee in the lawful discharge of duties and under the provisions of this code shall be defended by legal representative of the jurisdiction until the final termination of the proceedings. The code official or any subordinate shall not be liable for cost in any action, suit, or proceeding that is instituted in pursuance of the provisions of this code.

Revise the International Fire Code as follows:

IFC [A] 103.4 Liability. The fire code official, member of the board of appeals, officer or employee charged with the enforcement of this code, while acting for the jurisdiction, in good faith and without malice in the discharge of the duties required by this code or other pertinent law or ordinance, shall not thereby be rendered civilly or criminally liable personally, and is hereby relieved from all personal liability for any damage accruing to persons or property as a result of an act or by reason of an act or omission in the discharge of official duties.

IFC [A] 103.4.1 Legal defense. Any suit or criminal complaint instituted against any officer or employee because of an act performed by that officer or employee in the lawful discharge of duties and under the provisions of this code shall be defended by the legal representative of the jurisdiction until the final termination of the proceedings. The fire code official or any subordinate shall not be liable for costs in an action, suit or proceeding that is instituted in pursuance of the provisions of this code; and any officer of the department of fire prevention, acting in good faith and without malice, shall be free from liability for acts performed under any of its provisions or by reason of any act or omission in the performance of official duties in connection therewith.

Revise the International Fuel Gas Code as follows:

IFCG [A] 103.4 Liability. The code official, member of the board of appeals or employee charged with the enforcement of this code, while acting for the jurisdiction in good faith and without malice in the discharge of the duties required by this code or other pertinent law or ordinance, shall not thereby be rendered civilly or criminally liable personally, and is hereby relieved from all personal liability for any damage accruing to persons or property as a result of an act or by reason of an act or omission in the discharge of official duties.

IFGC [A] 103.4.1 Legal defense. Any suit or criminal complaint instituted against any officer or employee because of an act performed by that officer or employee in the lawful discharge of duties and under the provisions of this code shall be defended by the legal representative of the jurisdiction until the final termination of the proceedings. The code official or any subordinate shall not be liable for costs in an action, suit or proceeding that is instituted in pursuance of the provisions of this code.

Revise the International Mechanical Code as follows:

IMC [A] 103.4 Liability. The code official, member of the board of appeals or employee charged with the enforcement of this code, while acting for the jurisdiction in good faith and without malice in the discharge of the duties required by this code or other pertinent law or ordinance, shall not thereby be rendered civilly or criminally liable personally, and is hereby relieved from personal liability for any damage accruing to persons or property as a result of an act or by reason of an act or omission in the discharge of official duties.

IMC [A] 103.4.1 Legal defense. Any suit or criminal complaint instituted against any officer or employee because of an act performed by that officer or employee in the lawful discharge of duties and under the provisions of this code shall be defended by the legal representative of the jurisdiction until the final termination of the proceedings. The code official or any subordinate shall not be liable for costs in an action, suit or proceeding that is instituted in pursuance of the provisions of this code.

Revise the International Plumbing Code as follows:

IPC [A] 103.4 Liability. The code official, member of the board of appeals or employee charged with the enforcement of this code, while acting for the jurisdiction in good faith and without malice in the discharge of the duties required by this code or other pertinent law or ordinance, shall not thereby be rendered civilly or criminally liable personally, and is hereby relieved from all personal liability for any damage accruing to persons or property as a result of any act or by reason of an act or omission in the discharge of official duties.

IPC [A] 103.4.1 Legal defense. Any suit or criminal complaint instituted against any officer or employee because of an act performed by that officer or employee in the lawful discharge of duties and under the provisions of this code shall be defended by the legal representative of the jurisdiction until the final termination of the proceedings. The code official or any subordinate shall not be liable for costs in any action, suit or proceeding that is instituted in pursuance of the provisions of this code.

Revise the International Private Sewage Disposal Code as follows:

IPSDC [A] 103.4 Liability. The code official, member of the board of appeals or employee charged with the enforcement of this code, while acting for the jurisdiction in good faith and without malice in the discharge of the duties required by this code or other pertinent law or ordinance, shall not thereby be rendered civilly or criminally liable personally, and is hereby relieved from all personal liability for any damage accruing to persons or property as a result of any act or by reason of an act or omission in the discharge of official duties.

IPSDC [A] 103.4.1 Legal defense. Any suit or criminal complaint instituted against any officer or employee because of an act performed by that officer or employee in the lawful discharge of duties and under the provisions of this code shall be defended by the legal representative of the jurisdiction until the final termination of the proceedings. The code official or any subordinate shall not be liable for costs in any action, suit or proceeding that is instituted in pursuance of the provisions of this code.

Revise the International Property Maintenance Code as follows:

IPMC [A] 103.4 Liability. The code official, member of the board of appeals or employee charged with the enforcement of this code, while acting for the jurisdiction, in good faith and without malice in the discharge of the duties required by this code or other pertinent law or ordinance, shall not thereby be rendered civilly or criminally liable personally, and is hereby relieved from all personal liability for any damage accruing to persons or property as a result of an act or by reason of an act or omission in the discharge of official duties.

IPMC [A] 103.4.1 Legal defense. Any suit or criminal complaint instituted against any officer or employee because of an act performed by that officer or employee in the lawful discharge of duties and under the provisions of this code shall be defended by the legal representative of the jurisdiction until the final termination of the proceedings. The code official or any subordinate shall not be liable for costs in an action, suit or proceeding that is instituted in pursuance of the provisions of this code.

Revise the International Wildland-Urban Interface Code as follows:

IWUIC [A] 104.3 Liability of the code official. The code official, member of the board of appeals or employee charged with the enforcement of this code, acting in good faith and without malice in the discharge of the duties required by this code or other pertinent law or ordinance, shall not thereby be rendered civilly or criminally personally liable for damages that may accrue to persons or property as a result of an act or by reason of an act or omission in the discharge of such duties.

IWUIC [A] 104.3.1 Legal defense. A suit or criminal complaint brought against the code official or employee because of such act or omission performed by the code official or employee in the enforcement of any provision of such codes or other pertinent laws or ordinances implemented through the enforcement of this code or enforced by the code enforcement agency shall be defended by this jurisdiction until final termination of such proceedings, and any judgment resulting there from shall be assumed by this jurisdiction. The code enforcement agency or its parent jurisdiction shall not be held as assuming any liability by reason of the inspections authorized by this code or any permits or certificates issued under this code.

Revise the International Zoning Code as follows:

IZC [A] 104.7 Liability. The code official, or designee, charged with the enforcement of this code, acting in good faith and without malice in the discharge of the duties described in this code, shall not be personally civilly or criminally liable for any damage that may accrue to persons or property as a result of an act or by reason of an act or omission in the discharge of such duties.

IFGC [A] 104.7.1 Legal defense. A suit or criminal complaint brought against the code official or employee because such act or omission performed by the code official or employee in the enforcement of

any provision of such codes or other pertinent laws or ordinances implemented through the enforcement of this code or enforced by the enforcement agency shall be defended by the jurisdiction until final termination of such proceedings, and any judgment resulting therefrom shall be assumed by the jurisdiction.

This code shall not be construed to relieve from or lessen the responsibility of any person owning, operating or controlling any building or parcel of land for any damages to persons or property caused by defects, nor shall the enforcement agency or its jurisdiction be held as assuming any such liability by reason of the reviews or permits issued under this code

PART II – IRC

Revise the International Residential Code as follows:

IRC R104.8 Liability. The building official, member of the board of appeals or employee charged with the enforcement of this code, while acting for the jurisdiction in good faith and without malice in the discharge of the duties required by this code or other pertinent law or ordinance, shall not thereby be rendered civilly or criminally liable personally and is hereby relieved from personal liability for any damage accruing to persons or property as a result of any act or by reason of an act or omission in the discharge of official duties.

IRC R104.8.1 Legal defense. Any suit or criminal complaint instituted against an officer or employee because of an act performed by that officer or employee in the lawful discharge of duties and under the provisions of this code shall be defended by legal representative of the jurisdiction until the final termination of the proceedings. The building official or any subordinate shall not be liable for cost in any action, suit or proceeding that is instituted in pursuance of the provisions of this code.

PART III – ISPSC

Revise the International Swimming Pool and Spa Code as follows:

ISPSC 103.4 Liability. The *code official*, member of the board of appeals or employee charged with the enforcement of this code, while acting for the *jurisdiction* in good faith and without malice in the discharge of the duties required by this code or other pertinent law or ordinance, shall not thereby be rendered civilly or criminally liable personally and is hereby relieved from personal liability for any damage accruing to persons or property as a result of any act or by reason of an act or omission in the discharge of official duties.

ISPSC 103.4.1 Legal defense. Any suit or criminal complaint instituted against an officer or employee because of an act performed by that officer or employee in the lawful discharge of duties and under the provisions of this code shall be defended by legal representative of the jurisdiction until the final termination of the proceedings. The *code official* or any subordinate shall not be liable for cost in any action, suit or proceeding that is instituted in pursuance of the provisions of this code.

Reason: An Inspector in Colorado was charged with criminally negligent homicide as well as in a civil case as a result of a carbon monoxide poisoning that occurred in 2008. The inspector found that he was not afforded sovereign immunity for criminal charges even though he was acting in good faith and without malice in the discharge of the duties required by the codes. The jurisdiction was forced to go to City Council to request supplemental funding for his defense. The cost to the jurisdiction in defending the case was in excess of \$260,000. The criminal case was eventually dismissed based on a motion that the statute of limitations had run. The criminal case was dismissed on its merits. As code officials we need to know that immunity extends to both criminal and civil actions while discharging our duties and providing for public safety and welfare.

The addition of the title to split the requirements in two parts is for consistency with the IFC.

Cost Impact: This code change proposal will not increase the cost of construction.

ADM21-13**PART I – IBC; IEBC; IFC; IFCG; IMC; IPC; IPSDC; IPMC; IWUIC; IZC**

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IRC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART III – ISPSC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

104.8-ADM (ALL CODES)-METHENY

ADM22 – 12

PART I – IBC: [A] 104.10, [A] 105.1, [A] 106.1, [A] 107.3.4, [A] 110.1, [A] 115.2, 202, 901.5, 1004.3, 1703.4.1, 1703.6, 1703.6.1, 1704.2, 1704.2.4, 1707.1, 1803.6, 3306.8, 3401.2, G104.1, J106.1, K102.3;

ICCPC: [A] 103.3.1, [A] 103.3.1.1, [A] 103.3.1.2, [A] 103.3.1.3, [A] 103.3.1.4, [A] 103.3.1.5, [A] 103.3.1.6, [A] 103.3.1.7, [A] 103.3.1.8, [A] 103.3.1.9, [A] 103.3.4.1.4, [A] 103.3.1.4.6, [A] 103.3.4.2.3, [A] 103.3.8.3, [A] 103.3.9.1.4, [A] 103.3.9.2.3, [A] 103.3.10.1;

IEBC: [A] 104.6, [A] 104.10, [A] 105.1, [A] 106.6, [A] 110.2, [A] 111.3, [A] 114.2, [A] 115.3, [A] 115.4, [A] 116.5, [A] 117.1, [A] 117.3;

IFC: [A] 104.3, [A] 104.3.1, [A] 104.7.2, [A] 105.1.1, [A] 109.2, [A] 109.3.1, [A] 109.3.2, [A] 110.4, [A] 111.2, [A] 112.1;

IFGC: [A] 102.3, [A] 104.4, [A] 105.1, [A] 106.1, [A] 106.3, [A] 108.5, [A] 108.7.2;

IMC: [A] 102.3, [A] 104.4, [A] 105.1, [A] 106.1, [A] 106.3, [A] 108.5, [A] 108.7.2;

IPC: [A] 102.3, [A] 104.4, [A] 105.1, [A] 106.1, [A] 106.3, [A] 108.5, [A] 108.7.2;

IPSDC: [A] 102.5, [A] 104.4, [A] 105.1, [A] 108.5, [A] 108.7.2;

IPMC: [A] 101.2, [A] 102.2, [A] 104.3, [A] 105.1, [A] 107.2, [A] 107.6, [A] 108.2, [A] 108.2.1, [A] 108.3, [A] 108.4, [A] 108.5, [A] 108.6, [A] 109.5, [A] 110.1, [A] 110.3, [A] 112.2;

IWUIC: [A] 101.6, [A] 105.1, [A] 105.2, [A] 109.2.2, [A] 109.3, [A] 109.4.1, [A] 109.4.5.2, [A] 109.4.5.2.1, [A] 109.4.5.3, [A] 109.4.5.4, [A] 113.2, [A] 114.2;

IZC: [A] 103.3, [A] 107.7.3, [A] 109.1

PART II – IECC: C108.2;

PART III – IECC: R108.2;

PART IV – IRC: R104.6, R105.1, R110.3, R111.3, R114.1;

PART V – ISPSC 102.3, 104.6, 104.8, 105.1, 105.2, 107.5, 107.7.2;

THIS IS A 5 PART CODE CHANGE. PARTS I WILL BE HEARD BY THE ADMINISTRATIVE PROVISIONS COMMITTEE AS ONE CODE CHANGE. PART II WILL BE HEARD BY THE ENERGY CONSERVATION CODE-COMMERCIAL COMMITTEE. PART III WILL BE HEARD BY THE ENERGY CONSERVATION CODE-RESIDENTIAL COMMITTEE. PART IV WILL BE HEARD BY THE RESIDENTIAL CODE COMMITTEE. PART V WILL BE HEARD BY THE SWIMMING POOL AND SPA CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

Proponent: Philip Brazil, P.E., S.E., Reid Middleton, Inc., representing Washington Association of Building Officials, Technical Code Development Committee (pbrazil@reidmiddleton.com)

PART I – IBC; ICCPC; IEBC; IFC; IFGC; IMC; IPC; IPSDC; IPMC; IWUIC; IZC

Revise the International Building Code as follows:

IBC SECTION 202 DEFINITIONS

IBC [A] REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE. *A registered design professional engaged by the owner or the owner's authorized agent to review and coordinate certain aspects of the project, as determined by the building official, for compatibility with the design of the building or structure, including submittal documents prepared by others, deferred submittal documents and phased submittal documents.*

Revise the International Building Code as follows:

IBC [A] 104.10 Modifications. Wherever there are practical difficulties involved in carrying out the provisions of this code, the *building official* shall have the authority to grant modifications for individual cases, upon application of the owner or the owner's representative authorized agent, provided the *building official* shall first find that special individual reason makes the strict letter of this code impractical and the modification is in compliance with the intent and purpose of this code and that such modification does not lessen health, accessibility, life and fire safety, or structural requirements. The details of action granting modifications shall be recorded and entered in the files of the department of building safety.

IBC [A] 105.1 Required. Any owner or owner's authorized agent who intends to construct, enlarge, alter, repair, move, demolish, or change the occupancy of a building or structure, or to erect, install, enlarge, alter, repair, remove, convert or replace any electrical, gas, mechanical or plumbing system, the installation of which is regulated by this code, or to cause any such work to be done, shall first make application to the *building official* and obtain the required *permit*.

IBC [A] 106.1 Live loads posted. Where the live loads for which each floor or portion thereof of a commercial or industrial building is or has been designed to exceed 50 psf (2.40 kN/m²), such design live loads shall be conspicuously posted by the owner or the owner's authorized agent in that part of each story in which they apply, using durable signs. It shall be unlawful to remove or deface such notices.

IBC [A] 107.3.4 Design professional in responsible charge. When it is required that documents be prepared by a *registered design professional*, the *building official* shall be authorized to require the owner or the owner's authorized agent to engage and designate on the building *permit* application a *registered design professional* who shall act as the *registered design professional in responsible charge*. If the circumstances require, the owner or the owner's authorized agent shall designate a substitute registered design professional in responsible charge who shall perform the duties required of the original *registered design professional in responsible charge*. The building official shall be notified in writing by the owner or the owner's authorized agent if the *registered design professional in responsible charge* is changed or is unable to continue to perform the duties.

The *registered design professional in responsible charge* shall be responsible for reviewing and coordinating submittal documents prepared by others, including phased and deferred submittal items, for compatibility with the design of the building.

IBC [A] 110.1 General. Construction or work for which a permit is required shall be subject to inspection by the *building official* and such construction or work shall remain accessible and exposed for inspection purposes until *approved*. Approval as a result of an inspection shall not be construed to be an approval of a violation of the provisions of this code or of other ordinances of the jurisdiction. Inspections presuming to give authority to violate or cancel the provisions of this code or of other ordinances of the jurisdiction shall not be valid. It shall be the duty of the ~~permit applicant~~ owner or the owner's authorized agent to cause the work to remain accessible and exposed for inspection purposes. Neither the *building official* nor the jurisdiction shall be liable for expense entailed in the removal or replacement of any material required to allow inspection.

IBC [A] 115.2 Issuance. The stop work order shall be in writing and shall be given to the owner of the property involved, ~~or to the owner's~~ authorized agent, or ~~to the person doing the work~~. Upon issuance of a stop work order, the cited work shall immediately cease. The stop work order shall state the reason for the order, and the conditions under which the cited work will be permitted to resume.

Revise the International Building Code as follows:

IBC 901.5 Acceptance tests. Fire protection systems shall be tested in accordance with the requirements of this code and the *International Fire Code*. When required, the tests shall be conducted in the presence of the building official. Tests required by this code, the *International Fire Code* and the standards listed in this code shall be conducted at the expense of the owner or the owner's ~~representative~~

authorized agent. It shall be unlawful to occupy portions of a structure until the required fire protection systems within that portion of the structure have been tested and approved.

Revise the International Building Code as follows:

IBC 1004.3 (IFC [B] 1004.3) Posting of occupant load. Every room or space that is an assembly occupancy shall have the occupant load of the room or space posted in a conspicuous place, near the main exit or exit access doorway from the room or space. Posted signs shall be of an approved legible permanent design and shall be maintained by the owner or the owner's authorized agent.

Revise the International Building Code as follows:

IBC 1703.4.1 Research and investigation. Sufficient technical data shall be submitted to the *building official* to substantiate the proposed use of any material or assembly. If it is determined that the evidence submitted is satisfactory proof of performance for the use intended, the *building official* shall approve the use of the material or assembly subject to the requirements of this code. The costs, reports and investigations required under these provisions shall be paid by the ~~applicant~~ owner or the owner's authorized agent.

IBC 1703.6 Evaluation and follow-up inspection services. Where structural components or other items regulated by this code are not visible for *inspection* after completion of a prefabricated assembly, the ~~applicant~~ owner or the owner's authorized agent shall submit a report of each prefabricated assembly. The report shall indicate the complete details of the assembly, including a description of the assembly and its components, the basis upon which the assembly is being evaluated, test results and similar information and other data as necessary for the *building official* to determine conformance to this code. Such a report shall be *approved* by the *building official*.

IBC 1703.6.1 Follow-up inspection. The ~~applicant~~ owner or the owner's authorized agent shall provide for *special inspections* of fabricated items in accordance with Section 1704.2.5.

IBC 1704.2 Special Inspections. Where application is made for construction as described in this section, the owner or the *registered design professional in responsible charge* acting as the owner's authorized agent shall employ one or more *approved agencies* to perform inspections during construction on the types of work listed under Section 1705. These inspections are in addition to the inspections specified in Section 110.

Exceptions:

1. *Special inspections* are not required for construction of a minor nature or as warranted by conditions in the jurisdiction as *approved* by the *building official*.
2. Unless otherwise required by the *building official*, *special inspections* are not required for Group U occupancies that are accessory to a residential occupancy including, but not limited to, those listed in Section 312.1.
3. Special inspections are not required for portions of structures designed and constructed in accordance with the cold-formed steel light-frame construction provisions of Section 2211.7 or the conventional light-frame construction provisions of Section 2308.

IBC 1704.2.4 Report requirement. Special inspectors shall keep records of inspections. The special inspector shall furnish inspection reports to the *building official*, and to the *registered design professional in responsible charge*. Reports shall indicate that work inspected was or was not completed in conformance to *approved construction documents*. Discrepancies shall be brought to the immediate attention of the contractor for correction. If they are not corrected, the discrepancies shall be brought to the attention of the *building official* and to the *registered design professional in responsible charge* prior to the completion of that phase of the work. A final report documenting required *special inspections* and correction of any discrepancies noted in the inspections shall be submitted at a point in time agreed upon

prior to the start of work by the ~~applicant and~~ owner or the owner's authorized agent to the *building official*.

IBC 1707.1 General. In the absence of *approved* rules or other *approved* standards, the *building official* shall make, or cause to be made, the necessary tests and investigations; or the *building official* shall accept duly authenticated reports from *approved agencies* in respect to the quality and manner of use of new materials or assemblies as provided for in Section 104.11. The cost of all tests and other investigations required under the provisions of this code shall be borne by the ~~applicant~~ owner or the owner's authorized agent.

Revise the International Building Code as follows:

IBC 1803.6 Reporting. Where geotechnical investigations are required, a written report of the investigations shall be submitted to the *building official* by the owner or owner's authorized agent at the time of *permit* application. This geotechnical report shall include, but need not be limited to, the following information:

1. A plot showing the location of the soil investigations.
2. A complete record of the soil boring and penetration test logs and soil samples.
3. A record of the soil profile.
4. Elevation of the water table, if encountered.
5. Recommendations for foundation type and design criteria, including but not limited to: bearing capacity of natural or compacted soil; provisions to mitigate the effects of expansive soils; mitigation of the effects of liquefaction, differential settlement and varying soil strength; and the effects of adjacent loads.
6. Expected total and differential settlement.
7. Deep foundation information in accordance with Section 1803.5.5.
8. Special design and construction provisions for foundations of structures founded on expansive soils, as necessary.
9. Compacted fill material properties and testing in accordance with Section 1803.5.8.
10. Controlled low-strength material properties and testing in accordance with Section 1803.5.9.

Revise the International Building Code as follows:

IBC 3306.8 Repair, maintenance and removal. Pedestrian protection required by this chapter shall be maintained in place and kept in good order for the entire length of time pedestrians are subject to being endangered. The *owner* or the *owner's* authorized agent, upon the completion of the construction activity, shall immediately remove walkways, debris and other obstructions and leave such public property in as good a condition as it was before such work was commenced.

Revise the International Building Code as follows:

IBC 3401.2 Maintenance. Buildings and structures, and parts thereof, shall be maintained in a safe and sanitary condition. Devices or safeguards which are required by this code shall be maintained in conformance with the code edition under which installed. The owner or the owner's ~~designated~~ authorized agent shall be responsible for the maintenance of buildings and structures. To determine compliance with this subsection, the building official shall have the authority to require a building or structure to be reinspected. The requirements of this chapter shall not provide the basis for removal or abrogation of fire protection and safety systems and devices in existing structures.

Revise the International Building Code as follows:

IBC G104.1 Required. Any person, owner or owner's authorized agent who intends to conduct any development in a flood hazard area shall first make application to the *building official* and shall obtain the required *permit*.

Revise the International Building Code as follows:

IBC J106.1 Maximum slope. The slope of cut surfaces shall be no steeper than is safe for the intended use, and shall be no steeper than two units horizontal to one unit vertical (50-percent slope) unless the owner or the owner's authorized agent furnishes a geotechnical report justifying a steeper slope.

Exceptions:

1. A cut surface shall be permitted to be at a slope of 1.5 units horizontal to one unit vertical (67-percent slope) provided that all of the following are met:
 - 1.1. It is not intended to support structures or surcharges.
 - 1.2. It is adequately protected against erosion.
 - 1.3. It is no more than 8 feet (2438 mm) in height.
 - 1.4. It is approved by the building code official.
 - 1.5. Ground water is not encountered.
2. A cut surface in bedrock shall be permitted to be at a slope of one unit horizontal to one unit vertical (100-percent slope).

Revise the International Building Code as follows:

IBC K102.3 Maintenance. Electrical systems, equipment, materials and appurtenances, both existing and new, and parts thereof shall be maintained in proper operating condition in accordance with the original design and in a safe, hazard-free condition. Devices or safeguards that are required by this code shall be maintained in compliance with the code edition under which installed. The owner or the owner's ~~designated~~ authorized agent shall be responsible for the maintenance of the electrical systems and equipment. To determine compliance with this provision, the *building official* shall have the authority to require that the electrical systems and equipment be reinspected.

Revise the International Code Council Performance Code as follows:

ICCPC [A] 103.3.1 Building owner's or the owner's authorized agent responsibility.

ICCPC [A] 103.3.1.1 Design professional. The owner or the owner's authorized agent shall have the responsibility of retaining and furnishing the services of a design professional, who shall be in responsible charge of preparing and coordinating a complete and comprehensive set of design documents and other services required to prepare reports and other documents in accordance with this code. If the services required by this section are not provided, the use of this code is prohibited.

ICCPC [A] 103.3.1.2 Principal design professional. When the project requires the services of multiple design professionals, a principal design professional shall be retained and furnished, who shall have the contractual responsibility and authority over all required design professional disciplines to prepare and coordinate a complete and comprehensive set of design documents for the project.

ICCPC [A] 103.3.1.3 Peer review. The owner or the owner's authorized agent shall be responsible for retaining and furnishing the services of a design professional or recognized expert, who will perform as a peer reviewer, when required and approved by the code official. See Section 103.3.6.3 of this code.

ICCPC [A] 103.3.1.4 Costs. The costs of all special services, including contract review, when required by the code official, shall be borne by the owner or the owner's authorized agent.

ICCPC [A] 103.3.1.5 Document retention. The owner or the owner's authorized agent shall retain on the premises all documents and reports required by this code and make them available to the code official upon request.

ICCPC [A] 103.3.1.6 Maintenance. The owner or the owner's authorized agent is responsible to operate and maintain a building, structure or facility designed and built under this code in accordance with the bounding conditions and the operations and maintenance manual.

ICCPC [A] 103.3.1.7 Changes. The owner or the owner's authorized agent shall be responsible to ensure that any change to the facility, process or system does not increase the hazard level beyond that originally designed without approval and that all changes shall be documented in accordance with this code.

ICCPC [A] 103.3.1.8 Special expert. Where the scope of work is limited or focused in an area that does not require the services of a design professional or the special knowledge and skills associated with the practice of architecture or engineering, a special expert may be employed by the owner or the owner's authorized agent as the person in responsible charge of the limited or focused activity. It is the intent of this code that the individual shall possess the qualification characteristics required in Appendix D.

ICCPC [A] 103.3.1.9 Occupant requirements. The owner or the owner's authorized agent is responsible and accountable to ensure that all occupants and employees who are required to take certain actions or perform certain functions in accordance with a performance-based design possess the required knowledge and skills and are empowered to perform those actions.

ICCPC [A] 103.3.4.1.4 Deed restriction. Design features with bounding conditions that require continued maintenance or supervision by the owner or the owner's authorized agent throughout the life of the building, facility or process as conditions of compliance with the objectives of this code, shall be recorded as a deed restriction until released by the code official. When required by the code official, the deed restriction shall be modified to reflect specific changes.

ICCPC [A] 103.3.4.1.6 Emergency response capabilities. Design documentation shall clearly describe the level of response expected by emergency responders under the direct control of the owner or the owner's authorized agent. Emergency response capabilities, staffing levels, training requirements and equipment availability shall be documented as a bounding condition.

ICCPC [A] 103.3.4.2.3 Operations and maintenance manual. The operations and maintenance manual shall identify system and component commissioning requirements and the required interactions between these systems. The manual shall identify for the facility owner or the owner's authorized agent and the facility operator those actions that need to be performed on a regular basis to ensure that the components of the performance-based design are in place and operating properly. Furthermore, the operations and maintenance manual shall identify the restrictions or limitations placed upon the use and operation of the facility in order to stay within the bounding conditions of the performance-based design. The operations and maintenance manual shall be submitted at the time of the design documents submittal, unless the code official approves another time based upon the type of project and data needed for a composite review. The operations and maintenance manual shall address but not be limited to the following:

1. Description of critical systems.
2. Description of required system interactions.
3. Occupant responsibilities.
4. Occupant and staff training requirements.
5. Periodic operational requirements.
6. Periodic maintenance requirements.
7. Periodic testing requirements.
8. Limitations on facility operations (due to bounding conditions).
9. Report format for recording maintenance and operation data.
10. System and component commissioning requirements.

ICCPC [A] 103.3.8.3 Deed restrictions. Design features with bounding conditions determined by the design professional to require continued operation and maintenance by the owner or the owner's authorized agent throughout the life of the building as conditions of compliance with the objectives of this

code shall be recorded as a deed restriction as required by the code official until released by the code official.

ICCPC [A] 103.3.9.1.4 Revocation and renewal. Failure of the building owner or the owner's authorized agent to demonstrate to the code official that the building is being operated and maintained in compliance with Sections 103.3.1.6 and 103.3.9.1 is cause to revoke or not renew a certificate of occupancy.

ICCPC [A] 103.3.9.2.3 Revocation and renewal. Failure of the owner or the owner's authorized agent to demonstrate compliance with this section is cause to revoke or not renew the certificate of compliance.

ICCPC [A] 103.3.10 Maintenance.

ICCPC [A] 103.3.10.1 Owner's or the owner's authorized agent responsibility. The owner or the owner's authorized agent is responsible for maintaining the building or facility in accordance with the approved documents.

Revise the International Existing Building Code as follows:

IEBC [A] 104.6 Right of entry. Where it is necessary to make an inspection to enforce the provisions of this code, or where the *code official* has reasonable cause to believe that there exists in a structure or upon a premises a condition which is contrary to or in violation of this code which makes the structure or premises unsafe, *dangerous*, or hazardous, the *code official* is authorized to enter the structure or premises at reasonable times to inspect or to perform the duties imposed by this code, provided that if such structure or premises be occupied that credentials be presented to the occupant and entry requested. If such structure or premises be unoccupied, the *code official* shall first make a reasonable effort to locate the owner, the owner's authorized agent or other person having charge or control of the structure or premises and request entry. If entry is refused, the *code official* shall have recourse to the remedies provided by law to secure entry.

IEBC [A] 104.10 Modifications. Wherever there are practical difficulties involved in carrying out the provisions of this code, the *code official* shall have the authority to grant modifications for individual cases upon application of the owner or owner's authorized representative, provided the *code official* shall first find that special individual reason makes the strict letter of this code impractical and the modification is in compliance with the intent and purpose of this code, and that such modification does not lessen health, accessibility, life and fire safety, or structural requirements. The details of action granting modifications shall be recorded and entered in the files of the Department of Building Safety.

IEBC [A] 105.1 Required. Any owner or owner's authorized agent who intends to *repair*, add to, alter, relocate, demolish, or change the occupancy of a building or to *repair*, install, add, alter, remove, convert, or replace any electrical, gas, mechanical, or plumbing system, the installation of which is regulated by this code, or to cause any such work to be done, shall first make application to the *code official* and obtain the required permit.

IEBC [A] 106.6 Design professional in responsible charge. When it is required that documents be prepared by a registered design professional, the *code official* shall be authorized to require the owner or the owner's authorized agent to engage and designate on the building permit application a registered design professional who shall act as the *registered design professional in responsible charge*. If the circumstances require, the owner or the owner's authorized agent shall designate a substitute *registered design professional in responsible charge* who shall perform the duties required of the original *registered design professional in responsible charge*. The *code official* shall be notified in writing by the owner or the owner's authorized agent if the *registered design professional in responsible charge* is changed or is unable to continue to perform the duties. The *registered design professional in responsible charge* shall be responsible for reviewing and coordinating submittal documents prepared by others, including phased and deferred submittal items, for compatibility with the design of the building. Where structural observation is required, the inspection program shall name the individual or firms who are to perform structural observation and describe the stages of construction at which structural observation is to occur.

IEBC [A] 110.2 Certificate issued. After the *code official* inspects the building and finds no violations of the provisions of this code or other laws that are enforced by the Department of Building Safety, the *code official* shall issue a certificate of occupancy that shall contain the following:.

1. The building permit number.
2. The address of the structure.
3. The name and address of the owner or the owner's authorized agent.
4. A description of that portion of the structure for which the certificate is issued.
5. A statement that the described portion of the structure has been inspected for compliance with the requirements of this code for the occupancy and division of occupancy and the use for which the proposed occupancy is classified.
6. The name of the *code official*.
7. The edition of the code under which the permit was issued.
8. The use and occupancy in accordance with the provisions of the *International Building Code*.
9. The type of construction as defined in the *International Building Code*.
10. The design occupant load and any impact the *alteration* has on the design occupant load of the area not within the scope of the work.
11. If fire protection systems are provided, whether the fire protection systems are required.
12. Any special stipulations and conditions of the building permit.

IEBC [A] 111.3 Authority to disconnect service utilities. The *code official* shall have the authority to authorize disconnection of utility service to the building, structure or system regulated by this code and the referenced codes and standards in case of emergency where necessary to eliminate an immediate hazard to life or property or when such utility connection has been made without the approval required by Section 111.1 or 111.2. The *code official* shall notify the serving utility and, wherever possible, the owner or the owner's authorized agent and occupant of the building, structure or service system of the decision to disconnect prior to taking such action. If not notified prior to disconnecting, the owner or occupant of the building, structure or service system shall be notified in writing, as soon as practical thereafter.

IEBC [A] 114.2 Issuance. The stop work order shall be in writing and shall be given to the owner or the owner's authorized agent of the property involved ~~or to the owner's agent~~, or to the person doing the work. Upon issuance of a stop work order, the cited work shall immediately cease. The stop work order shall state the reason for the order and the conditions under which the cited work will be permitted to resume.

IEBC [A] 115.3 Notice. If an *unsafe* condition is found, the *code official* shall serve on the owner, the owner's authorized agent, or person in control of the structure a written notice that describes the condition deemed *unsafe* and specifies the required *repairs* or improvements to be made to abate the *unsafe* condition, or that requires the *unsafe* building to be demolished within a stipulated time. Such notice shall require the person thus notified to declare immediately to the *code official* acceptance or rejection of the terms of the order.

IEBC [A] 115.4 Method of service. Such notice shall be deemed properly served if a copy thereof is delivered to the owner or the owner's authorized agent personally; sent by certified or registered mail addressed to the owner or the owner's authorized agent at the last known address with the return receipt requested; or delivered in any other manner as prescribed by local law. If the certified or registered letter is returned showing that the letter was not delivered, a copy thereof shall be posted in a conspicuous place in or about the structure affected by such notice. Service of such notice in the foregoing manner upon the owner's authorized agent or upon the person responsible for the structure shall constitute service of notice upon the owner.

IEBC [A] 116.5 Costs of emergency repairs. Costs incurred in the performance of emergency work shall be paid by the jurisdiction. The legal counsel of the jurisdiction shall institute appropriate action against the owner of the premises or the owner's authorized agent where the unsafe structure is or was located for the recovery of such costs.

IEBC [A] 117.1 General. The *code official* shall order the owner of any premises or the owner's authorized agent upon which is located any structure that in the *code official's* judgment is so old, dilapidated, or has become so out of *repair* as to be *dangerous*, unsafe, insanitary, or otherwise unfit for human habitation or occupancy, and such that it is unreasonable to *repair* the structure, to demolish and remove such structure; or if such structure is capable of being made safe by *repairs*, to *repair* and make safe and sanitary or to demolish and remove at the owner's or the owner's authorized agent's option; or where there has been a cessation of normal construction of any structure for a period of more than two years, to demolish and remove such structure.

IEBC [A] 117.3 Failure to comply. If the owner or the owner's authorized agent of a premises fails to comply with a demolition order within the time prescribed, the *code official* shall cause the structure to be demolished and removed, either through an available public agency or by contract or arrangement with private persons, and the cost of such demolition and removal shall be charged against the real estate upon which the structure is located and shall be a lien upon such real estate.

Revise the International Fire Code as follows:

IFC [A] 104.3 Right of entry. Whenever it is necessary to make an inspection to enforce the provisions of this code, or whenever the *fire code official* has reasonable cause to believe that there exists in a building or upon any premises any conditions or violations of this code which make the building or premises unsafe, dangerous or hazardous, the *fire code official* shall have the authority to enter the building or premises at all reasonable times to inspect or to perform the duties imposed upon the *fire code official* by this code. If such building or premises is occupied, the *fire code official* shall present credentials to the occupant and request entry. If such building or premises is unoccupied, the *fire code official* shall first make a reasonable effort to locate the *owner*, the owner's authorized agent or other person having charge or control of the building or premises and request entry. If entry is refused, the *fire code official* has recourse to every remedy provided by law to secure entry.

IFC [A] 104.3.1 Warrant. When the *fire code official* has first obtained a proper inspection warrant or other remedy provided by law to secure entry, an *owner*, the owner's authorized agent or occupant or person having charge, care or control of the building or premises shall not fail or neglect, after proper request is made as herein provided, to permit entry therein by the *fire code official* for the purpose of inspection and examination pursuant to this code.

IFC [A] 104.7.2 Technical assistance. To determine the acceptability of technologies, processes, products, facilities, materials and uses attending the design, operation or use of a building or premises subject to inspection by the *fire code official*, the *fire code official* is authorized to require the *owner* or owner's authorized agent to provide, without charge to the jurisdiction, a technical opinion and report. The opinion and report shall be prepared by a qualified engineer, specialist, laboratory or fire safety specialty organization acceptable to the *fire code official* and shall analyze the fire safety properties of the design, operation or use of the building or premises and the facilities and appurtenances situated thereon, to recommend necessary changes. The *fire code official* is authorized to require design submittals to be prepared by, and bear the stamp of, a registered design professional.

IFC [A] 105.1.1 Permits required. Any property owner or owner's authorized agent who intends to conduct an operation or business, or install or modify systems and equipment which is regulated by this code, or to cause any such work to be done, shall first make application to the *fire code official* and obtain the required permit.

IFC [A] 109.2 Owner/occupant responsibility. Correction and abatement of violations of this code shall be the responsibility of the *owner* or the owner's authorized agent. If an occupant creates, or allows to be created, hazardous conditions in violation of this code, the occupant shall be held responsible for the abatement of such hazardous conditions.

IFC [A] 109.3.1 Service. A notice of violation issued pursuant to this code shall be served upon the *owner*, the owner's authorized agent, operator, occupant or other person responsible for the condition or violation, either by personal service, mail or by delivering the same to, and leaving it with, some person of responsibility upon the premises. For unattended or abandoned locations, a copy of such notice of violation shall be posted on the premises in a conspicuous place at or near the entrance to such premises and the notice of violation shall be mailed by certified mail with return receipt requested or a certificate of mailing, to the last known address of the *owner*, the owner's authorized agent, or occupant ~~or both~~.

IFC [A] 109.3.2 Compliance with orders and notices. A notice of violation issued or served as provided by this code shall be complied with by the *owner*, the owner's authorized agent, operator, occupant or other person responsible for the condition or violation to which the notice of violation pertains.

IFC [A] 110.4 Abatement. The *owner*, the owner's authorized agent, operator or occupant of a building or premises deemed unsafe by the *fire code official* shall abate or cause to be abated or corrected such unsafe conditions either by repair, rehabilitation, demolition or other *approved* corrective action.

IFC [A] 111.2 Issuance. A stop work order shall be in writing and shall be given to the *owner* of the property, or to the *owner's authorized agent*, or to the person doing the work. Upon issuance of a stop work order, the cited work shall immediately cease. The stop work order shall state the reason for the order, and the conditions under which the cited work is authorized to resume.

IFC [A] 112.1 Authority to disconnect service utilities. The *fire code official* shall have the authority to authorize disconnection of utility service to the building, structure or system in order to safely execute emergency operations or to eliminate an immediate hazard. The *fire code official* shall notify the serving utility and, whenever possible, the *owner* or the owner's authorized agent and occupant of the building, structure or service system of the decision to disconnect prior to taking such action if not notified prior to disconnection. The *owner*, the owner's authorized agent or occupant of the building, structure or service system shall be notified in writing as soon as practical thereafter.

Revise the International Fuel Gas Code as follows:

IFGC [A] 102.3 Maintenance. Installations, both existing and new, and parts thereof shall be maintained in proper operating condition in accordance with the original design and in a safe condition. Devices or safeguards which are required by this code shall be maintained in compliance with the code edition under which they were installed. The owner or the owner's authorized ~~designated~~ agent shall be responsible for maintenance of installations. To determine compliance with this provision, the code official shall have the authority to require an installation to be reinspected.

IFGC [A] 104.4 Right of entry. Whenever it is necessary to make an inspection to enforce the provisions of this code, or whenever the code official has reasonable cause to believe that there exists in a building or upon any premises any conditions or violations of this code that make the building or premises unsafe, dangerous or hazardous, the code official shall have the authority to enter the building or premises at all reasonable times to inspect or to perform the duties imposed upon the code official by this code. If such building or premises is occupied, the code official shall present credentials to the occupant and request entry. If such building or premises is unoccupied, the code official shall first make a reasonable effort to locate the owner, the owner's authorized agent or other person having charge or control of the building or premises and request entry. If entry is refused, the code official has recourse to every remedy provided by law to secure entry.

When the code official has first obtained a proper inspection warrant or other remedy provided by law to secure entry, an owner, the owner's authorized agent, ~~or~~ occupant or person having charge, care or control of the building or premises shall not fail or neglect, after proper request is made as herein provided, to promptly permit entry therein by the code official for the purpose of inspection and examination pursuant to this code.

IFGC [A] 105.1 Modifications. Whenever there are practical difficulties involved in carrying out the provisions of this code, the code official shall have the authority to grant modifications for individual

cases, upon application of the owner or owner's authorized agent representative, provided that the code official shall first find that special individual reason makes the strict letter of this code impractical and that such modification is in compliance with the intent and purpose of this code and does not lessen health, life and fire safety requirements. The details of action granting modifications shall be recorded and entered in the files of the Department of Inspection.

IFGC [A] 106.1 Where required. An owner, owner's authorized agent or contractor who desires to erect, install, enlarge, alter, repair, remove, convert or replace an installation regulated by this code, or to cause such work to be done, shall first make application to the code official and obtain the required permit for the work.

Exception: Where *appliance* and *equipment* replacements and repairs are required to be performed in an emergency situation, the permit application shall be submitted within the next working business day of the Department of Inspection.

IFGC [A] 106.3 Application for permit. Each application for a permit, with the required fee, shall be filed with the code official on a form furnished for that purpose and shall contain a general description of the proposed work and its location. The application shall be signed by the owner or an owner's authorized agent. The permit application shall indicate the proposed *occupancy* of all parts of the building and of that portion of the site or lot, if any, not covered by the building or structure and shall contain such other information required by the code official.

IFGC [A] 108.5 Stop work orders. Upon notice from the code official that work is being done contrary to the provisions of this code or in a dangerous or unsafe manner, such work shall immediately cease. Such notice shall be in writing and shall be given to the owner of the property, the owner's authorized agent, or the person doing the work. The notice shall state the conditions under which work is authorized to resume. Where an emergency exists, the code official shall not be required to give a written notice prior to stopping the work. Any person who shall continue any work on the system after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be liable for a fine of not less than [AMOUNT] dollars or more than [AMOUNT] dollars.

IFGC [A] 108.7.2 Authority to disconnect service utilities. The code official shall have the authority to require disconnection of utility service to the building, structure or system regulated by the technical codes in case of emergency where necessary to eliminate an immediate hazard to life or property. The code official shall notify the serving utility, and wherever possible, the owner or the owner's authorized agent and occupant of the building, structure or service system of the decision to disconnect prior to taking such action. If not notified prior to disconnection, the owner or occupant of the building, structure or service system shall be notified in writing, as soon as practicable thereafter.

Revise the International Mechanical Code as follows:

IMC [A] 102.3 Maintenance. Mechanical systems, both existing and new, and parts thereof shall be maintained in proper operating condition in accordance with the original design and in a safe and sanitary condition. Devices or safeguards which are required by this code shall be maintained in compliance with the code edition under which they were installed. The owner or the owner's authorized designated agent shall be responsible for maintenance of mechanical systems. To determine compliance with this provision, the code official shall have the authority to require a mechanical system to be reinspected.

The inspection for maintenance of HVAC systems shall be done in accordance with ASHRAE/ACCA/ANSI Standard 180.

IMC [A] 104.4 Right of entry. Whenever it is necessary to make an inspection to enforce the provisions of this code, or whenever the code official has reasonable cause to believe that there exists in a building or upon any premises any conditions or violations of this code which make the building or premises unsafe, insanitary, dangerous or hazardous, the code official shall have the authority to enter the building or premises at all reasonable times to inspect or to perform the duties imposed upon the code official by this code. If such building or premises is occupied, the code official shall present credentials to the occupant and request entry. If such building or premises is unoccupied, the code official shall first make a

reasonable effort to locate the owner, the owner's authorized agent or other person having charge or control of the building or premises and request entry. If entry is refused, the code official has recourse to every remedy provided by law to secure entry.

When the code official has first obtained a proper inspection warrant or other remedy provided by law to secure entry, an owner, the owner's authorized agent or occupant or person having charge, care or control of the building or premises shall not fail or neglect, after proper request is made as herein provided, to promptly permit entry therein by the code official for the purpose of inspection and examination pursuant to this code.

IMC [A] 105.1 Modifications. Whenever there are practical difficulties involved in carrying out the provisions of this code, the code official shall have the authority to grant modifications for individual cases upon application of the owner or owner's authorized agent representative, provided that the code official shall first find that special individual reason makes the strict letter of this code impractical and the modification is in compliance with the intent and purpose of this code and does not lessen health, life and fire safety requirements. The details of action granting modifications shall be recorded and entered in the files of the mechanical inspection department.

IMC [A] 106.1 When required. An owner, owner's authorized agent or contractor who desires to erect, install, enlarge, alter, repair, remove, convert or replace a mechanical system, the installation of which is regulated by this code, or to cause such work to be done, shall first make application to the code official and obtain the required permit for the work.

Exception: Where *equipment* and *appliance* replacements or repairs must be performed in an emergency situation, the permit application shall be submitted within the next working business day of the department of mechanical inspection.

IMC [A] 106.3 Application for permit. Each application for a permit, with the required fee, shall be filed with the code official on a form furnished for that purpose and shall contain a general description of the proposed work and its location. The application shall be signed by the owner or ~~an~~ the owner's authorized agent. The permit application shall indicate the proposed *occupancy* of all parts of the building and of that portion of the site or lot, if any, not covered by the building or structure and shall contain such other information required by the code official.

IMC [A] 108.5 Stop work orders. Upon notice from the code official that mechanical work is being done contrary to the provisions of this code or in a dangerous or unsafe manner, such work shall immediately cease. Such notice shall be in writing and shall be given to the owner of the property, or to the owner's authorized agent, or to the person doing the work. The notice shall state the conditions under which work is authorized to resume. Where an emergency exists, the code official shall not be required to give a written notice prior to stopping the work. Any person who shall continue any work on the system after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be liable for a fine of not less than [AMOUNT] dollars or more than [AMOUNT] dollars.

IMC [A] 108.7.2 Authority to order disconnection of energy sources. The code official shall have the authority to order disconnection of energy sources supplied to a building, structure or mechanical system regulated by this code, when it is determined that the mechanical system or any portion thereof has become hazardous or unsafe. Written notice of such order to disconnect service and the causes therefor shall be given within 24 hours to the owner, the owner's authorized agent and occupant of such building, structure or premises, provided, however, that in cases of immediate danger to life or property, such disconnection shall be made immediately without such notice. Where energy sources are provided by a public utility, the code official shall immediately notify the serving utility in writing of the issuance of such order to disconnect.

Revise the International Plumbing Code as follows:

IPC [A] 102.3 Maintenance. All plumbing systems, materials and appurtenances, both existing and new, and all parts thereof, shall be maintained in proper operating condition in accordance with the original design in a safe and sanitary condition. All devices or safeguards required by this code shall be maintained in compliance with the code edition under which they were installed.

The owner or the owner's authorized ~~designated~~ agent shall be responsible for maintenance of plumbing systems. To determine compliance with this provision, the code official shall have the authority to require any plumbing system to be reinspected.

IPC [A] 104.4 Right of entry. Whenever it is necessary to make an inspection to enforce the provisions of this code, or whenever the code official has reasonable cause to believe that there exists in any building or upon any premises any conditions or violations of this code that make the building or premises unsafe, insanitary, dangerous or hazardous, the code official shall have the authority to enter the building or premises at all reasonable times to inspect or to perform the duties imposed upon the code official by this code. If such building or premises is occupied, the code official shall present credentials to the occupant and request entry. If such building or premises is unoccupied, the code official shall first make a reasonable effort to locate the owner, the owner's authorized agent or other person having charge or control of the building or premises and request entry. If entry is refused, the code official shall have recourse to every remedy provided by law to secure entry.

When the code official shall have first obtained a proper inspection warrant or other remedy provided by law to secure entry, no owner, owner's authorized agent, or occupant or person having charge, care or control of any building or premises shall fail or neglect, after proper request is made as herein provided, to promptly permit entry therein by the code official for the purpose of inspection and examination pursuant to this code.

IPC [A] 105.1 Modifications. Whenever there are practical difficulties involved in carrying out the provisions of this code, the code official shall have the authority to grant modifications for individual cases, upon application of the owner or owner's ~~representative~~ authorized agent, provided the code official shall first find that special individual reason makes the strict letter of this code impractical and the modification conforms to the intent and purpose of this code and that such modification does not lessen health, life and fire safety requirements. The details of action granting modifications shall be recorded and entered in the files of the plumbing inspection department.

IPC [A] 106.1 When required. Any owner, owner's authorized agent or contractor who desires to construct, enlarge, alter, repair, move, demolish or change the *occupancy* of a building or structure, or to erect, install, enlarge, alter, repair, remove, convert or replace any plumbing system, the installation of which is regulated by this code, or to cause any such work to be done, shall first make application to the code official and obtain the required permit for the work.

IPC [A] 106.3 Application for permit. Each application for a permit, with the required fee, shall be filed with the code official on a form furnished for that purpose and shall contain a general description of the proposed work and its location. The application shall be signed by the owner or an owner's authorized agent. The permit application shall indicate the proposed *occupancy* of all parts of the building and of that portion of the site or lot, if any, not covered by the building or structure and shall contain such other information required by the code official.

IPC [A] 108.5 Stop work orders. Upon notice from the code official, work on any plumbing system that is being done contrary to the provisions of this code or in a dangerous or unsafe manner shall immediately cease. Such notice shall be in writing and shall be given to the owner of the property, or to the owner's authorized agent, or to the person doing the work. The notice shall state the conditions under which work is authorized to resume. Where an emergency exists, the code official shall not be required to give a written notice prior to stopping the work. Any person who shall continue any work in or about the structure after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be liable to a fine of not less than [AMOUNT] dollars or more than [AMOUNT] dollars.

IPC [A] 108.7.2 Authority to disconnect service utilities. The code official shall have the authority to authorize disconnection of utility service to the building, structure or system regulated by the technical codes in case of an emergency, where necessary, to eliminate an immediate danger to life or property. Where possible, the owner or an owner's authorized agent and occupant of the building, structure or service system shall be notified of the decision to disconnect utility service prior to taking such action. If not notified prior to disconnecting, the owner, an owner's authorized agent or occupant of the building, structure or service systems shall be notified in writing, as soon as practical thereafter.

Revise the International Private Sewage Disposal Code as follows:

IPSDC [A] 102.5 Maintenance. *Private sewage disposal systems*, materials and appurtenances, both existing and new, and all parts thereof shall be maintained in proper operating condition in accordance with the original design in a safe and sanitary condition. Devices or safeguards that are required by this code shall be maintained in compliance with the code edition under which they were installed. The owner or the owner's authorized ~~designated~~ agent shall be responsible for maintenance of *private sewage disposal systems*. To determine compliance with this provision, the code official shall have the authority to require reinspection of any *private sewage disposal system*.

IPSDC [A] 104.4 Right of entry. Whenever it is necessary to make an inspection to enforce the provisions of this code, or whenever the code official has reasonable cause to believe that there exists in any building or upon any premises any conditions or violations of this code that make the building or premises unsafe, insanitary, dangerous or hazardous, the code official shall have the authority to enter the building or premises at all reasonable times to inspect or to perform the duties imposed on the code official by this code. If such building or premises is occupied, the code official shall present credentials to the occupant and request entry. If such building or premises is unoccupied, the code official shall first make a reasonable effort to locate the owner, the owner's authorized agent or other person having charge or control of the building or premises and request entry. If entry is refused, the code official has recourse to every remedy provided by law to secure entry.

When the code official shall have first obtained a proper inspection warrant or other remedy provided by law to secure entry, no owner, owner's authorized agent or occupant or person having charge, care or control of any building or premises shall fail or neglect, after proper request is made as herein provided, to promptly permit entry therein by the code official for the purpose of inspection and examination pursuant to this code.

IPSDC [A] 105.1 Modifications. Whenever there are practical difficulties involved in carrying out the provisions of this code, the code official shall have the authority to grant modifications for individual cases, upon application of the owner or owner's ~~representative~~ authorized agent provided that the code official shall first find that special individual reason makes the strict letter of this code impractical, the modification is in conformity with the intent and purpose of this code and such modification does not lessen health and fire- and life-safety requirements. The details of action granting modifications shall be recorded and entered in the files of the Private Sewage Disposal Inspection Department.

IPSDC [A] 108.5 Stop work orders. Upon notice from the code official, work on any *private sewage disposal system* that is being done contrary to the provisions of this code or in a dangerous or unsafe manner shall immediately cease. Such notice shall be in writing and shall be given to the owner of the property, to the owner's authorized agent or to the person doing the work. The notice shall state the conditions under which work is authorized to resume. Where an emergency exists, the code official shall not be required to give a written notice prior to stopping the work. Any person who shall continue any work on the system after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be liable to a fine of not less than [AMOUNT] dollars or more than [AMOUNT] dollars.

IPSDC [A] 108.7.2 Authority to disconnect service utilities. The code official shall have the authority to authorize disconnection of utility service to the building, structure or system regulated by the technical codes in case of emergency, where necessary, to eliminate an immediate danger to life or property.

Where possible, the owner, the owner's authorized agent and occupant of the building, structure or service system shall be notified of the decision to disconnect utility service prior to taking such action. If not notified prior to disconnecting, the owner or occupant of the building, structure or service systems shall be notified in writing as soon as is practical thereafter.

Revise the International Property Maintenance Code as follows:

IPMC [A] 101.2 Scope. The provisions of this code shall apply to all existing residential and nonresidential structures and all existing *premises* and constitute minimum requirements and standards for *premises*, structures, equipment and facilities for light, *ventilation*, space, heating, sanitation, protection from the elements, life safety, safety from fire and other hazards, and for safe and sanitary maintenance; the responsibility of *owners*, an owner's authorized agent, *operators* and *occupants*; the *occupancy* of existing structures and *premises*, and for administration, enforcement and penalties.

IPMC [A] 102.2 Maintenance. Equipment, systems, devices and safeguards required by this code or a previous regulation or code under which the structure or *premises* was constructed, altered or repaired shall be maintained in good working order. No *owner*, owner's authorized agent, *operator* or *occupant* shall cause any service, facility, equipment or utility which is required under this section to be removed from or shut off from or discontinued for any occupied dwelling, except for such temporary interruption as necessary while repairs or alterations are in progress. The requirements of this code are not intended to provide the basis for removal or abrogation of fire protection and safety systems and devices in existing structures. Except as otherwise specified herein, the *owner* or the *owner's authorized designated agent* shall be responsible for the maintenance of buildings, structures and *premises*.

IPMC [A] 104.3 Right of entry. Where it is necessary to make an inspection to enforce the provisions of this code, or whenever the *code official* has reasonable cause to believe that there exists in a *structure* or upon a *premises* a condition in violation of this code, the *code official* is authorized to enter the structure or *premises* at reasonable times to inspect or perform the duties imposed by this code, provided that if such *structure* or *premises* is occupied the *code official* shall present credentials to the *occupant* and request entry. If such structure or *premises* is unoccupied, the *code official* shall first make a reasonable effort to locate the *owner*, the owner's authorized agent or other person having charge or control of the *structure* or *premises* and request entry. If entry is refused, the *code official* shall have recourse to the remedies provided by law to secure entry.

IPMC [A] 105.1 Modifications. Whenever there are practical difficulties involved in carrying out the provisions of this code, the *code official* shall have the authority to grant modifications for individual cases upon application of the *owner* or *owner's authorized agent representative*, provided the *code official* shall first find that special individual reason makes the strict letter of this code impractical and the modification is in compliance with the intent and purpose of this code and that such modification does not lessen health, life and fire safety requirements. The details of action granting modifications shall be recorded and entered in the department files.

IPMC [A] 107.2 Form. Such notice prescribed in Section 107.1 shall be in accordance with all of the following:

1. Be in writing.
2. Include a description of the real estate sufficient for identification.
3. Include a statement of the violation or violations and why the notice is being issued.
4. Include a correction order allowing a reasonable time to make the repairs and improvements required to bring the *dwelling unit* or structure into compliance with the provisions of this code.
5. Inform the property *owner* or the owner's authorized agent of the right to appeal.
6. Include a statement of the right to file a lien in accordance with Section 106.3.

IPMC [A] 107.6 Transfer of ownership. It shall be unlawful for the *owner* of any *dwelling unit* or structure who has received a compliance order or upon whom a notice of violation has been served to sell, transfer, mortgage, lease or otherwise dispose of such *dwelling unit* or structure to another until the

provisions of the compliance order or notice of violation have been complied with, or until such owner or the owner's authorized agent shall first furnish the grantee, transferee, mortgagee or lessee a true copy of any compliance order or notice of violation issued by the *code official* and shall furnish to the *code official* a signed and notarized statement from the grantee, transferee, mortgagee or lessee, acknowledging the receipt of such compliance order or notice of violation and fully accepting the responsibility without condition for making the corrections or repairs required by such compliance order or notice of violation.

IPMC [A] 108.2 Closing of vacant structures. If the structure is vacant and unfit for human habitation and *occupancy*, and is not in danger of structural collapse, the *code official* is authorized to post a placard of condemnation on the *premises* and order the structure closed up so as not to be an attractive nuisance. Upon failure of the owner or the owner's authorized agent to close up the *premises* within the time specified in the order, the *code official* shall cause the *premises* to be closed and secured through any available public agency or by contract or arrangement by private persons and the cost thereof shall be charged against the real estate upon which the structure is located and shall be a lien upon such real estate and may be collected by any other legal resource.

IPMC [A] 108.2.1 Authority to disconnect service utilities. The *code official* shall have the authority to authorize disconnection of utility service to the building, structure or system regulated by this code and the referenced codes and standards set forth in Section 102.7 in case of emergency where necessary to eliminate an immediate hazard to life or property or when such utility connection has been made without approval. The *code official* shall notify the serving utility and, whenever possible, the owner or the owner's authorized agent and *occupant* of the building, structure or service system of the decision to disconnect prior to taking such action. If not notified prior to disconnection the owner, the owner's authorized agent or *occupant* of the building structure or service system shall be notified in writing as soon as practical thereafter.

IPMC [A] 108.3 Notice. Whenever the *code official* has *condemned* a structure or equipment under the provisions of this section, notice shall be posted in a conspicuous place in or about the structure affected by such notice and served on the owner, the owner's authorized agent or the person or persons responsible for the structure or equipment in accordance with Section 107.3. If the notice pertains to equipment, it shall also be placed on the *condemned* equipment. The notice shall be in the form prescribed in Section 107.2.

IPMC [A] 108.4 Placarding. Upon failure of the owner or the owner's authorized agent or person responsible to comply with the notice provisions within the time given, the *code official* shall post on the *premises* or on defective equipment a placard bearing the word "Condemned" and a statement of the penalties provided for occupying the *premises*, operating the equipment or removing the placard.

IPMC [A] 108.5 Prohibited occupancy. Any occupied structure *condemned* and placarded by the *code official* shall be vacated as ordered by the *code official*. Any person who shall occupy a placarded *premises* or shall operate placarded equipment, and any owner, the owner's authorized agent or any person responsible for the *premises* who shall let anyone occupy a placarded *premises* or operate placarded equipment shall be liable for the penalties provided by this code.

IPMC [A] 108.6 Abatement methods. The owner, the owner's authorized agent, operator or *occupant* of a building, *premises* or equipment deemed unsafe by the *code official* shall abate or cause to be abated or corrected such unsafe conditions either by repair, rehabilitation, demolition or other *approved* corrective action.

IPMC [A] 109.5 Costs of emergency repairs. Costs incurred in the performance of emergency work shall be paid by the jurisdiction. The legal counsel of the jurisdiction shall institute appropriate action against the owner of the premises or the owner's authorized agent where the unsafe structure is or was located for the recovery of such costs.

IPMC [A] 110.1 General. The *code official* shall order the owner of any premises or the owner's authorized agent, upon which is located any structure, which in the *code official* judgment after review is

so deteriorated or dilapidated or has become so out of repair as to be dangerous, unsafe, insanitary or otherwise unfit for human habitation or occupancy, and such that it is unreasonable to repair the structure, to demolish and remove such structure; or if such structure is capable of being made safe by repairs, to repair and make safe and sanitary, or to board up and hold for future repair or to demolish and remove at the *owner's* option; or where there has been a cessation of normal construction of any structure for a period of more than two years, the *code official* shall order the *owner* or the owner's authorized agent to demolish and remove such structure, or board up until future repair. Boarding the building up for future repair shall not extend beyond one year, unless *approved* by the building official.

IPMC [A] 110.3 Failure to comply. If the *owner* of a *premises* or the owner's authorized agent, fails to comply with a demolition order within the time prescribed, the *code official* shall cause the structure to be demolished and removed, either through an available public agency or by contract or arrangement with private persons, and the cost of such demolition and removal shall be charged against the real estate upon which the structure is located and shall be a lien upon such real estate.

IPMC [A] 112.2 Issuance. A stop work order shall be in writing and shall be given to the *owner* of the property, to the *owner's* authorized agent, or to the person doing the work. Upon issuance of a stop work order, the cited work shall immediately cease. The stop work order shall state the reason for the order and the conditions under which the cited work is authorized to resume.

Revise the International Wildland-Urban Interface Code as follows:

IWUIC [A] 101.6 Maintenance. All buildings, structures, landscape materials, vegetation, *defensible space* or other devices or safeguards required by this code shall be maintained in conformance to the code edition under which installed. The owner or the owner's authorized designated agent shall be responsible for the maintenance of buildings, structures, landscape materials and vegetation.

IWUIC [A] 105.1 Practical difficulties. When there are practical difficulties involved in carrying out the provisions of this code, the code official is authorized to grant modifications for individual cases on application in writing by the owner or a duly owner's authorized ~~representative agent~~. The code official shall first find that a special individual reason makes enforcement of the strict letter of this code impractical, the modification is in conformance to the intent and purpose of this code, and the modification does not lessen any fire protection requirements or any degree of structural integrity. The details of any action granting modifications shall be recorded and entered into the files of the code enforcement agency.

IWUIC [A] 105.2 Technical assistance. To determine the acceptability of technologies, processes, products, facilities, materials and uses attending the design, operation or use of a building or premises subject to the inspection of the code official, the code official is authorized to require the owner, the owner's authorized agent, or the person in possession or control of the building or premises to provide, without charge to the jurisdiction, a technical opinion and report. The opinion and report shall be prepared by a qualified engineer, specialist, laboratory or fire safety specialty organization acceptable to the code official and the or the owner's authorized agent and shall analyze the fire safety of the design, operation or use of the building or premises, the facilities and appurtenances situated thereon and fuel management for purposes of establishing fire hazard severity to recommend necessary changes.

IWUIC [A] 109.2.2 Service of orders and notices. Orders and notices authorized or required by this code shall be given or served on the owner, the owner's authorized agent, operator, occupant or other person responsible for the condition or violation either by verbal notification, personal service, or delivering the same to, and leaving it with, a person of suitable age and discretion on the premises; or, if no such person is found on the premises, by affixing a copy thereof in a conspicuous place on the door to the entrance of said premises and by mailing a copy thereof to such person by registered or certified mail to the person's last known address.

Orders or notices that are given verbally shall be confirmed by service in writing as herein provided.

IWUIC [A] 109.3 Right of entry. Whenever necessary to make an inspection to enforce any of the provisions of this code, or whenever the code official has reasonable cause to believe that there exists in

any building or on any premises any condition that makes such building or premises unsafe, the code official is authorized to enter such building or premises at all reasonable times to inspect the same or to perform any duty authorized by this code, provided that if such building or premises is occupied, the code official shall first present proper credentials and request entry; and if such building or premises is unoccupied, the code official shall first make a reasonable effort to locate the owner, the owner's authorized agent, or other persons having charge or control of the building or premises and request entry. If such entry is refused, the code official shall have recourse to every remedy provided by law to secure entry. Owners, the owner's authorized agent, occupants or any other persons having charge, care or control of any building or premises, shall, after proper request is made as herein provided, promptly permit entry therein by the code official for the purpose of inspection and examination pursuant to this code.

IWUIC [A] 109.4.1 General compliance. Orders and notices issued or served as provided by this code shall be complied with by the owner, the owner's authorized agent, operator, occupant or other person responsible for the condition or violation to which the corrective order or notice pertains.

If the building or premises is not occupied, such corrective orders or notices shall be complied with by the owner or the owner's authorized agent.

IWUIC [A] 109.4.5.2 Notice. Where an unsafe condition is found, the code official shall serve on the owner, owner's authorized agent or person in control of the building, structure or premises, a written notice that describes the condition deemed unsafe and specifies the required repairs or improvements to be made to abate the unsafe condition, or that requires the unsafe structure to be demolished within a stipulated time. Such notice shall require the person thus notified, or their designee, to declare within a stipulated time to the code official acceptance or rejection of the terms of the order.

IWUIC [A] 109.4.5.2.1 Method of service. Such notice shall be deemed properly served if a copy thereof is (a) delivered to the owner or the owner's authorized agent personally; (b) sent by certified or registered mail addressed to the owner or the owner's authorized agent at the last known address with the return receipt requested; or (c) delivered in any other manner as prescribed by local law. If the certified or registered letter is returned showing that the letter was not delivered, a copy thereof shall be posted in a conspicuous place in or about the structure affected by such notice. Service of such notice in the foregoing manner upon the owner's authorized agent or upon the person responsible for the structure shall constitute service of notice upon the owner.

IWUIC [A] 109.4.5.3 Placarding. Upon failure of the owner, the owner's authorized agent, or person responsible to comply with the notice provisions within the time given, the code official shall post on the premises or on defective equipment a placard bearing the word "UNSAFE" and a statement of the penalties provided for occupying the premises, operating the equipment or removing the placard.

IWUIC [A] 109.4.5.4 Abatement. The owner, the owner's authorized agent, operator or occupant of a building, structure or premises deemed unsafe by the code official shall abate or correct or cause to be abated or corrected such unsafe conditions either by repair, rehabilitation, demolition or other *approved* corrective action.

IWUIC [A] 113.2 Authority to disconnect service utilities. The code official shall have the authority to authorize disconnection of utility service to the building, structure or system regulated by this code and the referenced codes and standards set forth in Section 102.4 in case of emergency where necessary to eliminate an immediate hazard to life or property or when such utility connection has been made without the release required by Section 113.1. The code official shall notify the serving utility and whenever possible the owner or the owner's authorized agent and occupant of the building, structure or service system of the decision to disconnect prior to taking such action if not notified prior to disconnection. The owner, the owner's authorized agent or occupant of the building, structure or service system shall be notified in writing as soon as practical thereafter.

IWUIC [A] 114.2 Issuance. The stop work order shall be in writing and shall be given to the owner of the property involved, to the owner's authorized agent or to the person doing the work. Upon issuance of a

stop work order, the cited work shall immediately cease. The stop work order shall state the reason for the order and the conditions under which the cited work will be permitted to resume.

Revise the International Zoning Code as follows:

IZC [A] 103.3 Maintenance. All buildings or uses, both existing and new, and all parts thereof, shall be maintained. The owner or owner's authorized agent shall be responsible for the maintenance of buildings and parcels of land. To determine compliance with this section, the code official shall be permitted to cause any structure or use to be inspected.

IZC [A] 107.7.3 Variance review criteria. The board of adjustment shall be permitted to approve, approve with conditions or deny a request for a variance. Each request for a variance shall be consistent with the following criteria:

1. Limitations on the use of the property due to physical, topographical and geologic features.
2. The grant of the variance will not grant any special privilege to the property owner or the owner's authorized agent.
3. The applicant can demonstrate that without a variance there can be no reasonable use of the property.
4. The grant of the variance is not based solely on economic reasons.
5. The necessity for the variance was not created by the property owner or the owner's authorized agent.
6. The variance requested is the minimum variance necessary to allow reasonable use of the property.
7. The grant of the variance will not be injurious to the public health, safety or welfare.
8. The property subject to the variance request possesses one or more unique characteristics generally not applicable to similarly situated properties.

IZC [A] 109.1 Hearings. Upon receipt of an application in proper form, the code official shall arrange to advertise the time and place of public hearing. Such advertisement shall be given by at least one publication in a newspaper of general circulation within the jurisdiction. Such notice shall state the nature of the request, the location of the property, and the time and place of hearing. Reasonable effort shall also be made to give notice by regular mail of the time and place of hearing to each surrounding property owner or the owner's authorized agent; the extent of the area to be notified shall be set by the code official. A notice of such hearing shall be posted in a conspicuous manner on the subject property.

PART II – IECC-COMMERCIAL

Revise the International Energy Conservation Code-Commercial as follows:

IECC C108.2 Issuance. The stop work order shall be in writing and shall be given to the owner of the property involved, or to the owner's authorized agent, or to the person doing the work. Upon issuance of a stop work order, the cited work shall immediately cease. The stop work order shall state the reason for the order, and the conditions under which the cited work will be permitted to resume.

PART III – IECC-RESIDENTIAL

Revise the International Energy Conservation Code-Residential as follows:

IECC R108.2 Issuance. The stop work order shall be in writing and shall be given to the owner of the property involved, or to the owner's authorized agent, or to the person doing the work. Upon issuance of a stop work order, the cited work shall immediately cease. The stop work order shall state the reason for the order, and the conditions under which the cited work will be permitted to resume.

PART IV – IRC

Revise the International Residential Code as follows:

IRC R104.6 Right of entry. Where it is necessary to make an inspection to enforce the provisions of this code, or where the *building official* has reasonable cause to believe that there exists in a structure or upon a premises a condition which is contrary to or in violation of this code which makes the structure or premises unsafe, dangerous or hazardous, the *building official* or designee is authorized to enter the structure or premises at reasonable times to inspect or to perform the duties imposed by this code, provided that if such structure or premises be occupied that credentials be presented to the occupant and entry requested. If such structure or premises be unoccupied, the *building official* shall first make a reasonable effort to locate the owner, the owner's authorized agent, or other person having charge or control of the structure or premises and request entry. If entry is refused, the *building official* shall have recourse to the remedies provided by law to secure entry.

IRC R105.1 Required. Any owner or owner's authorized agent who intends to construct, enlarge, alter, repair, move, demolish or change the occupancy of a building or structure, or to erect, install, enlarge, alter, repair, remove, convert or replace any electrical, gas, mechanical or plumbing system, the installation of which is regulated by this code, or to cause any such work to be done, shall first make application to the *building official* and obtain the required *permit*.

IRC R110.3 Certificate issued. After the *building official* inspects the building or structure and finds no violations of the provisions of this code or other laws that are enforced by the department of building safety, the *building official* shall issue a certificate of occupancy which shall contain the following:

1. The building *permit* number.
2. The address of the structure.
3. The name and address of the owner or the owner's authorized agent.
4. A description of that portion of the structure for which the certificate is issued.
5. A statement that the described portion of the structure has been inspected for compliance with the requirements of this code.
6. The name of the *building official*.
7. The edition of the code under which the *permit* was issued.
8. If an automatic sprinkler system is provided and whether the sprinkler system is required.
9. Any special stipulations and conditions of the building *permit*.

IRC R111.3 Authority to disconnect service utilities. The *building official* shall have the authority to authorize disconnection of utility service to the building, structure or system regulated by this code and the referenced codes and standards set forth in Section R102.4 in case of emergency where necessary to eliminate an immediate hazard to life or property or when such utility connection has been made without the approval required by Section R111.1 or R111.2. The *building official* shall notify the serving utility and whenever possible the owner or the owner's authorized agent and occupant of the building, structure or service system of the decision to disconnect prior to taking such action if not notified prior to disconnection. The owner, the owner's authorized agent, or occupant of the building, structure or service system shall be notified in writing as soon as practical thereafter.

IRC R114.1 Notice to owner or the owner's authorized agent. Upon notice from the *building official* that work on any building or structure is being prosecuted contrary to the provisions of this code or in an unsafe and dangerous manner, such work shall be immediately stopped. The stop work order shall be in writing and shall be given to the owner of the property involved, or to the owner's authorized agent or to the person doing the work and shall state the conditions under which work will be permitted to resume.

PART V – ISPSC

Revise the International Swimming Pool and Spa Code as follows:

ISPSC 102.3 Maintenance. All *aquatic vessel* and related mechanical, electrical and plumbing systems, both existing and new, and all parts thereof, shall be maintained in proper operating condition in accordance with the original design in a safe and sanitary condition. All devices or safeguards required by this code shall be maintained in compliance with the code edition under which they were installed.

The *owner* or the *owner's* authorized designated agent shall be responsible for maintenance of all systems. To determine compliance with this provision, the *code official* shall have the authority to require any system to be reinspected.

ISPSC 104.6 Right of entry. Where it is necessary to make an inspection to enforce the provisions of this code, or where the *code official* has reasonable cause to believe that there exists in a structure or upon a premises a condition which is contrary to or in violation of this code which makes the structure or premises unsafe, dangerous or hazardous, the *code official* is authorized to enter the structure or premises at reasonable times to inspect or to perform the duties imposed by this code, provided that if such structure or premises be occupied that credentials be presented to the occupant and entry requested. If such structure or premises is unoccupied, the *code official* shall first make a reasonable effort to locate the owner, the owner's authorized agent or other person having charge or control of the structure or premises and request entry. If entry is refused, the *code official* shall have recourse to the remedies provided by law to secure entry.

ISPSC 104.8 Modifications. Wherever there are practical difficulties involved in carrying out the provisions of this code, the *code official* shall have the authority to grant modifications for individual cases, upon application of the owner or owner's authorized agent ~~representative~~, provided the *code official* shall first find that special individual reason makes the strict letter of this code impractical and the modification is in compliance with the intent and purpose of this code and that such modification does not lessen sustainability, health, accessibility, life safety and structural requirements. The details of action granting modifications shall be recorded and entered in the files of the department of building safety.

ISPSC 105.1 When required. Any *owner*, or *owner's* authorized agent who desires to construct, enlarge, alter, *repair*, move, or demolish an *aquatic vessel* or to erect, install, enlarge, alter, repair, remove, convert or replace any system, the installation of which is regulated by this code, or to cause any such work to be done, shall first make application to the *code official* and obtain the required *permit* for the work.

ISPSC 105.2 Application for permit. Each application for a permit, with the required fee, shall be filed with the *code official* on a form furnished for that purpose and shall contain a general description of the proposed work and its location. The application shall be signed by the owner or ~~an~~ the owner's authorized agent. The permit application shall contain such other information required by the *code official*.

ISPSC 107.5 Stop work orders. Upon notice from the *code official*, work on any system that is being done contrary to the provisions of this code or in a dangerous or unsafe manner shall immediately cease. Such notice shall be in writing and shall be given to the owner of the property, or to the owner's authorized agent, or to the person doing the work. The notice shall state the conditions under which work is authorized to resume. Where an emergency exists, the *code official* shall not be required to give a written notice prior to stopping the work. Any person who shall continue any work in or about the structure after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be liable to a fine of not less than [AMOUNT] dollars or more than [AMOUNT] dollars.

ISPSC 107.7.2 Authority to disconnect service utilities. The *code official* shall have the authority to authorize disconnection of utility service to the *aquatic vessel* regulated by the technical codes in case of an emergency, where necessary, to eliminate an immediate danger to life or property. Where possible, the owner or the owner's authorized agent and occupant of the building where the aquatic vessel is

located shall be notified of the decision to disconnect utility service prior to taking such action. If not notified prior to disconnecting, the owner or the owner's authorized agent or occupant of the building shall be notified in writing, as soon as practical thereafter.

Reason: The purpose for the proposal is to update the references to "applicant" and "owner" throughout the building code by changing them to the "owner or the owner's authorized agent" where it is warranted. In Section 110.1, "the permit applicant" is changed to "the owner or the owner's authorized agent" because the latter should be responsible to keep the work accessible and exposed for inspection. In Sections 1703.4.1 and 1707.1, "the applicant" is changed to "the owner or the owner's authorized agent" because the latter should be responsible for the costs of required tests, reports and investigations. In Sections 1703.6 and 1704.2.4, "the applicant" is changed to "the owner or the owner's authorized agent" because the latter should be responsible for submitting required reports to the building official. In Section 1703.6.1, the applicant" is changed to "the owner or the owner's authorized agent" for consistency with Section 1704.2 that requires the latter to employ the approved agencies. In Section 1803.6, the "owner or authorized agent" is changed to the "permit applicant" because it should be permissible for the latter to submit the geotechnical report with the other submittal documents at the time of permit application. The 2012 IBC contains additional references to "owner" but, based on the context in which they are used, it is not considered appropriate or useful to revise the language in conjunction with this proposal (e.g., from "the owner" to "the owner or the owner's authorized agent"). See Sections 101.4.4, 104.6, 111.2, 112.3, 116.3, 116.4, 402.3, 913.4, 1107.4-Exc. 1, 1607.7.4, 3108.2, 3307.1, 3412.4, 3412.4.1, G101.2, G105.6-Item 3, K103.1 and L101.3. The 2012 IBC contains additional references to "applicant" but, based on the context in which they are used, it is also not considered appropriate or useful to revise the language in conjunction with this proposal (e.g., from "the applicant" to "the owner or the owner's authorized agent"). See Sections 104.10.1-Item 5, 105.1.1, 105.3, 107.3.1, 109.3, 109.5, 1612.3.1, 1612.3.2, 1704.2.3, 1704.3, G103.3, G103.4, G103.5.1, G103.6, G104.2, G105.7-Item 5 and J104.1. All instances in the 2012 IBC of "applicant" and "owner," other than listed above, are included in this proposal.

Cost Impact: The code change proposal will not increase the cost of construction.

Staff analysis: This proposal for IBC indicate a correlative change throughout the code for the changes in Chapter 1. If this proposal is approved, similar revisions will be completed in the other chapters of the codes where the terms similar to "owner and owner's authorized agent".

ADM22-13

PART I – IBC; ICCPC; IEBC; IFC; IFCG; IMC; IPC; IPSDC; IPMC; IWUIC; IZC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-COMMERCIAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART III – IECC-RESIDENTIAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART IV – IRC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART V – ISPC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1607.7.5-S-BRAZIL

ADM23 – 13

PART I - IBC: [A] 104.11; IEBC: [A] 104.11 IFC: [A] 104.9; IFGC: [A] 105.2; IMC: [A] 105.2; IPC: [A] 105.2; IPSDC: [A] 105.2; IPMC: [A] 105.2; IWUIC: [A] 105.3

PART II - IRC: R104.11;

PART III - ISPSC 104.9

THIS IS A 3 PART CODE CHANGE. PARTS I WILL BE HEARD BY THE ADMINISTRATIVE PROVISIONS COMMITTEE AS ONE CODE CHANGE. PART II WILL BE HEARD BY THE RESIDENTIAL CODE COMMITTEE. PART III WILL BE HEARD BY THE SWIMMING POOL AND SPA CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

Proponent: Larry Wainright, Qualtim, representing Structural Building Components Association (lwainright@qualtim.com)

PART I – IBC; IEBC; IFC; IFGC; IMC; IPC; IPSDC; IPMC; IWUIC

Revise the International Building Code as follows:

IBC [A] 104.11 Alternative materials, design and methods of construction and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design or method of construction shall be approved where the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety. Where the alternative material, design or method of construction is not approved, the *building official* shall respond in writing, stating the reasons the alternative was not approved.

Revise the International Existing Building Code as follows:

IEBC [A] 104.11 Alternative materials, design and methods of construction, and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design, or method of construction shall be approved where the *code official* finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method, or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability, and safety. Where the alternative material, design or method of construction is not approved, the *code official* shall respond in writing, stating the reasons the alternative was not approved.

Revise the International Fire Code as follows:

IFC [A] 104.9 Alternative materials and methods. The provisions of this code are not intended to prevent the installation of any material or to prohibit any method of construction not specifically prescribed by this code, provided that any such alternative has been *approved*. The *fire code official* is authorized to approve an alternative material or method of construction where the *fire code official* finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code in quality, strength, effectiveness, *fire resistance*, durability and safety. Where the alternative material, design or method of construction is not approved, the *fire code official* shall respond in writing, stating the reasons the alternative was not approved.

Revise the International Fuel Gas Code as follows:

IFGC [A] 105.2 Alternative materials, methods, appliances and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any method of construction not specifically prescribed by this code, provided that any such alternative has been *approved*. An alternative material or method of construction shall be *approved* where the code official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety. Where the alternative material, design or method of construction is not approved, the code official shall respond in writing, stating the reasons the alternative was not approved.

Revise the International Mechanical Code as follows:

IMC [A] 105.2 Alternative materials, methods, equipment and appliances. The provisions of this code are not intended to prevent the installation of any material or to prohibit any method of construction not specifically prescribed by this code, provided that any such alternative has been *approved*. An alternative material or method of construction shall be *approved* where the code official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety. Where the alternative material, design or method of construction is not approved, the code official shall respond in writing, stating the reasons the alternative was not approved.

Revise the International Plumbing Code as follows:

IPC [A] 105.2 Alternative materials, methods and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any method of construction not specifically prescribed by this code, provided that any such alternative has been *approved*. An alternative material or method of construction shall be *approved* where the code official finds that the proposed alternative material, method or equipment complies with the intent of the provisions of this code and is at least the equivalent of that prescribed in this code. Where the alternative material, design or method of construction is not approved, the code official shall respond in writing, stating the reasons the alternative was not approved.

Revise the International Private Sewage Disposal Code as follows:

IPSDC [A] 105.2 Alternative materials, methods and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material or method of construction shall be approved where the code official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety. Where the alternative material, design or method of construction is not approved, the code official shall respond in writing, stating the reasons the alternative was not approved.

Revise the International Property Maintenance Code as follows:

IPMC [A] 105.2 Alternative materials, methods and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any method of construction not specifically prescribed by this code, provided that any such alternative has been *approved*. An alternative material or method of construction shall be *approved* where the code official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety. Where the alternative material,

design or method of construction is not approved, the *code official* shall respond in writing, stating the reasons the alternative was not approved.

Revise the International Wildland-Urban Interface Code as follows:

IWUIC [A] 105.3 Alternative materials or methods. The code official, in concurrence with approval from the *building official* and fire chief, is authorized to approve alternative materials or methods, provided that the code official finds that the proposed design, use or operation satisfactorily complies with the intent of this code and that the alternative is, for the purpose intended, at least equivalent to the level of quality, strength, effectiveness, fire resistance, durability and safety prescribed by this code. Approvals under the authority herein contained shall be subject to the approval of the *building official* whenever the alternate material or method involves matters regulated by the *International Building Code*.

The code official shall require that sufficient evidence or proof be submitted to substantiate any claims that may be made regarding its use. The details of any action granting approval of an alternate shall be recorded and entered in the files of the code enforcement agency. Where the alternative material, design or method of construction is not approved, the *code official* shall respond in writing, stating the reasons the alternative was not approved.

PART II – IRC

Revise the International Residential Code as follows:

IRC R104.11 Alternative materials, design and methods of construction and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been *approved*. An alternative material, design or method of construction shall be *approved* where the *building official* finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code. Compliance with the specific performance-based provisions of the International Codes in lieu of specific requirements of this code shall also be permitted as an alternate. Where the alternative material, design or method of construction is not approved, the *building official* shall respond in writing, stating the reasons the alternative was not approved.

PART III – ISPSC

Revise the International Swimming Pool and Spa Code as follows:

ISPSC 104.9 Alternative materials, methods and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any method of construction not specifically prescribed by this code, provided that any such alternative has been *approved*. An alternative material or method of construction shall be approved where the *code official* finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code in quality, strength, effectiveness, durability and safety. Where the alternative material, design or method of construction is not approved, the *code official* shall respond in writing, stating the reasons the alternative was not approved.

Reason: the language added is similar to that included at 105.3.1 when a permit application is rejected. This proposed change assumes that the non-approval of an alternative method is not the same as the non-approval of a permit, i.e., the permit application may have been approved but an alternative method might not be approved until a later date. However, the reasons for responding to the applicant in writing are the same, as noted in the Commentary to section 105.3.1: 'In order to ensure effective communication and due process of law, the reasons for denial of an application for a permit are required to be in writing. Further, the language is coordinated across all of the I-codes for consistency of enforcement.'

Cost Impact: This proposal will not increase the cost of construction.

ADM23-13**PART I – IBC; IEBC; IFC; IFCG; IMC; IPC; IPSDC; IPMC; IWUIC**

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IRC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART III – ISPSC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

104.11-ADM (IBC)-WAINRIGHT

ADM24 – 13

PART I - IBC: [A]104.12 (New), [A]104.13(New), IEBC: [A]104.12 (New), [A]104.13(New), IFC: [A]104.12 (New), [A]104.13(New), IFGC: [A]104.8 (New), [A]104.9(New), IMC: [A]104.8(New), [A]104.9(New), IPC: [A]104.8(New), [A]104.9(New), IPSDC: [A]104.8(New), [A]104.9(New), IPMC: [A]104.7 (New), [A]104.8(New), IWUIC: [A]104.8(New), [A]104.9(New)
PART II – IRC: R104.12 (New), R104.13(New)
PART III - ISPC 104.13(New), 104.14(New)

THIS IS A 3 PART CODE CHANGE. PARTS I WILL BE HEARD BY THE ADMINISTRATIVE PROVISIONS COMMITTEE AS ONE CODE CHANGE. PART II WILL BE HEARD BY THE RESIDENTIAL CODE COMMITTEE. PART III WILL BE HEARD BY THE SWIMMING POOL AND SPA CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

Proponent: David S. Collins, FAIA, The Preview Group, Inc./The American Institute of Architects (dcollins@preview-group.com)

PART I – IBC; IEBC; IFC; IFGC; IMC; IPC; IPSDC; IPMC; IWUIC

Add new text to the International Building Code as follows:

IBC [A] 104.12 Preliminary meeting. When requested by the permit applicant or the building official, the building official shall meet with the permit applicant prior to the application for a construction permit to discuss plans for the proposed work or change of occupancy in order to establish the specific applicability of the provisions of this code.

IBC [A] 104.13 Building evaluation. The building official is authorized to require an existing building to be investigated and evaluated by a registered design professional based on the circumstances agreed upon at the preliminary meeting. The design professional shall notify the building official where any potential nonconformance with the provisions of this code is identified.

Add new text to the International Existing Building Code as follows:

IEBC [A] 104.12 Preliminary meeting. When requested by the permit applicant or the code official, the code official shall meet with the permit applicant prior to the application for a construction permit to discuss plans for the proposed work or change of occupancy in order to establish the specific applicability of the provisions of this code.

IEBC [A] 104.13 Building evaluation. The code official is authorized to require an existing building to be investigated and evaluated by a registered design professional based on the circumstances agreed upon at the preliminary meeting. The design professional shall notify the code official where any potential nonconformance with the provisions of this code is identified.

Add new text to the International Fire Code as follows:

IFC [A] 104.12 Preliminary meeting. When requested by the permit applicant or the fire code official, the fire code official shall meet with the permit applicant prior to the application for a construction permit to discuss plans for the proposed work or change of occupancy in order to establish the specific applicability of the provisions of this code.

IFC [A] 104.13 Building evaluation. The fire code official is authorized to require an existing building to be investigated and evaluated by a registered design professional based on the circumstances agreed upon at the preliminary meeting. The design professional shall notify the fire code official where any potential nonconformance with the provisions of this code is identified.

Add new text to the International Fuel Gas Code as follows:

IFGC [A] 104.8 Preliminary meeting. When requested by the permit applicant or the code official, the code official shall meet with the permit applicant prior to the application for a construction permit to discuss plans for the proposed work or change of occupancy in order to establish the specific applicability of the provisions of this code.

IFGC [A] 104.9 Building evaluation. The code official is authorized to require an existing building to be investigated and evaluated by a registered design professional based on the circumstances agreed upon at the preliminary meeting. The design professional shall notify the code official where any potential nonconformance with the provisions of this code is identified.

Add new text to the International Mechanical Code as follows:

IMC [A] 104.8 Preliminary meeting. When requested by the permit applicant or the code official, the code official shall meet with the permit applicant prior to the application for a construction permit to discuss plans for the proposed work or change of occupancy in order to establish the specific applicability of the provisions of this code.

IMC [A] 104.9 Building evaluation. The code official is authorized to require an existing building to be investigated and evaluated by a registered design professional based on the circumstances agreed upon at the preliminary meeting. The design professional shall notify the code official where any potential nonconformance with the provisions of this code is identified.

Add new text to the International Plumbing Code as follows:

IPC [A] 104.8 Preliminary meeting. When requested by the permit applicant or the code official, the code official shall meet with the permit applicant prior to the application for a construction permit to discuss plans for the proposed work or change of occupancy in order to establish the specific applicability of the provisions of this code.

IPC [A] 104.9 Building evaluation. The code official is authorized to require an existing building to be investigated and evaluated by a registered design professional based on the circumstances agreed upon at the preliminary meeting. The design professional shall notify the code official where any potential nonconformance with the provisions of this code is identified.

Add new text to the International Private Sewage Disposal Code as follows:

IPSDC [A] 104.8 Preliminary meeting. When requested by the permit applicant or the code official, the code official shall meet with the permit applicant prior to the application for a construction permit to discuss plans for the proposed work or change of occupancy in order to establish the specific applicability of the provisions of this code.

IPSDC [A] 104.9 Building evaluation. The code official is authorized to require an existing building to be investigated and evaluated by a registered design professional based on the circumstances agreed upon at the preliminary meeting. The design professional shall notify the code official where any potential nonconformance with the provisions of this code is identified.

Add new text to the International Property Maintenance Code as follows:

IPMC [A] 104.7 Preliminary meeting. When requested by the permit applicant or the code official, the code official shall meet with the permit applicant prior to the application for a construction permit to discuss plans for the proposed work or change of occupancy in order to establish the specific applicability of the provisions of this code.

IPMC [A] 104.8 Building evaluation. The code official is authorized to require an existing building to be investigated and evaluated by a registered design professional based on the circumstances agreed upon at the preliminary meeting. The design professional shall notify the code official where any potential nonconformance with the provisions of this code is identified.

Add new text to the International Wildland-Urban Interface Code as follows:

IWUIC [A] 104.8 Preliminary meeting. When requested by the permit applicant or the code official, the code official shall meet with the permit applicant prior to the application for a construction permit to discuss plans for the proposed work or change of occupancy in order to establish the specific applicability of the provisions of this code.

IWUIC [A] 104.9 Building evaluation. The code official is authorized to require an existing building to be investigated and evaluated by a registered design professional based on the circumstances agreed upon at the preliminary meeting. The design professional shall notify the code official where any potential nonconformance with the provisions of this code is identified.

PART II – IRC

Add new text to the International Residential Code as follows:

IRC [A] R104.12 Preliminary meeting. When requested by the permit applicant or the building official, the building official shall meet with the permit applicant prior to the application for a construction permit to discuss plans for the proposed work or change of occupancy in order to establish the specific applicability of the provisions of this code.

IRC [A] R104.13 Building evaluation. The building official is authorized to require an existing building to be investigated and evaluated by a registered design professional based on the circumstances agreed upon at the preliminary meeting. The design professional shall notify the building official where any potential nonconformance with the provisions of this code is identified.

PART III – ISPSC

Add new text to the International Swimming Pool and Spa Code as follows:

ISPSC 104.13 Preliminary meeting. When requested by the permit applicant or the code official, the code official shall meet with the permit applicant prior to the application for a construction permit to discuss plans for the proposed work or change of occupancy in order to establish the specific applicability of the provisions of this code.

ISPSC 104.14 Building evaluation. The code official is authorized to require an existing building to be investigated and evaluated by a registered design professional based on the circumstances agreed upon at the preliminary meeting. The design professional shall notify the code official where any potential nonconformance with the provisions of this code is identified.

Reason: Several of the ICC codes have provisions for meetings prior to the processing of an application. Every building would benefit from the sharing of knowledge and expertise of the design team and the code official regarding the scope and circumstances surrounding a particular project.

Cost Impact: None

ADM24-13**PART I – IBC; IEBC; IFC; IFCG; IMC; IPC; IPSDC; IPMC; IWUIC**

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IRC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART III – ISPSC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

104.12 (NEW)-ADM (IBC)-COLLINS

ADM25 – 13

IFC: [A] 105.1.4 (New), [A] 105.1.5 (New)

Proponent: Anthony C. Apfelbeck, CBO, CFPS, City of Altamonte Springs Building/Fire Safety Division, representing self. (ACApfelbeck@Altamonte.org)

Add new text to the International Fire Code as follows:

IFC [A] 105.1.4 Emergency repairs. Where equipment replacement and repairs must be performed in an emergency situation, the permit application shall be submitted within the next working business day to the fire code official

IFC [A] 105.1.5 Repairs. Application or notice to the fire code official is not required for ordinary repairs to structures, equipment or systems. Such repairs shall not include the cutting away of any wall, partition or portion thereof, the removal or change of any required means of egress, or rearrangement of parts of a structure affecting the egress requirements; nor shall any repairs include addition to, alteration of, replace or relocation of any standpipe, fire protection water supply, automatic sprinkler system, fire alarm system or other work affecting fire protection or life safety.

Reason: The proposed Section 105.1.4 and 105.1.5 are identical to Sections 105.2.1 and 105.2.2 of the IBC with the exception that fire code official has replaced the term building official. This provision is needed in the IFC to address situations where emergency repairs and general repairs are required in addition to providing an allowance for ordinary repairs. The need in the IFC is similar to the need in the IBC. Both codes should match with similar provisions and direction to end users in dealing with these two types of issues.

Cost Impact: This code change will reduce the cost of construction. This change will cause both the IBC and IFC to match which will ease compliance and enforcement costs.

ADM25-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

105.1.5 (NEW)-ADM (IFC)-APFELBECK

ADM26 – 13

IFC: [A] 105.1.4 (New), [A] 105.1.4.1 (New); **IFGC:** [A] 106.1.1 (New), [A] 106.1.2 (New); **IMC:** [A] 106.1.1 (New), [A] 106.1.2 (New); **IPC:** [A] 106.1.1 (New), [A] 106.1.2 (New); **IPSDC:** [A] 106.1.1 (New), [A] 106.1.2 (New)

Proponent: Anthony C. Apfelbeck, CBO, CFPS, City of Altamonte Springs Building/Fire Safety Division, representing self (ACApfelbeck@Altamonte.org)

Add new text to the International Fire Code as follows:

IFC [A] 105.1.4 Annual permit. In lieu of an individual construction permit for each alteration to an already approved system or equipment installation, the fire code official is authorized to issue an annual permit upon application therefor to any person, firm or corporation regularly employing one or more qualified tradespersons in the building, structure or on the premises owned or operated by the applicant for the permit.

IFC [A] 105.1.4.1 Annual permit records. The person to whom an annual permit is used shall keep a detailed record of alterations made under such annual permit. The fire code official shall have access to such records at all times or such records shall be filed with the fire code official as designated.

Revise the International Fuel Gas Code as follows:

IFGC [A] 106.1.1 Annual permit. In lieu of an individual construction permit for each alteration to an already approved system or equipment installation, the code official is authorized to issue an annual permit upon application therefor to any person, firm or corporation regularly employing one or more qualified tradespersons in the building, structure or on the premises owned or operated by the applicant for the permit.

IFGC [A] 106.1.2 Annual permit records. The person to whom an annual permit is used shall keep a detailed record of alterations made under such annual permit. The code official shall have access to such records at all times or such records shall be filed with the code official as designated.

Revise the International Mechanical Code as follows:

IMC [A] 106.1.1 Annual permit. In lieu of an individual construction permit for each alteration to an already approved system or equipment installation, the code official is authorized to issue an annual permit upon application therefor to any person, firm or corporation regularly employing one or more qualified tradespersons in the building, structure or on the premises owned or operated by the applicant for the permit.

IMC [A] 106.1.2 Annual permit records. The person to whom an annual permit is used shall keep a detailed record of alterations made under such annual permit. The code official shall have access to such records at all times or such records shall be filed with the code official as designated.

Revise the International Plumbing Code as follows:

IPC [A] 106.1.1 Annual permit. In lieu of an individual construction permit for each alteration to an already approved system or equipment installation, the code official is authorized to issue an annual permit upon application therefor to any person, firm or corporation regularly employing one or more qualified tradespersons in the building, structure or on the premises owned or operated by the applicant for the permit.

IPC [A] 106.1.2 Annual permit records. The person to whom an annual permit is used shall keep a detailed record of alterations made under such annual permit. The code official shall have access to such records at all times or such records shall be filed with the code official as designated.

Revise the International Private Sewage Disposal Code as follows:

IPSDC [A] 106.1.1 Annual permit. In lieu of an individual construction permit for each alteration to an already approved system or equipment installation, the code official is authorized to issue an annual permit upon application therefor to any person, firm or corporation regularly employing one or more qualified tradespersons in the building, structure or on the premises owned or operated by the applicant for the permit.

IPSDC [A] 106.1.2 Annual permit records. The person to whom an annual permit is used shall keep a detailed record of alterations made under such annual permit. The code official shall have access to such records at all times or such records shall be filed with the code official as designated.

Reason: This proposed language is identical to the current language in section 105.1.1 and 105.1.2 of the IBC with the exception that the title of the code official is changes and that the list of systems have been removed from the types of permits. There is similar language in the IEBC, Section 105.1.1 and 105.1.2. The need for this language in the IFC and other codes is similar to the justification for it being present in the IBC. If annual permits can be issued for MEP system upon approval of the Building Official, annual permits should be able to be issued for fire systems regulated by the IFC upon the approval of the Fire Official.

The idea for this proposal was originally brought up as an issue for the IFC and fire code officials. However, once it was identified that there is Permit section in the IFGC, IMC, IPC and IPSDC, it seemed appropriate to extend this proposal.

Cost Impact: This code change will reduce the cost of construction. In situations where the issuance of annual permit for fire protection systems is appropriate, there will be a direct cost saving to the contractor in avoiding the need for individual permits.

Staff analysis: Permit sections are also found in the IWUIC and Pool codes.

ADM26-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

105.1.4 (NEW)-ADM (IFC)-APFELBECK

ADM27 – 13

PART I – IBC: 105.2

PART II – IRC: R105.2

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE ADMINISTRATIVE PROVISIONS COMMITTEE. PART II WILL BE HEARD BY THE RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

Proponent: Rick Davidson, City of Maple Grove, representing Association of Minnesota Building Officials (rdavidson@maplegrovern.gov)

PART I – IBC

Revise the International Building Code as follows:

IBC [A] 105.2 Work exempt from permit. Exemptions from *permit* requirements of this code shall not be deemed to grant authorization for any work to be done in any manner in violation of the provisions of this code or any other laws or ordinances of this jurisdiction. *Permits* shall not be required for the following:

Building:

1. One-story detached accessory structures ~~used as tool and storage sheds, playhouses and similar uses,~~ provided the floor area is not greater than 120 square feet (11 m²).
- 2 through 13 (No change to current text)

(Remainder of section not shown remains unchanged.)

PART II – IRC

Revise the International Residential Code as follows:

R105.2 Work exempt from permit. *Permits* shall not be required for the following. Exemption from *permit* requirements of this code shall not be deemed to grant authorization for any work to be done in any manner in violation of the provisions of this code or any other laws or ordinances of this *jurisdiction*.

Building:

1. One-story detached ~~accessory structures used as tool and storage sheds, playhouses and similar uses,~~ provided the floor area does not exceed 200 square feet (18.58 m²).
- 2 through 10 (No change to current text)

(Remainder of section not shown remains unchanged.)

Reason: The term “used as tool and storage sheds, playhouses and similar uses” is proposed to be deleted because there now exists in the IRC a definition for “accessory structure”. It is unnecessary to further define the term in the rule as it only serves to add confusion. For example, a small outdoor screen room meets the definition of accessory structure but is it exempt from permits? It poses no more of a hazard than a playhouse or tool shed. It is better to let the definition provide direction.

ACCESSORY STRUCTURE. A structure not greater than 3,000 square feet (279 m²) in floor area, and not over two stories in height, the use of which is customarily accessory to and incidental to that of the dwelling(s) and which is located on the same lot.

Cost Impact: None

ADM27-13**PART I – IBC**

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IRC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R105.2 #2-RB-DAVIDSON

ADM28 – 13

IBC: [A] 105.2

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing Association of Pool & Spa Professionals (jen@jhatfieldandassociates.com)

Revise the International Building Code as follows:

IBC [A] 105.2 Work exempt from permit. Exemptions from *permit* requirements of this code shall not be deemed to grant authorization for any work to be done in any manner in violation of the provisions of this code or any other laws or ordinances of this jurisdiction. *Permits* shall not be required for the following:

Building:

1 through 8 *(No change to text)*

~~9. Prefabricated swimming pools accessory to a Group R-3 occupancy that are less than 24 inches (610 mm) deep, are not greater than 5,000 gallons (18 925 L) and are installed entirely above ground.~~

10 through 13 *(No change to text)*

(No change to portions of section not shown)

Reason: The new International Swimming Pool & Spa Code (ISPSC) does not define nor exempt from permitting, prefabricated swimming pools. Rather, the exemption from permitting under the new ISPSC is based on whether or not the structure in question meets the definition of an aquatic vessel, which is defined in the ISPSC (and suggested for inclusion in the IBC definitions in a subsequent proposal). This new aquatic vessel definition eliminates the need for the exception listed under Section 105.2 and if it were to remain, it would conflict with the requirements found in the new ISPSC, which find that if a structure falls under the aquatic vessel definition, it requires a permit.

Cost Impact: The code change proposal will not increase the cost of construction.

ADM28-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

105.2-ADM (IBC)-HATFIELD

ADM29 – 13

IFC: [A] 105.4.2.2 (New)

Proponent: Anthony C. Apfelbeck, CBO, CFPS, City of Altamonte Springs Building/Fire Safety Division, representing self. (ACApfelbeck@Altamonte.org)

Add new text to the International Fire Code as follows:

IFC [A] 105.4.2.2 Site Plan. The construction documents submitted with the application for permit shall be accompanied by a site plan showing to scale the size and location of new construction and exiting structures on the site, distances to lot lines, fire apparatus access roads, and fire protection water supply locations. In the case of demolition, the site plan shall show construction to be demolished and the location and size of existing structures and construction that are to remain on the site or plot. The fire code official is authorized to waive or modify the requirement for a site plan when the application for permit is for alteration or repair or when otherwise warranted.

Reason: This proposed language is very similar to the current language in Section 107.2.5 of the IBC. However, this proposal has been modified to change the title of the official and change the information needed on the site plan to make the information specific to the fire code official's specific needs. This language is needed in the IFC for fire code official to be able to effectively review the construction plans for compliance with this code and referenced documents. There are numerous provisions in the IFC that need a site plan submitted in order for the fire code official to be able to determine compliance with the code.

Cost Impact: This code change proposal will increase the cost of construction. The only increased cost associated with this proposal will be the time and effort to create a site plan. However, in a vast majority of circumstances, a site plan will already have been completed. There will be some potential cost savings due to the fire official being able to identify code compliance issues on the site plan prior to observing those conditions in the field and mandating a field change.

ADM29-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

105.4.2.2 (NEW)-ADM (IFC)-APFELBECK

ADM30 – 13

PART I - IFC: [A] 105.4.5; IWUIC: [A] 108.10;

PART II - IECC: C103.4;

PART III - IECC: R103.4

THIS IS A 3 PART CODE CHANGE. PARTS I WILL BE HEARD BY THE ADMINISTRATIVE PROVISIONS COMMITTEE AS ONE CODE CHANGE. PART II WILL BE HEARD BY THE ENERGY CONSERVATION CODE-COMMERICAL COMMITTEE. PART III WILL BE HEARD BY THE ENERGY CONSERVATION CODE-RESIDENTIAL COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

Proponent: Anthony C. Apfelbeck, CBO, CFPS, City of Altamonte Springs Building/Fire Safety Division, representing self. (ACApfelbeck@Altamonte.org)

PART I –IFC; IWUIC

Revise the International Fire Code as follows:

IFC [A] 105.4.5 ~~Corrected documents~~ Amended construction documents. ~~Where field conditions necessitate any substantial change from the approved construction documents, the fire code official shall have the authority to require the corrected construction documents to be submitted for approval. Work shall be installed in accordance with the approved construction documents, and any changes made during construction that are not in compliance with the approved construction documents shall be resubmitted for approval as an amended set of construction documents.~~

Revise the International Wildland-Urban Interface Code as follows:

IWUIC [A] 108.10 Amended construction documents. Work shall be installed in accordance with the approved construction documents, and any changes made during construction that are not in compliance with the approved documents shall be resubmitted for approval as an amended set of construction documents.

PART II – IECC-COMMERCIAL

Revise the International Energy Conservation Code-Commercial as follows:

IECC C103.4 Amended construction documents. Work shall be installed in accordance with the approved construction documents, and any changes made during construction that are not in compliance with the approved construction documents shall be resubmitted for approval as an amended set of construction documents.

PART III – IECC-RESIDENTIAL

Revise the International Energy Conservation Code-Residential as follows:

IECC R103.4 Amended construction documents. Work shall be installed in accordance with the approved construction documents, and any changes made during construction that are not in compliance with the approved construction documents shall be resubmitted for approval as an amended set of construction documents.

Reason: The proposed language is from 107.4 in the IBC which better describes the intent of the section. This proposal correlates the IFC requirement with the IBC so users, contractors and designers are subject to the same code provision in both codes. There is no justification for differing language in the IFC as opposed to the IBC on this topic. The current language in IFC 105.4.5, to submit corrected documents, is too specific based on the sole fact of “when field conditions necessitate. . .” Clearly, this not the only reason that revised construction documents would be needed. As an example, the owner may choose to make a revision, a design

professional may value engineer a design or a contractor may change materials from the original approved construction documents. All of these items are reasons that necessitate an amended construction document submittal under the IBC but currently do not under the IFC. This proposal will match the IBC and IFC language is broad enough to addresses any condition that may cause the installation to not be in compliance with the approved construction documents.

Cost Impact: This proposal will not increase the cost of construction. The IBC already requires amended construction documents per this language.

Staff analysis: The proposed language is found in IBC Section 107.4, IEBC Section 106.4 and IRC Section R106.4.

ADM30-13

PART I – IFC; IWUIC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-COMMERCIAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART III – IECC-RESIDENTIAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

105.4.5-ADM (IFC)-APFELBECK

ADM31 – 13

IFC: [A] 105.6.30 (New), [A] 105.6.39

THIS CHANGE WILL BE HEARD BY THE FIRE CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

Proponent: Chad P. Lawry, Deputy Fire Marshal, Vancouver Fire Department, representing Vancouver Fire Marshal's Office (chad.lawry@cityofvancouver.us)

Revise the International Fire Code as follows:

IFC [A] 105.6 Required operational permits. *(No change to text)*

IFC [A] 105.6.30 Motor fuel-dispensing facilities. An operational permit is required for the operation of automotive, marine and fleet motor fuel-dispensing facilities.

(Renumber subsequent sections)

~~IFC [A] 105.6.39 Repair garages and motor fuel-dispensing facilities.~~ An operational permit is required for the operation of repair garages ~~and automotive, marine and fleet motor fuel-dispensing facilities.~~

Reason: This is a simple division of a combined permit into two separate permits.

Currently the permit provides a perceived "authorization" for one or both regulated activities regardless of which specific activity triggered the permit at the time of the inspection. A permitted repair garage proprietor may believe that after the inspection they are allowed to dispense fuel without permits or inspections.

For example, we had a grocery store in Vancouver Washington with fuel dispensing that used their fire code permit for fuel dispensing to justify conducting automotive repair shop in violation of their certificate of occupancy and local zoning ordinances.

Cost Impact: None

Staff analysis: The section numbering choice is to maintain the alphabetic listing under the operational permits.

ADM31-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

105.6.39-ADM (IFC)-LAWRY

ADM32 – 13

IFC: [A] 105.7.9 (New)

THIS CHANGE WILL BE HEARD BY THE FIRE CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azumiamia@yahoo.com)

Add new text to the International Fire Code as follows:

IFC [A] 105.7.9 Gates and barricades across fire apparatus access roads. A construction permit is required for the installation of or modification of a gate or barricade across a fire apparatus access road.

(Renumber subsequent sections)

Reason: The proposal requires that gates and barricades across fire access lanes require a construction permit. The permit is necessary to provide the fire code official the ability to review and ensure that access requirements are met.

Current code requirements for gates include method of locking/securing the gate or barricade in an approved manner, proper dimensions and opening width of the gate or barricade, and proper devices for operation of the gate or barricade.

Cost Impact: The code change proposal will increase the cost of construction if the jurisdiction requires a fee for the permit.

ADM32-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

105.7.9 (NEW)-ADM (IFC)-ZUBIA-FCAC

ADM33 – 13

IFC: [A] 105.7.11, [A] 105.7.12, [A] 105.7.13, [A] 105.7.14

THIS CHANGE WILL BE HEARD BY THE FIRE CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

Proponent: Anthony C. Apfelbeck, CBO, CFPS, City of Altamonte Springs Building/Fire Safety Division, representing self. (ACApfelbeck@Altamonte.org)

Revise the International Fire Code as follows:

IFC [A] 105.7.11 LP-gas. A construction permit is required for installation of or modification to an LP-gas system. Maintenance performed in accordance with this code is not considered a modification and does not require a permit.

IFC [A] 105.7.12 Private fire hydrants. A construction permit is required for the installation or modification of private fire hydrants. Maintenance performed in accordance with this code is not considered a modification and does not require a permit.

IFC [A] 105.7.13 Solar photovoltaic power systems. A construction permit is required to install or modify solar photovoltaic power systems. Maintenance performed in accordance with this code is not considered a modification and does not require a permit.

IFC [A] 105.7.14 Spraying or dipping. A construction permit is required to install or modify a spray room, dip tank or booth. Maintenance performed in accordance with this code is not considered a modification and does not require a permit.

Reason: The above subcategories of construction permits in 105.7 are the only ones that require a permit for modifications but do not have an exception for routine maintenance in accordance with the code. Other similar sections, such as those for standpipes, in 105.7.15, fire pumps in 105.7.7 and fire alarms in 105.7.6 already provide this exception. The inclusion of the proposed text will make the sections above consistent with the other subcategory language in 105.7.

Cost Impact: The code change proposal will not increase the cost of construction.

ADM33-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

105.7.11-ADM (IFC)-APFELBECK

ADM34 – 13

IFC [A] 105.7.12 (New)

THIS CHANGE WILL BE HEARD BY THE FIRE CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

Proponent: Ian Hardage, San Ramon Valley Fire Protection District (ihardage@srvfire.ca.gov) and Amber Anderson, Cosumnes CSD Fire Department (AmberAnderson@csdfire.com), representing California Fire Chiefs Association

Revise the International Fire Code as follows:

IFC [A] 105.7.12 Mechanical refrigeration. A construction permit is required for the installation of or modification to a mechanical refrigeration unit or system.

(Renumber subsequent sections)

Reason: Currently only an operational permit is required to operate a mechanical refrigeration unit or system regulated by Chapter 6. In order for these systems to be maintained and operated in compliance with Chapter 6, these units or systems must be compliant with Chapter 6 at time of installation. Not all requirements of IFC Chapter 6 are found in the IMC, ASHRAE 15, or IIAR 2. Specifically, IFC, Sections 606.5, 606.10.1.2, and 606.12.3 which provide fire code officials the opportunity to provide mechanical refrigeration system installation design criteria and or exceptions.

It is not uncommon for mechanical refrigeration systems to be installed, replaced or modified without fire department knowledge or input until they are found on an emergency call or during a facility inspection. Other systems sensitive to change such as stationary battery systems, compressed gases, hazardous materials, and flammable and combustible liquids require a construction permit as found in IFC Section 105.7. The same opportunity is needed for mechanical refrigeration systems.

Increases in construction costs would only occur if an authority having jurisdiction chose to implement a separate fee for permit. All other costs such as design drawings and construction of the system should already be included in the original design budget. We feel that any cost increase by an AHJ would likely be significantly less than any delays in construction or operation of the system when such system is determined to be non-compliant with codes and standards enforced by the fire code official at a time less than ideal for the customer such as at final inspection.

Cost Impact: The code proposal will increase the cost of construction.

ADM34-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

105.7.12 (NEW)-ADM (IFC)-ANDERSON-HARDAGE

ADM35 – 13

IFC: 105.7.13 (New)

THIS CHANGE WILL BE HEARD BY THE FIRE CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

Proponent: Bob D. Morgan, P.E., Fort Worth Fire Department, representing the Fire Advisory Board to the North Central Texas Council of Governments

Revise as follows:

IFC 105.7.13 Smoke control or exhaust systems. Construction permits are required for installation of or alteration to smoke control or exhaust systems. Maintenance performed in accordance with this code is not considered a modification and does not require a permit.

(Renummer subsequent sections)

Reason: Section 105.7.17 adds construction permit requirements for smoke control and exhaust systems, which are required fire protection systems by Chapter 9 of the fire code to ensure proper design and installation of such systems.

Cost Impact: The code change proposal will not increase the cost of construction.

ADM35-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

105.7.17 (NEW)-ADM (IFC)-MORGAN

ADM36 – 13

PART I - IEBC: [A] 106.1.3 (New), [A] 109.3.7 (New), [A] 109.3.8 (New), 602.4 (New), 602.4.1 (New);

PART II - IPMC: [A] 103.6 (New), [A] 103.7 (New), [A] 106.1 (New), 305.4 (New), 305.4.1 (New)

Proponent: Darryl Morris, Aerobiologist, Midwest Aerobiology Labs, Corp., representing self (Darryl@airspores.com)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE EXISTING BUILDING COMMITTEE AS ONE CODE CHANGE. PART II WILL BE HEARD BY THE PROPERTY MAINTENANCE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

PART I – IEBC

Add new text to the International Existing Building Code as follows:

IEBC SECTION 106 PERMITS

IEBC [A] 106.1.3 Permit Required. A permit is required for mold remediation, mold removal, mold cleanup, or other mold-related activities.

IEBC SECTION 109 INSPECTIONS

IEBC [A] 109.3.7 Municipality Required Mold Inspections. Mold inspection by a certified mold inspector shall be required in the following situations:

1. Before the sale of any foreclosed, vacant, and bank-owned properties; or
2. Where stagnant water or visible molds are evident.

IEBC [A] 109.3.8 Post Mold Removal Verification Inspection. A post-remediation verification inspection shall be performed by a certified mold inspector. The inspection shall verify that the remediation has been properly executed and that the area has been restored to a benign indoor environment.

(Renumber subsequent sections)

IEBC SECTION 602 BUILDING ELEMENTS AND MATERIALS

IEBC 602.4 Mold Cleaning Procedures. Where mold and moisture problem are identified, physical extraction or encapsulation of mold and their spores is required.

IEBC 602.4.1 Disposal of Stagnant Water. Moldy stagnant water drained from a crawl space or basement shall be disposed of in accordance with directions from the code official.

(Renumber subsequent sections)

PART II – IPMC

Add new text to the International Property Maintenance Code as follows:

IPMC SECTION 103
DEPARTMENT OF PROPERTY MAINTENANCE INSPECTION

IPMC [A] 103.6 Municipality Required Mold Inspections. Mold inspection by a certified mold inspector shall be required in the following situations:

1. Before the sale of any foreclosed, vacant, and bank-owned properties; or
2. Where stagnant water or visible molds are evident.

IPMC [A] 103.7 Post Mold Removal Verification Inspection. A post-remediation verification inspection shall be performed by a certified mold inspector. The inspection shall verify that the remediation has been properly executed and that the area has been restored to a benign indoor environment.

IPMC SECTION 106
PERMITS

IPMC [A] 106.1 Permit Required. A permit is required for mold remediation, mold removal, mold cleanup, or other mold-related activities.

IPMC SECTION 305
INTERIOR STRUCTURES

IPMC 305.4 Mold Cleaning Procedures. Where mold and moisture problem are identified, physical extraction or encapsulation of mold and their spores is required.

IPMC 305.4.1 Disposal of Stagnant Water. Moldy stagnant water drained from a crawl space or basement shall be disposed of in accordance with directions from the code official.

(Renumber subsequent sections)

Reason: Currently, there are no guidelines for mold removal and post mold removal verification. An enforceable code would provide code enforcers with the opportunity to determine if an indoor environment is sufficiently benign, and does not pose any serious health risk to themselves, current or future occupants.

Cost Impact: The code change proposal will not increase the cost of construction.

ADM36-13

PART I –IEBC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IPMC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

105 (NEW)-PM-MORRIS

ADM37 – 13

IEBC: 106.2.6 (New), Chapter 16

THIS CHANGE WILL BE HEARD BY THE EXISTING BUILDING CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

Proponent: Rebecca Morley, representing National Center for Healthy Housing

Add new text to the International Existing Building Code as follows:

IEBC 106.2.6 Certifications and plans where painted surfaces are disturbed. Where a Group E, I-4, R-2, R-3 or R-4 occupancy was completed prior to 1978 and repair, alteration or addition being performed will result in the disturbance of painted surfaces, the contractor shall provide to the code official one of the following:

1. Copies of EPA or state renovation firm certification, renovator certification and a plan for compliance for renovations in accordance with 40 CFR 745 requirements for renovations.
2. Documentation from an approved test in accordance with 40 CFR 745.82(a)(1) or (2) that shows that the disturbed paint contains lead that is below specified levels.

Add the following standard to IEBC Chapter 16:

EPA **U.S. Environmental Protection Agency**

40 CFR 745 **Lead-Based Paint Poisoning Prevention in Certain Residential Structures – July 1, 2012**

Reason: Section 106 covers construction documents, and the specific provisions include fire protection drawings, means of egress, exterior wall envelope and site plans. This code change proposal, 106.2.6, adds a simple requirement that permit applicants include, with the other construction documents, evidence of compliance with health-protective requirements to protect children from lead poisoning during additions, alterations, and repairs to pre-1978 homes.

The purpose of this proposed code language is to incorporate protection from lead-based paint into the Code through the requirement for construction documents. Once the Code requires permit applicants to demonstrate up front their knowledge of, and plans to follow, the federal and state renovation rule requirements, the code official will be positioned to provide important oversight and leadership in preventing lead poisoning without even leaving the office. This oversight will help level the playing field between contractors who are complying with the rule and noncompliant entities who are under-pricing and undercutting their competitors. By merely asking an applicant for the missing documents, the code official can influence entities not following the law into compliance before the work even starts. In a few cases, these entities may be unaware of the regulations. Although these regulations have been in effect since April 2010, and have been adopted by 12 states, reported non-compliance is affecting the compliant contractor and continuing the problem of lead poisoning in the US.

The proposed “plan that indicates compliance with the federal disclosure and work practice requirements” can take different forms depending on what documents the builder is already using. Some builders who work on pre-1978 homes are already using a form to track their upfront assessments and another form for recordkeeping. Anyone working in pre-1978 homes should have an EPA or state certification for their firm, along with at least one individual renovator certification that the renovator received at the end of the required one-day training course. dispersal of lead before, during, and after work performed on a pre-1978 home. These requirements are already in effect in federal and state regulation.

The plan and certifications would only be needed for a structure likely to contain lead-based paint: a pre-1978 home. As noted under the exception, the requirement is waived if paint testing proves that the paint is not lead-based paint. A rebuttable presumption of lead’s presence allows the builder to demonstrate that lead is not present and obtain exemption from the requirements. EPA-approved tests include lead-based paint inspection or risk assessment, test kit used by a certified renovator, and collection of a lead-based paint chips for laboratory analysis.

Renovation of painted surfaces is a significant source of lead dust that poisons children. The dangers associated with lead poisoning are well-known: serious health effects, detrimental effects on cognitive and behavioral development, with serious personal and social consequences that may persist throughout their lifetime.

Multiple studies have demonstrated that lead dust is the major source of lead poisoning for young children. There is no safe level of lead exposure for children; lead affects intelligence even at very low levels.^{1,2,5,8,9} Indeed, the rate of IQ loss per 1 microgram of lead per deciliter of blood (µg/dL) is greatest at lead levels below 10 µg/dL. As a child’s BLL increases from 1 to 10 µg/dL, experts estimate a child may lose anywhere from 3.9 to 7.4 IQ points, but from 10 to 30 µg/dL the decrement is 2.5 to 3.0 IQ points. Low-level chronic exposure may have an even greater effect on IQ than a single instance of very high BLL.¹⁰

Research indicates that a five-point negative shift in IQ at the population level would increase the number of children with an “extremely low” IQ by 57%, substantially increasing the cost of special education programs.³ Considering the costs to the special education system alone, one study conservatively estimated that it costs \$38,000 over three years to educate a child with lead poisoning.¹¹ Low-level exposure to lead has also been linked to factors other than IQ that can further impact educational outcomes.

EBLLs are associated with Attention Deficit Hyperactivity Disorder (ADHD) and antisocial behavior, which in turn increase the likelihood of conduct disorder, criminal activity, and drug abuse.^{1,4} Each 1 µg/dL reduction in the average preschool blood lead level saves \$13.4 billion from the direct and indirect costs of crime.¹

Several recent studies have explored the specific effects of lead on educational outcomes. These studies show a strong relationship between slightly elevated blood lead levels in young children and decreased scores on end-of-grade tests in elementary school. While similar educational effects were documented for higher blood levels decades ago,¹² the recent studies confirm that the connection between blood lead and poor educational outcomes remains true for blood levels as low as 3-4 µg/dL. A more recent study of 57,000 North Carolina children found that children with a BLL as low as 4 µg/dL at three years of age were significantly more likely to be classified as learning-disabled than children with a BLL of 1 µg/dL.⁶

The consequences of lead exposure are clear. This code change proposal seeks to reduce the risk – and level the playing field among contractors working on pre-1978 properties.

The EPA 40 CFR 745 standard is available at <http://www.gpo.gov/fdsys/pkg/CFR-2012-title40-vol32/xml/CFR-2012-title40-vol32-part745.xml>.

References

1. Gould E. Childhood lead poisoning: conservative estimates of the social and economic benefits of lead hazard control. *Environ. Health Perspect.* 2009;117(7):1162–1167.
2. Jusko TA, Henderson CR, Lanphear BP, Cory-Slechta DA, Parsons PJ, Canfield RL. Blood lead concentrations. *Environ. Health Perspect.* 2008;116(2):243–248.
3. Mazumdar M, Bellinger DC, Gregas M, Abanilla K, Bacic J, Needleman HL. Low-level environmental lead exposure in childhood and adult intellectual function: a follow-up study. *Environ Health.* 2011;10:24.
4. Chandramouli K, Steer CD, Ellis M, Emond AM. Effects of early childhood lead exposure on academic performance and behaviour of school age children. *Arch. Dis. Child.* 2009;94(11):844–848.
5. Miranda ML, Kim D, Galeano MA, Paul CJ, Hull AP, Morgan SP. The relationship between early childhood blood lead levels and performance on end-of-grade tests. *Environ. Health Perspect.* 2007;115(8):1242–1247.
6. Miranda ML, Maxson P, Kim D. Early childhood lead exposure and exceptionality designations for students. *Int J Child Health Hum Dev.* 2010;3(1):77–84.
7. Advisory Committee on Childhood Lead Poisoning Prevention. Low Level Lead Exposure Harms Children: A Renewed Call for Primary Prevention. 2012:1–68. Available at: http://www.cdc.gov/nceh/lead/ACCLPP/Final_Document_030712.pdf. Accessed March 6, 2012.
8. Lanphear BP, Hornung R, Khoury J, et al. Low-level environmental lead exposure and children's intellectual function: an international pooled analysis. *Environ. Health Perspect.* 2005;113(7):894–899.
9. Canfield RL, Henderson CRJ, Cory-Slechta DA, Cox C, Jusko TA, Lanphear BP. Intellectual impairment in children with blood lead concentrations below 10 microg per deciliter. *N. Engl. J. Med.* 2003;348(16):1517–1526.16.
10. Lanphear BP, Dietrich K, Auinger P, Cox C. Cognitive deficits associated with blood lead concentrations. *Public Health Rep.* 2000;115(6):521–529.17.
11. Korfmacher KS. Long-term costs of lead poisoning: How much can New York save by stopping lead? Rochester, NY: University of Rochester; 2003.
12. Needleman HL, Leviton A, Bellinger D. Lead-associated intellectual deficit. *N Engl J Med.* 1982; 306(6):367.

Cost Impact: This code change proposal will not increase the cost of construction.

Staff analysis: A review of the standard proposed for inclusion in the code, NFPA 914 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

ADM37-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

106.2.6 (NEW)-ADM (IEBC)-MORLEY

ADM38 – 13

IFC: 106.3 (New), 113.2

Proponent: Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee
(cbaldassarra@rjagroup.com)

Add new text to the International Fire Code as follows:

IFC [A] 106.3 Periodic building fire safety inspections. In addition to any other inspections required or authorized by this code, all buildings shall be subjected to periodic building fire safety inspections in compliance with the requirements of Sections 106.3.1 through 106.3.6.

Exceptions: Periodic building fire safety inspections shall not be required in any of the following:

1. Buildings classified as Group U occupancies that are associated with Group R-3 occupancies.
2. Dwelling units in Group R-2 and Group R-3 occupancies.
3. Dwelling units constructed in accordance with the *International Residential Code*.

IFC [A] 106.3.1 Scope. The scope of periodic building fire safety inspections shall include the maintenance of safeguards as required by Section 107.1; the maintenance of the means of egress, fire-resistance-rated construction, and fire protection systems; storage arrangements, including hazardous material and combustible material storage; evidence of unlawful alterations; compliance with the fire safety and evacuation plan requirements of Chapter 4; recordkeeping, housekeeping and such other requirements as determined by the *fire code official*.

IFC [A] 106.3.2 Inspecting entity. Periodic building fire safety inspections required by Section 106.3 shall be conducted by the *fire code official*.

Exception: Where the *fire code official* determines that periodic fire safety inspections shall be conducted by an *approved third party*.

IFC [A] 106.3.3 Inspector qualifications. *Fire code officials* and *approved third parties* conducting periodic building fire safety inspections required by Section 106.3 shall, at a minimum, be certified through a recognized fire inspector certification program.

Exception: Where the building is subject to a building fire safety inspection program approved by the *fire code official*.

IFC [A] 106.3.4 Frequency of inspection. The minimum required frequency of periodic building fire safety inspections shall be determined by the *fire code official* based upon the *fire code official's* assessment of the risk or once every 5 years.

IFC [A] 106.3.5 Filings. Inspection reports for periodic building fire safety inspections conducted by an *approved third party* in accordance with Section 106.3.2 shall be submitted to the *fire code official* in accordance with the frequency of inspection schedule established by the *fire code official* in accordance with Section 106.3.4. The *fire code official* has the authority to prescribe the form and format of such report.

IFC [A] 106.3.6 Not a limitation on inspection authority. Periodic building fire safety inspections required by Section 106.3 shall not be construed to limit the *fire code official's* inspection authority pursuant to other sections of this code.

(Renumber subsequent sections)

Revise the International Fire Code as follows:

IFC [A] SECTION 113 FEES

IFC [A] 113.2 Schedule of permit fees. A fee for each permit, and fees associated with establishing a program to implement the requirement for periodic building fire safety inspections in accordance with Section 106.3, shall be paid as required, in accordance with the schedule as established by the applicable governing authority.

Reason: This proposed change is a result of the CTC's investigation of the area of study entitled "NIST Charleston Sofa Store Fire Recommendations". The scope of the activity is noted as:

Review the NIST and other investigative reports on the fire that occurred on the evening of June 18, 2007 in the Sofa Super Store in Charleston, South Carolina to identify issues that can be addressed by the International Codes.

In connection with their investigation, NIST analyzed the fire ground, consulted with other experts, and performed computer simulations of fire growth alternatives. Based on these analyses, NIST concluded that the following sequence of events is likely to have occurred. A fire began in packing material and discarded furniture outside an enclosed loading dock area. The fire spread to the loading dock, then into both the retail showroom and warehouse spaces. During the early stages of the fire in the two latter locations, the fire spread was slowed by the limited supply of fresh air. This under-ventilation led to generation of a large mass of pyrolyzed and only partially oxidized effluent. The smoke and combustible gases flowed into the interstitial space below the roof and above the suspended ceiling of the main retail showroom. As this space filled with unburned fuel, the hot smoke also seeped through the suspended ceiling into the main showroom and formed a hot smoke layer below the suspended ceiling. Up to this time, the extent of fire spread into the interstitial space was not visible to fire fighters in the store. If the fire spread had been visible to the fire fighters in the store, it would have provided a direct indication of a fire hazard in the showroom. Meanwhile, the fire at the back of the main showroom and the gas mixture below the suspended ceiling were both still fuel rich. When the front windows were broken out or vented, the inflow of additional air allowed the heat release rate of the fire to intensify rapidly and added air to the layer of unburned fuel below the suspended ceiling enabling the ignition of the unburned fuel/air mixture. The fire swept from the rear to the front of the main showroom extremely quickly, and then into the west and east showrooms. Nine fire fighters were killed in the Sofa Super Store fire. NIST developed eleven recommendations to help mitigate such future losses.

Recommendation 2 of the NIST report reads as follows:

"Model Building and Fire Code Enforcement: NIST recommends that all state and local jurisdictions implement aggressive and effective fire inspection and enforcement programs that address:

- a) all aspects of the building and fire codes;
- b) adequate documentation of building permits and alterations;
- c) means of fire protection systems inspection and detailed recordkeeping;
- d) frequency and rigor of fire inspections, including follow-up and auditing procedures; and
- e) guidelines for remedial requirements when inspections identify deviations from code provisions."

Following a review of recommendation 2 of the NIST report, a new section, 106.3, is proposed.

Section 106.3 requires that all buildings, with certain exceptions as listed in the section, be subjected to periodic building fire safety inspections in accordance with the requirements of Sections 106.3.1 through 106.3.6. The exception includes dwelling units in Group R-2 and Group R-3 occupancies, Group U occupancies associated with Group R-3 occupancies, and dwelling units constructed in accordance with the International Residential Code.

The purpose of requiring periodic building fire safety inspections is to help ensure that buildings are operated and maintained in accordance with the intent of the International Fire Code, as set forth in Section 101.3. There is little benefit to having an International Fire Code that includes periodic inspection, testing and maintenance requirements intended to ensure that a building is maintained in a safe condition unless there is a mechanism inherent in such code that provides the fire code official with reasonable assurances that they are being complied with. The 18th century phrase "a chain is only as strong as its weakest link" appropriately describes the reality of Building and Fire Codes being adopted in a jurisdiction, but not comprehensively enforced.

The NIST report offers several other recommendations that are not addressed in this proposal. The CTC has investigated all of the NIST recommendations and has, as deemed appropriate, submitted separate code changes in response. These separate code change proposals address the following: fire inspector, and fire plan examiner qualifications and certifications; detailed recordkeeping requirements; and required automatic sprinkler protection for existing Group F-1, M and S-1 occupancies that manufacture, store or sell upholstered furniture or mattresses that undergoing an Alteration 3 renovation. It is these proposals, coupled with the proposed requirement for a periodic building fire safety inspection, which will help fire code officials in their efforts to ensure that all buildings, not just buildings storing or selling upholstered furniture and mattresses, are constructed, operated and maintained in a manner that provides a prudent level of fire safety for building occupants and firefighters. The importance of fire prevention in the overall safety to building occupants and the protection of property cannot be overemphasized. It is interesting to note that the report "America Burning", a report published by the Federal Government in the early 1970's, recommended a "balance" of 50/50 between public fire department expenditures on suppression and fire prevention. This report can be found at <http://www.usfa.fema.gov/downloads/pdf/publications/fa-264.pdf>.

Section 106.3.1 defines the scope of periodic building fire safety inspections to include the maintenance of means of egress, fire-resistant-rated construction, and fire protection systems; evidence of unlawful alterations; compliance with the fire safety and evacuation plan required by Chapter 4 of the Fire Code; recordkeeping, housekeeping and such other requirements as determined by the fire code official.

Section 106.3.2 requires that periodic building fire safety inspections be conducted by the fire code official unless the fire code official determines that the inspection shall be conducted by an approved third party.

Section 106.3.2 acknowledges that the primary and preferred entity authorized to conduct periodic building fire safety inspections is the fire code official, but recognizes that certain jurisdictions may choose to require such inspection to be conducted by an approved third party. This section places no duty or liability on the fire code official to conduct periodic building fire safety inspections, it merely identifies them as the primary and preferred entity to do so.

Section 106.3.3 establishes qualifications for the inspector conducting periodic building fire safety inspections. Such inspector qualification requirement would not apply to buildings that are subjected to a building fire safety inspection program when approved by the fire code official. This section requires that inspectors conducting such inspections, at a minimum, be certified through a recognized fire inspector certification program. If the fire code officials choose to conduct periodic building fire safety inspections, they would be required to have such inspections conducted by individuals that meet this certification requirement. However, as previously stated, the fire code official has no duty or liability to conduct such inspections and therefore no obligation to employ certified inspectors. Approved third party individuals conducting such inspections, except as noted above, would be required to comply with this certification requirement. The section authorizes the fire code official to accept any recognized certification program for such fire inspectors.

Section 106.3.4 requires that the minimum frequency of periodic building fire safety inspections be determined by the fire code official based upon the fire code official's assessment of the risk or once every 5 years. As stated previously, certain buildings, as identified in Section 106.3, would not require periodic building fire safety inspections. For those buildings requiring periodic building fire safety inspections, 5 years was chosen as the maximum time to be allowed between such inspections, unless the fire code official's assessment of the building risk determines that a shorter or longer period should apply.

A building risk assessment would require that many factors be considered on a case-by-case basis, including but not limited to consideration of the building's occupancy Group; occupant load; building height and floor area; construction type and features; fire protection systems; layout and use of the building; size, type and configuration of the fuel load; vulnerability of the building occupants; history and severity of noncompliance with fire safety requirements; incidence of fire and other considerations relevant to the fire risk presented to building occupants and firefighters by such building.

Section 106.3.5 requires that inspection reports for periodic building fire safety inspections conducted by an approved third party be submitted to the fire code official in accordance with the frequency of inspection schedule established by the fire code official. This requirement would help the fire code official identify those buildings not in compliance with the periodic building fire safety inspection requirement. Fire code officials can then take appropriate enforcement action against such building owners to achieve compliance. The proposed change would also allow the fire code official to prescribe the form and format of such report, thereby facilitating its review.

Section 106.3.6 makes it clear that the periodic building fire safety inspection required by Section 106.3 does not limit the fire code official's authority to inspect a building under other provisions of the International Fire Code, including Section 104.3.

The proposed change to Section 113.2 would authorize the fire code official to establish fees associated with implementing a periodic building fire safety inspection program. Jurisdictions that act on this authority would help provide themselves with the economic resource they require to administer the program.

This proposal is submitted by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website:

<http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty-five meetings - all open to the public. In 2012, three of the 25 face-to-face meetings were held. In addition to the CTC meetings, the CTC established Study Groups (SG) of interested parties for each of the areas of study. These SG's are responsible for reviewing the available information and making recommendations to the CTC. All totaled, the SG's held over 70 conference calls in 2012.

Cost Impact: This code change proposal will not increase the cost of construction.

ADM38-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

106.3 (NEW)-ADM (IFC)-BALDASSARRA-CTC

ADM39 – 13

IFC: [A] 106.5 (New)

Proponent: Anthony C. Apfelbeck, CBO, CFPS, City of Altamonte Springs Building/Fire Safety Division, representing self. (ACApfelbeck@Altamonte.org)

Add new text to the International Fire Code as follows:

IFC [A] 106.5 Occupancy prohibited before approval. No building or structure shall be used or occupied, and no change in the existing occupancy classification of a building or structure or portion thereof shall be made until the fire code official has approved the use or occupancy.

Reason: This language is consistent with the language in the IBC section 111.1. This language is also similar to the language that currently exists in IFC 105.3.3 prohibiting occupancy prior to permit approval. However, this proposed code change clarifies that the fire code official has an important role in the approval of buildings prior to occupancy. Currently, the code does not clearly require the approval of the fire code official prior to occupancy. Ensuring compliance with this code, before the building is occupied, is of utmost importance in correcting dangerous conditions and ensuring fire protection systems are operational.

From a customer service standpoint, this language is also imperative. The owner, contractor and tenant should not be placed in a situation where a Certificate of Occupancy is issued, the building occupied and the fire code official comes along at a later date and requires corrections. There should be some basic assurance to the involved parties that occupancy of the building is tied to fire code official approval and fire code compliance. It is important to note that this language does not require an inspection unless the fire code official was of the opinion that an inspection should occur prior to occupancy.

Cost Impact: This code change proposal will not increase the cost of construction. Earlier intervention by the fire official in the occupancy approval process may actually reduce construction costs as code compliance issues should be identified earlier on in the job.

Staff analysis: This language is also found in IBC Section 111.1 and IEBC Section 110.1.

ADM39-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

106.5 (NEW)-ADM (IFC)-APFELBECK

ADM40 – 13

PART I - IBC: [A] 107.1, IEBC: [A] 106.1, IWUIC: [A] 108.1;

PART II - IECC: C103.1;

PART III - IECC: R103.1;

PART IV - IRC: R106.1

THIS IS A 4 PART CODE CHANGE. PARTS I WILL BE HEARD BY THE ADMINISTRATIVE PROVISIONS COMMITTEE AS ONE CODE CHANGE. PART II WILL BE HEARD BY THE ENERGY CONSERVATION CODE-COMMERCIAL COMMITTEE. PART III WILL BE HEARD BY THE ENERGY CONSERVATION CODE-RESIDENTIAL COMMITTEE. PART IV WILL BE HEARD BY THE RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

Proponent: Todd Letterman, Riverside County Fire Department, and Elley Klausbruckner representing self

PART I – IBC; IEBC; IWUIC

Revise the International Building Code as follows:

IBC [A] 107.1 General. Submittal documents consisting of *construction documents*, statement of *special inspections*, geotechnical report, technical reports and other data shall be submitted in two or more sets with each *permit* application. The *construction documents* and technical reports shall be prepared by a *registered design professional* where required by the statutes of the jurisdiction in which the project is to be constructed. Where special conditions exist, the *building official* is authorized to require additional *construction documents* to be prepared by a *registered design professional*.

Exception: The *building official* is authorized to waive the submission of *construction documents* and other data not required to be prepared by a *registered design professional* if it is found that the nature of the work applied for is such that review of *construction documents* is not necessary to obtain compliance with this code.

Revise the International Existing Building Code as follows:

IEBC [A] 106.1 General. Submittal documents consisting of construction documents, special inspection and structural observation programs, investigation and evaluation reports, technical reports and other data shall be submitted in two or more sets with each application for a permit. The construction documents and technical reports shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed. Where special conditions exist, the *code official* is authorized to require additional construction documents to be prepared by a registered design professional.

Exception: The *code official* is authorized to waive the submission of construction documents and other data not required to be prepared by a registered design professional if it is found that the nature of the work applied for is such that reviewing of construction documents is not necessary to obtain compliance with this code.

Revise the International Wildland-Urban Interface Code as follows:

IWUIC [A] 108.1 General. Plans, engineering calculations, diagrams, technical reports and other data shall be submitted in at least two sets with each application for a permit. The construction documents and technical reports shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed. Where special conditions exist, the code official is authorized to require additional documents to be prepared by a registered design professional.

Exception: The code official is authorized to waive the requirements for submission of plans, calculations, construction inspection requirements and other data, if it is found that the nature of the work applied for is such that reviewing of plans is not necessary to obtain compliance with this code.

PART II – IECC-COMMERCIAL

Revise the International Energy Conservation Code-Commercial as follows:

IECC C103.1 General. Construction documents, technical reports and other supporting data shall be submitted in one or more sets with each application for a permit. The construction documents and technical reports shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed. Where special conditions exist, the *code official* is authorized to require necessary construction documents to be prepared by a registered design professional.

Exception: The *code official* is authorized to waive the requirements for construction documents or other supporting data if the *code official* determines they are not necessary to confirm compliance with this code.

PART III – IECC-RESIDENTIAL

Revise the International Energy Conservation Code-Residential as follows:

IECC R103.1 General. Construction documents, technical reports and other supporting data shall be submitted in one or more sets with each application for a permit. The construction documents and technical reports shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed. Where special conditions exist, the *code official* is authorized to require necessary construction documents to be prepared by a registered design professional.

Exception: The *code official* is authorized to waive the requirements for construction documents or other supporting data if the *code official* determines they are not necessary to confirm compliance with this code.

PART IV – IRC

Revise the International Residential Code as follows:

IRC R106.1 Submittal documents. Submittal documents consisting of *construction documents*, technical reports and other data shall be submitted in two or more sets with each application for a *permit*. The *construction documents and technical reports* shall be prepared by a registered *design professional* where required by the statutes of the *jurisdiction* in which the project is to be constructed. Where special conditions exist, the *building official* is authorized to require additional *construction documents* to be prepared by a registered *design professional*.

Exception: The *building official* is authorized to waive the submission of *construction documents* and other data not required to be prepared by a registered *design professional* if it is found that the nature of the work applied for is such that reviewing of *construction documents* is not necessary to obtain compliance with this code.

Reason: Building construction and systems such as mechanical, etc. have to be designed by a professional engineer. The report addressing the requirements for some of these systems is the basis of their design. It is illogical to require the design to be prepared by a registered design professional but not require the report addressing the basis of the design be prepared by a registered design professional. Additionally if there are intentional acts of omission [or misleading information] in the report prepared by a registered design professional, the authority having jurisdiction can submit a complaint to the state board and the registered design professional can face disciplinary action [from fines, loss of reputation, etc. to having their license revoked]. There are no major repercussions to the preparer of these reports if they are not registered design professionals or if the Jurisdiction or

state does not require educational or licensing requirements from the preparer. The added language will lend added support to the jurisdiction when a technical report is required if chosen to adopt this section as a local or state amendment.

NOTE: CBC Definition of Registered Design Professional - An individual who is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws of the state or jurisdiction in which the project is to be constructed.

Additional Verbal Reason: The cities and jurisdictions that prefer a registered design professional prepare these technical reports are facing opposition for political reasons since the language is not specific. This will also help reduce liability from the cities and jurisdictions since registered design professionals typically carry liability insurance.

Cost Impact: None

ADM40-13

PART I – IBC; IEBC; IWUIC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-COMMERCIAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART III – IECC-RESIDENTIAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART IV – IRC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

107.1-ADM (IBC)-LETTERMAN

ADM41 – 13

PART I - IBC: [A] 107.1, IEBC:[A] 106.1, IWUIC:[A] 108.1;

PART II – IECC C103.1;

PART III – IECC R103.1;

PART IV – IRC R106.1

THIS IS A 4 PART CODE CHANGE. PARTS I WILL BE HEARD BY THE ADMINISTRATIVE PROVISIONS COMMITTEE AS ONE CODE CHANGE. PART II WILL BE HEARD BY THE ENERGY CONSERVATION CODE-COMMERCIAL COMMITTEE. PART III WILL BE HEARD BY THE ENERGY CONSERVATION CODE-RESIDENTIAL COMMITTEE. PART IV WILL BE HEARD BY THE RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

Proponent: Richard B. Crawford, Mercer Sign Consultants, representing the United States Sign Council (rcmercer@verizon.net or rick@ussc.org)

PART I – IBC; IEBC; IWUIC

Revise the International Building Code as follows:

IBC [A] 107.1 General. Submittal documents consisting of *construction documents*, statement of *special inspections*, geotechnical report and other data shall be submitted in two or more sets with each *permit* application. The *construction documents* shall be prepared by a *registered design professional* only where expressly required in legislation enacted by the statutes of the jurisdiction in which the project is to be constructed for the type of construction being proposed. Where special conditions exist, the *building official* is authorized to require additional *construction documents* to be prepared by a *registered design professional*.

Exception: The *building official* is authorized to waive the submission of *construction documents* and other data not required to be prepared by a *registered design professional* if it is found that the nature of the work applied for is such that review of *construction documents, including construction drawings prepared by a registered design professional,* is not necessary to obtain compliance with this code.

Revise the International Existing Building Code as follows:

IEBC [A] 106.1 General. Submittal documents consisting of construction documents, special inspection and structural observation programs, investigation and evaluation reports, and other data shall be submitted in two or more sets with each application for a permit. The construction documents shall be prepared by a registered design professional only where expressly required in legislation enacted by the statutes of the jurisdiction in which the project is to be constructed for the type of construction being proposed. Where special conditions exist, the *code official* is authorized to require additional construction documents to be prepared by a registered design professional.

Exception: The *code official* is authorized to waive the submission of construction documents and other data not required to be prepared by a registered design professional if it is found that the nature of the work applied for is such that reviewing of construction documents, including construction drawings prepared by a registered design professional, is not necessary to obtain compliance with this code.

Revise the International Wildland-Urban Interface Code as follows:

IWUIC [A] 108.1 General. Plans, engineering calculations, diagrams and other data shall be submitted in at least two sets with each application for a permit. The construction documents shall be prepared by a registered design professional only where expressly required in legislation enacted by

~~the statutes of the jurisdiction in which the project is to be constructed for the type of construction being proposed.~~ Where special conditions exist, the code official is authorized to require additional documents to be prepared by a registered design professional.

Exception: The code official is authorized to waive submission of plans, calculations, construction inspection requirements and other data, if it is found that the nature of the work applied for is such that reviewing of plans, including construction drawings prepared by a registered design professional, is not necessary to obtain compliance with this code.

PART II – IECC-COMMERCIAL

Revise the International Energy Conservation Code-Commercial as follows:

IECC C103.1 General. Construction documents and other supporting data shall be submitted in one or more sets with each application for a permit. The construction documents shall be prepared by a registered design professional only where expressly required in legislation enacted by the statutes of the jurisdiction in which the project is to be constructed for the type of construction being proposed. Where special conditions exist, the *code official* is authorized to require necessary construction documents to be prepared by a registered design professional.

Exception: The *code official* is authorized to waive the requirements for construction documents or other supporting data, including construction drawings prepared by a registered design professional, if the *code official* determines they are not necessary to confirm compliance with this code.

PART III – IECC-RESIDENTIAL

Revise the International Energy Conservation Code-Residential as follows:

IECC R103.1 General. Construction documents and other supporting data shall be submitted in one or more sets with each application for a permit. The construction documents shall be prepared by a registered design professional only where expressly required in legislation enacted by the statutes of the jurisdiction in which the project is to be constructed for the type of construction being proposed. Where special conditions exist, the *code official* is authorized to require necessary construction documents to be prepared by a registered design professional.

Exception: The *code official* is authorized to waive the requirements for construction documents or other supporting data, including construction drawings prepared by a registered design professional, if the *code official* determines they are not necessary to confirm compliance with this code.

PART IV – IRC

Revise the International Residential Code as follows:

IRC R106.1 Submittal documents. Submittal documents consisting of *construction documents*, and other data shall be submitted in two or more sets with each application for a *permit*. The *construction documents* shall be prepared by a registered *design professional* only where expressly required in legislation enacted by the statutes of the jurisdiction in which the project is to be constructed for the type of construction being proposed. Where special conditions exist, the *building official* is authorized to require additional *construction documents* to be prepared by a registered *design professional*.

Exception: The *building official* is authorized to waive the submission of *construction documents* and other data not required to be prepared by a registered *design professional* if it is found that the nature of the work applied for is such that reviewing of *construction documents, including construction drawings prepared by a registered design professional,* is not necessary to obtain compliance with this code.

Reason: A possible unforeseen consequence of the language in Section 106.1, over time, has been that jurisdictions are routinely demanding sealed construction documents (by a licensed engineer generally) for all types of work, including small and minor projects, as long as a construction or building permit is required for the work. Sealed plans are being required for repetitive, ordinary and minor construction projects.

Additional guidance for adopting jurisdictions and building officials would helpful in determining when sealed plans are required, and when they can be deemed unnecessary and will add to the cost of construction without a corresponding benefit to the public.

Although Section 106.1 contains an exception to the requirement that construction documents be sealed, building officials may be hesitant to waive the requirement without firm guidance in the Code itself. The suggested revision will permit a jurisdiction to expressly decide which types of construction projects will require documents prepared by a registered design professional, and which will not. Each jurisdiction can therefore tailor the requirements to local needs and concerns. It will also help avoid the potential waste of resources that may be created by a one-size-fits-all regulatory requirement.

The suggested revisions allows for more reasonable and rational code application in the jurisdictions that adopt the IBC. Not every project requires a sealed plan to further the goals of public safety.

Cost Impact: The code change proposal will not increase the cost of construction.

ADM41-13

PART I – IBC; IEBC; IWUIC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-COMMERCIAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART III – IECC-RESIDENTIAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART IV – IRC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

106.1-ADM (IBC)-CRAWFORD

ADM42 – 13

IBC: [A] 107.1.1 (New)

Proponent: Philip Brazil, P.E., S.E., Senior Structural Engineer, Reid Middleton, Inc., representing self

Add new text to the International Building Code as follows:

IBC [A] 107.1.1 Structural reports and certificates. Structural reports and certificates shall be submitted by the owner or the owner's authorized agent to the *building official* in accordance with Section 1704.5.

Reason: The purpose for this proposal is for correlation with a proposal that adds a new Section 1704.5 specifying submittals to the building official, which are typically related to the structural design of the building or structure, and are typically submitted during construction.

Note that separate proposals:

1. Transfer the requirements of Section 1705.12.1 to new Section 1704.5;
2. Add additional requirements for submittals that are related to structural steel;
3. Add additional requirements for submittals that are related to the welding of concrete reinforcement and anchor bolts;
4. Add additional requirements for submittals that are related to masonry; and
5. Change "the owner" to "the owner or the owner's authorized agent".

Cost Impact: The code change proposal will not increase the cost of construction.

ADM42-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

107.1.1 (NEW)-ADM (IBC)-BRAZIL

ADM43 – 13

PART I - IFC: [A] 107.2.1, [A] 107.3 (New),

PART II – IFC: 406.2, 408.5.2, 408.10.2, 507.5.2, 507.5.3, 604.3.2, 604.5.1.1, 604.5.2.1, 606.6, 606.15, 609.3.3.3, 703.1, 703.4, 901.6.2, 901.6.2.1, 904.5, 904.6, 904.7, 904.8, 904.9, 904.10, 907.8, 907.8.2, 907.8.5, 909.20.2, 912.6, 913.5, 913.5.2, 913.5.3, 1030.8, 2006.5.3.2.2, 2006.6.4, 2305.2.1, 2306.2.1.1, 2808.6, 5003.2.9, 5003.3.1.1, 5603.2, 5704.2.11.5.1, 5706.5.4.5, 5806.4.8.2; IBC [F] 904.5, 904.6, 904.7, 904.8, 904.9, 904.10

THIS IS A 2 PART CODE CHANGE. PARTS I WILL BE HEARD BY THE ADMINISTRATIVE PROVISIONS COMMITTEE. PART II WILL BE HEARD BY THE FIRE CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

Proponent: Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee
(cbaldassarra@rjagroup.com)

PART I – Administration

Revise the International Fire Code as follows:

IFC [A] 107.2 Testing and operation. Equipment requiring periodic testing or operation to ensure maintenance shall be tested or operated as specified in this code.

~~**IFC [A] 107.2.1 Testing and inspection records.** Required test and inspection records shall be available to the *fire code official* at all times or such records as the *fire code official* designates shall be filed with the *fire code official*.~~

IFC [A] ~~107.2.2~~ 107.2.1 Reinspection and testing. *(No change to current text)*

IFC [A] 107.3 Recordkeeping. A record of the periodic inspections, tests, servicing, and other operations and maintenance shall be maintained on the premises or other *approved* location for a minimum of 3 years, or the interval where a different period of time is specified in this code or referenced standards. Records shall be made available for inspection by the *fire code official*, and a copy of the records shall be provided to the *fire code official* upon request.

The *fire code official* has the authority to prescribe the form and format of such recordkeeping. The *fire code official* has the authority to require that certain required records be filed with the *fire code official*.

(Renumber subsequent sections)

PART II – IFC

Revise the International Fire Code as follows:

IFC 406.2 Frequency. Employees shall receive training in the contents of fire safety and evacuation plans and their duties as part of new employee orientation and at least annually thereafter. Records of training shall be ~~kept and made available to the *fire code official* upon request~~ maintained.

IFC 408.5.2 Staff training. Employees shall be periodically instructed and kept informed of their duties and responsibilities under the plan. Records of instruction shall be maintained. Such instruction shall be reviewed by the staff at least every two months. A copy of the plan shall be readily available at all times within the facility.

IFC 408.10.2 Staff training. Employees shall be periodically instructed and kept informed of their duties and responsibilities under the plan. Records of instruction shall be maintained. Such instruction shall be reviewed by the staff at least every two months. A copy of the plan shall be readily available at all times within the facility.

Revise the International Fire Code as follows:

IFC 507.5.2 Inspection, testing and maintenance. Fire hydrant systems shall be subject to periodic tests as required by the *fire code official*. Fire hydrant systems shall be maintained in an operative condition at all times and shall be repaired where defective. Additions, repairs, *alterations* and servicing shall comply with *approved* standards. Records of tests and required maintenance shall be maintained.

IFC 507.5.3 Private fire service mains and water tanks. Private fire service mains and water tanks shall be periodically inspected, tested and maintained in accordance with NFPA 25 at the following intervals:

1. Private fire hydrants (all types): Inspection annually and after each operation; flow test and maintenance annually.
2. Fire service main piping: Inspection of exposed, annually; flow test every 5 years.
3. Fire service main piping strainers: Inspection and maintenance after each use.

Records of inspections, testing and maintenance shall be maintained.

Revise the International Fire Code as follows:

IFC 604.3.2 ~~Written record~~ Records. ~~Written records~~ Records of the inspection, testing and maintenance of emergency and standby power systems shall include the date of service, name of the servicing technician, a summary of conditions noted and a detailed description of any conditions requiring correction and what corrective action was taken. Such records shall be ~~kept on the premises served by the emergency or standby power system and be available for inspection by the fire code official~~ maintained.

IFC 604.5.1.1 Activation test record. ~~Records of tests shall be maintained on the premises for a minimum of three years and submitted to the fire code official upon request.~~ The record shall include the location of the emergency lighting tested, whether the unit passed or failed, the date of the test, and the person completing the test.

IFC 604.5.2.1 Power test record. ~~Records of tests shall be maintained on the premises for a minimum of three years and submitted to the fire code official upon request.~~ The record shall include the location of the emergency lighting tested, whether the unit passed or failed, the date of the test, and the person completing the test.

IFC 606.6 Testing of equipment. Refrigeration equipment and systems having a refrigerant circuit containing more than 220 pounds (100 kg) of Group A1 or 30 pounds (14 kg) of any other group refrigerant shall be subject to periodic testing in accordance with Section 606.6.1. ~~A written record of required testing~~ Records of tests shall be maintained on the premises. Tests of emergency devices or systems required by this chapter shall be conducted by persons trained and qualified in refrigeration systems.

IFC 606.15 Records. ~~A written record shall be kept of refrigerant quantities brought into and removed from the premises shall be maintained.~~ Such records shall be available to the fire code official.

IFC 609.3.3.3 Records. Records for inspections shall state the individual and company performing the inspection, a description of the inspection and when the inspection took place. Records for cleanings shall state the individual and company performing the cleaning and when the cleaning took place. Such records shall be completed after each inspection or cleaning, and maintained on the premises for a minimum of three years and be copied to the fire code official upon request.

Revise the International Fire Code as follows:

IFC 703.1 Maintenance. The required *fire-resistance rating* of fire-resistance-rated construction (including walls, firestops, shaft enclosures, partitions, *smoke barriers*, floors, fire-resistive coatings and sprayed fire-resistant materials applied to structural members and fire-resistant joint systems) shall be maintained. Such elements shall be visually inspected by the *owner* annually and properly repaired, restored or replaced when damaged, altered, breached or penetrated. Records of inspections and repairs shall be maintained. Where concealed, such elements shall not be required to be visually inspected by the *owner* unless the concealed space is accessible by the removal or movement of a panel, access door, ceiling tile or similar movable entry to the space. Openings made therein for the passage of pipes, electrical conduit, wires, ducts, air transfer openings and holes made for any reason shall be protected with *approved* methods capable of resisting the passage of smoke and fire. Openings through fire-resistance-rated assemblies shall be protected by self- or automatic- closing doors of *approved* construction meeting the fire protection requirements for the assembly.

IFC 703.4 Testing. Horizontal and vertical sliding and rolling fire doors shall be inspected and tested annually to confirm proper operation and full closure. ~~A written record~~ Records of inspections and testing shall be maintained and be available to the fire code official.

Revise the International Fire Code as follows:

IFC 901.6.2 Records. Records of all system inspections, tests and maintenance required by the referenced standards shall be maintained ~~on the premises for a minimum of three years and shall be copied to the fire code official upon request.~~

IFC 901.6.2.1 Records information. Initial records shall include the name of the installation contractor, type of components installed, manufacturer of the components, location and number of components installed per floor. Records shall also include the manufacturers' operation and maintenance instruction manuals. Such records shall be maintained ~~on the premises~~ for the life of the installation.

IFC 904.5 (IBC [F] 904.5) Wet-chemical systems. Wet-chemical extinguishing systems shall be installed, maintained, periodically inspected and tested in accordance with NFPA 17A and their listing. Records of inspections and testing shall be maintained.

IFC 904.6 (IBC [F] 904.6) Dry-chemical systems. Dry-chemical extinguishing systems shall be installed, maintained, periodically inspected and tested in accordance with NFPA 17 and their listing. Records of inspections and testing shall be maintained.

IFC 904.7 (IBC [F] 904.7) Foam systems. Foam-extinguishing systems shall be installed, maintained, periodically inspected and tested in accordance with NFPA 11 and NFPA 16 and their listing. Records of inspections and testing shall be maintained.

IFC 904.8 (IBC [F] 904.8) Carbon dioxide systems. Carbon dioxide extinguishing systems shall be installed, maintained, periodically inspected and tested in accordance with NFPA 12 and their listing. Records of inspections and testing shall be maintained.

IFC 904.9 (IBC [F] 904.9) Halon systems. Halogenated extinguishing systems shall be installed, maintained, periodically inspected and tested in accordance with NFPA 12A and their listing. Records of inspections and testing shall be maintained.

IFC 904.10 (IBC [F] 904.10) Clean-agent systems. Clean-agent fire-extinguishing systems shall be installed, maintained, periodically inspected and tested in accordance with NFPA 2001 and their listing. Records of inspections and testing shall be maintained.

IFC 907.8 Inspection, testing and maintenance. The maintenance and testing schedules and procedures for fire alarm and fire detection systems shall be in accordance with Sections 907.8.1 through 907.8.5 and NFPA 72. Records of inspection, testing and maintenance shall be maintained.

IFC 907.8.2 Testing. Testing shall be performed in accordance with the schedules in NFPA 72 or more frequently where required by the *fire code official*. Records of testing shall be maintained.

Exception: Devices or equipment that are inaccessible for safety considerations shall be tested during scheduled shutdowns where *approved* by the *fire code official*, but not less than every 18 months.

IFC 907.8.5 ~~Inspection, testing and maintenance~~ Maintenance, inspection and testing. The building owner shall be responsible to maintain the fire and life safety systems in an operable condition at all times. Service personnel shall meet the qualification requirements of NFPA 72 for ~~maintaining, inspecting and testing~~ inspection, testing and maintenance of such systems. ~~A written record~~ Records of inspection, testing and maintenance shall be maintained ~~and shall be made available to the fire code official.~~

IFC 909.20.2 ~~Written record~~ Records. ~~A written record~~ Records of smoke control system testing and maintenance shall be maintained ~~on the premises.~~ The ~~written~~ record shall include the date of the maintenance, identification of the servicing personnel and notification of any unsatisfactory condition and the corrective action taken, including parts replaced.

IFC 912.6 Inspection, testing and maintenance. All fire department connections shall be periodically inspected, tested and maintained in accordance with NFPA 25. Records of inspection, testing and maintenance shall be maintained.

IFC 913.5 Inspection, testing and maintenance. Fire pumps shall be inspected, tested and maintained in accordance with the requirements of this section and NFPA 25. Records of inspection, testing and maintenance shall be maintained.

IFC 913.5.2 Generator sets. Engine generator sets supplying emergency or standby power to fire pump assemblies shall be periodically tested in accordance with NFPA 110. Records of testing shall be maintained.

IFC 913.5.3 Transfer switches. Automatic transfer switches shall be periodically tested in accordance with NFPA 110. Records of testing shall be maintained.

Revise the International Fire Code as follows:

IFC 1030.8 Inspection, testing and maintenance. All two-way communication systems for *areas of refuge* shall be inspected and tested on a yearly basis to verify that all components are operational. When required, the tests shall be conducted in the presence of the *fire code official*. Records of inspection, testing and maintenance shall be maintained.

Revise the International Fire Code as follows:

IFC 2006.5.3.2.2 ~~Documentation~~ Records. The airport fueling-system operator shall maintain records of all training administered to its employees. ~~These records shall be made available to the fire code official on request.~~

IFC 2006.6.4 Testing. Emergency fuel shutoff devices shall be operationally tested at intervals not exceeding three months. The fueling-system operator shall maintain ~~suitable~~ testing records ~~of these tests.~~

Revise the International Fire Code as follows:

IFC 2305.2.1 Inspections. Flammable and *combustible liquid* fuel-dispensing and containment equipment shall be periodically inspected where required by the *fire code official* to verify that ~~it~~ the equipment is in proper working order and not subject to leakage. Records of inspections shall be maintained.

IFC 2306.2.1.1 Inventory control for underground tanks. Accurate daily inventory records shall be maintained and reconciled on underground fuel storage tanks for indication of possible leakage from tanks and piping. The records ~~shall be kept at the premises or made available for inspection by the fire code official within 24 hours of a written or verbal request~~ and shall include records for each product showing daily reconciliation between sales, use, receipts and inventory on hand. Where there is more than one system consisting of tanks serving separate pumps or dispensers for a product, the reconciliation shall be ascertained separately for each tank system. A consistent or accidental loss of product shall be immediately reported to the *fire code official*.

Revise the International Fire Code as follows:

IFC 2808.6 Static pile protection. Static piles shall be monitored by an *approved* means to measure temperatures within the static piles. Internal pile temperatures shall be monitored and recorded weekly. Such records shall be kept on file at the facility and made available for inspection maintained. An operational plan indicating procedures and schedules for the inspection, monitoring and restricting of excessive internal temperatures in static piles shall be submitted to the *fire code official* for review and approval.

Revise the International Fire Code as follows:

IFC 5003.2.9 Testing. The equipment, devices and systems listed in Section 5003.2.9.1 shall be tested at the time of installation and at one of the intervals listed in Section 5003.2.9.2. ~~Written~~ Records of the tests conducted or maintenance performed shall be maintained.

Exceptions:

1 through 5 (*No change to current text*)

IFC 5003.3.1.1 Records. ~~Accurate records shall be kept~~ Records of the unauthorized discharge of hazardous materials by the permittee shall be maintained.

Revise the International Fire Code as follows:

IFC 5603.2 Transaction record. The permittee shall maintain a record of all transactions involving receipt, removal, use or disposal of *explosive materials*. ~~Such a record~~ records shall be maintained for a period of five years, ~~and shall be furnished to the fire code official for inspection upon request.~~

Exception: Where only Division 1.4G (consumer fireworks) are handled, records need only be maintained for a period of three years.

Revise the International Fire Code as follows:

IFC 5704.2.11.5.1 Inventory control. Daily inventory records ~~shall be maintained~~ for underground storage tank systems shall be maintained.

IFC 5706.5.4.5 Commercial, industrial, governmental or manufacturing. Dispensing of Class II and III motor vehicle fuel from tank vehicles into the fuel tanks of motor vehicles located at commercial, industrial, governmental or manufacturing establishments is allowed where permitted, provided such dispensing operations are conducted in accordance with the following:

1 through 13 (*No change to current text*)

14. Persons responsible for dispensing operations shall be trained in the appropriate mitigating actions in the event of a fire, leak or spill. Training records shall be maintained by the dispensing company ~~and shall be made available to the fire code official upon request.~~

15 through 25 (No change to current text)

Revise the International Fire Code as follows:

IFC 5806.4.8.2 Corrosion protection. The vacuum jacket shall be protected by *approved* or *listed* corrosion-resistant materials or an engineered cathodic protection system. Where cathodic protection is utilized, an *approved* maintenance schedule shall be established. Exposed components shall be inspected at least twice a year. ~~Maintenance Records of maintenance and inspection events shall be recorded and those records shall be maintained on the premises for a minimum of three years and made available to the fire code official upon request.~~

Reason: This proposed change is a result of the CTC's investigation of the area of study entitled "NIST Charleston Sofa Store Fire Recommendations". The scope of the activity is noted as:

Review the NIST and other investigative reports on the fire that occurred on the evening of June 18, 2007 in the Sofa Super Store in Charleston, South Carolina to identify issues that can be addressed by the International Codes.

In connection with their investigation, NIST analyzed the fire ground, consulted with other experts, and performed computer simulations of fire growth alternatives. Based on these analyses, NIST concluded that the following sequence of events is likely to have occurred. A fire began in packing material and discarded furniture outside an enclosed loading dock area. The fire spread to the loading dock, then into both the retail showroom and warehouse spaces. During the early stages of the fire in the two latter locations, the fire spread was slowed by the limited supply of fresh air. This under-ventilation led to generation of a large mass of pyrolyzed and only partially oxidized effluent. The smoke and combustible gases flowed into the interstitial space below the roof and above the suspended ceiling of the main retail showroom. As this space filled with unburned fuel, the hot smoke also seeped through the suspended ceiling into the main showroom and formed a hot smoke layer below the suspended ceiling. Up to this time, the extent of fire spread into the interstitial space was not visible to fire fighters in the store. If the fire spread had been visible to the fire fighters in the store, it would have provided a direct indication of a fire hazard in the showroom. Meanwhile, the fire at the back of the main showroom and the gas mixture below the suspended ceiling were both still fuel rich. When the front windows were broken out or vented, the inflow of additional air allowed the heat release rate of the fire to intensify rapidly and added air to the layer of unburned fuel below the suspended ceiling enabling the ignition of the unburned fuel/air mixture. The fire swept from the rear to the front of the main showroom extremely quickly, and then into the west and east showrooms. Nine fire fighters were killed in the Sofa Super Store fire. NIST developed eleven recommendations to help mitigate such future losses.

Recommendation 2(c) of the NIST report recommended that that all state and local jurisdictions implement aggressive and effective fire inspection and enforcement programs that address detailed recordkeeping.

Following a review of recommendation 2(c) of the NIST report, changes are proposed to Section 107.2 and 49 other sections of the International Fire Code that address recordkeeping.

The proposed change to Section 107.2 accomplishes several things with regard to recordkeeping. Most significantly, it standardizes recordkeeping requirements for periodic inspection, testing, servicing and other operational and maintenance requirements of the International Fire Code.

The change to Section 107.2 would now make it clear that records must be maintained on the premises or other approved location and that copies of records must be provided to the fire code official upon request. The change would also make clear that records must be maintained for a period of not less than 3 years unless a different time interval were specified in the code or a referenced standard, and that the fire code official is authorized to prescribe the form and format of such records.

The changes proposed to the other sections of the International Fire Code are intended to make clear what records must be maintained.

This proposal is submitted by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty-five meetings - all open to the public. In 2012, three of the 25 face-to face meetings were held. In addition to the CTC meetings, the CTC established Study Groups (SG) of interested parties for each of the areas of study. These SG's are responsible for reviewing the available information and making recommendations to the CTC. All totaled, the SG's held over 70 conference calls in 2012.

Cost Impact: The code change proposed will not increase the cost of construction.

Staff analysis: Recordkeeping of maintenance and inspections is also addressed in the ICCPC, IPC and IWUIC.

ADM43-13**PART I – Administration**

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IFC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

107.2.1-ADM (IFC)-BALDASSARRA-CTC

ADM44 – 13

IBC: [A] 107.2, [A] 107.2.6 (New)

Proponent: Jerry R. Tepe, FAIA, JRT•AIA ARCHITECT, representing The American Institute of Architects

Revise the International Building Code as follows:

IBC [A] 107.2 Construction documents. *Construction documents* shall be in accordance with Sections 107.2.1 through ~~107.2.5~~ 107.2.6.

IBC [A] 107.2.6 Structural. The *construction documents* shall provide the information specified in Section 1603.

Reason: Often the *construction document* requirements of Section 1603 for structural design are overlooked as they are only shown in Chapter 16 and not with the other *construction document* requirements found in Section 107. This places guidance in that section. An alternative approach would be to relocate the entire Section 1603 to Section 107. I do not suggest this as many engineers then would lose track of the requirements. It would also place them in an administrative section while they should remain the responsibility of the Structural Code Development Committee. There is no technical change proposed.

Cost Impact: None

ADM44-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

107.2.6 (NEW)-ADM (IBC)-TEPE

ADM45 – 13

IBC: [A] 107.2.5 (New)

Proponent: William E. Koffel, P.E., Koffel Associates, Inc., representing Firestop Contractors International Association (wkoffel@koffel.com)

Revise the International Building Code as follows:

IBC [A] 107.2.5 Penetrations and Joints. Where designs from approved sources for through-penetration or membrane penetration firestop systems and fire resistant joint systems are used, the design number for the listed systems, the assigned rating, the description of the listed systems, and the installation instructions for the listed systems shall be submitted to the building official prior to installation.

(Renumber remaining subsections)

Reason: The protection of penetrations and joints should be given the same level of attention as fire barriers and fire protection systems already receive within the Code. Construction documents typically identify fire barriers and the appropriate design number, ICC-ES Report, or other details allowing the code official to verify compliance with the Code. Fire protection system shop drawings are required by Paragraph 107.2.2. Recognizing that firestop systems are different than fire protection systems and shop drawings are typically not required for this work, the requested information has been limited to require the details regarding the listing of the systems. The language better describes information that is vital for all parties – architects, code officials, contractors, and maintenance personnel during the life cycle of the building. These Through Penetration Firestop Systems and Fire Resistant Joint Systems aren't systems without this documentation. With this documentation, inspectors can identify systems to be used.

The two significant changes between this Public Proposal and what was submitted last cycle are the information to be submitted has been specifically identified and the time at which the information needs to be submitted has been changed to prior to installation of the firestop system or joint system. Although one can argue that this would allow submission immediately prior to installation, and as such not provide the code official with adequate time for approval, the information is essential to proper inspection and approval of the system when it is installed. As such, the code official will have the necessary information for final approval.

The proposal should assist code officials in the performance of their duties by making sure the appropriate and necessary information is available to inspectors in the field. Without this information it is virtually impossible for a code official in the field to confirm that the correct system has been installed and that it has been installed properly. It is also anticipated that requiring such documentation and prior approval will result in earlier consideration regarding how to protect penetrations and joints, thereby reducing the need for as many engineering judgments as are currently being used due to poor planning and coordination.

Cost Impact: None

ADM45-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

107.2.5 (NEW)-ADM (IBC)-KOFFEL

ADM46 – 13

IBC: [A] 107.3.4.1, 202; IEBC: [A] 106.3.4, 202

Proponent: Maureen Traxler, City of Seattle, representing Seattle Department of Planning and Development (maureen.traxler@seattle.gov)

Revise the International Building Code as follows:

IBC [A] 107.3.4.1 Deferred submittals. ~~For the purposes of this section, deferred submittals are defined as those portions of the design that are not submitted at the time of the application and that are to be submitted to the *building official* within a specified period.~~

Deferral of any submittal items shall have the prior approval of the *building official*. The *registered design professional in responsible charge* shall list the deferred submittals on the *construction documents* for review by the *building official*.

Documents for deferred submittal items shall be submitted to the *registered design professional in responsible charge* who shall review them and forward them to the *building official* with a notation indicating that the deferred submittal documents have been reviewed and found to be in general conformance to the design of the building. The deferred submittal items shall not be installed until the deferred submittal documents have been *approved* by the *building official*.

Add new definition as follows:

IBC SECTION 202 DEFINITIONS

DEFERRED SUBMITTAL. Those portions of the design that are not submitted at the time of the application and that are to be submitted to the *building official* within a specified period.

Revise the International Existing Building Code as follows:

IEBC [A] 106.3.4 Deferred submittals. ~~For the purposes of this section, deferred submittals are defined as those portions of the design that are not submitted at the time of the application and that are to be submitted to the *code official* within a specified period.~~

Deferral of any submittal items shall have the prior approval of the *code official*. The *registered design professional in responsible charge* shall list the deferred submittals on the construction documents for review by the *code official*.

Submittal documents for deferred submittal items shall be submitted to the *registered design professional in responsible charge* who shall review them and forward them to the *code official* with a notation indicating that the deferred submittal documents have been reviewed and that they have been found to be in general conformance to the design of the building. The deferred submittal items shall not be installed until their deferred submittal documents have been approved by the *code official*.

Add new definition as follows:

IEBC SECTION 202 DEFINITIONS

DEFERRED SUBMITTAL. Those portions of the design that are not submitted at the time of the application and that are to be submitted to the *code official* within a specified period.

Reason: A definition of “deferred submittal” is buried in IBC Section 107.3.4.1 and IEBC 106.3.4. This proposal moves the definition to Section 202. The term is used at least two places in the code, so placing the definition in Chapter 2 will make it easier to find when applying those sections.

Cost Impact: None.

ADM46-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

[A] 107.3.4.1-ADM (IBC)-TRAXLER

ADM47 – 13

PART I - IBC: [A] 107.6 (New); IEBC: [A] 106.6 (New); IWUIC: [A] 108.9 (New)

PART II - IECC: C103.6 (New);

PART III - IECC: R103.6 (New);

PART IV - IRC: R106.6 (New)

THIS IS A 4 PART CODE CHANGE. PART I WILL BE HEARD BY THE ADMINISTRATIVE PROVISIONS COMMITTEE AS ONE CODE CHANGE. PART II WILL BE HEARD BY THE ENERGY CONSERVATION CODE-COMMERCIAL COMMITTEE. PART III WILL BE HEARD BY THE ENERGY CONSERVATION CODE-RESIDENTIAL COMMITTEE. PART IV WILL BE HEARD BY THE RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

Proponent: Michael D. Fischer, Kellen Company, representing the American Institute of Building Design (mfischer@kellencompany.com)

PART I – IBC; IEBC; IWUIC

Add new text to the International Building Code as follows:

IBC 107.6 Copyright protection. The *building official* shall establish procedures to prevent improper or unauthorized duplication, reuse, or dissemination to the public, of retained *construction documents* that contain copyrighted materials including building designs, floor plans, elevations, engineering designs, and other architectural features.

Add new text to the International Existing Building Code as follows:

IEBC 106.6 Copyright protection. The *building official* shall establish procedures to prevent improper or unauthorized duplication, reuse, or dissemination to the public, of retained *construction documents* that contain copyrighted materials including building designs, floor plans, elevations, engineering designs, and other architectural features.

(Renumber subsequent sections)

Add new text to the International Wildland-Urban Interface Code as follows:

IWUIC 108.9 Copyright protection. The *building official* shall establish procedures to prevent improper or unauthorized duplication, reuse, or dissemination to the public, of retained *construction documents* that contain copyrighted materials including building designs, floor plans, elevations, engineering designs, and other architectural features.

(Renumber subsequent sections)

PART II – IECC-COMMERCIAL

Add new text to the International Energy Conservation Code-Commercial as follows:

R106.6 Copyright protection. The *building official* shall establish procedures to prevent improper or unauthorized duplication, reuse, or dissemination to the public, of retained *construction documents* that contain copyrighted materials including building designs, floor plans, elevations, engineering designs, and other architectural features.

PART III – IECC-RESIDENTIAL

Add new text to the International Energy Conservation Code-Residential as follows:

R106.6 Copyright protection. The *building official* shall establish procedures to prevent improper or unauthorized duplication, reuse, or dissemination to the public, of retained *construction documents* that contain copyrighted materials including building designs, floor plans, elevations, engineering designs, and other architectural features.

PART IV – IRC

Add new text to the International Residential Code as follows:

IRC R106.6 Copyright protection. The *building official* shall establish procedures to prevent improper or unauthorized duplication, reuse, or dissemination to the public, of retained *construction documents* that contain copyrighted materials including building designs, floor plans, elevations, engineering designs, and other architectural features.

Reason: The code requires that construction documents be kept on file and generally available to the public. The code does not include safeguards to ensure that the building department at the least will honor the copyrighted works that are part and parcel of most projects. Local copy and print centers honor such copyright protection by declining to duplicate copyrighted works without permission of the author. It is not unreasonable to expect similar efforts by governmental agencies.

Cost Impact: None.

ADM47-13

PART I – IBC; IEBC; IWUIC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-COMMERCIAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART III – IECC-RESIDENTIAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART IV – IRC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R106.6 (NEW)-RB-FISCHER

ADM48 – 13

IBC: [A] 108.2

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee
(bajnaic@chesterfield.gov)

Revise the International Building Code as follows:

IBC [A] SECTION 108 TEMPORARY STRUCTURES AND USES

IBC [A] 108.1 General. The *building official* is authorized to issue a *permit* for temporary structures and temporary uses. Such *permits* shall be limited as to time of service, but shall not be permitted for more than 180 days. The *building official* is authorized to grant extensions for demonstrated cause.

IBC [A] 108.2 Conformance. Temporary structures and uses shall comply with the requirements in Section 3103. ~~conform to the structural strength, fire safety, means of egress, accessibility, light, ventilation and sanitary requirements of this code as necessary to ensure public health, safety and general welfare.~~

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

The BCAC was asked during the Group A cycle to look at adding technical requirements for temporary structures in Section 3103. It was determined that there is sufficient language in the code. The problem was, the language was in the administrative section in Chapter 1. Therefore, this two part proposal is simply to move the language from Chapter 1 to Section 3103. The addition of the language to Section 3103 was under the Group A cycle and this removal of the language from Chapter 1 is under Group B cycle.

BCAC Proposal G190-12 shown below was approved in Portland which moved the existing 108.2 language to chapter 31 as they were technical requirements and did not belong in the administrative provisions. This proposal is a follow-up to that change and intends to delete the technical provisions from Chapter 1, leaving only the administrative requirement, which simply references the user to Chapter 31.

SECTION 3103 TEMPORARY STRUCTURES

3103.1 General. The provisions of Sections 3103.1 through 3103.4 shall apply to structures erected for a period of less than 180 days. Tents and other membrane structures erected for a period of less than 180 days shall comply with the *International Fire Code*. Those erected for a longer period of time shall comply with applicable sections of this code.

Add new section 3103.1.1 and re-number the existing 3103.1.1 as follows:

3103.1.1 Conformance. Temporary structures and uses shall conform to the structural strength, fire safety, means of egress, accessibility, light, ventilation and sanitary requirements of this code as necessary to ensure public health, safety and general welfare.

Cost Impact: This proposal will not increase the cost of construction.

Staff analysis: The current language in IBC Section 108.2 is also found in IEBC 107.2, IFGC 110.2, IMC 110.2, IPC 110.2, IPSCD 110.2, IWUIC 111.2 and IRC R107.2.

ADM48-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

[A] 108.1-ADM (IBC)-BAJNAI-BCAC

ADM49 – 13

PART I - IBC: [A] 111.1, IEBC: [A] 110.1, IWUIC [A] 110.1;

PART II – IRC: R110.1

THIS IS A 2 PART CODE CHANGE. PARTS I WILL BE HEARD BY THE ADMINISTRATIVE PROVISIONS COMMITTEE AS ONE CODE CHANGE. PART II WILL BE HEARD BY THE RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

Proponent: Jerry Anderson, City of Overland Park, Ks, representing self (jerry.anderson@opkansas.org)

PART I – IBC; IEBC; IWUIC

Revise the International Building Code as follows:

IBC [A] SECTION 111 CERTIFICATE OF OCCUPANCY

IBC [A] 111.1 Use and occupancy. No building or structure shall be used or occupied, and no change in the existing use or occupancy classification of a building or structure or portion thereof shall be made, until the *building official* has issued a certificate of occupancy therefor as provided herein. Issuance of a certificate of occupancy shall not be construed as an approval of a violation of the provisions of this code or of other ordinances of the jurisdiction.

Exception: Certificates of occupancy are not required for work exempt from *permits* under Section 105.2.

Revise the International Existing Building Code as follows:

IEBC [A] SECTION 110 CERTIFICATE OF OCCUPANCY

IEBC [A] 110.1 Altered area use and occupancy classification change. No altered area of a building and no relocated building shall be used or occupied, and no change in the existing use or occupancy classification of a building or portion thereof shall be made until the code official has issued a certificate of occupancy therefor as provided herein. Issuance of a certificate of occupancy shall not be construed as an approval of a violation of the provisions of this code or of other ordinances of the jurisdiction.

Revise the International Wildland-Urban Interface Code as follows:

IWUIC SECTION 110 CERTIFICATE OF COMPLETION

IWUIC [A] 110.1 General. No building, structure or premises shall be used or occupied, and no change in the existing use or occupancy classification of a building, structure, premise or portion thereof shall be made until the code official has issued a certificate of completion therefor as provided herein. The certificate of occupancy shall not be issued until the certificate of completion indicating that the project is in compliance with this code has been issued by the code official.

PART II – IRC

Revise the International Residential Code as follows:

IRC SECTION R110 CERTIFICATE OF OCCUPANCY

IRC R110.1 Use and occupancy. No building or structure shall be used or occupied, and no change in the existing use or occupancy classification of a building or structure or portion thereof shall be made until the *building official* has issued a certificate of occupancy therefor as provided herein. Issuance of a certificate of occupancy shall not be construed as an approval of a violation of the provisions of this code or of other ordinances of the *jurisdiction*. Certificates presuming to give authority to violate or cancel the provisions of this code or other ordinances of the *jurisdiction* shall not be valid.

Exceptions:

1. Certificates of occupancy are not required for work exempt from permits under Section R105.2.
2. Accessory buildings or structures.

IRC R110.2 Change in use. Changes in the character or use of an existing structure shall not be made except as specified in Sections 3408 and 3409 of the *International Building Code*.

Reason: The purpose of this code change is to clarify the intent of this code section as it pertains to existing buildings and structures. The current language implies that a new (revised) certificate of occupancy is required only if there is a change in the occupancy classification. I have inserted the word "use" to indicate that there cannot be change in the use of the building or structure regardless if there is a change occupancy classification.

Cost Impact: no cost associated with this change

ADM49-13

PART I – IBC; IEBC; IWUIC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IRC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

[A] 111.1-ADM (IBC)-ANDERSON

ADM50 – 13

PART I - IBC: [A] 114.1; ICCPC: [A] 103.3.13.1; IEBC: [A] 113.1; IFC: [A] 109.1;
IFGC: [A] 108.1; IMC: [A] 108.1; IPC: [A] 108.1; IPSDC: [A] 108.1; IPMC: [A] 106.1;
IZC: [A] 110.1;

PART II - IRC: R113.1;

PART III – ISPSC: 107.1

THIS IS A 3 PART CODE CHANGE. PARTS I WILL BE HEARD BY THE ADMINISTRATIVE PROVISIONS COMMITTEE AS ONE CODE CHANGE. PART II WILL BE HEARD BY THE RESIDENTIAL CODE COMMITTEE. PART III WILL BE HEARD BY THE SWIMMING POOL AND SPA CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

Proponent: Rebecca Morley, representing National Center for Healthy Housing

PART I – IBC; ICCPC; IEBC; IFC; IFGC; IMC; IPC; IPSDC; IPMC; IZC

Revise the International Building Code as follows:

IBC SECTION 114 VIOLATIONS

IBC [A] 114.1 Unlawful acts. It shall be unlawful for any person, firm or corporation to erect, construct, alter, extend, repair, move, remove, demolish or occupy any building, structure or equipment regulated by this code, or cause same to be done, in conflict with or in violation of any of the provisions of this code or applicable state or federal law or regulation.

Revise the International Code Council Performance Code as follows:

ICCPC [A] 103.3.13 Violations.

ICCPC [A] 103.3.13.1 General Unlawful acts. It shall be unlawful for any person, firm or corporation to erect, construct, alter, extend, repair, move, remove, demolish or occupy any building, structure or facility regulated by this code, or cause same to be done, in conflict with or in violation of any of the provisions of this code or applicable state or federal law or regulation.

Revise the International Existing Building Code as follows:

IEBC SECTION 113 VIOLATIONS

IEBC [A] 113.1 Unlawful acts. It shall be unlawful for any person, firm or corporation to repair, alter, extend, add, move, remove, demolish or change the occupancy of any building or *equipment* regulated by this code or cause same to be done in conflict with or in violation of any of the provisions of this code or applicable state or federal law or regulation.

Revise the International Fire Code as follows:

IFC SECTION 109 VIOLATIONS

IFC [A] 109.1 Unlawful acts. It shall be unlawful for a person, firm or corporation to erect, construct, alter, repair, remove, demolish or utilize a building, occupancy, premises or system regulated by this code, or cause same to be done, in conflict with or in violation of any of the provisions of this code or applicable state or federal law or regulation.

Revise the International Fuel Gas Code as follows:

**IFGC SECTION 108
VIOLATIONS**

IFGC [A] 108.1 Unlawful acts. It shall be unlawful for a person, firm or corporation to erect, construct, alter, repair, remove, demolish or utilize an installation, or cause same to be done, in conflict with or in violation of any of the provisions of this code or applicable state or federal law or regulation.

Revise the International Mechanical Code as follows:

**IMC SECTION 108
VIOLATIONS**

IMC [A] 108.1 Unlawful acts. It shall be unlawful for a person, firm or corporation to erect, construct, alter, repair, remove, demolish or utilize a mechanical system, or cause same to be done, in conflict with or in violation of any of the provisions of this code or applicable state or federal law or regulation.

Revise the International Plumbing Code as follows:

**IPC SECTION 108
VIOLATIONS**

IPC [A] 108.1 Unlawful acts. It shall be unlawful for any person, firm or corporation to erect, construct, alter, repair, remove, demolish or utilize any plumbing system, or cause same to be done, in conflict with or in violation of any of the provisions of this code or applicable state or federal law or regulation.

Revise the International Private Sewage Disposal Code as follows:

**IPSDC SECTION 108
VIOLATIONS**

IPSDC [A] 108.1 Unlawful acts. It shall be unlawful for any person, firm or corporation to erect, construct, alter, repair, remove, demolish or use any *private sewage disposal system*, or cause same to be done, in conflict with or in violation of any of the provisions of this code or applicable state or federal law or regulation.

Revise the International Property Maintenance Code as follows:

**IPMC SECTION 106
VIOLATIONS**

IPMC [A] 106.1 Unlawful acts. It shall be unlawful for a person, firm or corporation to be in conflict with or in violation of any of the provisions of this code or applicable state or federal law or regulation.

Revise the International Zoning Code as follows:

**IZC SECTION 110
VIOLATIONS**

IZC [A] 110.1 Unlawful acts. It shall be unlawful for any person to erect, construct, enlarge, alter, repair, move, improve, remove, convert or demolish, equip, use, occupy, or maintain any building or land or cause or permit the same to be done in violation of this code or applicable state or federal law or regulation. When any building or parcel of land regulated by this code is being used contrary to this code, the code official shall be permitted to order such use discontinued and the structure, parcel of land, or portion thereof, vacated by notice served on any person causing such use to be continued. Such person

shall discontinue the use within the time prescribed by the code official after receipt of such notice to make the structure, parcel of land, or portion thereof, comply with the requirements of this code.

PART II – IRC

Revise the International Residential Code as follows:

IRC SECTION R113 VIOLATIONS

IRC R113.1 Unlawful acts. It shall be unlawful for any person, firm or corporation to erect, construct, alter, extend, repair, move, remove, demolish or occupy any building, structure or *equipment* regulated by this code, or cause same to be done, in conflict with or in violation of any of the provisions of this code or applicable state or federal law or regulation.

PART III – ISPSC

Revise the International Swimming Pool and Spa Code as follows:

ISPSC SECTION 107 VIOLATIONS

ISPSC 107.1 Unlawful acts. It shall be unlawful for any person, firm or corporation to erect, construct, alter, *repair*, remove, demolish or utilize any system, or cause same to be done, in conflict with or in violation of any of the provisions of this code or applicable state or federal law or regulation.

Reason: The purpose of this group of code changes is to clarify that the code requires compliance with all applicable laws and regulations in the course of conducting construction work. From a children's health perspective, making this change will enable the code official to cite and stop work that is conducted in violation of the federal and state lead renovation requirements, and thereby reduce the risk of childhood lead poisoning. More broadly, the code change will allow the code official to address violation of other local, state and federal policies intended to protect health that are not specifically covered in the code. In the case of the lead renovation rule, the code official will be positioned to help level the playing field between contractors who are complying with the rule and noncompliant entities who are under-pricing and undercutting their competitors. These provisions can prompt entities not following the law to comply before or after work is underway whether or not the work is covered by a building permit. Although the lead renovation regulations have been in effect since April 2010, and have been adopted by 12 states, reported non-compliance is affecting the compliant contractor and continuing the problem of lead poisoning in the US.

Cost Impact: This code change proposal will not increase the cost of construction since these federal/state requirements are already in effect.

ADM50-13

PART I – IBC; ICCPC; IEBC; IFC; IFCG; IMC; IPC; IPSDC; IPMC; IZC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IRC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART III – ISPSC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

113.1-EB-MORLEY

ADM51 – 13

PART I - IBC: 202, IEBC: 202, IFC: 202, IFGC: 202, IMC: 202, IZC: 202

PART II - IECC: C202;

PART III - IECC: R202 (IRC N1101.9);

PART IV - IRC: R202;

PART V – ISPSC: 202.

THIS IS A 5 PART CODE CHANGE. PARTS I WILL BE HEARD BY THE ADMINISTRATIVE PROVISIONS COMMITTEE AS ONE CODE CHANGE. PART II WILL BE HEARD BY THE ENERGY CONSERVATION CODE-COMMERCIAL COMMITTEE. PART III WILL BE HEARD BY THE ENERGY CONSERVATION CODE-RESIDENTIAL COMMITTEE. PART IV WILL BE HEARD BY THE RESIDENTIAL CODE COMMITTEE. PART V WILL BE HEARD BY THE SWIMMING POOL AND SPA CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

PART I – IBC; IEBC; IFC; IFGC; IMC; IZC

Revise the International Building Code as follows:

IBC SECTION 202 DEFINITIONS

[A] ALTERATION. Any construction, retrofit or renovation to an *existing structure* other than *repair* or *addition* that requires a permit. Also, a change in a building, electrical, gas, mechanical or plumbing system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a permit.

Revise the International Existing Building Code as follows:

IEBC SECTION 202 DEFINITIONS

[A] ALTERATION. Any construction, retrofit or renovation to an existing structure other than a *repair* or *addition* that requires a permit. Also, a change in a building, electrical, gas, mechanical or plumbing system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a permit. Alterations are classified as Level 1, Level 2 or Level 3.

Revise the International Fire Code as follows:

IFC SECTION 202 DEFINITIONS

[A] ALTERATION. Any construction, retrofit or renovation to an *existing structure* other than *repair* or *addition* that requires a permit. Also, a change in a building, electrical, gas, mechanical or plumbing system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a permit.

Revise the International Fuel Gas Code as follows:

**IFGC SECTION 202
GENERAL DEFINITIONS**

[A] ALTERATION. A change in a system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a permit.

Revise the International Mechanical Code as follows:

**IMC SECTION 202
GENERAL DEFINITIONS**

[A] ALTERATION. A change in a ~~mechanical~~ system that involves ~~an~~ a retrofit, extension, addition or change to the arrangement, type or purpose of the original installation that requires a permit.

Revise the International Zoning Code as follows:

**IZC SECTION 202
GENERAL DEFINITIONS**

[A] ALTERATION. Any retrofit, change, addition or modification in construction, occupancy or use.

PART II – IECC-COMMERCIAL

Revise the International Energy Conservation Code-Commercial as follows:

**IECC SECTION C202
GENERAL DEFINITIONS**

ALTERATION. Any construction, retrofit or renovation to an existing structure other than repair or addition that requires a permit. Also, a change in a building, electrical, gas, mechanical or plumbing system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a permit.

PART III – IECC-RESIDENTIAL

Revise the International Energy Conservation Code-Residential as follows:

**IECC SECTION R202 (IRC N1101.9)
GENERAL DEFINITIONS**

ALTERATION. Any construction, retrofit or renovation to an existing structure other than repair or addition that requires a permit. Also, a change in a building, electrical, gas, mechanical or plumbing system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a permit.

PART IV – IRC

Revise the International Residential Code as follows:

**IRC SECTION R202
DEFINITIONS**

ALTERATION. Any construction, retrofit or renovation to an existing structure other than repair or addition that requires a *permit*. Also, a change in a building, electrical, gas, mechanical or plumbing system that

involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a *permit*.

PART V – ISPSC

Revise the International Swimming Pool and Spa Code as follows:

ISPSC SECTION 202 DEFINITIONS

ALTERATION. Any construction, retrofit or renovation to an *existing aquatic vessel* other than repair or addition that requires a permit. Also, a change in a building, electrical, gas, mechanical or plumbing system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a *permit*.

Reason:

PART I - This proposal expands definition of “alteration” to include retrofits and changes to energy systems for consistency with the 2012 International Energy Conservation Code (IECC). While the terms “construction” and “renovation” are not defined in the International Existing Buildings Code (IEBC) or other International Code Council (ICC) codes, they logically include mechanical, water heating, and lighting systems. Since this is not clearly spelled out, given some interpretations of the code these energy using systems might be excluded from IECC compliance when they should not be excluded. The suggested new sentence is intended to clarify the scope of the IECC with respect to alterations of such systems or their component parts and is consistent with the definition of “alteration” in the 2012 IECC. Because the term “retrofit” is used regularly to generally describe work done in existing buildings, its inclusion in the definition along with construction and renovation is intended to provide more clarity when trying to determine what is and is not covered by the IEBC with respect to work being done in and to existing buildings.

PART II, PART III, PART IV, and PART V –

A change in a mechanical system as currently described in the code is an appropriate target for compliance and alterations to such systems should meet the applicable provisions of the energy code. Plumbing, electrical (lighting), and other building systems also use energy and, if altered as defined in the code, they should be equally addressed as mechanical systems are in the current code. As an example, the extension of a potable hot water system to serve additional lavatories could involve additional hot water piping that should be insulated. Another example involves updating a lighting system arrangement with new fixtures and wiring. Such situations do not involve repairs or additions and are currently not subject to the provisions of the code when they should be. This proposal clarifies “alterations” to include changes to HVAC, service heating water, or lighting systems involving extension, addition, or change to arrangement, type, or purpose. This ensures that alterations, no matter what systems are involved, comply with the code. Approval of this change also ensures consistency between the IEBC as applied to alterations and the IECC. All three chapters in the IEBC applicable to alterations (7, 8 and 9) refer to the IECC and contain provisions applicable to other than mechanical systems. This change ensures consistency in scope between the IEBC and the IECC with respect to alterations.

There is a cost impact associated with this proposed change to the degree that the subject systems are not clearly covered in the current code and as a result alterations that should be subject to the energy code are not required to meet the energy code.

Cost Impact: The code change proposal will not increase the cost of construction.

ADM51-13

PART I – IBC; IEBC; IFC; IFCG; IMC; IZC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-COMMERCIAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART III – IECC-RESIDENTIAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART IV – IRC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART V – ISPSC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

202-ALTERATION-EB-WILLIAMS.doc

ADM52 – 13

PART I - IBC: 202, IEBC: 202, IFC: 202, IMC: 202

PART II - IECC: C202;

PART III - IECC: R202 (IRC N1101.9);

PART IV - IRC: R202;

PART V - ISPSC 202.

THIS IS A 5 PART CODE CHANGE. PARTS I WILL BE HEARD BY THE ADMINISTRATIVE PROVISIONS COMMITTEE AS ONE CODE CHANGE. PART II WILL BE HEARD BY THE ENERGY CONSERVATION CODE-COMMERCIAL COMMITTEE. PART III WILL BE HEARD BY THE ENERGY CONSERVATION CODE-RESIDENTIAL COMMITTEE. PART IV WILL BE HEARD BY THE RESIDENTIAL CODE COMMITTEE. PART V WILL BE HEARD BY THE SWIMMING POOL AND SPA CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

Proponent: Deborah Taylor, Deborah F. Taylor Consulting, LLC, representing self
(taylor@dftconsultingny.com)

PART I – IBC; IEBC; IFC; IMC

Revise the International Building Code as follows:

IBC SECTION 202 DEFINITIONS

[A] ALTERATION. Any construction or renovation to an *existing structure* other than *repair* or *addition*. Also, a change in an electrical or mechanical system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a permit.

Revise the International Existing Building Code as follows:

IEBC SECTION 202 DEFINITIONS

[A] ALTERATION. Any construction or renovation to an existing structure other than a *repair* or *addition*. Also, a change in an electrical or mechanical system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a permit.
Alterations are classified as Level 1, Level 2 or Level 3.

Revise the International Fire Code as follows:

IFC SECTION 202 DEFINITIONS

[A] ALTERATION. Any construction or renovation to an *existing structure* other than *repair* or *addition*. Also, a change in an electrical or mechanical system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a permit.

Revise the International Mechanical Code as follows:

IMC SECTION 202 GENERAL DEFINITIONS

[A] ALTERATION. A change in a mechanical or electrical system that involves an extension, addition or change to the arrangement, type or purpose of the original installation.

PART II – IECC-COMMERCIAL

Revise the International Energy Conservation Code-Commercial as follows:

IECC SECTION C202 GENERAL DEFINITIONS

ALTERATION. Any construction or renovation to an existing structure other than repair or addition that requires a permit. Also, a change in a an electrical or mechanical system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a permit.

COMMISSIONING. A protocol included in the construction documents for mechanical and lighting systems, including controls, that establishes a process of testing, balancing, calibrating and adjusting the installed systems to ensure that they function according to approved construction documents.

LIGHTING POWER ALLOWANCE. The total input electrical power permitted by this code for lighting in a building, or part thereof as applicable.

LIGHTING POWER DENSITY. The ratio of lighting input power permitted by this code as a function of area served, measured in watts per square foot.

TOTAL CONNECTED LIGHTING POWER. A calculation of the lighting power capacity in a building, or part thereof, or design, performed in accordance with Section C405.5.1 of this code.

WORK. Proposed or actual construction that shall include demolition or installation of materials, equipment or systems related to creating, altering or removing a building, or part thereof.

PART III – IECC-RESIDENTIAL

Revise the International Energy Conservation Code-Residential as follows:

IECC SECTION R202 (IRC N1101.9) GENERAL DEFINITIONS

ALTERATION. Any construction or renovation to an existing structure other than repair or addition that requires a permit. Also, a change in a an electrical or mechanical system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a permit.

COMMISSIONING. A protocol included in the construction documents for mechanical and lighting systems, including controls, that establishes a process of testing, balancing, calibrating and adjusting the installed systems to ensure that they function according to approved construction documents.

LIGHTING POWER ALLOWANCE. The total input electrical power permitted by this code for lighting in a building, or part thereof as applicable.

LIGHTING POWER DENSITY. The ratio of lighting input power permitted by this code as a function of area served, measured in watts per square foot.

TOTAL CONNECTED LIGHTING POWER. A calculation of the lighting power capacity in a building, or part thereof, or design, performed in accordance with Section C405.5.1 of this code.

WORK. Proposed or actual construction that shall include demolition or installation of materials, equipment or systems related to creating, altering or removing a building, or part thereof.

PART IV – IRC

Revise the International Residential Code as follows:

IRC SECTION R202 DEFINITIONS

ALTERATION. Any construction, retrofit or renovation to an existing structure other than repair or addition that requires a *permit*. Also, a change in a an electrical or mechanical system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a *permit*.

PART V – ISPSC

Revise the International Swimming Pool and Spa Code as follows:

ISPSC SECTION 202 DEFINITIONS

ALTERATION. Any construction, retrofit or renovation to an existing aquatic vessel other than repair or addition that requires a permit. Also, a change in an electrical or mechanical system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a permit.

Reason: The definition for “alteration” needs to acknowledge electrical alterations as well. The added terms are already used in the code and required definition.

Cost Impact: This code change proposal will not increase the cost of construction.

Staff Analysis: The definition for Alteration also appears in the IFGC and IZC.

ADM52-13

PART I – IBC; IEBC; IFC; IMC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-COMMERCIAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART III – IECC-RESIDENTIAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART IV – IRC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART V – ISPSC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C202-ALTERATION-EC-TAYLOR.doc

ADM53 – 13

PART I - IFC: 202, IPMC: 202, IWUIC: 202

PART II - IECC: C202, C407.3;

PART III - IECC: R103.2 (IRC N1101.8), R202 (IRC N1101.9);

PART IV - IRC: R202

THIS IS A 4 PART CODE CHANGE. PARTS I WILL BE HEARD BY THE ADMINISTRATIVE PROVISIONS COMMITTEE AS ONE CODE CHANGE. PART II WILL BE HEARD BY THE ENERGY CONSERVATION CODE-COMMERCIAL COMMITTEE. PART III WILL BE HEARD BY THE ENERGY CONSERVATION CODE-RESIDENTIAL COMMITTEE. PART IV WILL BE HEARD BY THE RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

PART I – IFC; IPMC; IWUIC

Revise the International Fire Code as follows:

IFC SECTION 202 DEFINITIONS

[A] **APPROVED.** Acceptable to the *fire code official* or authority having jurisdiction.

Revise the International Property Maintenance Code as follows:

IPMC SECTION 202 DEFINITIONS

[A] **APPROVED.** Acceptable to ~~Approved by~~ the *code official* or authority having jurisdiction.

Revise the International Wildland-Urban Interface Code as follows:

IWUICC SECTION 202 DEFINITIONS

[A] **APPROVED.** Acceptable to ~~Approval by~~ the code official ~~as the result of review, investigation or tests conducted by the code official or by reason of accepted principles or tests by national authorities, or technical or scientific organizations or authority having jurisdiction.~~

PART II – IECC-COMMERCIAL

Revise the International Energy Conservation Code-Commercial as follows:

IECC SECTION C202 GENERAL DEFINITIONS

APPROVED. Acceptable to ~~Approval by~~ the code official ~~as a result of investigation and tests conducted by him or her, or by reason of accepted principles or tests by nationally recognized organizations or authority having jurisdiction.~~

IECC C407.3 Performance-based compliance. Compliance based on total building performance requires that a proposed building (proposed design) be shown to have an annual energy cost that is less than or equal to the annual energy cost of the standard reference design. Energy prices shall be taken

from an approved source ~~approved by the code official~~, such as the Department of Energy, Energy Information Administration's State Energy Price and Expenditure Report. Code officials shall be permitted to require time-of-use pricing in energy cost calculations. Nondepletable energy collected off site shall be treated and priced the same as purchased energy. Energy from nondepletable energy sources collected on site shall be omitted from the annual energy cost of the proposed design.

Exception: Jurisdictions that require site energy (1 kWh = 3413 Btu) rather than energy cost as the metric of comparison.

PART III – IECC-RESIDENTIAL

Revise the International Energy Conservation Code-Residential as follows:

IECC R103.2 (IRC N1101.8) Information on construction documents. Construction documents shall be drawn to scale upon suitable material. Electronic media documents are permitted to be submitted when ~~approved by the code official~~. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, systems and equipment as herein governed. Details shall include, but are not limited to, as applicable, insulation materials and their R-values; fenestration U-factors and SHGCs; area-weighted U-factor and SHGC calculations; mechanical system design criteria; mechanical and service water heating system and equipment types, sizes and efficiencies; economizer description; equipment and systems controls; fan motor horsepower (hp) and controls; duct sealing, duct and pipe insulation and location; lighting fixture schedule with wattage and control narrative; and air sealing details.

IECC SECTION R202 (IRC N1101.9) GENERAL DEFINITIONS

APPROVED. ~~Acceptable to Approval by the code official as a result of investigation and tests conducted by him or her, or by reason of accepted principles or tests by nationally recognized organizations or authority having jurisdiction.~~

PART IV – IRC

Revise the International Residential Code as follows:

IRC SECTION R202 DEFINITIONS

APPROVED. Acceptable to the building official or authority having jurisdiction.

Reason: Approved is an important word. "Approved" already incorporates the "by who" in the definition, repeating that is redundant. I-codes should be consistent.

Cost Impact: The code change proposal will not increase the cost of construction.

Staff analysis: The same phrase that is proposed to be modified in IECC Residential Section 103.2 is also found in IECC Commercial Section 103.2.

ADM53-13

PART I – IFC; IPMC; IWUIC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-COMMERCIAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART III – IECC-RESIDENTIAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART IV – IRC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C407.3-EC-CONNER.doc

ADM54 – 13

PART I – IBC: 202; IFC: 202

PART II – IRC: R202

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE ADMINISTRATIVE PROVISIONS COMMITTEE AS ONE CODE CHANGE. PART II WILL BE HEARD BY THE RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

Proponent: Bob Eugene, representing UL LLC (Robert.Eugene@ul.com)

PART I – IBC; IFC

Revise the International Building Code as follows:

IBC SECTION 202 DEFINITIONS

[A] **APPROVED.** Acceptable to the code building official or authority having jurisdiction.

[A] **BUILDING CODE OFFICIAL.** The officer or other designated authority charged with the administration and enforcement of this code, or a duly authorized representative.

Revise the International Fire Code as follows:

IFC SECTION 202 DEFINITIONS

[A] **APPROVED.** Acceptable to the fire code official or other authority having jurisdiction.

[A] **BUILDING CODE OFFICIAL.** The officer or other designated authority charged with the administration and enforcement of the *International Building Code*, or a duly authorized representative.

PART II – IRC

Revise the International Residential Code as follows:

IRC SECTION R202 DEFINITIONS

APPROVED. Acceptable to the code building official or other authority having jurisdiction.

BUILDING CODE OFFICIAL. The officer or other designated authority charged with the administration and enforcement of this code.

Reason: This would make the definition consistent with other I-codes. Additionally, the code covers not only building, provisions but also energy conservation, mechanical, fuel gas, plumbing and electrical installations which may be under the jurisdiction of other AHJs.

Cost Impact: None

Staff analysis: If this proposal is approved, wherever “building official” is used in the text of the IBC, IFC and IRC, the term will be changed to “code official”. The term “fire code official” in the IFC will remain unchanged.

ADM54-13

PART I – IBC; IFC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IRC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R202-APPROVED-EUGENE

ADM55 – 12

PART I - IBC: 202, IFC: 202, IFGC: 202, IMC: 202, IPC: 202, IPMC: 202, IWUIC: 202

PART II - IECC: C202;

PART III - IECC: R202 (IRC N1101.9);

PART IV - IRC: R202;

PART V - ISPSC 202.

THIS IS A 5 PART CODE CHANGE. PARTS I WILL BE HEARD BY THE ADMINISTRATIVE PROVISIONS COMMITTEE AS ONE CODE CHANGE. PART II WILL BE HEARD BY THE ENERGY CONSERVATION CODE-COMMERCIAL COMMITTEE. PART III WILL BE HEARD BY THE ENERGY CONSERVATION CODE-RESIDENTIAL COMMITTEE. PART IV WILL BE HEARD BY THE RESIDENTIAL CODE COMMITTEE. PART V WILL BE HEARD BY THE SWIMMING POOL AND SPA CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

Proponent: Philip Brazil, P.E., Reid Middletonw, Inc., representing Washington Association of Building Officials, Technical Code Development (pbrazil@reidmiddleton.com)

PART I – IBC; IFC; IFCG; IMC; IPC; IPMC; IWUIC

Revise the International Building Code as follows:

IBC SECTION 202 DEFINITIONS

[A] APPROVED. Acceptable to the *building official* ~~or authority having jurisdiction.~~

[A] PERMIT. An official document or certificate issued by the ~~authority having jurisdiction which~~ building official that authorizes performance of a specified activity.

Revise the International Fire Code as follows:

IFC SECTION 202 DEFINITIONS

[A] APPROVED. Acceptable to the *fire code official*.

[A] PERMIT. An official document or certificate issued by the ~~authority having jurisdiction which~~ fire code official that authorizes performance of a specified activity.

Revise the International Fuel Gas Code as follows:

IFGC SECTION 202 DEFINITIONS

[A] APPROVED. Acceptable to the *code official* ~~or authority having jurisdiction.~~

Revise the International Mechanical Code as follows:

IMC SECTION 202 DEFINITIONS

[A] APPROVED. Acceptable to the *code official* ~~or authority having jurisdiction.~~

Revise the International Plumbing Code as follows:

**IPC SECTION 202
DEFINITIONS**

[A] APPROVED. ~~Acceptable to the code official or authority having jurisdiction.~~

Revise the International Property Maintenance Code as follows:

**IPMC SECTION 202
DEFINITIONS**

[A] APPROVED. ~~Acceptable to~~ Approved by the code official.

Revise the International Wildland-Urban Interface Code as follows:

**IWUICC SECTION 202
DEFINITIONS**

[A] APPROVED. ~~Acceptable to the code official Approval by the code official as the result of review, investigation or tests conducted by the code official or by reason of accepted principles or tests by national authorities, or technical or scientific organizations.~~

PART II – IECC-COMMERCIAL

Revise the International Energy Conservation Code-Commercial as follows:

**IECC SECTION C202
GENERAL DEFINITIONS**

APPROVED. ~~Acceptable to Approval by the code official as the result of investigation and tests conducted by him or her, or by reason of accepted principles or tests by national recognized organizations.~~

PART III – IECC-RESIDENTIAL

Revise the International Energy Conservation Code-Residential as follows:

**IECC SECTION R202 (IRC N1101.9)
GENERAL DEFINITIONS**

APPROVED. ~~Acceptable to Approval by the code official as the result of investigation and tests conducted by him or her, or by reason of accepted principles or tests by national recognized organizations.~~

PART IV – IRC

Revise the International Residential Code as follows:

**IRC SECTION R202
DEFINITIONS**

APPROVED. Acceptable to the *building official*.

PERMIT. An official document or certificate issued by the ~~authority having jurisdiction~~ building official that authorizes performance of a specified activity.

PART V – ISPSC

Revise the International Swimming Pool and Spa Code as follows:

ISPSC SECTION 202 DEFINITIONS

APPROVED. Acceptable to the *code official* ~~or authority having jurisdiction~~.

PERMIT. An official document or certificate issued by the ~~authority having jurisdiction~~ building official that authorizes performance of a specified activity.

Reason: The purpose for the proposal is to clarify the meaning of the definitions for “approved” and “permit” by specifying the building official rather than the “authority having jurisdiction.” The provisions of the building code consistently identify the building official as the official in charge of administration and enforcement of the building code. The only instances of “authority having jurisdiction” in the 2012 IBC are in this proposal.

Cost Impact: The code change proposal will not increase the cost of construction.

ADM55-13

PART I – IBC; IFC; IFCG; IMC; IPC; IPMC; IWUIC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-COMMERCIAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART III – IECC-RESIDENTIAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART IV – IRC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART V – ISPSC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

202-APPROVED-ADM-BRAZIL

ADM56 – 13

IEBC: 202 (New)

THIS PROPSAL WILL BE HEARD BY THE EXISTING BUILDING CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THE IEBC COMMITTEE.

Proponent: Maureen Traxler, City of Seattle, representing Seattle Dept. of Planning & Development (Maureen.traxler@seattle.gov)

Add new definition to the International Existing Building Code as follows:

IEBC SECTION 202 DEFINITIONS

[A] APPROVED. Acceptable to the *code official* or authority having jurisdiction.

Reason: The term “approved” appears dozens of times in the IEBC but is not defined. The definition will eliminate dispute about who “approves” something—without the definition, it could be the code official, the design professional, or a testing laboratory. This definition, or one substantially the same, is used in the IBC, IMC, IFGC, IFC, IRC and IPC.

Cost Impact: This code change proposal will not increase the cost of construction.

ADM56-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

202-APPROVED-EB-TRAXLER.doc

ADM57 – 13

PART I - IFGC: 202, IMC: 202, IPC: 202

PART II - IECC: C202 (New);

PART III - IECC: R202 (IRC N1101.9)(New).

THIS IS A 3 PART CODE CHANGE. PARTS I WILL BE HEARD BY THE ADMINISTRATIVE PROVISIONS COMMITTEE AS ONE CODE CHANGE. PART II WILL BE HEARD BY THE ENERGY CONSERVATION CODE-COMMERCIAL COMMITTEE. PART III WILL BE HEARD BY THE ENERGY CONSERVATION CODE-RESIDENTIAL COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

PART I – IBC; IFGC; IMC; IPC

Revise the International Building Code as follows:

IBC SECTION 202 DEFINITIONS

[A] APPROVED AGENCY. An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved by the building official.

Revise the International Fuel Gas Code as follows:

IFGC SECTION 202 GENERAL DEFINITIONS

[A] APPROVED AGENCY. An established and recognized agency ~~that is approved by the code official~~ and regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved by the code official.

Revise the International Mechanical Code as follows:

IMC SECTION 202 GENERAL DEFINITIONS

[A] APPROVED AGENCY. An established and recognized agency ~~that is approved by the code official~~ and regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved by the code official.

Revise the International Plumbing Code as follows:

IPC SECTION 202 GENERAL DEFINITIONS

[A] APPROVED AGENCY. An established and recognized agency ~~that is approved by the code official~~ and regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved by the code official.

PART II – IECC-COMMERCIAL

Add a new definition to the International Energy Conservation Code-Commercial as follows:

IECC SECTION C202 GENERAL DEFINITIONS

APPROVED AGENCY. An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved by the code official.

PART III – IECC-RESIDENTIAL

Add a new definition to the International Energy Conservation Code-Residential as follows:

IECC SECTION R202 (IRC N1101.9) GENERAL DEFINITIONS

APPROVED AGENCY. An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved by the code official.

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

Reasons for this specific proposal:

Part I – These revisions are for consistency across codes with the defined term.

Part II and III - The term 'approved agency' is used in the IECC, but not defined. While the term is defined in the *International Building Code*, and therefore available for application to the IECC, the SEHPCAC believes that the definition should be included in the IECC so that it is readily available for code users and the term is consistently applied.

Cost Impact: This code change proposal will not increase the cost of construction.

Staff analysis: The term "Approved Agency" is currently defined in the IBC, IFGC, IMC, IPC, IRC, ISPC and IgCC. In the IBC, IPC, IMC and IPC, this definition is scoped to Administration. The term proposed for the IECC is the same as defined in the IRC and the ISPC.

ADM57-13

PART I – IBC; IFGC; IMC; IPC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-COMMERCIAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART III – IECC-RESIDENTIAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C202-APPROVED AGENCY-THOMPSON-SEHPCAC.doc

ADM58 – 13

PART I - IBC: 202; IEBC: 202;

PART II - IRC: R202;

PART III - ISPSC: 202

THIS IS A 3 PART CODE CHANGE. PARTS I WILL BE HEARD BY THE ADMINISTRATIVE PROVISIONS COMMITTEE AS ONE CODE CHANGE. PART II WILL BE HEARD BY THE RESIDENTIAL CODE COMMITTEE. PART III WILL BE HEARD BY THE SWIMMING POOL AND SPA CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee (bajnaic@chesterfield.gov)

PART I – IBC; IEBC

Revise the International Building Code as follows:

IBC SECTION 202 DEFINITIONS

[A] REPAIR. The reconstruction or renewal of any part of an existing building ~~for the purpose of its maintenance.~~

Revise the International Existing Building Code as follows:

IEBC SECTION 202 DEFINITIONS

[A] REPAIR. The ~~restoration to good or sound condition~~ reconstruction or renewal of any part of an existing building ~~for the purpose of its maintenance.~~

PART II – IRC

Revise the International Residential Code as follows:

IRC SECTION R202 DEFINITIONS

REPAIR. The reconstruction or renewal of any part of an existing building ~~for the purpose of its maintenance.~~ For definitions applicable in Chapter 11, see Section N1101.9.

PART III – ISPSC

Revise the International Swimming Pool and Spa Code as follows:

ISPSC SECTION 202 DEFINITIONS

REPAIR. The ~~restoration to good or sound condition~~ reconstruction or renewal of any part of an existing aquatic vessel ~~for the purpose of its maintenance.~~

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the

BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

This proposal seeks to unify the definition of repair across the I code family. Currently there are several subtle variations between the definitions in the IBC, the IRC, the IEBC and the IECC where the word "repair" is defined. We are proposing to use the broadest possible definition of repair, that from the IECC, which removes the qualifying language "for the purpose of its maintenance" that is found in the IBC, IRC and IEBC definitions of repair. This change would properly put the categorization of work on existing buildings, which are: repair, alteration, addition or change of occupancy, into the technical body of the code not in a definition. Repair is defined in the body of each "I" code and should not rely on the maintenance restriction contained in the definition. What constitutes an "addition" is clear, both in conventional terms and as defined in the codes. A change of occupancy is well understood and easy to categorize. Alterations, while including the concept of renovation to existing conditions is generally thought of as making changes within the envelope of an existing building. This new definition will be consistent with the language in all of the "I" codes where the term repair is used.

Cost Impact: This proposal will not increase the cost of construction.

Staff analysis: The definition for Repair is also the both the commercial and residential portions of the IECC.

ADM58-13

PART I – IBC, IEBC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IRC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART III – ISPSC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

[A] REPAIR-G-BAJNAI-BCAC

ADM59 – 13

PART I – IBC: 202; IEBC: 202

PART II - IRC: R202

PART III - ISPSC: 202

THIS IS A 3 PART CODE CHANGE. PARTS I WILL BE HEARD BY THE ADMINISTRATIVE PROVISIONS COMMITTEE AS ONE CODE CHANGE. PART II WILL BE HEARD BY THE RESIDENTIAL CODE COMMITTEE. PART III WILL BE HEARD BY THE SWIMMING POOL AND SPA CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

PART I – IBC; IEBC

Revise the International Building Code as follows:

IBC SECTION 202 DEFINITIONS

[A] REPAIR. The reconstruction or renewal of any part of an existing building ~~for the purpose of its maintenance.~~

Revise the International Existing Building Code as follows:

IEBC SECTION 202 DEFINITIONS

[A] REPAIR. The ~~restoration to good or sound condition~~ reconstruction or renewal of any part of an existing building ~~for the purpose of its maintenance.~~

PART II – IRC

Revise the International Residential Code as follows:

IRC SECTION R202 DEFINITIONS

REPAIR. The reconstruction or renewal of any part of an existing building ~~for the purpose of its maintenance.~~ For definitions applicable in Chapter 11, see Section N1101.9.

PART III – ISPSC

Revise the International Swimming Pool and Spa Code as follows:

ISPSC SECTION 202 DEFINITIONS

REPAIR. The ~~restoration to good or sound condition~~ reconstruction or renewal of any part of an existing aquatic vessel ~~for the purpose of its maintenance.~~

Reason: This proposal expands definition of "repair" to include retrofits and changes to energy systems for consistency with the 2012 International Energy Conservation Code (IECC). The terms "good" and "sound" are not used in the ICC codes and are subjective. The wording "for the purpose of its maintenance" is a reason for the text but not relevant to a definition. Adding "restoration or renewal" clarifies the definition of this term and makes it consistent with the IBC definition. This is especially important in the IECC because this definition and the definition of alteration are key to determining which of Chapters 6, 7, 8, and/or 9 are applicable to the work being conducted. .

There is no cost impact other than ensuring that something not considered within the scope of the International Existing Buildings Code (IEBC) would now, through clarification, be considered.

Cost Impact: The code change proposal will increase the cost of construction in some buildings.

Staff analysis: The definition for Repair is also the both the commercial and residential portions of the IECC.

ADM59-13

PART I – IBC; IEBC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IRC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART III – ISPSC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

202-REPAIR-EB-WILLIAMS.doc

ADM60 – 13

PART I - IBC: 202; IEBC: 202;

PART II - IECC: C202;

PART III - IECC: R202 (IRC N1101.9);

PART IV - IRC: R202;

PART V - ISPSC: 202

THIS IS A 5 PART CODE CHANGE. PARTS I WILL BE HEARD BY THE ADMINISTRATIVE PROVISIONS COMMITTEE AS ONE CODE CHANGE. PART II WILL BE HEARD BY THE ENERGY CONSERVATION CODE-COMMERCIAL COMMITTEE. PART III WILL BE HEARD BY THE ENERGY CONSERVATION CODE-RESIDENTIAL COMMITTEE. PART IV WILL BE HEARD BY THE RESIDENTIAL CODE COMMITTEE. PART V WILL BE HEARD BY THE SWIMMING POOL AND SPA CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

Proponent: Maureen Traxler, City of Seattle, representing Seattle Department of Planning and Development (maureen.traxler@seattle.gov)

PART I – IBC; IEBC

Revise the International Building Code as follows:

IBC SECTION 202 DEFINITIONS

[A] REPAIR. The reconstruction or renewal of any part of an existing building for the purpose of its maintenance or to correct damage.

Revise the International Existing Building Code as follows:

IEBC SECTION 202 DEFINITIONS

[A] REPAIR. The ~~restoration to good or sound condition~~ reconstruction or renewal of any part of an existing building for the purpose of its maintenance or to correct damage.

PART II – IECC-COMMERCIAL

Revise the International Energy Conservation Code-Commercial as follows:

IECC SECTION C202 GENERAL DEFINITIONS

REPAIR. The reconstruction or renewal of any part of an existing building for the purpose of its maintenance or to correct damage.

PART III – IECC-RESIDENTIAL

Revise the International Energy Conservation Code-Residential as follows:

IECC SECTION R202 (IRC N1101.9) GENERAL DEFINITIONS

REPAIR. The reconstruction or renewal of any part of an existing building for the purpose of its maintenance or to correct damage.

PART IV – IRC

Revise the International Residential Code as follows:

IRC SECTION R202 DEFINITIONS

REPAIR. The reconstruction or renewal of any part of an existing building for the purpose of its maintenance or to correct damage. For definitions applicable in Chapter 11, see Section N1101.9.

PART V – ISPSC

Revise the International Swimming Pool and Spa Code as follows:

ISPSC SECTION 202 DEFINITIONS

REPAIR. The ~~restoration to good or sound condition~~ reconstruction or renewal of any part of an existing aquatic vessel for the purpose of its maintenance or to correct damage.

Reason: We are proposing the definition be modified in each of the codes in which it appears. The identical definition appears in the IBC, IEBC, IRC and ISPSC--4 of the 6 ICC codes in which it appears. The IECC definition is "The reconstruction or renewal of any part of an existing building." Note that the term is not defined in the IFC, IMC, IFGC, IPC or IPSDC. The definition of 'repair' in the IGCC definition is identical except that it includes building sites as well as buildings, and can be addressed in Group C.

Limiting repairs to maintenance is not consistent with the use of the term in the codes. IBC Section 3405.1 and IEBC Section 404.1, Repairs, specifically state that repair includes correction of damage. "Work on nondamaged components that is necessary for the required *repair* of damaged components shall be considered part of the *repair* and shall not be subject to the requirements for *alterations* in this chapter." IEBC Section 606.2 deals with repairs to damaged buildings—explicitly including correction of damage, which in many cases would be more than "maintenance".

Another possible solution to this inconsistency would be to delete the phrase "for the purpose of its maintenance" as the term is defined in the IECC. However, adding damage to the existing definition more clearly distinguishes repairs from alterations.

Cost Impact: None.

ADM60-13

PART I – IBC; IEBC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-COMMERCIAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART III – IECC-RESIDENTIAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART IV – IRC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART V – ISPSC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

[A] REPAIR-G-TRAXLER

ADM61 – 13

IRC: R202

THIS CHANGE WILL BE HEARD BY THE RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

Proponent: Paul Armstrong, PE, CBO; Orange Empire Chapter – Code Committee, Orange Empire Chapter

Revise the International Residential Code as follows:

IRC SECTION R202 DEFINITIONS

IRC TOWNHOUSE. A single-family *dwelling unit* constructed in a group of three or more attached units in which each unit extends from the foundation to roof and with open space ~~a yard or public way~~ on at least two or more sides.

Reason: The purpose of this change is to coordinate the definitions of Townhouse between the IRC and IBC. The proposal intends to use the definition in the 2012 IBC in both codes. The current inconsistency found is a problem in determining the application of the codes. The example is a townhouse design using a court on one of the sides. The IBC in the Scope, Section 101.2, would refer the designer to the IRC for the design of the project but the IRC, based on its definition, would not be allowed whether the project meets all the other criteria or not. So the user is back to the IBC and its definition does allow the design of the project. However, there are no provisions specific for townhouses in the IBC. So the definition the IBC is really only useful for determining the application of the IRC or IBC and needs to be consistent between the two codes.

Definitions are vital in understanding the application of all codes. While differences can exist between codes in the ICC family of codes, those definitions that are used in determining the application of one code or another should be consistent.

Cost Impact: The code change proposal will not increase the cost of construction.

Staff Analysis: Townhouse is defined in the IBC and IRC.

ADM61-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R202-TOWNHOUSE-RB-ARMSTRONG

ADM62-13**IBC, IECC, IEBC, IFC, IFGC, IgCC, IMC, IPC, IPMC, IRC, and the ISPSC**

The following table provides a comprehensive list of all standards that the respective standards promulgators have indicated have been, or will be, updated from the listing in the 2012 Editions of the International Codes. According to Section 4.5.1 of ICC Council Policy #CP 28, Code Development Policy, the updating of standards referenced by the Codes shall be accomplished administratively by the Administrative code development committee. Therefore, referenced standards that are to be updated for the 2015 edition of any of the I-Codes are listed in this single code change proposal. Note that the table below indicates the change to the standard, and the code or codes in which each standard appears. The list includes standards that the promulgators have already updated or will have updated by December 1, 2014.

**4.5.1 Standards referenced in the I-Codes: The updating of standards referenced by the Codes shall be accomplished administratively by the Administrative code development committee in accordance with these full procedures except that the deadline for availability of the updated standard and receipt by the Secretariat shall be December 1 of the third year of each code cycle. The published version of the new edition of the Code which references the standard will refer to the updated edition of the standard. If the standard is not available by the deadline, the edition of the standard as referenced by the newly published Code shall revert back to the reference contained in the previous edition and an errata to the Code issued. Multiple standards to be updated may be included in a single proposal.*

AA**Aluminum Association****Standard
Reference
Number****Title****Referenced in Code(s):**ADM 1-2010 2015Aluminum Design Manual: Part I
Specification for Aluminum
Structures

IBC

AAMA**American Architectural Manufacturers Association****Standard
Reference
Number****Title****Referenced in Code(s):**450-09 10Voluntary Performance Rating
Method for Muller Fenestration
Assemblies

IRC

506-08 11Voluntary Specifications for
Hurricane Impact and Cycle
Testing of Fenestration Products

IRC

711-07 13Voluntary Specification for Self
Adhering Flashing Used for
Installation of Exterior Wall
Fenestration Products

IRC

1402-86 09Standard Specification for
Aluminum Siding, Soffit and
Fascia

IBC

ACCA**Air Conditioning Contractors of America****Standard
Reference
Number****Title****Referenced in Code(s):**Manual D-09 2011

Residential Duct Systems

IMC

IRC

Manual J-2011

Residential Load Calculation -
Eighth Edition

IRC

IECC-R

Manual S-40 13

Residential Equipment Selection

IRC

IECC-R

180-2008 2012Standard Practice for Inspection
and Maintenance of Commercial
Building HVAC Systems

IMC

IRC

183-2007 (reaffirmed 2011)

Peak Cooling and Heating Load

IMC

IECC

	Calculations in Buildings Except Low-Rise Residential Buildings								
ACI		American Concrete Institute							
Standard Reference Number	Title	Referenced in Code(s):							
216.1-07 <u>14</u>	Standard Method Code Requirements for Determining Fire Resistance of Concrete and Masonry Construction Assemblies	IBC							
304.2R-04 <u>96</u>	Placing Concrete by Pumping Methods (Reapproved 2008)	ISPSC							
305.1-06 <u>14</u>	Specification for Hot Weather Concreting	ISPSC							
308.1-98 <u>11</u>	Standard Specification for Curing Concrete	ISPSC							
318-44 <u>14</u>	Building Code Requirements for Structural Concrete	IBC	IRC	ISPSC					
332-40 <u>14</u>	Residential Code Requirements for Structural Concrete Construction	IRC							
506.2-95 <u>13</u>	Specification for Shotcrete	ISPSC							
530-44 <u>13</u>	Building Code Requirements for Masonry Structures	IBC	IRC						
530.1-44 <u>13</u>	Specifications for Masonry Structures	IBC	IRC						
AF&PA AWC		American Forest & Paper Association American Wood Council							
Standard Reference Number	Title	Referenced in Code(s):							
AF&PA AWC STJR—2012-2015	Span Tables for Joists and Rafters	IBC	IRC						
ANSI/AF&PA AWC WFCM—2012 2015	Wood Frame Construction Manual for One- and Two-Family Dwellings	IBC	IRC						
ANSI/AWC NDS-2012 2015	National Design Specification (NDS) for Wood Construction - with 2012 Supplement	IBC	IRC						
ANSI/AF&PA AWC SDPWS—2008-2015	Special Design Provisions for Wind and Seismic	IBC							
AF&PA AWC WCD No. 4-2003	Wood Construction Data-Plank and Beam Framing for Residential Buildings	IBC							
ANSI/AF&PA AWC PWF—2007-2015	Permanent Wood Foundation Design Specification	IBC	IRC						
AHRI		Air Conditioning, Heating and Refrigeration Institute							
Standard Reference Number	Title	Referenced in Code(s):							
210/240-2008 with Addenda 1 and 2	Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment	IECC-C							
310/380-2004 (CSA - C744-04)	Standard for Packaged Terminal Air-Conditioners and Heat Pumps	IECC-C							
340/360-2007 with Addendum 2	Performance Rating of Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment	IECC-C							

365 (I-P)-2009	Commercial and Industrial Unitary Air-Conditioning Condensing Units	IECC-C							
366 (SI)-2009	Commercial and Industrial Unitary Air-Conditioning Condensing Units	IECC-C							
400-2001 with Addenda 1 and 2	Liquid to Liquid Heat Exchangers with Addendum 2	IECC-C							
440-2008	Performance Rating of Room Fan-Coils	IECC-C							
460-2005	Performance Rating of Remote Mechanical-Draft Air-Cooled Refrigerant Condensers	IECC-C							
550/590-03 2011 with Addendum 1	Performance Rating of Water-Chilling Packages and Heat Pump Water-Heating Packages Using the Vapor Compression Cycle with Addenda	IECC-C							
700- 2006 2011 with Addendum 1	Purity Specifications for Fluorocarbon and Other Refrigerants	IECC-C							
870-2009 05	Performance Rating of Direct Geoexchange Heat Pumps	IECC-C							
1160-08 (I-P) 09	Performance Rating of Heat Pump z21.56	IECC-C	ISPSC						
11601 (SI)- 08 -2011	Performance Rating of Heat Pump Pool Heaters	IECC-C	ISPSC						
13256-1(2005) (2011)	Water-Source Heat Pumps – Water-to-Air and Brine-to-Air Heat Pumps – Testing and Rating for Performance: Part 1–	IECC-C							
13256-2(1998) (2011)	Water-source Heat Pumps Water-to-Water and Brine-to-water Heat Pumps - Testing and Rating For Performance: Part 2:	IECC-C							
AISI	American Iron and Steel Institute								
Standard Reference Number	Title	Referenced in Code(s):							
AISI S100-07/S2-10 12	North American Specification for the Design of Cold Formed Steel Structural Members with Supplement 2, dated 2010-2012	IBC	IRC						
AISI S110-07/S1-09 (2012)	Standard for Seismic Design of Cold-Formed Steel Structural Systems-Special Moment Frames, 2007 with Supplement 1, dated 2009, (2012)	IBC							
AISI S200-07 2012	North American Standard for Cold-Formed Steel Framing - General Provisions	IBC							

AISI S210-07 <u>2012</u>	North American Standard for Cold-formed Steel Framing-Floor and Roof System Design, <u>2007</u> , (2012)	IBC							
AISI S211-07/S1-12 (2012)	North American Standard for Cold-Formed Steel Framing-Wall Stud Design, <u>2007</u> , including Supplement 1, dated 2012, (2012)	IBC							
AISI S212-07 (2012)	North American Standard for Cold-Formed Steel Framing-Header Design, <u>2007</u> , (2012)	IBC							
AISI S213-07/S1-09 (2012)	North American Standard for Cold-Formed Steel Framing-Lateral Design, with Supplement 1, dated 2009, (2012)	IBC							
AISI S214-07 <u>12</u>	North American Standard for Cold-Formed Steel Framing - Truss Design with Supplement 2, dated 2008, 2012	IBC							
AISI S230-07-07/S2-08 /S3-12 (2012)	Standard for Cold-formed Steel Framing-Prescriptive Method for One- and Two-family Dwellings, <u>2007</u> , with Supplement 2 3, dated 2008 dated 2012, (2012)	IRC	IBC						
AITC	American Institute of Timber Construction (Please note that the AITC is no longer promulgating ICC standards. Standards previously promulgated by AITC are now being handled by APA and WCLIB.)								
Standard Reference Number	Title	Referenced in Code(s):							
ALI	Automotive Lift Institute								
Standard Reference Number	Title	Referenced in Code(s):							
ALI/ALCTV-2006 <u>2011</u>	Standard for Automotive Lifts - Safety Requirements for Construction, Testing, and Validation (ANSI)	IBC							
AMCA	Air Movement and Control Association International								
Standard Reference Number	Title	Referenced in Code(s):							
205-40 <u>12</u>	Energy Efficiency Classification for Fans	IgCC							
220-05 <u>08</u>	Laboratory Methods of Testing Air Curtain Units for Aerodynamic Performance Rating	IgCC							
500D-40 <u>12</u>	Laboratory Methods for Testing Dampers for Rating	IECC-C							
ANSI	American National Standards Institute								
Standard Reference Number	Title	Referenced in Code(s):							
Z97.1- 09 <u>2014</u>	Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test	IBC	IRC						
ANSI A137.1-88 2012	American National Standard Specifications for Ceramic Tile	IBC	IRC						

<u>Z21.50/CSA 2.22-2007 2012</u>	Vented Gas Fireplaces	IRC	IFGC	IgCC					
<u>Z21.88/CSA 2.33-09 2015</u>	Vented Gas Fireplace Heaters	IRC	IFGC	IgCC					
<u>LC 1/CSA 6.26-2005 2013</u>	Fuel Gas Piping Systems Using Corrugated Stainless Steel Tubing (CSST)	IFGC							
<u>LC 4/CSA 6.32-2007 2012</u>	Press-Connect Metallic Fittings for Use in Fuel Gas Distribution Systems	IFGC	IRC						
<u>Z21.1-2005 2010</u>	Household Gas Cooking Appliances	IFGC	IRC						
<u>Z21.5.1/CSA 7.1-2006 2014</u>	Gas Clothes Dryers - Volume I - Type 1 Clothes Dryer	IFGC	IRC						
<u>Z21.5.2/CSA 7.2-2005 2014</u>	Gas Clothes Dryers - Volume II - Type 2 Clothes Dryer	IFGC							
<u>Z21.10.1/CSA 4.1-2009 2012</u>	Gas Water Heaters - Volume I - Storage Water Heaters with Input Ratings of 75,000 Btu per Hour or Less	IFGC	IRC						
<u>Z21.10.3/CSA 4.3-2004 2011</u>	Gas Water Heaters - Volume III - Storage Water Heaters with Input Ratings Above 75,000 Btu per Hour, Circulating or Instantaneous	IFGC	IRC						
<u>Z21.11.2-2007 2011</u>	Gas-Fired Room Heaters - Volume II - Unvented Room Heaters	IFGC	IRC						
<u>Z21.13/CSA 4.9-2010 2011</u>	Gas-Fired Low Pressure Steam and Hot Water Boilers	IFGC	IRC						
<u>A21.40.1/CSA 2.91-96 (R2002 2011)</u>	Gas-Fired Heat Activated Air Conditioning and Heat Pump Appliances	IFGC	IRC						
<u>Z21.40.2/CSA 2.92-96 (R2002 2011)</u>	Air-Conditioning and Heat Pump Appliances (Thermal Combustion)	IFGC	IRC						
<u>Z21.42-1993 (R2002) 2014</u>	Gas-Fired Illuminating Appliances	IFGC	IRC						
<u>Z21.47/CSA 2.3-2007 2012</u>	Gas-Fired Central Furnaces	IFGC	IRC						
<u>Z21.50/CSA 2.22-2006 2012</u>	Vented Gas Fireplaces	IFGC	IRC						
<u>Z21.56/CSA 4.7-2007 2013</u>	Gas-Fired Pool Heaters	IFGC	ISPSC	IRC					
<u>Z21.58/CSA 1.6-2003 2013</u>	Outdoor Cooking Gas Appliances	IFGC	IRC						
<u>Z21.60/CSA 2.26-2003 2012</u>	Decorative Gas Appliances for Installation in Solid-fuel Burning Fireplaces	IFGC	IRC						
<u>Z21.80/CSA 6.22-2003 (R2008) 2011</u>	Line Pressure Regulators	IFGC	IRC						
<u>Z21.84-2002 2012</u>	Manually-lighted, Natural Gas Decorative Gas Appliances for Installation in Solid Fuel Burning Fireplaces	IFGC	IRC						
<u>Z21.88/CSA 2.33-2009 2015</u>	Vented Gas Fireplace Heaters	IFGC	IRC						
<u>Z21.97-2009 2012</u>	Outdoor Decorative Appliances	IFGC	IRC						
<u>Z83.4/CSA 3.7-2003 2012</u>	Non-Recirculating Direct Gas-fired Industrial Air Heaters	IFGC							
<u>Z83.6-90 (R1998) withdrawn replaced with Z83.19 & Z83.20</u>	Gas-fired Infrared Heaters	IFGC	IRC						
<u>Z83.11/CSA 1.8-2006 2013</u>	Gas Food Service Equipment	IFGC							
<u>Z83.18-2004 2012</u>	Recirculating Direct Gas-fired Industrial Air Heaters	IFGC							
<u>Z83.19-2001 (R2005 2009)</u>	Gas-fired High Intensity Infrared Heaters	IFGC	IRC						
<u>Z124.1-95-replaced with CSA B45.5-11/ IAPMO Z124-11</u>	Plastic Bathtub Units Plumbing Fixtures	IPC	IRC						
<u>Z124.1.2-2005-replaced with CSA B45.5-11/ IAPMO Z124-11</u>	Plastic Bathtub and Shower Units Plumbing Fixtures	IPC	IRC						
<u>Z124.2-95-replaced with CSA B45.5-11/ IAPMO Z124-11</u>	Plastic Shower Receptors and Shower Stalls Plumbing Fixtures	IPC	IRC						

Z124.3-95-replaced with <u>CSA B45.5-11/ IAPMO Z124-11</u>	Plastic Lavatories- Plumbing Fixtures	IPC	IRC						
Z124.4-96-replaced with <u>CSA B45.5-11/ IAPMO Z124-11</u>	Plastic Water-Closet-Bowls-and Tanks- Plumbing Fixtures	IPC	IRC						
Z124.6-97-replaced with <u>CSA B45.5-11/ IAPMO Z124-11</u>	Plastic Sinks- Plumbing Fixtures	IPC	IRC						
Z124.7-97-replaced with <u>IAPMO Z124.7-2012</u>	Prefabricated Plastic Spa Shells	ISPSC							
Z124.9-94-replaced with <u>CSA B45.5-11/ IAPMO Z124-11</u>	Plastic Urinal-Fixtures- Plumbing Fixtures	IPC	IRC						
APA	APA -The Engineered Wood Association								
Standard Reference Number	Title	Referenced in Code(s):							
ANSI/AITC A 190.1 – 07 <u>12</u>	Structural Glued-Laminated Timber	IBC	IRC	IgCC					
APA E30-03 <u>11</u>	Engineered Wood Construction Guide	IRC							
APA PDS 04 <u>12</u>	Panel Design Specification	IBC							
APA PDS Supplement 5-08 <u>12</u>	Design and Fabrication of All-Plywood Beams (revised 2008 2013)	IBC							
APA PDS Supplement 1-90 <u>12</u>	Design and Fabrication of Plywood Curved Panels (revised 1995 2013)	IBC							
APA PDS Supplement 4-90 <u>12</u>	Design and Fabrication of Plywood Sandwich Panels (revised 1993 2013)	IBC							
APA PDS Supplement 3-90 <u>12</u>	Design and Fabrication of Plywood Stressed-skin Panels (revised 1996 2013)	IBC							
APA PDS Supplement 2-92 <u>12</u>	Design and Fabrication of Glued Plywood-lumber Beams (revised 1998 2013)	IBC							
EWS R540-02 <u>12</u>	Builders Tips: Proper Storage and Handling of Glulam Beams	IBC							
EWS S475-04 <u>07</u>	Glued Laminated Beam Design Tables	IBC							
EWS S560-03 <u>10</u>	Field Notching and Drilling of Glued Laminated Timber Beams	IBC							
EWS T300-05 <u>07</u>	Glulam Connection Details	IBC							
EWS X440-03 <u>08</u>	Product Guide - Glulam	IBC							
API	API –American Petroleum Institute								
Standard Reference Number	Title	Referenced in Code(s):							
Publ 2009 7 th Edition (2002, R2012)	Safe Welding and Cutting Practices in Refineries, Gas Plants and Petrochemical Plants	IFC							
Publ 2023 3 rd Edition (R2001, R2006)	Guide for Safe Storage and Handling of Heated Petroleum-Derived Asphalt Products and Crude Oil Residue	IFC							
Publ 2028 3 rd Edition (2002, R2012)	Flame Arrestors in Piping Systems	IFC							
Publ 2201 5 th Edition (2003, 2010)	Procedures for Welding or Hot Tapping on Equipment in Service	IFC							
RP 651 (1997) 3 rd Edition (2007)	Cathodic Protection of Aboveground Petroleum Storage	IFC							

	Tanks								
RP 752 (2003) <u>3rd Edition (2009)</u>	Management of Hazards Associated with Location of Process Plant Buildings, CMA Manager's Guide	IFC							
RP 1604 (1996) <u>3rd Edition, R2010)</u>	Closure of Underground Petroleum Storage Tanks	IFC							
RP 1615 (1996) <u>6th Edition (2011)</u>	Installation of Underground Petroleum Storage Systems	IFC							
RP 2001 (2005) <u>9th Edition (2012)</u>	Fire Protection in Refineries	IFC							
RP 2350 (2005) <u>4th Edition (2012)</u>	Overfill Protection for Storage Tanks in Petroleum Facilities, 3rd Edition	IFC							
RP 2003 (1998) <u>7th Edition (2008)</u>	Protection Against Ignitions Arising out of Static, Lightening, and Stray Currents	IFC							
Spec 12P <u>3rd Edition (1995) (Reaffirmed 2009)</u>	Specification for Fiberglass Reinforced Plastic Tanks	IFC							
Std 653 (2004) <u>4th Edition (2009) (2009)</u>	Tank Inspection, Repair, Alteration and Reconstruction	IFC							
Std 2015 <u>6th Edition (2001, R2006)</u>	Safe Entry and Cleaning of Petroleum Storage Tanks	IFC							
Std 2000 <u>6th Edition (1998) 2009</u>	Venting Atmosphere and Low-pressure Storage Tanks: Nonrefrigerated and Refrigerated	IFC							
APHA	American Public Health Association								
Standard Reference Number	Title	Referenced in Code(s):							
2005 2012	Standard Methods for Examination of Water and Waste water 24 2nd Edition	IgCC							
APSP	The Association of Pool & Spa Professionals								
Standard Reference Number	Title	Referenced in Code(s):							
ANSI/NSPI <u>APSP/ICC 3-99 2013</u>	Standard for Permanently Installed Residential Spas	IRC							
ANSI/NSPI <u>APSP/ICC 4-2007 2012</u>	Standard for Above-ground/On-ground residential swimming pools	IRC							
ANSI/NSPI <u>APSP/ICC 5-2003 2011</u>	Standard for Residential In-Ground Swimming Pools	IRC							
ANSI/NSPI <u>APSP/ICC 6-2009 2013</u>	Standard for Residential Portable Spas	IRC							
ANSI/APSP/ICC <u>7-06 2013</u>	Standard for Suction Entrapment Avoidance in Swimming Pools, Wading Pools, Spas, Hot Tubs, and Catch Basins	IBC	IRC	ISPC					
ANSI/APSP/ICC <u>14-11</u>	Portable Spa Energy Efficiency Standard	IPSPC							
ANSI/APSP/ICC <u>15-11</u>	Standard for Energy Efficiency for Residential Inground Swimming Pools and Spas <u>with Addenda A Approved 2013)</u>	ISPC							

ANSI/APSP/ICC16-11	<u>Standard for Suction Fittings for Use in Swimming Pools, Wading Pools, Spas and Hot Tubs</u>	ISPSC							
ASABE	American Society of Agricultural & Biological Engineers								
Standard Reference Number	Title	Referenced in Code(s):							
EP 559.1 1997 W/Corr. 1 DEC 1996 (R2008) <u>AUG2010</u>	Design Requirements and Bending Properties for Mechanically Laminated <u>Wood Columns Assemblies</u>	IBC							
EP 486.1 2 DEC 1999 (R2005) <u>OCT2012</u>	Shallow Post and Pier Foundation Design	IBC							
EP542- <u>FEB1999 99(R2009)</u>	Procedures for Using and Reporting Data Obtained with the Soil Cone Penetrometer	IgCC							
S313.3-99 FEB1999 (R2009)	Soil Cone Penetrometer	IgCC							
ASCE/SEI	American Society of Civil Engineers/Structural Engineers Institute								
Standard Reference Number	Title	Referenced in Code(s):							
5—11 <u>13</u>	Building Code Requirements for Masonry Structures	IBC	IRC						
6—11 <u>13</u>	Specification for Masonry Structures	IBC	IRC						
7—10	Minimum Design Loads for Buildings and Other Structures with Supplement No. 1	IBC	IEBC	IRC					
8—02 <u>14</u>	Standard Specification for the Design of Cold-formed Stainless Steel Structural Members	IBC							
24-05 <u>13</u>	Flood Resistant Design and Construction	IBC	ISPSC	IRC					
29-05 <u>14</u>	Standard Calculation Methods for Structural Fire Protection	IBC							
31-03- 41-13 Note: will be incorporated into ASCE 41-13	Seismic <u>Evaluation and Retrofit Rehabilitation</u> of Existing Buildings	IEBC							
32-01	Design and Construction of Frost Protected Shallow Foundations	IBC	IRC						
41-06 <u>13</u>	Seismic <u>Evaluation and Retrofit Rehabilitation</u> of Existing Buildings	IEBC							
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers								
Standard Reference Number	Title	Referenced in Code(s):							
15-2010 <u>2013</u>	Safety Standard for Refrigeration Systems	IMC							

34-2010 <u>2013</u>	Designation and Safety Classification of Refrigerants	IRC	IMC						
52.2-2007 <u>2012</u>	Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size	IgCC							
55-2004 <u>2010</u>	Thermal Environmental Conditions on Human Occupancy	IgCC							
62.1-2010 <u>2013</u>	Ventilation for Acceptable Indoor Air Quality	IMC	IECC	IEBC	IgCC				
90.1-2010 <u>2013</u>	Energy Standard for Buildings Except Low-Rise Residential Buildings including Addendum G (ANSI/ASHRAE/IESNA 90.1-2007)	IECC	IgCC						
140-2010 <u>11</u>	Standard Method of Test for the Evaluation of Building Energy Analysis Computer Programs	IECC							
146-2006 <u>2011</u>	Testing for Rating Pool Heaters	IECC							
180-08 <u>2012</u>	Standard Practice for Inspection and Maintenance of Commercial Building HVAC Systems	IMC							
ANSI/ASHRAE/ACCA 183-2007 (RA2011)	Peak Cooling and Heating Load Calculations in Buildings, Except Low-rise Residential Buildings	IECC							
ASHRAE-2004 <u>2012</u>	HVAC Systems and Equipment Handbook - 2004	IMC	IECC						
ASHRAE-2009 <u>2013</u>	ASHRAE Handbook of Fundamentals	IRC	IECC-R	IMC					
13256-1(2005) <u>1998 (RA 2012)</u>	Water-source Heat Pumps - Testing and Rating for Performance - Part 1: Water-to-Air and Brine-to-Air Heat Pumps (ANSI/ASHRAE/IESNA 90.1-2004)	IECC							

ASME		American Society of Mechanical Engineers							
Standard Reference Number	Title	Referenced in Code(s):							
		IBC	IFC	IEBC	IRC	IPMC			
ASME A17.1/CSA B44—2007 <u>2013</u>	Safety Code for Elevators and Escalators								
A112.1.3-2000 (Reaffirmed 2005 <u>11</u>)	Air Gap Fittings for Use with Plumbing Fixtures, Appliances, and Appurtenances	IPC	IRC						
A112.3.4-2000 (Reaffirmed 2004) replaced with ASME A112.3.4-2013/CSA B45.9-13	Macerating Toilet Systems and Related Components	IPC	IRC						
A112.4.1-1993 (Reaffirmed 2002) <u>2009</u>	Water Heater Relief Valve Drain Tubes	IPC	IRC						
A112.4.2-2003 (R2008) <u>2009</u>	Water Closet Personal Hygiene Devices	IPC							
A112.4.3-1999 (Reaffirmed 2004 <u>10</u>)	Plastic Fittings for Connecting Water Closets to the Sanitary Drainage System	IPC	IRC						
A112.6.1M-1997 (Reaffirmed 2002 <u>08</u>)	Floor-Affixed Supports for Off-the-Floor Plumbing Fixtures for Public Use	IPC	IRC						
A112.6.2-2000 (Reaffirmed 2004 <u>10</u>)	Framing-Affixed Supports for Off-the-Floor Water Closets with Concealed Tanks	IPC	IRC						
A112.6.3-2001 (Reaffirmed 2007)	Floor and Trench Drains	IPC	IRC						
A112.6.7-2001 (Reaffirmed 2007) <u>2010</u>	Enameled and Epoxy Coated Cast Iron and PVC Plastic Sanitary Floor Sinks	IPC							

A112.6.9-2005 (R2010)	Siphonic Roof Drains	IPC							
ASME A112.18.1-2005 2012/ CSA B125.1-2005 2012	Plumbing Supply Fittings	IPC	IRC						
ASME A112.18.2-2005 2011/ CSA B125.2-2005 2011	Plumbing Waste Fittings	IPC	IRC						
ASME A112.19.1-2013/ CSA B45.2-08 13	Enameled Cast-Iron and Enameled Steel Plumbing Fixtures	IPC	IRC						
ASME A112.19.2-2008 2013/ CSA B45.1-08 13	Ceramic Plumbing Fixtures	IPC	IRC						
ASME A112.19.3-2008/ CSA B45.4-08(R2013)	Stainless-Steel Plumbing Fixtures	IPC	IRC						
ASME A112.19.5-2011/ CSA/B45.15-09 11	Flush Valves and Spuds Trim for Water Closets, Urinals, Bowls and Tanks	IPC	IRC						
ASME A112.19.7-2012/ CSA B45.10-09 2012	Hydromassage Bathtubs Appliances Systems	IPC	IRC						
B16.1-2005 2010	Cast Gray Iron Pipe Flanges and Flanged Fittings, Classes 25, 125 and 250	IFGC							
B16.3-2006 2011	Malleable Iron Threaded Fittings Classes 150 and 300	IPC	IRC	IMC					
B16.4—2006 2011	Gray Iron Threaded Fittings Class 125 and 250	IPC	IRC						
B16.5-2003 2009	Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24	IMC							
B16.11-2005 2011	Forged Fittings, Socket-Welding and Threaded	IPC	IRC	IMC					
B16.12-1998 (Reaffirmed 2006) 2009	Cast Iron Threaded Drainage Fittings	IPC	IRC						
B16.15-2006 2011	Cast Bronze Threaded Fittings	IRC	IMC	IPC	IPSPC				
B16.18-2001 (Reaffirmed 2005) 2012	Cast Copper Alloy Solder Joint Pressure Fittings	IPC	IBC	IRC	IMC	IFC			
B16.20-1998(Reaffirmed 2007)	Metallic Gaskets for Pipe Flanges: Ring-Joint, Spiral- Wound, and Jacketed	IFGC							
B16.22-2001(Reaffirmed 2005) (R2010)	Wrought Copper and Copper Alloy Solder Joint Pressure Fittings	IPC	IBC	IRC	IFC	IMC			
B16.23-2002 (Reaffirmed 2006) 2011	Cast Copper Alloy Solder Joint Drainage Fittings: DWV	IPC	IRC	IMC					
B16.24-2006 2011	Cast Copper Alloy Pipe Flanges and Flanged Fittings: Class 150, 300, 400, 600, 900, 1500 and 2500	IMC							
B16.26-2006 2011	Cast Copper Alloy Fittings for Flared Copper Tubes	IPC	IRC	IMC					
B16.29-2007 2012	Wrought Copper and Wrought- Copper-Alloy Solder Joint Drainage Fittings - (DWV)	IPC	IRC	IMC					
B16.33-2002(Reaffirmed 2007) 2012	Manually Operated Metallic Gas Valves for Use in Gas Piping Systems up to 125 psig (Sizes 1/2 through 2)	IFGC	IRC						
B31.1-2007 2012	Power Piping	IFC							
B31.3-2004 2012	Process Piping	IBC	IFC						
B31.4-2006 2012	Pipeline Transportation Systems for Liquid Hydrocarbons and other Liquids	IFC							
B31.9—08 2011	Building Services Piping	IFC	IMC						
ASSE 1016/ASME A112.1016/CSA B125.16-2011 is a replacement for ASSE 1016-2010	Performance Requirements for Automatic Compensating Valves for Individual Showers and Tub/Shower Combinations	IPC	IRC	IqCC					

BPVC-2007 <u>2010/2011 addenda</u>	Boiler & Pressure Vessel Code	IFC	IMC	IFGC	IRC				
CSD-1-2009 <u>2011</u>	Controls and Safety Devices for Automatically Fired Boilers	IMC							
ASPE	American Society of Plumbing Engineers								
Standard Reference Number	Title	Referenced in Code(s):							
45-2007 <u>2013</u>	Siphonic Roof Drainage Systems	IPC							
ASSE	American Society of Sanitary Engineering								
Standard Reference Number	Title	Referenced in Code(s):							
4046-2010 <u>ASSE 1016/ASME A112.1016/CSA B125.16-2011</u>	Performance Requirements for Automatic Compensating, Valves for Individual Showers and Tub/Shower Combinations	IPC	IRC	IgCC					
ASTM	ASTM International								
Standard Reference Number	Title	Referenced in Code(s):							
A53/A 53M-07 <u>12</u>	Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless	IPC	IMC	IRC	IFGC				
A74-09 <u>12</u>	Specification for Cast Iron Soil Pipe and Fittings	IPC	IRC	IPSDC					
A82/A 2M-05a <u>07</u>	Specification for Steel Wire, Plain, for Concrete Reinforcement	IRC							
A106/A 106M-08 <u>11</u>	Specification for Seamless Carbon Steel Pipe for High-Temperature Service	IMC	IRC	IFGC					
A123/A 123M-02 <u>12</u>	Specification of Zinc (Hot-Dip Galvanized) Coating on Iron and Steel Products	IBC							
A126-04(2009)	Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings	IMC	IRC						
A153/A153M-05 <u>09</u>	Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware	IBC	IRC						
A182-40a- <u>12A</u>	Standard Specification for Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings and Valves and Parts for High-Temperature Service	ISPSC							
A185/A 185M-06E01 <u>07</u>	Specification for Steel Welded Wire Reinforcement, Plain for Concrete	IBC							
A240/A 240M-09 <u>12</u>	Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications	IBC	IRC	IPSPC					
A252-98(2007) <u>10</u>	Specification for Welded and Seamless Steel Pipe Piles	IBC							
A283/A 283M-03(2007) <u>12</u>	Specification for Low and Intermediate Tensile Strength Carbon Steel Plates	IBC							
A307-07b <u>10</u>	Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength	IBC	IRC						
A312/A 312M-08a <u>12A</u>	Specification for Seamless, and Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes	IPC	IRC	ISPSC					

A377-03 2003(2008)e1*	Index of Specification for Ductile-Iron Pressure Pipe	IRC							
A403-40a 12	Standard Specification for Wrought Austenitic Stainless Steel Pipe Fittings	ISPSC							
A416/A 416M-06 12A	Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete	IBC							
A420/A 420M-07 10A	Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Low-Temperature Service	IMC							
A421/A 421M- 05 10	Specification for Uncoated Stress-Relieved Steel Wire for Prestressed Concrete	IBC							
A435/A 435M-90 (2007) 2012	Specification for Straight-Beam Ultrasonic Examination of Steel Plates	IBC							
A463M/A 463M-06 10	Specification for Steel Sheet, Aluminum-Coated, by the Hot Dip Process	IBC	IRC						
A480/A480M-06b 12	Specification for General Requirements for Flat-Rolled Stainless and Heat-/Resisting Steel Plate, Sheet and Strip	IBC							
A496-05 07	Specification for Steel Wire, Deformed for Concrete Reinforcement	IBC							
A497 A497M-06e04 07	Specification for Steel Welded Reinforcement Deformed for Concrete	IBC							
A510-08 11	Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel, Alloy Steel	IBC	IRC						
A572/A 572M-07 12	Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel	IBC							
A588/A 588M-05 40	Specification for High-Strength Low-Alloy Structural Steel with 50 ksi (345 Mpa) Minimum Yield Point, with Atmospheric Corrosion Resistance	IBC							
A615/A 615M-09 12	Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement	IBC	IRC						
A653/A 653M-08 11	Specification for Steel Sheet, Zinc-Coated Galvanized or Zinc-Iron Alloy-Coated Galvannealed by the Hot-Dip Process	IBC	IRC						
A690/690M-07(2012)	Standard Specification for High Strength Low-Alloy Nickel, Copper Phosphorus Steel H-Piles and Sheet Piling with Atmospheric Corrosion Resistance for Use in Marine Environments	IBC							
A706/A 706M-09B	Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement	IBC	IRC						
A722/A 722M-07 12	Specification for Uncoated High-Strength Steel Bar for Prestressing Concrete	IBC							
A733-2003(2009)e1*	Specification for Welded and Seamless Carbon Steel and Austenitic Stainless Steel Pipe Nipples	IPC							
A755/A 755M-03(2008) 2011	Specification for Steel Sheet, Metallic-Coated by the Hot-Dip Process and Prepainted by the Coil-coating Process for Exterior Exposed Building Products	IBC	IRC						

A767/A 767M-05 09	Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement	IBC							
A775/A 775M-07b	Specification for Steel Sheet, Metallic-Coated by the Hot-Dip Process and Prepainted by the Coil-coating Process for Exterior Exposed Building Products	IBC							
A778-01(2009)e1	Specification for Welded Unannealed Austenitic Stainless Steel Tubular Products	IPC	IRC						
A792/A 792M-08 10	Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process	IBC	IRC						
A875/A 875M-06 10	Standard Specification for Steel Sheet Zinc-5%, Aluminum Alloy-Coated by the Hot-Dip Process	IBC	IRC						
A888-09 11	Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Application	IPC	IPSDC	IRC					
A913/A 913M-07 11	Specification for High-Strength Low-Alloy Steel Shapes of Structural Quality, Produced by Quenching and Self-Tempering Process (QST)	IBC							
A924/A 924M-08a 2010a	Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot Dip Process	IBC	IRC						
A951/A951M-06 11	Specification for Steel Wire Masonry Joint Reinforcement	IRC							
A992/A 992M-06a 11	Standard Specification for Structural Shapes	IBC							
A996/A 996M-2009b	Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement	IRC							
A1003/A 1003M-08 12	Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-formed Framing Members	IRC							
A1008/A1008M-07 12	Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, Solution Hardened and Bake Hardenable	IBC							
B42-02e04 10	Specification for Seamless Copper Pipe, Standard Sizes	IPC	IBC	IRC	IFC				
B43-98(2004) 09	Specification for Seamless Red Brass Pipe, Standard Sizes	IPC	IBC	IRC	IFC	IMC			
B68-02 11	Specification for Seamless Copper Tube, Bright Annealed	IBC	IFC	IMC					
B75-02 11	Specification for Seamless Copper Tube	IPC	IPSDC	IRC	IMC				
B88-03 09	Specification for Seamless Copper Water Tube	IPC	IBC	IPSDC	IRC	IMC	IFC	IPSPC	
B101-07 12	Specification for Lead-Coated Copper Sheet and Strip for Building Construction	IBC	IRC						
B135-08a 10	Specification for Seamless Brass Tube	IRC	IMC						
B152/B 152M-06a 09	Specification for Copper Sheet, Strip Plate and Rolled Bar	IPC							
B209-07 10	Specification for Aluminum and Aluminum-Alloy Steel and Plate	IBC	IRC						
B210-04 12	Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes	IFGC							

B227-04 <u>10</u>	Specification for Hard-Drawn Copper-Clad Steel Wire	IRC							
B241/B 241M-02 <u>10</u>	Specification for Aluminum and Aluminum-Alloy, Seamless Pipe and Seamless Extruded Tube	IFGC							
B251-02e04 <u>10</u>	Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tube	IPC	IPSDC	IBC	IFC	IRC	IMC		
B302-07 <u>12</u>	Specification for Threadless Copper Pipe, Standard Sizes	IPC	IRC	IMC					
B370-09 <u>12</u>	Specification for Cold-Rolled Copper Sheet and Strip for Building Construction	IBC	IRC						
B447-07 <u>12a</u>	Specification for Welded Copper Tube	IPC	IRC						
B633-07 <u>11</u>	Specification for Electrodeposited Coatings of Zinc on Iron and Steel	IRC							
B687-99(2005)e04 (2011)	Specification for Brass, Copper, and Chromium-Plated Pipe Nipples	IPC							
B695-04(2009)	Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel	IBC	IRC						
B813-00(2009) <u>10</u>	Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube	IPC	IPSDC	IRC	IMC				
B828-02(2010)	Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings	IPC	IPSDC	IRC					
C4-04e04 (2009)	Specification for Clay Drain Tile and Perforated Clay Drain Tile	IPC	IPSDC	IRC					
C5-03 <u>10</u>	Specification for Quicklime for Structural Purposes	IBC	IRC						
C14-07 <u>11</u>	Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe	IPC	IPSDC	IRC					
C22/C 22M-00(2005)e04 (2010)	Specification for Gypsum	IBC	IRC						
C27-98(2008)	Specification for Standard Classification of Fireclay and High-Alumina Refractory Brick	IBC	IRC						
C28/C 28M-00(2005) <u>10</u>	Specification for Gypsum Plasters	IBC	IRC						
C31/C 31M-08b <u>12</u>	Practice for Making and Curing Concrete Test Specimens in the Field	IBC							
C33/C33M-08 <u>11a</u>	Specification for Concrete Aggregates	IBC	IRC						
C34-03 <u>10</u>	Specification for Structural Clay Load-Bearing Wall Tile	IBC	IRC						
C35-01(2005)/C35M-1995(2009)	Specification for Inorganic Aggregates for Use in Gypsum Plaster	IBC	IRC						
C36/C 36M-03 Withdrawn Replaced	Specification for Gypsum Wallboard	IBC							
C37/C 37M-04 Withdrawn Replaced	Specification for Gypsum Lath	IBC							
C42/C 42M-04 <u>12</u>	Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete	IBC							
C55-06e04 <u>2011</u>	Specification for Concrete Building Brick	IBC	IRC						
C56-05 <u>2010</u>	Specification for Structural Clay Non-Load-Bearing Tile	IBC							
C59/C 59M-00(2006)	Specification for Gypsum Casting Plaster and Molding Plaster	IBC	IRC						

C61/C 61M-00(2006) <u>(2011)</u>	Specification for Gypsum Keene's Cement	IBC	IRC						
C62-08 <u>12</u>	Specification for Building Brick (Solid Masonry Units Made From Clay or Shale)	IBC	IRC						
C67-08 <u>12</u>	Test Methods of Sampling and Testing Brick and Structural Clay Tile	IBC							
C73-05 <u>10</u>	Specification for Calcium Silicate Face Brick (Sand-Lime Brick)	IBC	IRC						
C76-08a <u>12a</u>	Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe	IPC	IPSDC	IRC					
C90-08 <u>12</u>	Specification for Loadbearing Concrete Masonry Units	IBC	IRC	IECC					
C91-05 <u>12</u>	Specification for Masonry Cement	IBC	IRC						
C94/C 94M-09 <u>12</u>	Specification for Ready-Mixed Concrete	IBC	IRC						
C109/C 109M-05 <u>2001b</u>	Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)	IBC							
C126-99(2005) <u>12</u>	Specification for Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units	IBC							
C129-06 <u>11</u>	Specification for Nonload-bearing Concrete Masonry Units	IBC	IRC						
C140-08a <u>2012a</u>	Test Method Sampling and Testing Concrete Masonry Units and Related Units	IBC	IRC						
C143/C 143M-08 <u>2010a</u>	Test Method for Slump of Hydraulic Cement Concrete	IRC							
C145-85 <i>Withdrawn Combined</i>	Specification for Solid-Load Bearing Concrete Masonry Units	IRC							
C150-07- <u>12</u>	Specification for Portland Cement	IBC	IRC						
C172/C172M-08 <u>10</u>	Practice for Sampling Freshly Mixed Concrete	IBC							
C199-84 (2005) <u>(2011)</u>	Test Method for Pier Test for Refractory Mortars	IBC	IRC						
C203-5a <u>(2012)</u>	Standard Test Methods for Breaking Load and Flexural Properties of Block-type Thermal Insulation	IRC							
C206-03(2009)	Specification for Finishing Hydrated Lime	IBC							
C207-06 <u>2011</u>	Specification for Hydrated Lime for Masonry Purposes	IBC	IRC						
C208-2008a <u>12</u>	Specification for Cellulosic Fiber Insulating Board	IBC	IRC						
C212-00(2006) <u>10</u>	Specification for Structural Clay Facing Tile	IBC							
C216-07a <u>12</u>	Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale)	IBC	IRC						
C270-08a <u>12a</u>	Specification for Mortar for Unit Masonry	IBC	IRC						
C272-01(2007)/C272M-12	Standard Test Method for Water Absorption of Core Materials for Structural-Sandwich Constructions	IRC							
C273/C273M-07a <u>11</u>	Standard Test Method for Shear Properties of Sandwich Core Materials	IRC							

C296-00(2004) /C296M-00(2009)e1	Specification for Asbestos-Cement Pressure Pipe	IPC	IRC						
C315-07(2011)	Specification for Clay Flue Liners and Chimney Pots	IBC	IRC	IMC	IFGC				
C317/C 317M-00(2005) 2010	Specification for Gypsum Concrete	IBC							
C330-05/C330-2009	Specification for Lightweight Aggregates for Structural Concrete	IBC							
C331-05 /C331M-2010	Specification for Lightweight Aggregates for Concrete Masonry Units	IBC							
C406-06e01 /C406M-2010	Specification for Roofing Slate	IBC	IRC						
C411-05 11	Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation	IRC	IMC						
C425-04(2009)	Specification for Compression Joints for Vitrified Clay Pipe and Fittings	IPC	IPSDC	IRC					
C428/C428M-05(200611)e1	Specification for Asbestos-Cement Nonpressure Sewer Pipe	IPC	IPSDC	IRC					
C443-05a 12	Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets	IPC	IPSDC	IRC					
C472-99(2004) (2009)	Specification for Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters and Gypsum Concrete	IBC							
C473-07 12	Test Methods for Physical Testing of Gypsum Panel Products	IBC							
C474-05 12	Test Methods for Joint Treatment Materials for Gypsum Board Construction	IBC							
C475/C 475M-02(2007) 12	Specification for Joint Compound and Joint Tape for Finishing Gypsum Wall-Board	IBC	IRC						
C476-08 10	Specification for Grout for Masonry	IRC							
C496/C496M-96 11	Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens	IEBC							
C503-08a 10	Specification for Marble Dimension Stone (Exterior)	IBC							
C508/C508M-00(2004) (2009)e1	Specification for Asbestos-Cement Underdrain Pipe	IPC	IRC						
C514-04(2009)e1	Specification for Nails for the Application of Gypsum Board	IBC	IRC						
C516-08a	Specification for Vermiculite Loose Fill Thermal Insulation	IBC							
C518-04 10	Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus	IBC	IECC						
C547-07e1 12	Specification for Mineral Fiber Pipe Insulation	IBC							
C549-06(2012)	Specification for Perlite Loose Fill Insulation	IBC							
C552-07 12b	Standard Specification for Cellular Glass Thermal Insulation	IBC	IRC						
C557-03(2009)e01	Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing	IBC	IRC						
C564-08 12	Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings	IPC	IPSDC	IRC					

C568-08a <u>10</u>	Specification for Limestone Dimension Stone	IBC							
C578—08b12a	Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation	IBC	IRC						
C587-04(2009)	Specification for Gypsum Veneer Plaster	IBC	IRC						
C595/C95M-08a <u>2012e1</u>	Specification for Blended Hydraulic Cements	IBC	IRC						
C615/C615M-03 <u>2011</u>	Specification for Granite Dimension Stone	IBC							
C616/C616M-08a <u>2010</u>	Specification for Quartz Dimension Stone	IBC							
C629-08 <u>2010</u>	Specification for Slate Dimension Stone	IBC							
C630/C 630M-03 <i>Withdrawn replaced by C1396/C1396M-11</i>	Specification for Water-Resistant Gypsum Backing Board	IBC	IRC						
C635/C635M-07 <u>12</u>	Specification for the Manufacturer, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings	IBC							
C645-08a <u>11A</u>	Specification for Nonstructural Steel Framing Members	IBC	IRC						
C652-09 <u>12</u>	Specification for Hollow Brick (Hollow Masonry Units Made from Clay or Shale)	IBC	IRC						
C685/C 685M-07 <u>11</u>	Specification for Concrete Made by Volumetric Batching and Continuous Mixing	IRC							
C700-07a <u>11</u>	Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated	IPC	IPSDC	IRC					
C726-05e1 <u>12</u>	Standard Specification for Mineral Wool Roof Insulation Board	IBC							
C728-05(2010)	Standard Specification for Perlite Thermal Insulation Board	IBC	IRC						
C744-08 <u>11</u>	Specification for Prefaced Concrete and Calcium Silicate Masonry Units	IBC							
C754-08 <u>11</u>	Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products	IBC							
C836/C836M-06 <u>12</u>	Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course	IBC	IRC						
C840-08 <u>11</u>	Specification for Application and Finishing of Gypsum Board	IBC							
C841-03(2008)E1	Specification for Installation of Interior Lathing and Furring	IBC							
C842-05(2010)E1	Specification for Application of Interior Gypsum Plaster	IBC							
C843-99(2006) (2012)	Specification for Application of Gypsum Veneer Plaster	IBC	IRC						
C844-04(2010)	Specification for Application of Gypsum Base to Receive Gypsum Veneer Plaster	IBC	IRC						
C847-09 <u>12</u>	Specification for Metal Lath	IBC	IRC						
C887-05(2010)	Specification for Packaged, Dry, Combined Materials for Surface Bonding Mortar	IBC	IRC						

C897-05(2009)	Specification for Aggregate for Job-Mixed Portland Cement-Based Plasters	IBC	IRC						
C920-08 <u>11</u>	Standard Specification for Elastomeric Joint Sealants	IBC	IRC	IgCC					
C926-06 <u>12A</u>	Specification for Application of Portland Cement-Based Plaster	IBC	IRC						
C931/C 931M-04 <i>Withdrawn Replaced by C1396/C1396M-11</i>	Specification for Exterior Gypsum Soffit Board	IBC							
C932-06	Specification for Surface-Applied Bonding Compounds Agents for Exterior Plastering	IBC							
C933-07b <u>11</u>	Specification for Welded Wire Lath	IBC							
C946-91 (2001) <u>10</u>	Specification for Practice for Construction of Dry-stacked, Surface-Bonded Walls	IBC							
C954-07 <u>11</u>	Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 inch (0.84 mm) to 0.112 inch (2.84 mm) in Thickness	IBC	IRC						
C955-09 <u>11C</u>	Standard Specification for Load-bearing Transverse and Axial Steel Studs, Runners Tracks, and Bracing or Bridging, for Screw Application of Gypsum Panel Products and Metal Plaster Bases	IBC	IRC						
C956-04(2010)	Specification for Installation of Cast-in-Place Reinforced Gypsum Concrete	IBC							
C957-06 <u>10</u>	Specification for High-Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane with Integral Wearing Surface	IBC	IRC						
C989/C989M-06 <u>12A</u>	Specification for Ground <u>Granulated Blast-Furnace Slag Cement</u> for Use in Concrete and Mortars	IBC							
C1007-08a- <u>11a</u>	Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories	IBC							
C1019-09 <u>11</u>	Test Method for Sampling and Testing Grout	IBC							
C1029-08 <u>10</u>	Specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation	IBC	IRC						
C1032-06(2011)	Specification for Woven Wire Plaster Base	IBC	IRC						
C1047-09 <u>10A</u>	Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base	IBC	IRC						
C1053-00(2005) <u>(2010)</u>	Specification for Borosilicate Glass Pipe and Fittings for Drain, Waste, and Vent (DWV) Applications	IPC							

C1063-08 <u>12C</u>	Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster	IBC	IRC						
C1088-09	Specification for Thin Veneer Brick Units Made From Clay or Shale	IBC							
C1072-06 <u>11</u>	Standard Text Method for Measurement of Masonry Flexural Bond Strength	IBC							
C1107/C1107-08 <u>11</u>	Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)	IRC							
C1116/C1116M-08a <u>10</u>	Standard Specification for Fiber - Reinforced Concrete and Shotcrete	IRC							
C1157-08a <u>11</u>	<u>Standard Performance Specification for Hydraulic Cement</u>	IBC							
C1167-03 <u>11</u>	Specification for Clay Roof Tiles	IBC	IRC						
C1173-08 <u>10</u>	Specification for Flexible Transition Couplings for Underground Piping Systems	IPC	IPSDC	IRC					
C1178/C 1178M-06 <u>11</u>	Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel	IBC	IRC						
C1186-08	Specification for Flat Nonasbestos Fiber Cement Sheets	IBC	IRC						
C1218/C1218M-99(2008)	Test Method for Water-Soluble Chloride in Mortar and Concrete	IBC							
C1240-05 <u>12</u>	Specification for Silica Fume Used in Cementitious Mixtures	IBC							
C1261-07 <u>10</u>	Specification for Firebox Brick for Residential Fireplaces	IBC	IRC						
C1277-08 <u>11</u>	Specification for Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings	IPC	IPSDC	IRC					
C1278/C1278M-07a(2011)	Specification for Fiber-Reinforced Gypsum Panels	IBC	IRC						
C1280-09 <u>12A</u>	Specification for Application of <u>Exterior Gypsum Panel Products for Use as Sheathing</u>	IBC							
C1283-07a <u>11</u>	Practice for Installing Clay Flue Lining	IBC	IRC						
C1288-99(2004)e1 <u>2010</u>	Standard Specification for Discrete Non-Asbestos Fiber-Cement Interior Substrate Sheets	IBC	IRC						
C1289—08- <u>12a</u>	Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board	IBC	IRC						
C1314-07 <u>11A</u>	Test Method for Compressive Strength of Masonry Prisms	IBC							

C1325-08b	Standard Specification for Non-Asbestos Fiber-Mat Reinforced Cement Interior Substrate Sheets Backer Units	IBC	IRC						
C1328/C1328M-05 12	Specification for Plastic (Stucco Cement)	IBC	IRC						
C1364-07 10B	Standard Specification for Architectural Cast Stone	IBC							
C1371-04A(2010)E1	Standard Test Method For Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers	IECC	IgCC						
C1373/C1373--03 11	Standard Practice for Determination of Thermal Resistance of Attic Insulation Systems Under Simulated Winter Conditions	IECC							
C1396/1396M-06a 11	Specification for Gypsum Ceiling Board	IBC	IRC						
C1405-08 12	Standard Specification for Glazed Brick (Single Fired, Solid Brick Units)	IBC							
C1492-03(2009)	Standard Specification for Concrete Roof Tile	IBC	IRC						
C1513-04 12	Standard Specification for Concrete Roof Tile	IRC							
C1540-08 11	Specification for Heavy Duty Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings	IPC							
C1611/C 1611M-05-09BE1	Standard Test Method for Slump Flow of Self-Consolidating Concrete	IBC							
C1629/C1692M—06(2011)	Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels	IBC							
C1658/C1658-06 12	Standard Specification for Glass Mat Gypsum Panels	IBC	IRC						
C1563-08	Standard Test Method for Gaskets for Use in Connection with Hub and Spigot Cast Iron Soil Pipe and Fittings for Sanitary Drain, Waste, Vent and Storm Piping Applications	IPC							
D25-99(2005)12	Specification for Round Timber Piles	IBC							
D56-05(2010)	Test Method for Flash Point by Tag Closed Tester	IBC							
D86-09 2011b	Test Method for Distillation of Petroleum Products at Atmospheric Pressure	IBC	IFC						
D92-05a 12	Test Method for Flash and Fire Points by Cleveland Open Cup Tester	IFC							
D93-08 11	Test Method for Flash Point by Pensky-Martens Closed Cup Tester	IBC	IFC	IMC					

D226/D226M-06_09	Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing	IBC	IRC						
D227/D227M-03(2011)E1	Specification for Coal-Tar-Saturated Organic Felt Used in Roofing and Waterproofing	IBC	IRC						
D635-06_10	Test Method for Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position	IBC							
D1003-07_11e1	Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics	IECC							
D1248-05_12	Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable	IRC							
D1557-07_12	Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb/ft ³ (2,700kN-m/m ³))	IBC							
D1593-09	Non-rigid vinyl chloride plastic <u>film and sheeting</u>	ISPSC							
D1621-04a_10	Standard Test Method for Compressive Properties Of Rigid Cellular Plastics	IRC							
D1623-03_09	Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics	IRC							
D1693-08_12	Test Method for Environmental Stress-Cracking of Ethylene Plastics	IRC	IMC						
D1784-08_11	Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds	IRC							
D1785-06_12	Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80 and 120	IPC	IMC	IRC	ISPSC				
D1863/D1863M-05(2011)E1	Specification for Mineral Aggregate Used on Built-Up Roofs	IBC	IRC						
D1869-95 (2005)e1 (2010)	Specification for Rubber Rings for Asbestos-Cement Pipe	IPC	IPSDC	IRC					
D1929-96(2001)e01-12	Test Method for Determining Ignition Properties <u>Temperature</u> of Plastics	IBC							
D1970/D1970M-09_11	Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roof Underlayment for Ice Dam Protection	IBC	IRC						
D2126-04_09	Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging	IRC							
D2216-05_10	Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass	IBC							
D2235-04 (2011)	Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings	IPC	IPSDC	IMC	IRC				
D2239-03_12	Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter	IPC	IRC						

D2241-05 09	Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR-Series)	IPC	IRC	IMC	ISPSC				
D2412-02(2008) 11	Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading	IRC	IMC						
D2487-06e1 2011	Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)	IBC							
D2513-08b 12	Specification for Thermoplastic Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings	IRC	IMC	IFGC					
D2559-04 12A	Standard Specification for Adhesives for Structural Laminated Bonded Structural Wood Products for Use under Exterior (West Use) Exposure Conditions	IRC							
D2564-04e01 12	Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems	IPC	IPSDC	IRC	IMC				
D2626/D2626M-04(2012)E1	Specification for Asphalt-Saturated and Coated Organic Felt Base Sheet Used in Roofing	IBC	IRC						
D2661-08 11	Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings	IPC	IPSDC	IRC					
D2665-09 12	Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings	IPC	IPSDC	IRC					
D2672-96a(2003) (2009)	Specification for Joints for IPS PVC Pipe Using Solvent Cement	IPC	IRC	ISPSC					
D2683-04 10	Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing	IPC	IRC	IMC					
D2729-03 11	Specification for Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings	IRC	IPC	IPSDC					
D2737-03 12E1	Specification for Polyethylene (PE) Plastic Tubing	IPC	IRC						
D2822/D2822M-05(2011)E1	Specification for Asphalt Roof Cement, Asbestos Containing	IBC	IRC						
D2823/D2823M-05 (2011)E1	Specification for Asphalt Roof Coatings, Asbestos Containing	IBC	IRC						
D2824-06(2012)E1	Specification for Aluminum-Pigmented Asphalt Roof Coatings, Non-fibred, Asbestos Fibred, and Fibred without Asbestos	IRC	IBC						
D2837-08 11	Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products	IRC	IMC						
D2843-99(2004)e01 10	Test for Density of Smoke from the Burning or Decomposition of Plastics	IBC							
D2846/D 2846M-09BE1	Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Hot- and Cold-Water Distribution Systems	IPC	IRC	IMC	ISPSC				
D2855-96(2002) (2010)	Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings	IPC	IPSDC	IRC					
D2859-06 (2011)	Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials	IBC	IFC						
D2898-(04) 10	Standard Test Methods for Accelerated Weathering of Fire-	IBC	IRC	IWUIC					

	Retardant-Treated Wood for Fire Testing								
D2949-01a(2008) 10	Specification for 3.25-in. Outside Diameter Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings	IPC	IPSDC	IRC					
D2974-07a-A	Standard Test Methods for Moisture, Ash and Organic Matter of Peat and other Organic Soils	IgCC							
D3035-08 12	Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter	IPC	IRC	IMC					
D3139-98(2005) 2011	Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals	IPC							
D3161/D3161M-09 12	Test Method for a Wind Resistance of Asphalt Shingles (Fan Induced Method)	IBC	IRC						
D3200-74(2005) 2012	Standard Specification and Test Method for Establishing Recommended Design Stresses for Round Timber Construction Poles	IBC							
D3201-08AE1	Test Method for Hygroscopic Properties of Fire-Retardant Wood and Wood-Based Products	IBC	IRC	IWUIC					
D3261-03 12	Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings Plastic Pipe and Tubings	IMC	IPC						
D3278-1996(2004)e1 (2011)	Test Methods for Flash Point of Liquids by Small Scale Closed-Cup Apparatus	IBC	IFC	IMC					
D3311-08 11	Specification for Drain, Waste and Vent (DWV) Plastic Fittings Patterns	IPC	IRC						
D3350-08 12	Specification for Polyethylene Plastics Pipe and Fittings Materials	IRC	IMC						
D3462/3462M-09 10A	Specification for Asphalt Shingles Made From Glass Felt and Surfaced with Mineral Granules	IBC	IRC						
D3679-09 11	Specification for Rigid Poly (Vinyl Chloride) (PVC) Siding	IBC	IRC						
D3689-07	Test Methods for Deep Foundations Piles Under Static Axial Tensile Load	IBC							
D3737-08 09E1	Practice for Establishing Allowable Properties for Structural Glued Laminated Timber (Glulam)	IBC	IRC						
D3805/D3805M-97(2003)e1 (2009)	Standard Guide for Application of Aluminum-Pigmented Asphalt Roof Coatings	IBC							
D3909/D3909M-97b(2004) 2012e1	Specification for Asphalt Roll Roofing (Glass Felt) Surfaced with Mineral Granules	IBC	IRC	IWUIC					
D3957-06 09	Standard Practices for Establishing Stress Grades for Structural Members Used In Log Buildings	IBC	IRC						
D4022/D4022M-2007(2012)E1	Specification for Coal Tar Roof Cement, Asbestos Containing	IBC	IRC						
D4068-04 09	Specification for Chlorinated Polyethylene (CPE) Sheeting for Concealed Water-Containment Membrane	IPC	IRC						
D4272-08a 09	Test Method for Total Energy Impact of Plastic Films by Dart Drop	IBC							
D4318-05 10	Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils	IBC	IRC						
D4434/D4434M-09 12	Specification for Poly (Vinyl Chloride) Sheet Roofing	IBC	IRC						

D4479/D4479M-07(2012)E1	Specification for Asphalt Roof Coatings - Asbestos-Free	IBC	IRC						
D4551-96-(2008)e1 12	Specification for Poly (Vinyl Chloride) (PVC) Plastic Flexible Concealed Water-Containment Membrane	IPC	IRC						
D4586/D4586M-07(2012)E1	Specification for Asphalt Roof Cement, Asbestos-Free	IBC	IRC						
D4601/D4601M-08 042012E1	Specification for Asphalt-Coated Glass Fiber Base Sheet Used in Roofing	IBC	IRC						
D4637/D4637M-08 12	Specification for EPDM Sheet Used in Single-Ply Roof Membrane	IBC	IRC						
D4829-08a 11	Test Method for Expansion Index of Soils	IBC	IRC						
D4869/D4869M-05(2011)e01	Specification for Asphalt-Saturated (Organic Felt) Underlayment Used in Steep Slope Roofing	IBC	IRC						
D4897/D4897M-01(2009)	Specification for Asphalt-Coated Glass-Fiber Venting Base Sheet Used in Roofing	IBC	IRC						
D4945-08 12	Test Methods for High-Strain Dynamic Testing of Deep Foundations	IBC							
D5049-07a Withdrawn/no replacement	Specification for Reinforced CSM Polymeric Sheet Used in Roofing Membrane	IBC	IRC						
D5055-10 12	Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists	IBC	IRC	IgCC					
D5197-09E1	Test Method for Determination of Formaldehyde and Other Carbonyl Compounds in Air (Active Sampler Methodology)	IgCC							
D5456-10 12	Standard Specification for Evaluation of Structural Composite Lumber Products	IBC	IRC	IgCC					
D5516-03 09	Test Method of Evaluating the Flexural Properties of Fire-Retardant Treated Softwood Plywood Exposed to the Elevated Temperatures	IBC	IRC						
D5643/D5643M-06 (2012)E1	Specification for Coal Tar Roof Cement, Asbestos-Free	IBC	IRC						
D5664-08 10	Test Methods for Evaluating the Effects of Fire-Retardant Treatments and Elevated Temperatures on Strength Properties of Fire-Retardant Treated Lumber	IBC	IRC						
D6162-2000a(2008)	Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements	IBC	IRC						
D6164/D6164M-05e1 11	Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements	IBC	IRC						
D6222/D6222M-08 11	Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using Polyester Reinforcements	IBC	IRC						
D6223D6223M-02(2009)E1	Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements	IBC	IRC						

D6662-09	Standard Specification for Polyolefin-Based <u>Plastic</u> Lumber Decking Boards	IWUIC							
D6694-08	Standard Specification for Liquid-applied Silicone Coating Used In Spray Polyurethane Foam Roofing Systems	IBC	IRC						
D6698-07 <u>12</u>	Standard Test Method for On-Line Measurement of Turbidity Below 5 NTU in Water	IgCC							
D6754/D6745M-02 <u>10</u>	Standard Specification for Ketone Ethylene Ester Based Sheet Roofing	IBC	IRC						
D6757-07	Standard Specification for Inorganic-Underlayment Felt Containing Inorganic Fibers used in Steep-Slope Roofing Products	IBC	IRC						
D6878-08e1/D6878-11A	Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing	IBC	IRC						
D6886-14 <u>12</u>	Standard Methods for Determining the Biobased Content of Solid, Liquid, and Gaseous Samples Using Radiocarbon Analysis	IgCC							
D7032-08 <u>10a</u>	Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite Deck Boards and Guardrail Systems (Guards or Handrails)	IRC	IWUIC						
D7158-08d/D7158M <u>2011</u>	Standard Test Method for Wind Resistance of Sealed Asphalt Shingles (Uplift Force/Uplift Resistance Method)	IBC	IRC						
E84-09 <u>2012c</u>	Test Method for Surface Burning Characteristics of Building Materials	IBC	IFC	IRC	IMC				
E96/E96M-05 <u>10</u>	Test Method for Water Vapor Transmission of Materials	IBC	IRC						
E108-07a <u>2011</u>	Test Methods for Fire Tests of Roof Coverings	IBC	IRC						
E119-2008a <u>2012a</u>	Standard Test Methods for Fire Tests of Building Construction and Materials	IBC	IRC	IMC	IWUIC				
E136-09 <u>2012</u>	Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C	IBC	IRC	IMC	IWUIC				
E519-00e1/E519M <u>2010</u>	Standard Test Method for Diagonal Tension (Shear) in Masonry Assemblages	IEBC							
E605-93(2006) (2011)	Test Method for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members	IBC							
E681-04 <u>2009</u>	Test Method for Concentration Limits of Flammability of Chemicals (Vapors and Gases)	IBC	IFC						
E736-00(2006) (2011)	Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members	IBC							
E779—03 <u>10</u>	Standard Test Method for Determining Air Leakage Rate by Fan Pressurization	IECC	IgCC						
E814-08b <u>2011a</u>	Test Method of Fire Tests of Through-Penetration Firestops	IBC	IRC	IMC					
E970-08a <u>2010</u>	Test Method for Critical Radiant Flux of Exposed Attic Floor Insulation Using a Radiant Heat Energy Source	IBC	IRC						
E1300-07e04 <u>12AE1</u>	Practice for Determining Load Resistance of Glass in	IBC							

	Buildings								
E1332-90(2003)	Standard Classification for the Determination of Outdoor-Indoor Transmission Class	IgCC							
E1354-09 <u>2011b</u>	Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter	IBC	IFC						
E1465-08A	Standard Practice for Radon Control Options for the Design and Construction of New Low-Rise Residential Buildings	IRC							
E1509-04 <u>12</u>	Standard Specification for Room Heaters, Pellet Fuel-Burning Type	IRC	IMC	IgCC					
E1529-06 <u>10</u>	Test Method for Determining Effects of Large Hydrocarbon Pool Fires on Structural Members and Assemblies	IFC							
E1537-07 <u>12</u>	Test Method for Fire Testing of Upholstered Furniture	IFC							
E1590-07 <u>12</u>	Test Method for Fire Testing of Mattresses	IFC							
E1592-05(2012)	Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference	IBC							
E1602-03 <u>02(2010)E1</u>	Guide for Construction of Solid Fuel-Burning Masonry Heaters	IBC	IRC						
E1643-10 <u>11</u>	Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders <u>used in Contact with Earth or Granular Fill Under Concrete Slabs</u>	IgCC							
E1677-05 <u>11</u>	Standard Specification for an Air Retarder (AR) Material or System for Low-Rise Framed Building Walls	IECC							
E1966-07A(2011)	Test Method for Fire resistant Joint Systems	IBC	IFC						
E1980-04 <u>11</u>	Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-sloped Opaque Surfaces	IECC	IgCC						
E1996-09 <u>12</u>	Specification for Performance of Exterior Windows, Glazed Curtain Walls, Doors and Impact Protective Systems Impacted by Windborne Debris in Hurricanes	IBC	IRC	IFC					
E2072-04 <u>10</u>	Standard Specification for Photoluminescent (Phosphorescent) Safety Markings	IBC	IFC						
E2174-09 <u>10AE1</u>	Standard Practice for On-Site Inspection of Installed Fire Stops	IBC	IEBC						
E2178-03 <u>11</u>	Standard Test Method for Air Permeance of Building Materials	IRC	IECC						
E2231-04 <u>09</u>	Standard Practice for Specimen Preparation and Mounting of Pipe and Duct Insulation Materials to Assess to Surface Burning Characteristics	IRC	IMC						
E2273-03(2011)	Standard Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies	IBC	IRC						

E2307 -04 <u>12</u>	Standard Test Method for Determining Fire Resistance of a Perimeter Fire Barriers Joint System Between an Exterior Wall Assembly and a Floor Assembly Using the Intermediate-Scale, Multi-story Test Apparatus ¹ .	IBC							
E2336-04(2009)	Standard Test Methods Fire Resistive Grease Duct Enclosure Systems	IMC							
E2357-05 <u>11</u>	Standard Test Method for Determining Air Leakage Rate of Air Barrier Assemblies	IECC							
E2393-09 <u>10A</u>	Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barrier	IBC	IEBC						
E2404—08 <u>12</u>	Standard Practice for Specimen Preparation and Mounting of Textile, Paper or Vinyl Wall or Ceiling Coverings to Assess Surface Burning Characteristics	IBC	IFC						
E2568—09e1	Standard Specification of PB Exterior Insulation and Finish Systems (EIFS)	IBC	IRC						
E2573—07a <u>12</u>	Standard Practice for Specimen Preparation and Mounting of Site-fabricated Stretch Systems to Assess Surface Burning Characteristics	IBC	IFC						
E2599-09 <u>11</u>	Standard Practice for Specimen Preparation and Mounting of Reflective Insulation Materials and Vinyl Stretch Ceiling Materials Radiant Barrier for Building Applications to Assess Surface Burning Characteristics	IBC							
E2634-08 <u>11</u>	Standard Specification for Flat Wall Insulating Concrete Form (ICF) Systems	IBC	IRC						
F409-02(2008) <u>12</u>	Specification for Thermoplastic Accessible and Replaceable Plastic Tube and Tubular Fittings	IPC	IRC						
F437-06 <u>09</u>	Specification for Threaded Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80	IPC	IRC	IMC	ISPSC				
F438-04 <u>09</u>	Specification for Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40	IPC	IRC	IMC	ISPSC				
F439-06 <u>12</u>	Specification for Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80	IPC	IRC	IMC	ISPSC				
F441/F 441M-02(2008) <u>12</u>	Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80	IPC	IRC	IMC					
F442/F 442M-99(2005)e1 <u>12</u>	Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR)	IPC	IRC	IMC					
F477-08 <u>10</u>	Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe	IPC	IPSDC	IRC					
F493-04 <u>10</u>	Specification for Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings	IPC	IRC	IMC					
F547-06 (2012)	Terminology of Nails for Use with Wood and Wood-based Materials	IBC							

F656-08 <u>10</u>	Specification for Primers for Use in Solvent Cement Joints of Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings	IPC	IPSDC	IRC					
F714-08 <u>12E1</u>	Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter	IPC	IRC	IMC					
F876-08b <u>10E1</u>	Specification for Crosslinked Polyethylene (PEX) Tubing	IPC	IRC	IMC					
F877-07 <u>11</u>	Specification for Crosslinked Polyethylene (PEX) Plastic Hot- and Cold-Water Distribution Systems	IPC	IRC	IMC					
F891-07 <u>10</u>	Specification for Coextruded Poly (Vinyl Chloride) (PVC) Plastic Pipe with a Cellular Core	IPC	IPSDC	IRC					
F1055-98(2006) <u>11</u>	Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene <u>and Crosslinked Polyethylene</u> Pipe and Tubing	IPC	IRC	IMC					
F1281-07 <u>11</u>	Specification for Crosslinked Polyethylene/Aluminum/Crosslinked Polyethylene (PEX-AL-PEX) Pressure Pipe	IPC	IRC	IMC					
F1282-06 <u>10</u>	Specification for Polyethylene/Aluminum/Polyethylene (PE-AL-PE) Composite Pressure Pipe	IPC	IMC	IRC					
F1346-91 (2003) (2010)	Performance Specification for Safety Covers and Labeling Requirements for All Covers for Swimming Pools, Spas and Hot Tubs	IBC	IRC	IPMC	IgCC	ISPSC			
F1484-05 <u>12</u>	Standard Test Methods for Performance of Steam Cookers	IgCC							
F1488-03 <u>09E1</u>	Specification for Coextruded Composite Pipe	IPC	IPSDC	IRC	IgCC				
F1496-99(2005)e1 <u>12</u>	Standard Test Method for Performance of Convection Ovens	IgCC							
F1499-01(2008) <u>12</u>	Specification for Coextruded Composite Drain, Waste, and Vent Pipe (DWV)	IPSDC							
F1667-05 <u>11A E1</u>	Specification for Driven Fasteners: Nails, Spikes, and Staples	IBC	IRC						
F1673-04(2005) <u>10</u>	Standard Specification for Polyvinylidene Fluoride (PVDF) Corrosive Waste Drainage Systems	IPC							
F1807-08 <u>12</u>	Specifications for Metal Insert Fittings Utilizing a Copper Crimp Ring for SDR9 Cross-linked Polyethylene (PEX) Tubing <u>and SDR9 Polyethylene of Raised Temperature (PE-RT) Tubing</u>	IPC	IRC	IMC					

F1924-05 <u>12</u>	Standard Specification for Plastic Mechanical Fittings for Use on Outside Diameter Controlled Polyethylene Gas Distribution Pipe and Tubing	IMC							
F1960-09 <u>12</u>	Specification for Cold Expansion Fittings with PEX Reinforcing Rings for Use with Cross-linked Polyethylene (PEX) Tubing	IPC	IRC	IMC					
F1974-08 <u>09</u>	Specification for Metal Insert Fittings for Polyethylene/Aluminum/Polyethylene and Crosslinked Polyethylene/Aluminum/Crosslinked Polyethylene Composite Pressure Pipe	IPC	IRC	IMC					
F1986-01(2006) (2011)	Specification for Multilayer Pipe, Type 2, Compression Fittings and Compression Joints for Hot and Cold Drinking Water Systems	IPC	IRC						
F2080-08 <u>09</u>	Specification for Cold-Expansion Fittings with Metal Compression-Sleeves for Cross-linked Polyethylene (PEX) Pipe	IPC	IRC						
F2098-08	Standard Specification for Stainless Steel Clamps for Securing SDR9 Cross-Linked Polyethylene (PEX) Tubing to Metal Insert and Plastic Insert Fittings	IPC	IRC						
F2159-05 <u>11</u>	Specification for Plastic Insert Fittings Utilizing a Copper Crimp Ring for SDR9 Cross-linked Polyethylene (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT) Tubing	IPC							
F2200—05 <u>11B</u>	Standard Specification for Automated Vehicular Gate Construction	IRC	IFC						
F2262-05 <u>09</u>	Standard Specification for Cross-linked Polyethylene/Aluminum/Cross-linked Polyethylene Tubing OD Controlled SDR9	IPC	IRC						
F2306/F 2306M-08 <u>11</u>	Specification for 12" to 60" 300 to 1500 mm annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications	IPC							
F2387-04(2012)	Standard Specification for Manufactured Safety Vacuum Release Systems, Swimming (SVRS) for Pools, Spas and Hot Tubs	IBC							
F2389-07e1 <u>10</u>	Specification for Pressure-Rated Polypropylene (PP) Piping Systems	IPC	IRC	IMC					
F2434-08 <u>09</u>	Standard Specification for Metal Insert Fittings Utilizing a Copper Crimp ring for SDR9 Cross-Linked Polyethylene (PEX) Tubing and SDR9 Cross-Linked Polyethylene/Aluminum/Cross-Linked Polyethylene (PEX-AL-PEX) Tubing	IPC	IRC	IMC					
F2735-09	Standard Specification for Plastic Insert Fittings for SDR9 Cross-linked Polyethylene (PEX) and Polyethylene of Raised Temperature (PE-RT) Tubing	IMC	IPC	IRC					
F2769-09 <u>10</u>	Polyethylene of Raised Temperature (PE-RT) Plastic Hot and Cold-Water Tubing and Distribution Systems	IMC	IPC	IRC					

AWCI		The Association of the Wall & Ceiling Industries International							
Standard Reference Number	Title	Referenced in Code(s):							
12-B-98 <u>04</u>	Technical Manual 12-B Standard Practice for the Testing and Inspection of Field Applied Thin Film Intumescent Fire-Resistive Materials; an Annotated Guide, First- <u>Second</u> Edition	IBC							
AWPA		American Wood Protection Association							
Standard Reference Number	Title	Referenced in Code(s):							
M4—08 <u>11</u>	Standard for the Care of Preservative-Treated Wood Products	IBC	IRC						
U1—11 <u>14</u>	USE CATEGORY SYSTEM: User Specification for Treated Wood except Section 6, Commodity Specification H	IBC	IRC						
AWS		American Welding Society							
Standard Reference Number	Title	Referenced in Code(s):							
A5.8-04M/A5.8:2011	Specifications for Filler Metals for Brazing and Braze Welding	IRC	IMC	IPC					
D1.3-98/D1.3M:2008	Structural Welding Code-Sheet Steel	IBC							
D1.4-1998 /D1.4M:2011	Structural Welding Code - Reinforcing Steel <u>Including Metal Inserts and Connections in Reinforced Concrete Construction</u>	IBC							
AWWA		American Water Works Association							
Standard Reference Number	Title	Referenced in Code(s):							
C104-98/A21.4-08	Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water	IRC	IPC						
C110/A21.10-03 <u>12</u>	Standard for Ductile-Iron and Gray-Iron Fittings, 3-in through 48 Inches for Water	IRC	IPC	IMC					
C111-00/A21.11-12	Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings	IPC	IFGC						
C115-A21.15-99 <u>11</u>	Standard for Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges	IRC	IPC	IMC					
C151/A21.51-02 <u>09</u>	Standard for Ductile-Iron Pipe, Centrifugally Cast for Water	IRC	IPC	IMC					
C153/A21.53-00 <u>11</u>	Standard for Ductile-Iron Compact Fittings for Water Service	IRC	IPC	IMC					
C510-00 <u>07</u>	Double Check Valve Backflow Prevention Assembly	IRC	IPC						
C511-00 <u>07</u>	Reduced-Pressure Principle Backflow Prevention Assembly	IRC	IPC						

C651-99 <u>05</u>	Disinfecting Water Mains	IPC							
C652-02 <u>11</u>	Disinfection of Water-Storage Facilities	IPC							
BHMA	Builders Hardware Manufacturers' Association								
Standard Reference Number	Title	Referenced in Code(s):							
A 156.19-2007 <u>2013</u>	Power Assist and Low Energy Power Operated Doors	IBC	IFC						
CDPH	California Department of Public Health								
Standard Reference Number	Title	Referenced in Code(s):							
CDPH Section 01350	EHLB Standard Method for the Testing and Evaluation of VOC Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1(2010)	IgCC							
CGA	Compressed Gas Association								
Standard Reference Number	Title	Referenced in Code(s):							
C-7 (2004) (2011)	Guide to Preparation of Precautionary Labeling and Marking of Compressed Gas Containers	IFC							
<u>ANSI/CGA P-18-2006</u>	Standard for Bulk Inert Gas Systems at Consumer Sites (an American National Standard)	IFC							
P-20 (2003) (2009)	Standard for Classification of Toxic Mixtures	IFC							
P-23 (2003) (2008)	Standard for Categorizing Gas Mixtures Containing Flammable and Nonflammable Components	IFC							
S-1.1 (2005) (2011)	Pressure Relief Device Standards - Part 1 - Cylinders for Compressed Gases	IFC	IFGC						
S-1.3 (2005) (2008)	Pressure Relief Device Standards - Part 3 - Stationary Storage Containers for Compressed Gases	IFC	IFGC						
CPA	Composite Panel Association								
Standard Reference Number	Title	Referenced in Code(s):							
A135.4-2004 <u>2012</u>	Basic Hardboard	IBC	IRC						
A135.5-2004 <u>2012</u>	Prefinished Hardboard Paneling	IBC	IRC						
A135.6-2006 <u>2012</u>	<u>Hardboard Engineered Wood Siding</u>	IBC	IRC						
A208.1-99 <u>2009</u>	Particleboard	IBC	IRC						
CRRC	Cool Roof Rating Council								
Standard Reference Number	Title	Referenced in Code(s):							
CRRC-1-2010 <u>12</u>	Cool Roof Rating Council Standard	IgCC							

CSA		Canadian Standards Association CSA Group							
Standard Reference Number	Title	Referenced in Code(s):							
<u>ASME A17.1/CSA B44—2013</u>	<u>Safety Code for Elevators and Escalators</u>	IBC	IFC	IEBC	IRC	IPMC			
<u>ASME A112.18.1-2005 2012/ CSA B125.1-2005 2012</u>	Plumbing Supply Fittings	IPC	IRC						
<u>ASME A112.18.2-2005 2011/ CSA B125.2-2005 2011</u>	Plumbing Waste Fittings	IRC	IPC						
<u>ASME A112.19.1 2013/ CSA B45.2-08 13</u>	Enameled Cast-Iron and Enameled Steel Plumbing Fixtures	IRC	IPC						
<u>A112.19.2-2008 2013/ CSA B45.1-08 13</u>	Ceramic Plumbing Fixtures	IPC	IRC						
<u>ASME A112.19.3-2008/ CSA B45.4-08(R2013)</u>	Stainless-Steel Plumbing Fixtures	IRC	IPC						
<u>ASME A112.19.5-2011/ CSA/B45.15-09 11</u>	<u>Flush Valves and Spuds Trim for Water Closets, Urinals, Bowls and Tanks</u>	IPC	IRC						
<u>ASME A112.19.7-2012/ CSA B45.10-09-2012</u>	Hydromassage Bathtubs Appliances Systems	IPC	IRC						
<u>ASME A112.3.4-2013/CSA B45.9-99(R2008) 13</u>	Macerating Systems and Related Components	IRC	IPC						
<u>ASSE 1016/ASME A112.1016/CSA B125.16-2011</u> is a replacement for ASSE 1016-2010	<u>Performance Requirements for Automatic Compensating Valves for Individual Showers and Tub/Shower Combinations</u>	IPC	IRC	IqCC					
<u>CSA B45.5-02 (R2008) 11/ IAPMO Z124-2011</u>	Plastic Plumbing Fixtures	IRC	IPC						
<u>B64.1.1-04 11</u>	Vacuum Breakers, Atmospheric Type (AVB)	IRC	IPC						
<u>B64.1.2-07 11</u>	Pressure Vacuum Breakers (PVB)	IRC	IPC						
<u>B64.1.3-07 11</u>	Spill Resistant Pressure Vacuum Breakers (SRPVB)	IPC	IRC						
<u>B64.2-04 11</u>	Vacuum Breakers, Hose Connection Type (HCVF)	IRC	IPC						
<u>B64.2.1-07 11</u>	Vacuum Breakers, Hose Connection (HCVB) with Manual Draining Feature	IRC	IPC						
<u>B64.2.1.1-07 11</u>	Hose Connection Dual Check Vacuum Breakers (HCDVB)	IRC	IPC						
<u>B64.2.2-04 11</u>	Vacuum Breakers, Hose Connection Type (HCVF) with Automatic Draining Feature	IRC	IPC						
<u>B64.3-07 11</u>	Dual Check Valve Backflow Preventers Atmospheric Port (DCAP)	IRC	IPC						
<u>B64.4-07 11</u>	Reduced Pressure Principle Backflow Preventers (RP)	IRC	IPC						
<u>B64.4.1-07 11</u>	Reduced Pressure Principle for Fire Systems (RPF)	IRC	IPC						
<u>B64.5-07 11</u>	Double Check Backflow Preventers (DCVA)	IRC	IPC						
<u>B64.5.1-07 11</u>	Double Check Valve Backflow Preventers for Fire Systems (DCVAF)	IRC	IPC						
<u>B64.6-07 11</u>	Dual Backflow Preventers Check Valve (DuC)	IPC	IRC						
<u>B64.7-07 11</u>	Laboratory Faucet Vacuum Breakers (LFVB)	IRC	IPC						
<u>B64.10.1-07 11</u>	<u>Manual for the Selection, Installation, Maintenance and Field Testing of Backflow Preventers on Devices</u>	IPC							

B79-08 (R2013)	Commercial and Residential Drains, and Cleanouts	IPC							
CSA B125.3-2005 12	Plumbing Fittings	IRC	IPC						
B137.1-05 13	Polyethylene (PE) Pipe , Tubing and Fittings for Cold Water Pressure Services	IRC	IPC						
B137.2-05 13	Polyvinylchloride PVC Injection-Moulded Gasketed Fittings for Pressure Applications	IRC	IPC	ISPSC					
B137.3-05 13	Rigid Poly (Vinyl Chloride) (PVC) Pipe for Pressure Applications	IRC	IPC	IPSDC					
B137.5-05 13	Cross-Linked Polyethylene (PEX) Tubing Systems for Pressure Applications	IRC	IPC						
B137.6-05 13	Chlorinated Polyvinylchloride CPVC Pipe, Tubing and Fittings for Hot and Cold Water Distribution Systems	IRC	IPC	ISPSC					
B137.9-02 13	Polyethylene/Aluminum/Polyethylene (PE-AL-PE) Composite Pressure-Pipe Systems	IRC	IPC	IMC					
B137.10M-05 13	Crosslinked Polyethylene/Aluminum/Crosslinked Polyethylene (PEX-AL-PEX) Composite Pressure-Pipe Systems	IRC	IPC	IMC					
B137.11-05 13	Polypropylene (PP-R) Pipe and Fittings for Pressure Applications	IRC	IPC						
B181.1-06 11	Acrylonitrile-butadiene-stryrene (ABS) Drain, Waste, and Vent Pipe and Pipe Fittings	IRC	IPC	IPSDC					
B181.2-06 11	Polyvinylchloride PVC Drain, and chlorinated polyvinylchloride (CPVC) Drain, Waste, and Vent Pipe and Pipe Fittings	IRC	IPC	IPSDC					
B181.3-06 11	Polyolefin and polyvinylidene fluoride (PVDF) Laboratory Drainage Systems	IRC	IPC						
B182.1- 06 11	Plastic drain and sewer pipe and pipe fittings	IPC	IPSDC						
B182.2-06 11	PSM type polyvinylchloride (PVC) sewer pipe and fittings	IRC	IPC	IPSDC					
B182.4-06 11	Profile polyvinylchloride PVC Sewer Pipe and Fittings	IRC	IPC	IPSDC					
B182.6-06 11	Profile Polyethylene (PE) Sewer Pipe and Fittings for leak proof sewer applications	IRC	IPC						
B182.8-06 11	Profile Polyethylene (PE) Storm Sewer and Drainage Pipe and Fittings	IRC	IPC						
B356-00(2005) 10	Water Pressure Reducing Valves for Domestic Water Supply Systems	IPC	IRC						
B481.1-07 12	Testing and Rating of Grease Interceptors Using Lard	IPC							
B602-05 10	Mechanical Couplings for Drain, Waste, and Vent Pipe and Sewer Pipe	IRC	IPC	IPSDC					
CAN/CSA A257.1M-92 2009	Circular Concrete Culvert, Storm Drain, Sewer Pipe and Fittings	IRC	IPC	IPSDC					
CAN/CSA A257.2M-92 2009	Reinforced Circular Concrete Culvert, Storm Drain, Sewer Pipe and Fittings	IRC	IPC	IPSDC					
CAN/CSA A257.3M-92 2009	Joints for Circular Concrete Sewer and Culvert Pipe, Manhole Sections, and Fittings Using Rubber Gaskets	IRC	IPC	IPSDC					
B137.11-05 13	Polypropylene (PP-R) Pipe and Fittings for Pressure Applications	IRC	IPC						

B45.3-02 (R2008)	Porcelain Enameled Steel Plumbing Fixtures	IRC	IPC						
0437-Series-93 (R2006)	Standards on OSB and Waferboard (Reaffirmed 2001)	IRC							
ANSI CSA America FC 1-2003 2012 to be relocated under ANSI	Stationary Fuel Cell Power Systems	IFGC	IMC	IRC					
CAN/CSA B366.1-2009 2011	Solid-Fuel-Fired Central Heating Appliances	IgCC							
B483.1-07 14	Drinking Water Treatment Systems	IRC	IPC						
CSA C22.2 No. 218.1-M89(R2006 2011)	Spas, Hot Tubs and Associated Equipment	ISPSC							
C22.2 No. 236 05 -11 (R2009) M89(R2006)	Heating and Cooling Equipment (binational standard with UL 1995)	ISPSC							
C22.2 No. 108-01 (R2010)	Liquid Pump	ISPSC							
CTI	Cooling Technology Institute								
Standard Reference Number	Title	Referenced in Code(s):							
STD-201 (2009 11)	Standard for Certification of Water Cooling Tower Thermal Performance	IECC							
DASMA	Door and Access Systems Manufacturers								
Standard Reference Number	Title	Referenced in Code(s):							
105-92(R2004) -13	Test Method for Thermal Transmittance and Air Infiltration of Garage Doors	IECC							
107-97 (R2004 2012)	Room Fire Test Standard for Garage Doors Using Foam Plastic Insulation	IBC							
108-05 12	Standard Method for Testing Sectional Garage Doors and Rolling Doors: Determination of Structural Performance Under Uniform Static Air Pressure Difference	IBC	IRC						
115-05 12	Standard Method for Testing Sectional Garage Doors and Rolling Doors: Determination of Structural Performance Under Missile Impact and Cyclic Wind Pressure	IBC	IRC						
FEMA	Federal Emergency Management Agency								
Standard Reference Number	Title	Referenced in Code(s):							
FEMA P646-08 12	Guidelines for Design of Structures for Vertical Evacuation from Tsunamis	IBC							
FEMA-FA/ TB-2-08	Flood-Damage Resistant Materials Requirements	IRC							
FIA-TB-11-01 FEMA-TB 11-01	Crawlspace Construction for Buildings Located in Special Flood Hazard Area	IBC	IRC						

FM		FM Global								
Standard Reference Number	Title	Referenced in Code(s):								
FM 4470 2009 2013	Approval Standard for <u>Single-Ply Polymer-Modified Bitumen Sheet, Built-Up Roof (BUR) and Liquid Applied Roof Assemblies for use in Class 1 and Noncombustible Roof Deck Construction Covers.</u>	IBC								
4474-04 <u>11</u>	American National Standard for Evaluating the Simulated Wind Uplift Resistance of <u>Roof/Ceiling Assemblies, Plastic Interior Finish Materials, Plastic Exterior Building Panels, Wall/Ceiling Coating Systems, Interior or Exterior Finish Systems Using Static Positive and/or Negative Differential Pressures</u>	IBC								
4880 (2005) <u>2010</u>	<u>Approval Standard for Class 1 Rating of Evaluating Insulated Wall or Wall and Roof/Ceiling Panels, Assemblies, Plastic Interior Finish Materials, Plastic Exterior Building, Wall/Ceiling or Coatings Systems, Interior or Exterior Finish Systems</u>	IBC	IRC							
GA		Gypsum Association								
Standard Reference Number	Title	Referenced in Code(s):								
GA 216-07 <u>13</u>	Application and Finishing of Gypsum Panel Products	IBC								
GA-253-07 <u>12</u>	Recommended Standard Specification for the Application of Gypsum Sheathing	IRC								
GA-600-09 <u>12</u>	Fire- Resistance Design Manual, 48 th <u>20th</u> Edition	IBC								
HPVA		Hardwood Plywood and Veneer Association								
Standard Reference Number	Title	Referenced in Code(s):								
HP-1-2009 <u>2013</u>	Standard for Hardwood and Decorative Plywood	IBC	IRC	IgCC						
IAPMO		International Association of Plumbing and Mechanical Officials								
Standard Reference Number	Title	Referenced in Code(s):								
<u>CSA B45.5-11/ IAPMO Z124-2011</u> replaces ANSI Z124.1, 1.2, 2, 3, 4, 6, 9	Plastic Plumbing Fixtures	IRC	IPC							
<u>IAPMO Z124.7-2012</u> replaces ANSI Z124.7-97	Prefabricated Plastic Spa Shells	ISPSC								

ICC		International Code Council							
Standard Reference Number	Title	Referenced in Code(s):							
ICC A117.1-09 <u>14</u>	Accessible and Usable Buildings and Facilities	IBC	IFC	IZC	IEBC	IRC			
IBC-12 <u>15</u>	International Building Code	IRC	IFC	IMC	IPC	IPSDC	IFGC	IECC	IEBC IWUIC
IECC-12 <u>15</u>	International Energy Conservation Code	IBC	IRC	IMC	IPC	IFGC	IgCC	ISPSC	
IEBC-12 <u>15</u>	International Existing Building Code	IBC	IMC	IPMC	IgCC				
IFC-12 <u>15</u>	International Fire Code	IBC	IRC	IMC	IPC	IFGC	IECC	IEBC	IPMC
IFGC-12 <u>15</u>	International Fuel Gas Code	IBC	IRC	IFC	IMC	IPC	IECC	IEBC	IPMC
IMC-12 <u>15</u>	International Mechanical Code	IBC	IRC	IFC	IPC	IFGC	IECC	IEBC	IPMC
ICCPC-12 <u>15</u>	International Performance Code	IgCC							
IPC-12 <u>15</u>	International Plumbing Code	IBC	IRC	IFC	IMC	IPSDC	IFGC	IEBC	IPMC
IPSDC-12 <u>15</u>	International Private Sewage Disposal Code	IBC	IPC	IRC					
IPMC-12 <u>15</u>	International Property Maintenance Code	IBC	IRC	IFC	IEBC				
IRC-12 <u>15</u>	International Residential Code	IBC	IFC	IMC	IFGC	IEBC	IPC	IPMC	IgCC
IWUIC-12 <u>15</u>	International Wildland-Urban Interface Code	IBC	IFC						
IZC-12 <u>15</u>	International Zoning Code	IBC	IMC						
ICC 500-08 <u>14</u>	ICC/NSSA Standard on the Design and Construction of Storm Shelters	IBC	IRC						
ICC 600-08 <u>14</u>	Standard for Residential Construction In High Wind Regions	IBC	IRC						
ICC 700-2008 <u>12</u>	National Green Building Standard	IgCC							
IgCC-12 <u>15</u>	International Green Construction Code	IBC	ICCPC	IEBC	IECC	IFC	IFGC	IMC	IPC
IES		Illuminating Engineering Society							
Standard Reference Number	Title	Referenced in Code(s):							
TM-15-07 <u>11</u>	Luminaire Classification System for Outdoor Luminaires	IgCC							
IIAR		International Institute of Ammonia Refrigeration							
Standard Reference Number	Title	Referenced in Code(s):							
2-99 2014 (Addendum A-2005)	Addendum A to Equipment, Design, and Installation of Ammonia Mechanical Refrigerating Systems	IMC							
ISEA		International Safety Equipment Association							

Standard Reference Number	Title	Referenced in Code(s):							
ANSI/ISEA Z358.1-98 2009	Emergency Eyewash and Shower Equipment	IPC							
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry								
Standard Reference Number	Title	Referenced in Code(s):							
MSS SP-6-04 <u>2012</u>	Standard Finishes for Contact Faces of Pipe Flanges and Connecting-End Flanges of Valves and Fittings	IFGC							
<u>ANSI</u> MSS SP-58 1993 <u>2009</u>	Pipe Hangers and Supports –Materials, Design, Manufacture, Selection, Application, and Installation	IRC	IFGC						
SP-69-2002 ANSI/MSS SP-58-2009	Pipe Hangers and Supports – <u>Materials, Design, Manufacture, Selection and Application , and Installation</u> <i>(SP69 will be withdrawn in 2014 and ANSI MSS SP-58-2009 replaces it)</i>	IMC							
NFPA	National Fire Protection Association								
Standard Reference Number	Title	Referenced in Code(s):							
10-40 <u>13</u>	Standard for Portable Fire Extinguishers	IFC	IBC						
13-40 <u>13</u>	Standard for the Installation of Sprinkler Systems	IFC	IBC						
13D-40 <u>13</u>	<u>Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes</u>	IFC	IRC	IBC					
13R- 40 <u>13</u>	<u>Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies Up to and Including Four Stories in Height</u>	IFC	IBC	IEBC					
14-40 <u>13</u>	<u>Standard for the Installation of Standpipe, Private Hydrants and Hose Systems</u>	IFC	IBC						
15-12	<u>Standard for the Water Spray Fixed Systems for Fire Protection</u>	IFC							
16-11	<u>Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems</u>	IFC	IBC						
17-09 <u>13</u>	<u>Standard for Dry Chemical Extinguishing Systems</u>	IFC	IBC						

17A-09 <u>13</u>	<u>Standard for Wet Chemical Extinguishing Systems</u>	IFC	IBC						
20- 40 <u>13</u>	<u>Standard for the Installation of Stationary Pumps for Fire Protection</u>	IFC	IBC						
22-08 <u>13</u>	<u>Standard for the Water Tanks for Private Fire Protection</u>	IFC							
24- 40 <u>13</u>	<u>Standard for the Installation of Private Fire Service Mains and Their Appurtenances</u>	IFC							
25-44 <u>13</u>	<u>Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems</u>	IFC	IPMC						
30A-42 <u>15</u>	<u>Code for Motor Fuel Dispensing Facilities and Repair Garages</u>	IFC	IMC	IFGC					
30B-42 <u>15</u>	<u>Code for the Manufacture and Storage of Aerosol Products</u>	IFC							
31-44 <u>15</u>	<u>Standard for the Installation of Oil-Burning Equipment</u>	IFC	IRC	IMC	IBC				
32-44 <u>15</u>	<u>Drycleaning Plants</u>	IFC	IBC						
33-44 <u>15</u>	<u>Standard for Spray Application Using Flammable or Combustible Materials</u>	IFC							
34-44 <u>15</u>	<u>Standard for Dipping and Coating Processes Using Flammable or Combustible Liquids</u>	IFC							
35-44 <u>15</u>	<u>Standard for Manufacture of Organic Coatings</u>	IFC							
37-40 <u>14</u>	<u>Installation and Use of Stationary Combustion Engines and Gas Turbines</u>	IMC	IFGC						
40-44 <u>15</u>	<u>Standard for the Storage and Handling of Cellulose Nitrate Film</u>	IFC	IBC						
45-44 <u>15</u>	<u>Standard on Fire Protection for Laboratories Using Chemicals</u>	IMC							
50-04 replaced with 55-13 that incorporates NFPA 50	<u>Bulk Oxygen Systems at Consumer Sites Compressed Gases and Cryogenic Fluids Code</u>	IPC							
51- 07 <u>13</u>	<u>Standard for the Design and Installation of Oxygen-Fuel Gas Systems for Welding, Cutting, and Allied Processes</u>	IFC	IPC	IFGC					
51A-12	<u>Standard for Acetylene Cylinder Charging Plants</u>	IFC							

52-40 <u>13</u>	<u>Vehicular Fuel Gaseous System Code</u>	IFC							
55-40 <u>13</u>	<u>Standard for the Storage, Use and Handling of Compressed Gases and Cryogenic Fluids Code in Portable and Stationery Containers Cylinders and Tanks</u>	IFC							
58-44 <u>13</u>	<u>Liquefied Petroleum Gas Code</u>	IFC	IBC	IRC	IMC	IFGC			
59A 40 <u>13</u>	<u>Standard for the Production, Storage and Handling of Liquefied Natural Gas (LNG)</u>	IFC							
61- 08 <u>13</u>	<u>Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities</u>	IFC	IBC						
69-08 <u>14</u>	<u>Standard on Explosion Prevention Systems</u>	IFC	IMC						
72- 40 <u>13</u>	<u>National Fire Alarm and Signaling Code</u>	IFC	IBC	IRC	IMC	IEBC	IgCC	IWUIC	
80- 40 <u>13</u>	<u>Standard for Fire Doors and Other Opening Protectives</u>	IFC	IBC						
82-09 <u>14</u>	<u>Standard on Incinerators, Waste and Linen Handling Systems and Equipment, 2009 Edition</u>	IMC	IFGC	IBC	IRC				
85-11	<u>Boiler and Construction Combustion Systems Hazards Code</u>	IFC	IBC	IRC	IFGC				
86-44 <u>15</u>	<u>Standard for Ovens and Furnaces</u>	IFC							
88A-44 <u>15</u>	<u>Standard for Parking Structures</u>	IFGC							
91-40 <u>15</u>	<u>Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Noncombustible Particulate Solids</u>	IMC							
92B—09 <u>12</u>	<u>Smoke Control Management Systems in Malls, Atria, and Large Spaces</u>	IFC	IBC	IMC					
96-44 <u>13</u>	<u>Standard for Ventilation Control and Fire Protection of Commercial Cooking Operation</u>	IMC							
99-42 <u>15</u>	<u>Health Care Facilities Code</u>	IBC	IFC	IEBC	IBC				
101-42 <u>15</u>	<u>Life Safety Code</u>	IBC	IFC	IEBC					
105-40 <u>15</u>	<u>Installation Standard of for Smoke Door Assemblies and Other Opening Protectives</u>	IBC	IFC						

110-40 <u>15</u>	<u>Standard for</u> Emergency and Standby Power Systems	IFC	IBC	IECC					
111-40 <u>15</u>	<u>Standard on</u> Stored Electrical Energy Emergency and Standby Power Systems	IFC	IECC	IBC					
120-40 <u>15</u>	<u>Standard for</u> Fire Prevention and Control in Coal Mines	IFC	IBC						
160-44 <u>15</u>	<u>Standard for the Use</u> of Flame Effects Before an Audience	IFC							
170-09 <u>15</u>	Standard for Fire Safety and Emergency Symbols	IFC	IBC						
204-07 <u>15</u>	Standard for Smoke and Heat Venting	IFC							
211-40 <u>13</u>	<u>Standard for</u> Chimneys, Fireplaces, Vents, and Solid Fuel- Burning Appliances	IFC	IBC	IRC	IMC	IFGC			
221-09 <u>15</u>	Standard for High Challenge Fire Walls, Fire Walls and Fire Barrier Walls, 2009 Edition	IBC							
241-09 <u>13</u>	<u>Standard for</u> Safeguarding Construction, Alteration, and Demolition Operations	IFC							
253-44 <u>15</u>	Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source	IBC	IFC						
259-08 <u>13</u>	Standard Test Method for Potential Heat of Building Materials	IBC	IRC						
260-09 <u>13</u>	Standard Methods of Tests and Classification System for Cigarette Ignition Resistance of Components of Upholstered Furniture	IFC							
261-09 <u>13</u>	<u>Standard</u> Method of Test for Determining Resistance of Mock- Up Upholstered Furniture Material Assemblies to Ignition by Smoldering Cigarettes	IFC							
262-44 <u>15</u>	Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air- Handling Spaces	IMC							
274-09 <u>13</u>	Standard Test Method to Evaluate Fire Performance Characteristics of Pipe Insulation	IMC							

275-10 <u>13</u>	Standard Method of Fire Tests for the Evaluation of Thermal Barriers Used Over Foam Plastic Insulation	IBC	IRC						
285-11	Standard Fire Test Method of for the Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components	IBC							
286-11 <u>15</u>	Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth	IFC	IBC	IRC					
288-12	Standard Methods of Fire Tests of Floor-Horizontal Fire Door Assemblies Installed in Horizontally Fire-Resistance-Rated Floor Systems	IBC							
289-09 <u>13</u>	Standard Method of Fire Test for Individual Fuel Packages	IFC	IBC						
318-09 <u>15</u>	Standard for the Protection of Semiconductor Fabrication Facilities	IFC							
385- 07 <u>12</u>	Standard for Tank Vehicles for Flammable and Combustible Liquids	IFC							
407-12	Standard for Aircraft Fuel Servicing	IFC							
409-11 <u>15</u>	Aircraft Hangers	IFC	IBC	IFGC					
430-04 <u>400-13</u>	Storage of Liquid and Solid Oxidizers Hazardous Material Code	IFC							
484-12 <u>15</u>	Standard for Combustible Metals	IFC	IBC						
490-10 <u>400-13</u>	Storage of Ammonium Nitrate Hazardous Material Code	IFC							
495-10 <u>13</u>	Explosive Materials Code	IFC							
498-10 <u>13</u>	Standard for Safe Havens and Interchange Lots for Vehicles Transporting Explosives	IFC							
501-10 <u>13</u>	Standard on Manufactured Housing	IRC							
505-11 <u>13</u>	Fire Safety Standard Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operations	IFC							

654-06 <u>13</u>	<u>Standard for Prevention of Fire & Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids</u>	IBC	IFC						
655-12	<u>Standard for the Prevention of Sulfur Fires and Explosions</u>	IBC	IFC						
664-12	<u>Standard for the Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities</u>	IBC	IFC						
701-10	<u>Standard Methods of Fire Tests for Flame-Propagation of Textiles and Films</u>	IFC	IBC						
703-12 <u>15</u>	<u>Standard for Fire Retardant Treated Wood and Fire Retardant Coatings for Building Materials</u>	IFC							
704-12	<u>Standard System for the Identification of the Hazards of Materials for Emergency Response</u>	IFC	IMC	IBC					
720-09 <u>15</u>	<u>Standard for the Installation of Carbon Monoxide (CO) Warning Equipment Dwelling Units</u>	IFC	IBC	IRC					
750-10 <u>13</u>	<u>Standard on Water Mist Fire Protection Systems</u>	IFC	IMC	IFGC					
853-10 <u>15</u>	<u>Installation of Stationary Fuel Cell Power Systems</u>	IRC							
1122- 08 <u>13</u>	<u>Code for Model Rocketry</u>	IFC							
1123-10 <u>13</u>	<u>Code for Fireworks Display</u>	IFC							
1124- 08 <u>13</u>	<u>Code for the Manufacturing, Transportation, Storage and Retail Sales of Fireworks and Pyrotechnic Articles</u>	IFC	IBC						
1125-12	<u>Code for the Manufacture of Model Rocket and High Power Rocket Motors</u>	IFC							
1126-11 <u>15</u>	<u>Standard for the Use of Pyrotechnics Before a Proximate Audience</u>	IFC							
1127- 08 <u>13</u>	<u>Code for High Power Rocketry</u>	IFC							
1142-12	<u>Standard on Water Supply for Suburban and Rural Fire Fighting</u>	IFC							
2001-12	<u>Standard on Clean Agent Fire Extinguishing Systems</u>	IFC	IBC						

NSF		NSF International							
Standard Reference Number	Title	Referenced in Code(s):							
3—2008 2010	Commercial Warewashing Equipment	IPC	IgCC						
14-2008e 2011	Plastics Piping System Components and Related Materials	IRC	IPC	ISPSC					
18-2007 2012	Manual Food and Beverage Dispensing Equipment	IPC							
40-2000 2012	Residential Wastewater Treatment Systems	IPSDC							
41-1999 2011	Nonliquid Saturated Treatment Systems (Composing Toilets)	IPSDC							
42-2007ae 2011	Drinking Water Treatment Units - Aesthetic Effects	IRC	IPC						
44-2007 2012	Residential Cation Exchange Water Softeners	IRC	IPC	IgCC					
50-2009 2012	Equipment for Swimming Pools, Spas, Hot Tubs, and other Recreational Water Facilities	IgCC	ISPSC						
53-2007a 2011a	Drinking Water Treatment Units - Health Effects	IRC	IPC						
58-2007 2012	Reverse Osmosis Drinking Water Treatment Systems	IRC	IPC	IgCC					
61-2008 2012	Drinking Water System Components - Health Effects	IRC	IPC	IgCC					
62-2007 2012	Drinking Water Distillation Systems	IPC							
350-2011	Onsite Residential and Commercial Water Reuse Treatment Systems	IgCC							
PCA		Portland Cement Association							
Standard Reference Number	Title	Referenced in Code(s):							
100-07 12	Prescriptive Design of Exterior Concrete Walls for One and Two-Family Dwellings (Pub. No. EB241)	IRC							
PCI		Prestressed Concrete Institute							
Standard Reference Number	Title	Referenced in Code(s):							
MNL 124-89 11	Design for Fire Resistance of Precast Prestressed Concrete	IBC							

PDI		Plumbing and Draining Institute							
Standard Reference Number	Title	Referenced in Code(s):							
PDI G101 (2003) 2012	Testing and Rating Procedure for Grease Interceptors with Appendix of Sizing and Installation Data	IPC							
PTI		Post-Tensioning Institute							
Standard Reference Number	Title	Referenced in Code(s):							
PTI DC -2007 10.5-12	Standard Requirements for Design and Analysis of Shallow Post-tensioned Concrete Foundation on Expansive Soils, Second Edition	IBC							
PTI DC 2007 10.5-12	Standard Requirements for Design and Analysis of Shallow Post-Tensioned Concrete Foundations on Expansive Soils, Third Edition	IBC							
RMI		Rack Manufacturers Institute							
Standard Reference Number	Title	Referenced in Code(s):							
ANSI/MH16.1—08 12	Specification for Design, Testing and Utilization of Industrial Steel Storage Racks	IBC							
SBCA		Structural Building Components Association							
Standard Reference Number	Title	Referenced in Code(s):							
BCSI-2008 2013	Building Component Safety Information Guide to Good Practice for Handling, Installing, Restraining & Bracing of Metal Plate Connected Wood Trusses	IRC							
CFS-BCSI-2008	Cold Formed Steel Building Component Safety Information (CFSBCSI) Guide to Good Practice for Handling, Installing & Bracing of Cold-formed Steel Trusses	IRC							
SMACNA		Sheet Metal & Air Conditioning Contractors National Assoc. Inc.							

Standard Reference Number	Title	Referenced in Code(s):							
SMACNA-85 2012	HVAC Air Duct Leakage Test Manual 2nd Edition	IECC-C	IgCC						
SMACNA-/ANSI 2005 2015	HVAC Duct Construction Standards - Metal and Flexible 4 th Edition (ANSI)	IMC							
SPRI		Single-Ply Roofing Institute							
Standard Reference Number	Title	Referenced in Code(s):							
ANSI/SPRI RP-4-08 13	Wind Design Guide for Ballasted Single-ply Roofing Systems	IBC							
ANSI/SPRI/FM4435-ES-1-03 11	Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems	IBC							
TIA		Telecommunications Industry Association							
Standard Reference Number	Title	Referenced in Code(s):							
222-G-2005	Structural Standards for Antenna Supporting Structures and Antennas, including - Addendum 1, 222-G-1 dated 2007, and Addendum 2, 222-G-2 Dated 2009, Addendum 3, 222-3 dated 2013, and Addendum 4, 222-G-4 dated 2014	IBC							
TMS		The Masonry Society							
Standard Reference Number	Title	Referenced in Code(s):							
216-97 2013	Standard Method for Determining Fire Resistance of Concrete and Masonry Construction Assemblies	IBC							
302-07 2012	Standard Method for Determining the Sound Transmission Class Rating for Masonry Walls	IBC	IRC	IgCC					
402-11 2013	Building Code for Masonry Structures	IBC	IRC						
403-10 2013	Direct Design Handbook for Masonry Structures	IBC	IRC						
602-11 2013	Specification for Masonry Structures	IBC	IRC						
TPI		Truss Plate Institute							

Standard Reference Number	Title	Referenced in Code(s):							
TPI 1-2007 2012	National Design Standards for Metal Plate Connected Wood Truss Construction	IBC	IRC						
UL	Underwriters Laboratories								
Standard Reference Number	Title	Referenced in Code(s):							
9-2009	Fire Tests of Window Assemblies, <u>with Revisions through April 2005</u>	IBC							
14B-2008	Sliding Hardware for Standard Horizontally Mounted Tin Clad Fire Doors - <u>with Revisions through July 2000</u>	IBC							
14C-2006	Swinging Hardware for Standard Tin Clad Fire Doors Mounted Singly and in Pairs, <u>with revisions through December 2008</u>	IBC							
17-2008	Vent or Chimney Connector Dampers for Oil-Fired Appliances, <u>with Revisions through January 2010</u>	IRC	IMC						
80-2007	Steel Tanks for Oil-Burner Fuels and Other Combustible Liquids <u>with Revisions through August 2009</u>	IRC	IFC						
103-2004 <u>2010</u>	Factory-Built Chimneys, for Residential Type and Building Heating Appliances with Revisions through July 2012	IBC	IMC	IFGC	IRC				
127-08 <u>2011</u>	Factory-Built Fireplaces - <u>with Revisions through January 2010</u>	IBC	IRC	IMC					
142-06	Steel Aboveground Tanks for Flammable and Combustible Liquids <u>with Revisions through February 2010</u>	IFC							
174-04	Household Electric Storage Tank Water Heaters - with Revisions through May 2006 <u>September 2012</u>	IRC	IMC						

180-03 <u>2012</u>	Liquid-level Indicating Guarges for Oil Burner Fuels- with revision through March 2007 and <u>Other Combustible Liquids</u>	IRC	IMC						
197-2003 <u>2010</u>	Commercial Electric Cooking Appliances - with revisions through March 2006 <u>June 2011</u>	IMC							
217-2006	Single and Multiple Stations Smoke Alarms - with revisions through April 2010 <u>2012</u>	IBC	IRC	IFC					
263-03 <u>2011</u>	Standard for Fire Test of Building Construction and Materials with revisions through <u>October 2007</u>	IBC	IRC	IWUIC	IMC				
294-1999	Access Control Systems Units with Revisions through <u>September 2010</u>	IBC	IFC						
300-2005 <u>(R2010)</u>	Fire Testing of Fire Extinguishing Systems for Protection of Restaurant Cooking Equipment <u>with Revisions through July 16, 2010</u>	IBC	IFC						
305-97 <u>2012</u>	Panic Hardware	IBC	IFC						
325-2002	Door, Drapery, Gate, Louver and Window Operators and Systems - with Revisions through February 2010 <u>January 2012</u>	IBC	IFC	IRC					
372-2007	Automatic Electrical Controls for Household and Similar Use - Part 2: Particular Requirements for Burner Ignition Systems and Components with revisions through July 25, 2011 <u>2012</u>	ISPSC							
378-06	Draft Equipment, <u>with Revisions through January 2010</u>	IRC	IMC						
391-2006 <u>2010</u>	Solid-Fuel and Combination-Fuel Central and Supplementary Furnaces	IMC							
412-2004 <u>2011</u>	Refrigeration Unit Coolers - with Revisions through January 2009 <u>August 2012</u>	IMC							
499-05	Electric Heating Appliances-with revisions through <u>January 2009</u>	IMC							

	<u>April 2012</u>								
555-2006	Fire Dampers-with revisions through May 2010 <u>2012</u>	IBC	IMC						
555S-1999	Smoke Dampers - with Revisions through May 2010 <u>2012</u>	IBC	IMC						
641-1995 <u>2010</u>	Type L Low-Temperature Venting Systems - with Revisions through July 2009	IBC	IRC	IMC	IFGC				
651-05 <u>2011</u>	Schedule 40 and Schedule 80 Rigid PVC Conduit and Fittings with revisions through March 2010 <u>2012</u>	IFGC	IRC						
705-2004 <u>Revision 5</u>	Standard for Power Ventilators with revisions through March 2012	IMC							
710B-2004 <u>2011</u>	Recirculating Systems with Revisions through December 2009	IBC	IFC	IMC					
723-08	Standard for Test for Surface Burning Characteristics of Building Materials with Revisions through September 2010	<u>IBC</u>	IFC	IWUIC	IRC				
726-1995	Oil-Fired Boiler Assemblies - with Revisions through April 2010 <u>2011</u>	IRC	IMC	IECC					
729-03	Oil-Fired Floor Furnaces with revisions through April 2010 <u>August 2012</u>	IRC	IMC						
730-03	Oil-Fired Wall Furnaces with revisions through April 2010 <u>August 2012</u>	IRC	IMC						
731-1995	Oil-Fired Unit Heaters with Revisions through April 2010 <u>August 2012</u>	IMC	IECC-C						
737-07 <u>2011</u>	Fireplaces Stoves-with Revisions through January 2010	IRC	IMC						
793-08	Automatically Operated Roof Vents For Smoke and Heat with Revisions through September 2011	IBC	IFC						
795-2006 <u>2011</u>	Commercial-Industrial Gas Heating Equipment with revisions through April 2010 <u>September 2012</u>	IRC	IFGC						

842-07	Valves for Flammable Fluids, with Revisions through April 2011	IRC	IMC						
858-05	Household Electric Ranges - with Revisions through May 2010 April 2012	IMC	IRC						
864-03	Standard for Control Units and Accessories for Fire Alarm Systems-with Revisions through February 2010 August 2012	IBC	IFC						
867-00 <u>2011</u>	Electrostatic Air Cleaners-with Revisions through February 2010	IMC							
873-2007	Temperature-Indicating and -Regulating Equipment, with revisions through July 25, 2011-2012	ISPSC							
875-09	Electric Day Bath Heaters with revisions through October 2009 November 2011	IMC	IRC						
896-1993	Oil-Burning Stoves - with Revisions through May 2010 August 2012	IRC	IMC						
900-04	Air Filter Units- with revisions through November 2009 February 2012	IFC	IMC						
907-94 <u>2010</u>	Fireplace Accessories - with revisions through July 2006 April 2010	IMC							
924-06	Emergency Lighting and Power Equipment with revisions through January 2009 February 2011	IBC	IFC						
959-2004 <u>2010</u>	Medium Heat Appliance Factory-Built Chimneys - with Revisions through June 2010	IRC	IMC	IFGC					
1004-1-08 <u>2012</u>	Standard for Rotating Electrical Machines General Requirements with revisions through June 23, 2011	ISPSC							
1026-07 <u>2012</u>	Electric Household Cooking and Food Services Appliances	IRC							
1037-99	Antitheft Alarms and Devices with Revisions through December 2009	IFC							
1040-1996	Fire Test of Insulated Wall Construction - with Revisions through September 2007	IBC	IRC						

	<u>October 2012</u>								
1042-94 <u>2009</u>	Electric Baseboard Heating Equipment-with revisions through <u>February 2008</u> <u>June 2010</u>	IRC							
1046-00 <u>2010</u>	Grease Filters for Exhaust Ducts <u>with revisions through January 2012</u>	IMC							
1081-2008	Standard for Swimming Pool Pumps, Filters and Chlorinators, with revisions through <u>March 31, 2010</u> <u>November 2011</u>	ISPSC							
1240-2005	Electric Commercial Clothes-Drying Equipment - with Revisions through <u>October 2009</u> <u>February 2011</u>	IMC							
1261-2001	Electric Water Heaters for Pools and Tubs - with Revisions through <u>June 16, 2010</u> <u>July 2012</u>	IRC	IMC	ISPSC					
1275-2005	Flammable Liquid Storage Cabinets with Revisions through <u>May 2006</u> <u>February 2010</u>	IFC							
1315-95	Standard for Safety for Metal Waste Paper containers-with Revisions through <u>August 2007</u> <u>September 2012</u>	IFC							
1363-2007	Relocatable Power Taps - with revisions through <u>October 2009</u> <u>September 2012</u>	IFC							
1453-04	Electric Booster and Commercial Storage Tank Water Heaters - with Revisions through <u>December 2009</u> <u>July 2011</u>	IRC	IMC						
1482-10 <u>2011</u>	Solid-Fuel Type Room Heaters	IBC	IRC	IMC	IgCC				
1563-2009	Standard for Electric Hot Tubs, Spas and Association Equipment with revisions through <u>March 31, 2010</u> <u>July 2012</u>	ISPSC							
1673-96 <u>2010</u>	Electric Space Heating Cables-with revision through <u>July 2003</u> <u>October 2011</u>	IRC							

1693-02 <u>2010</u>	Electric Radiant Heating Panels and Heating Panel Sets, <u>with Revisions through October 2011</u>	IRC							
1703-02	Flat-plate Photovoltaic Modules and Panels - with revisions through April 2008 <u>May 2012</u>	IBC							
1738-06 <u>2010</u>	Venting Systems for Gas-Burning Appliances, Categories II, III and IV, <u>with Revisions though May 2011</u>	IRC	IFGC						
1741-99 <u>2010</u>	Inverters, Converters, Controllers and Interconnection System Equipment with Distributed Energy Resources- <u>with revisions through November 2005</u>	IRC							
1815-09 <u>2012</u>	Standard for Nonducted Heat Recovery Ventilators	IMC							
1897-2004 <u>2012</u>	Uplift Tests for Roof Covering Systems <u>with revisions through May 2008</u>	IBC							
1978-05 2010	Grease Ducts	IMC							
1994-04	Luminous Egress Path Marking Systems with Revisions through April 2010 <u>November 2010</u>	IBC	IFC						
1995-2005 2011	Heating and Cooling Equipment, <u>with revisions through July 2009</u>	IRC	IMC	ISPSC					
1996-04 <u>2009</u>	Electric Duct Heaters-with revisions through July 2009 <u>November 2011</u>	IRC	IMC						
2017-2008	Standards for General-Purpose Signaling Devices and Systems-with Revisions through October 2009 <u>May 2011</u>	IBC	IRC						
2024-2008 <u>2011</u>	Standard for Safety Optical-Fiber and Communications Cable Raceway <u>,with Revisions through April 2011</u>	IMC							

2158-1997	For Electric Clothes Dryers - with Revisions through March 2009	IMC							
2158A-2006 2010	Outline of Investigation for Clothes Dryer Transition Duct	IRC	IMC						
2200-98 2012	Stationary Engine Generator Assemblies with Revisions through December 2009	IBC	IFC	IMC	IFGC				
2208-2005 2010	Solvent Distillation Units - with Revisions through December 2009 March 2011	IFC							
2221-2004 2010	Tests of Fire Resistive Grease Duct Enclosure Assemblies	IMC							
2335-04 2010	Fire Tests of Storage Pallets-with Revisions through March 2010 September 2012	IFC							
2518-02 2005	Air Dispersion System Materials	IMC							
2523-09	Standard for Solid Fuel-Fired Hydronic Heating Appliances, Water Heaters, and Boilers, with Revisions through October 2011	IRC	IgCC	IMC					
ULC/CAN		Underwriters Laboratories Canada							
Standard Reference Number	Title	Referenced in Code(s):							
CAN/ULC S102.2-1988 2010	Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies -with 2000 Revisions	IBC	IRC						
Reason: The CP 28 Code Development Policy, Section 4.5.1 requires the updating of referenced standards to be accomplished administratively, and be processed as a Code Change Proposal for consideration by the Administrative Code Change Committee. In September 2012, a letter was sent to each developer of standards that is referenced in the International Codes, asking them to provide ICC with a list of their standards in order to update to the current edition. Above is the list of the referenced standards that are to be updated based upon responses from standards developer.									
Public Hearing: Committee: AS AM D Assembly: ASF AMF DF									

PC1– 13

501.4 (New), 501.4.1 (New)

Proponent: Michael Mahoney, Federal Emergency Management Agency, representing the National Earthquake Hazards Reduction Program
(mike.mahoney@fema.dhs.gov)

Add text as follows:

501.4 Acceptable Methods. The following methods are considered acceptable methods to comply with Section 501.3.

501.4.1 Seismic Performance Assessment Methodology- Application of the seismic performance assessment methodology in FEMA P-58, including the Performance Assessment Calculation Tool (PACT) contained therein, shall be considered an *acceptable method* for compliance with the seismic provisions of Section 501.3 of this code.

Add new standards as follows:

CHAPTER 23

REFERENCED STANDARDS

FEMA P-58- January 2013, Seismic Performance Assessment of Buildings

Reason: This new method is being introduced to provide further guidance on performance based design for seismic loads. It introduces and is based on a new seismic performance assessment methodology developed for the Federal Emergency Management Agency (FEMA) under contract with the Applied Technology Council (ATC).

This document introduces a seismic performance assessment methodology as well as the basic building information, response quantities, fragilities, and consequence data that are used as inputs to the methodology. The procedures are probabilistic, uncertainties are explicitly considered, and performance is expressed as the probable consequences, in terms of human losses (deaths and serious injuries), direct economic losses (building repair or replacement costs), and indirect losses (repair time and unsafe placarding) resulting from building damage due to earthquake shaking. The methodology is general enough to be applied to any building type, regardless of age, construction or occupancy; however, basic data on structural and nonstructural damageability and consequence are necessary for its implementation. To allow for practical implementation of the methodology, this product also includes fragility and consequence data for most common structural systems and building occupancies, and an electronic *Performance Assessment Calculation Tool* (PACT) for performing the probabilistic computations and accumulation of losses.

Historically, direct references in this document to design standards have been avoided but as performance design standards emerge it is becoming more important to link these methods and standards with the performance code. Therefore it has been proposed to create a new section in Chapter 5 titled acceptable methods. This same structure could occur in all chapters as these performance based methods are developed and will give a clear quantitative way to comply with this code. Alternatively, at a minimum an appendix should be developed to house these methods so code users can more directly link to quantitative tools.

Appendix C – Structural Acceptable Methods

Section C101 Scope

C101.1 General. This appendix provides acceptable methods for compliance with Chapter 5 of this code.

C102 SEISMIC DESIGN.

C102.1 Seismic Performance Assessment Methodology. Application of the seismic performance assessment methodology in FEMA P-58, including the Performance Assessment Calculation Tool (PACT) contained therein, shall be considered an *acceptable method* for compliance with the seismic provisions of Chapter 5 of this code.

Section C103

REFERENCED STANDARDS

FEMA P-58- January 2013, Seismic Performance Assessment of Buildings

Cost Impact: Not applicable

Analysis: A review of the standard proposed for inclusion in the code FEMA P 58 – January 2013 titled Seismic Performance Assessment of Buildings , with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

PC1-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

APP F (NEW)-PC-MAHONEY.DOC

PC2-13

1501.2, 1501.3.1, 1501.3.2, 1501.4 (New)

Proponent (email): Ryan M. Colker, National Institute of Building Sciences representing National Institute of Building Sciences; Ryan Meres, Institute for Market Transformation, representing Institute for Market Transformation; Greg Towsley, Grundfos, representing Grundfos; Kurt Riesenberg, Spray Polyurethane Foam Alliance, representing Spray Polyurethane Foam Alliance (rcolker@nibs.org)

Revise as follows:

SECTION 1501 ENERGY EFFICIENCY

1501.1 Objective. To facilitate efficient use of energy.

1501.2 Functional statement. Buildings shall ~~have provisions ensuring~~ ensure efficient use of ~~nonrenewable~~ energy.

1501.3 Performance requirements.

1501.3.1 Energy performance indices. To provide for the efficient use of ~~depletable energy sources~~, the building envelope and all other building systems impacting energy use including but not limited to mechanical, plumbing and electrical shall be designed and constructed within stated parameters either individually or as a system. These parameters are called the energy performance indices. These indices are the amount of energy ~~from a depletable energy source passing through~~ entering a specified building envelope area or facility during a specified difference in internal and external temperature period of time. These indices are based on the geographic location and region of the country as well as the use of the building. Equivalent energy performance utilizing alternative energy conservation techniques is permitted. In some cases, for certain types of buildings, the local jurisdiction has the authority to choose not to specify energy performance indices.

~~1501.3.2 Temperature control.~~ ~~For buildings requiring a controlled temperature, the building design and construction shall take into account various factors. Normally, only insulation, types of windows and related building elements are considered when addressing energy conservation. However, to provide for the efficient use of energy, there are several other items that need to be taken into consideration, such as thermal resistance, solar radiation, air tightness and heat gain or loss from building services.~~

1501.4 Acceptable Methods. The following methods are considered acceptable methods to develop and demonstrate compliance with energy performance indices in Section 1501.3

1501.4.1 Development of indices. In determining the energy performance indices for a building or facility, the following factors shall be used by the authority having jurisdiction:

1. The principal purpose or function of the building or facility;
2. The length of time the building or facility is normally occupied by people;
3. The number of persons normally occupying, visiting, employed in or otherwise using the building, facility or portion of the building or facility
4. The energy use of similar buildings or systems based on occupancy and climate.

5. Anticipated energy use of a building or facility of the same classification in accordance with the latest edition of the *International Energy Conservation Code* or *International Green Construction Code*.
6. The energy use data characterizing a defined stock of buildings relevant to region and the building types being addressed shall be reviewed.

1501.4.2 Establishment of Indices. The energy performance indices shall be established in accordance with Section 1501.4.2.1 or 1501.4.2.2.

1501.4.2.1 Jurisdiction-wide indices. The adopting entity shall establish acceptable indices for all similar buildings covered under this code.

1501.4.2.2 Project-specific indices. The adopting entity shall establish acceptable indices for each individual building or facility to meet.

1501.4.3 Methodology for Compliance. Compliance with the energy indices shall comply with Section 1501.4.3.1 through 1501.4.3.9.

1501.4.3.1 Pre-Occupancy. The expected energy use of the building shall be less than or equal to that determined in accordance with Section 1501.4.1 and 1501.4.2.

1501.4.3.2 Energy Model. The design team shall develop a whole building energy model using software and parameters approved by the code official. ASHRAE 105 and ASHRAE 140 shall be approved methods used in the development of whole building energy models.

1501.4.3.3 Design Submittal. Results of the model and cut sheets of equipment and characteristics contained within the compliant model developed under Section 1501.4.3.2 shall be provided to the code official in accordance with Section 103.3.5. The design team shall determine the expected energy use of the building in accordance with ASHRAE 105.

1501.4.3.4 Permits and Inspections. Permits and inspections shall be based on matching the equipment and characteristics contained in the compliant model under Section 1501.4.3.2 and design report under Section 103.3.4.2.2 with the plan and on-site as required in Section 103.3.6 and Section 103.3.7.

1501.4.3.5 Verification of Compliance Documentation. The design team shall submit documentation verifying compliance with the established bounding conditions in accordance with Section 103.3.8.1.

1501.4.3.6 Issuance of Certificate. The code official is authorized to issue a "Conditional certificate of occupancy" in accordance with Section 103.3.9.1.3 for a time period determined sufficient to demonstrate achievement of the outcome requirement.

1501.4.3.7 Post-Occupancy. The actual energy use of the building shall not be greater than that determined in accordance with Section 1501.4.1 and 1501.4.2.

1501.4.3.8 Reporting of Energy Use. An annual report of energy use is required to be provided by the building owner to the code official in accordance with Section 103.3.10.2 and Section 103.3.10.3.

1501.4.3.9 Violations and Penalties. If the building's energy use as reported in accordance with Section 1501.4.3.8 is deemed noncompliant, the adopting entity is authorized to determine appropriate penalties in accordance with Section 103.2.10, Section 103.3.10.2, Section 103.3.10.3, and Section 103.3.12. The actual penalties shall be set by the jurisdiction in accordance with Section 103.3.13.4.

Add new standards as follows:

CHAPTER 23

REFERENCED STANDARDS

ASHRAE

American Society of Heating, Refrigerating and
Air-Conditioning Engineers, Inc. □ 1791 Tullie
Circle □ Atlanta, GA 30329-2305

ASHRAE 105-2007

Standard Methods of Expressing, and Comparing
Building Energy Performance

ASHRAE 140—2007

Standard Method of Test for the Evaluation of
Building Energy Analysis Computer Programs

Reason:

1. There is increasing interest in focusing on actual energy performance of buildings. This is in direct contrast to the current focus by energy codes on building and component design (primarily based on prescriptive requirements) with no requirements for ongoing performance and associated measurement and verification. They also have not generally looked at the building as a whole, other than the ability to adjudge a building based on how an energy simulation predicts it will perform against a clone of itself that is based on the prescriptive requirements.
2. The ICCPC is clear and serves as an appropriate code for inclusion of an outcome-based approach for energy. An approach consistent with the intent of the ICCPC is needed to foster the ability to look at the building as a whole, assess its anticipated performance in the design stage and then confirm delivery of an energy efficient building based on the actual energy use of the building.
3. Software and other tools exist that allow for the accurate modeling of building energy use to predict how a building will perform. Resources included within the ICCPC are §104.2.1: Approved methodologies, Appendix C: Individually Substantiated Design Method and Appendix E: Use of Computer Models. Guidance from the Department of Energy, ASHRAE Standard 105 and ASHRAE 140 and ComNet also may be used.
4. Data exist that provide a basis for accurately stipulating how buildings should perform (e.g. setting annual Energy Use Indices) including the Energy Information Administration Commercial Buildings Energy Consumption Survey and the U.S. Department of Energy/Environmental Protection Agency EnergyStar Program.
5. It is now feasible and more realistic to stipulate how buildings should be designed and constructed in order to yield a certain performance level and be evaluated for compliance with that level.
6. It is also now feasible and more appropriate to also assess how buildings actually perform against an established EUI.
7. The primary challenges currently identified for achievement of outcome-based energy performance include the methodology for setting outcomes, the role of code departments and others in monitoring and enforcing the outcome requirements, the fit within existing energy codes and standards, recourse for non-compliance, and contracting mechanisms for implementing such policies. This proposal is intended to establish optional, code-based criteria for establishment of an outcome-based methodology.
8. The proposal leaves open the opportunity to have post-occupancy compliance conducted by entities outside the code department.

Cost Impact: This code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code ASHRAE 105-2007, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013. The standard ASHRAE 140 -2007 is currently referenced in the IECC.

PC2-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PC3-13

Section 1501.4 (New)

Proponent: Jim Edelson, representing New Buildings Institute
(jedelson@comcast.net)

Add text as follows:

1501.4 Acceptable Methods. The following methods are considered acceptable methods to satisfy the performance requirements in Section 1501.3.

1501.4.1 Outcome based compliance. The measurement of actual energy used to demonstrate compliance with Section 1501.3 shall be in accordance with Sections 1501.4.1.1 through 1501.4.1.4.

1501.4.1.1 Calculations. All energy usage shall be converted into units consistent with the energy units established by Section 1501.3.1.

1501.4.1.2 Certificate of Occupancy. Prior to the issuance of the certificate of occupancy and upon completion of construction, the *building* owner shall submit an operational plan to the *authority having jurisdiction* that includes the certification of the owner and an architect, engineer or general contractor under contract to the owner for monitoring and reporting energy use over a continuous 12-month period. The plan shall include the method for reporting actual energy use of the *building* in the format of the energy performance indices established by Section 1501.3.1.

1501.4.1.3 Occupancy. The metered, measured or billed energy use of the building shall be apportioned based on the occupancy period and square footage of the actual occupancy of the building during the 12-month period of monitoring energy use. Where multiple tenants or multiple occupancies exist, their tenancy or occupancy in the building shall be attested to by an affidavit signed by all building tenants indicating the time periods and square footage of the building portion occupied.

1501.4.1.4 Certificate of Acceptance. An application for Certificate of Acceptance is required to be filed with the *authority having jurisdiction* within 36 months of receiving a final Certificate of Occupancy. The application for the Certificate of Acceptance shall indicate that the owner and an architect, engineer or general contractor under contract to the owner have determined that the building has met the performance requirement established by Section 1501.3.1. Upon receipt of the completed application, a Certificate of Acceptance shall be provided to the building owner.

Reason: Since the first energy codes, compliance has not been based on actual building performance but rather on tried and true means of improving the performance of buildings: more insulation, better windows, better equipment, more efficient lighting, etc. This effectively made the goal of energy codes to create more efficient buildings rather than to create buildings that attain a certain level of efficiency. This current method of compliance leaves a whole range of factors that impact energy efficiency, from design to occupancy, unaddressed and unregulated by the code. In the design phase, these factors include orientation, system selection, passive characteristics, etc. In the occupancy phase, these factors include control strategies, occupant density, equipment maintenance, plug loads, etc.

The result is a misalignment between the energy codes and how buildings actually perform. Not only does this leave a large portion of building energy use unaddressed, it means that many very effective means of achieving energy efficiency, especially many new technologies, cannot be used to achieve code compliance. As technologies become more complex, and the 'unregulated' portions of building energy use increase, the traditional prescriptive-based energy codes will become less and less able to impact the actual energy performance of buildings. The significant increases in stringency contained in the 2012 version of the International Energy Conservation Code accelerated the pace at which this is occurring.

The ICC Performance Code is formulated around a concept of flexibility. Rather than prescribing the details that lead to a desired outcome, the ICCPC requires a desired performance – a desired outcome – and then provides flexibility as to how that outcome is reached. This makes it a natural fit for an approach to energy efficiency that uses actual outcomes rather than performance proxies (insulation levels, equipment efficiency, etc.) to demonstrate compliance.

In section 1501.3.1, the ICCPC already contains a mechanism that allows jurisdictions to set performance targets. This proposal adds a new section 1501.4 that allows projects to demonstrate compliance with those performance targets through the measurement of actual energy performance. The outcome-based compliance option relies upon actual measurement of the

performance of a building after it is occupied and fully operational. Only then can the owner be fully cognizant of the true energy costs and possibilities for management of the use and application of energy savings.

A certificate of occupancy is necessary to allow the building to be occupied despite the fact that outcome-based compliance has not been determined, and cannot be determined. Responsibility for monitoring and recording the energy used and energy produced by the building and the building site falls to the design team, including the owner, architect, engineer and even contractors. They are all part of the process of preparing an operational plan that indicates the measurement methodology and how they intend to comply with the performance target set in 1501.3.

Occupancy factors for the actual tenants are required to be factored into the calculation of energy consumption if there are multiple tenants in a building. With at least a full year of testing and evaluation of the building performance, the team can determine whether the results meet the anticipated goal. The compliance path sets a period of 36 months in which to demonstrate compliance. This 3-year period permits time to allow for the building to become as fully occupied as possible and to come up to speed with the operational features. This will also give the design team sufficient time to modify and adjust the various key elements of the building that are affecting the building's energy consumption.

Finally, there is documentation submitted to the jurisdiction for a certificate of acceptance. The design team provides the information that has been gathered in accordance with their procedures and it only requires that the documentation be entered into the building project record. The owner simply gets a Certificate of Acceptance indicating this step in the process has been completed. While this process provides only a promise that the building will perform, this is not different from the method of determining compliance with the computer simulation approach that is already in almost every energy code.

This proposal does not require that all buildings demonstrate compliance with the ICCPC by using actual energy outcomes. The permissive language only makes the proposed option available for those projects that desire it. It closes the gap between the code and actual energy outcomes, and brings the full range of factors that impact energy performance as an option into the ICCPC.

Cost Impact: There is no cost impact to this proposal.

PC3-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1501.4 (NEW)-PC-EDELSON.DOC

PC4-13

1901.3.2, 1901.3.10

Proponent: Mark Watson, IntPE, Ecoglo International Ltd, representing Ecoglo International Ltd.
(mark.watson@ecoglo.com)

Revise as follows:

1901.3.2 Identification, ~~illumination~~ visibility and safety of means of egress. Means of egress shall be clearly identified, ~~provided with adequate illumination~~ be made adequately visible and be easy and safe to use.

1901.3.10 Maintenance of ~~illumination~~ visibility. Means of egress shall be maintained and operated in such a manner to ensure adequate ~~lighting~~ means for providing visibility to facilitate safe egress is available.

Reason: The use of the word "illumination" rather than "visibility" discourages the use of alternative solutions, which is contrary to the purpose of the ICC PC [Section 101.1 Purpose: "To provide appropriate health, safety, welfare, and social and economic value, while promoting innovative, flexible and responsive solutions that optimize the expenditure and consumption of resources."] Alternative solutions such as systems using electrical or photoluminescent path markings can make the means of egress adequately visible without illumination of the means of egress. Illumination infers the casting of light onto a surface or object. It depends on the properties of that object how much light (if any) is reflected or emitted to be detected by our eyes. "Visibility" requires that the object is detected by our visual system, and therefore is the critical performance indicator.

Cost Impact: The code change proposal will not increase the cost of construction.

PC4-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1901.3.2-ICCPC-WATSON.DOC

2013 PROPOSED CHANGES TO THE INTERNATIONAL EXISTING BUILDING CODE

INTERNATIONAL EXISTING BUILDING CODE COMMITTEE

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TENTATIVE ORDER OF DISCUSSION 2013 PROPOSED CHANGES TO THE INTERNATIONAL EXISTING BUILDING CODE

The following is the tentative order in which the proposed changes to the code will be discussed at the public hearings. Proposed changes which impact the same subject have been grouped to permit consideration in consecutive changes.

Proposed change numbers that are indented are those which are being heard out of numerical order. Indentation **does not** necessarily indicate that one change is related to another. Proposed changes may be grouped for purposes of discussion at the hearing at the discretion of the chair. Note that some IEBC code change proposals may not be included on this list, as they are being heard by other committees. Please consult the Cross Index of Proposed Changes.

ADM56-13	EB38-13
EB1-13	EB25-13
EB2-13	EB39-13
EB3-13	EB40-13
EB4-13	EB41-13
ADM37-13	EB42-13
EB63-13	EB44-13
ADM36-13, Part I	EB6-13
EB8-13	EB7-13
EB10-13	EB45-13
EB11-13	EB46-13
EB12-13	EB47-13
EB13-13	EB48-13
EB14-13	EB49-13
EB9-13	EB43-13
EB15-13	EB50-13
EB16-13	EB51-13
EB17-13	EB52-13
EB18-13	EB53-13
EB19-13	CE19-13, Part III
EB20-13	EB54-13
EB21-13	EB55-13
EB22-13	EB56-13
EB23-13	EB57-13
CE3-13, Part III	EB58-13
EB5-13	EB59-13
EB24-13	EB60-13
EB26-13	EB61-13
F212-13, Part II	CE6-13, Part III
EB27-13	EB62-13
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EB29-13	
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EB31-13	
EB32-13	
EB33-13	
EB34-13	
EB35-13	
EB36-13	
F59-13, Part II	
EB37-13	

EB1 – 13

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Proponent: Jim Edelson, New Buildings Institute (jedelson@comcast.net), Ric Cochrane, National Trust for Historic Preservation, David Collins, The Preview Group, representing The American Institute of Architects

Delete and substitute as follows:

~~**[B] HISTORIC BUILDING.** Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource within a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Register of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places.~~

HISTORIC BUILDING. Any building or structure that is one or more of the following:

1. Listed, or certified as eligible for listing by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, in the National Register of Historic Places
2. Designated as historic under an applicable state or local law; or
3. Certified as a contributing resource within a National Register listed or locally designated historic district.

Reason: The current language for Historic Buildings in the IECC-Commercial, the IECC-Residential and the IEBC is confusing and does not clearly describe how buildings and districts are listed or determined to be eligible to be listed as historic. The definition in the IEBC contains no fewer than three semi-colons and nine uses of “or” in a single sentence. This makes the language very difficult to parse.

This proposal solves two problems. First, it remedies the confusion caused by the sheer complexity of the defining language by converting the running list of qualifications into a clearly delineated numbered list. Second, the proposal gives the language clarity and specificity as to how a building is officially determined to be eligible for the various lists of historic buildings. In accordance with the Code of Federal Regulations, Title 36, Chapter I, Part 63, determinations of eligibility for listing in the National Register of Historic Places are made by State Historic Preservation Offices in coordination with the Keeper of the National Register of Historic Places. This is an official process conducted in accordance with federal standards. This proposal aligns the code language with the language of this official process and removes any ambiguity as to who can make determinations of eligibility.

This proposal is one of four proposals in Cycle B to create a consistency for Historic Buildings across the I-codes. The other three proposals are being made to the IECC-Residential, the IECC-Commercial and the IPMC.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: PM2-13 and CE7-13 also propose a similar definition for Historic Building for the IPMC and IECC, respectively.

EB_-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

202-[B] HISTORIC BUILDING-EB-COCHRANE-COLLINS-EDELSON.doc

EB2 – 13

Chapter 3, 302 (NEW), 501.3

Proponent: Maureen Traxler, City of Seattle, representing Seattle Dept. of Planning & Development (Maureen.traxler@seattle.gov)

Revise as follows:

CHAPTER 3 PROVISIONS FOR ALL COMPLIANCE METHODS

SECTION 302 PROVISIONS FOR ALL COMPLIANCE METHODS

302.1 Applicability. The provisions of Section 302 apply to all alterations, repairs, additions, relocations of structures and changes of occupancy regardless of compliance method.

301.2 302.2 Additional codes. *Alterations, repairs, additions and changes of occupancy to, or relocation of, existing buildings and structures shall comply with the provisions for alterations, repairs, additions and changes of occupancy or relocation, respectively, in this code and the International Energy Conservation Code, International Fire Code, International Fuel Gas Code, International Mechanical Code, International Plumbing Code, International Property Maintenance Code, International Private Sewage Disposal Code, International Residential Code and NFPA 70. Where provisions of the other codes conflict with provisions of this code, the provisions of this code shall take precedence.*

302.3 Existing materials. Materials already in use in a building in compliance with requirements or approvals in effect at the time of their erection or installation shall be permitted to remain in use unless determined by the building official to be unsafe per Section 115. (IEBC 401.2.1)

302.4 New and replacement materials. Except as otherwise required or permitted by this code, materials permitted by the applicable code for new construction shall be used. Like materials shall be permitted for repairs and alterations, provided no hazard to life, health or property is created. Hazardous materials shall not be used where the code for new construction would not permit their use in buildings of similar occupancy, purpose and location. (IEBC 401.2.2)

302.5 501.3 Occupancy and use. When determining the appropriate application of the referenced sections of this code, the occupancy and use of a building shall be determined in accordance with Chapter 3 of the *International Building Code*.

Reason: Some provisions that should apply to all 3 compliance methods are located in chapters related to only one method. To accommodate these provisions, we propose that a new section be created in chapter 3, which is the only chapter, other than administrative chapters, that applies to all 3 compliance methods. All the provisions in the proposed Section 302 already exist in the IEBC, except the charging section. Since Chapter 4 was dealt with during the Group A Cycle the sections in Chapter 4 can not be deleted but instead are copied into Chapter 3. Section 302.3 is a duplication of Section 401.2.1 and Section 302.4 is a duplication of Section 401.2.2.

The intent of this proposal is to copy and relocate sections and renumber other chapters as necessary.

Cost Impact: This code change proposal will not increase the cost of construction.

EB2-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

CHAPTER 3-EB-TRAXLER.doc

EB3 – 13

301.1, 301.2, 302 (New), 302.1 (New), 302.1.1 (New), 303 (New), 705.1, Chapter 16

Proponent: David S. Collins, FAIA, The Preview Group, Inc. (dcollins@preview-group.com), The American Institute of Architects and Robert J Davidson, Davidson Code Concepts, LLC

Revise as follows:

CHAPTER 3 COMPLIANCE METHODS, APPLICABILITY AND MINIMUM REQUIREMENTS

301.1 General. The *repair, alteration, change of occupancy, addition* or relocation of all *existing buildings* shall comply with one of the methods listed in Sections 301.1.1 through 301.1.3 as selected by the applicant in addition to complying with the minimum requirements in Sections 302 and 303. Application of a method shall be the sole basis for assessing the compliance of work performed under a single permit unless otherwise approved by the *code official*. Sections 301.1.1 through 301.1.3 shall not be applied in combination with each other. Where this code requires consideration of the seismic force-resisting system of an existing building subject to *repair, alteration, change of occupancy, addition* or relocation of *existing buildings*, the seismic evaluation and design shall be based on Section 301.1.4 regardless of which compliance method is used.

Exception: Subject to the approval of the *code official*, *alterations* complying with the laws in existence at the time the building or the affected portion of the building was built shall be considered in compliance with the provisions of this code unless the building is undergoing more than a limited structural alteration as defined in Section 907.4.3. New structural members added as part of the *alteration* shall comply with the *International Building Code*. *Alterations of existing buildings in flood hazard areas* shall comply with Section 701.3.

SECTION 302 ADDITIONAL CODES AND REQUIREMENTS

301.2 Additional codes 302.1 General. *Alterations, repairs, additions and changes of occupancy* to, or relocation of, *existing buildings* and structures shall comply with the provisions for *alterations, repairs, additions and changes of occupancy* or relocation, respectively, in this code and the *International Energy Conservation Code, International Fire Code, International Fuel Gas Code, International Mechanical Code, International Plumbing Code, International Property Maintenance Code, International Private Sewage Disposal Code, International Residential Code* and NFPA 70. Where provisions of the other codes conflict with provisions of this code, the provisions of this code shall take precedence.

302.1.1 Accessibility. Level 1 alterations shall comply with the 2015 ANSI A117.1 to the extent of the altered element. Areas of an existing building that are outside the specific work area or otherwise unaffected by alterations Level 1, 2 or 3, that are required to be accessible by Chapter 7 shall comply with the 2003 ANSI A117.1.

Work performed under Level 2 and 3 alterations shall comply with the 2015 ANSI A117.1 and all spaces that change configuration as part of the alterations shall comply with the 2015 ANSI A117.1.

SECTION 303 EXISTING BUILDING MINIMUM REQUIREMENTS

303.1 Administration. Sections 303.1.1 through 303.1.4 shall set the scope, intent and administration of provisions related to minimum requirements that are applicable to existing buildings.

303.1.1 (IF 1101.1) Scope. The provisions of this Section shall apply to existing buildings constructed prior to the adoption of this code.

303.1.2 ([F] 1101.2) Intent. The intent of this Section is to provide a minimum degree of fire and life safety to persons occupying existing buildings by providing minimum construction requirements where such existing buildings do not comply with the minimum requirements of the International Building Code.

303.1.3 ([F] 1101.3) Permits. Permits for alterations necessary to conform with this Section shall be required as set forth in Sections 105.1.

303.1.4 ([F] 1101.4) Owner notification. When a building is found to be in noncompliance with this chapter, the code official shall duly notify the owner of the building. Upon receipt of such notice, the owner shall, subject to the following time limits, take necessary actions to comply with the provisions of this chapter.

303.1.4.1 ([F] 1101.4.1) Construction documents. Construction documents necessary to comply with this chapter shall be completed and submitted within a time schedule approved by the code official.

303.1.4.2 ([F] 1101.4.2) Completion of work. Work necessary to comply with this chapter shall be completed within a time schedule approved by the code official.

303.1.4.3 ([F] 1101.4.3) Extension of time. The code official is authorized to grant necessary extensions of time when it can be shown that the specified time periods are not physically practical or pose an undue hardship. The granting of an extension of time for compliance shall be based on the showing of good cause and subject to the filing of an acceptable systematic plan of correction with the code official.

303.2 ([F] SECTION 1103) Fire safety requirements for existing buildings. Minimum fire safety requirements for existing buildings shall be in provided in accordance with Sections 303.2.1 through 303.2.9.

303.2.1 ([F] 1103.1) Required construction. Existing buildings shall comply with not less than the minimum provisions specified in Table 303.2.1 and as further enumerated in Sections 303.2.2 through 303.2.9.

The provisions of this chapter shall not be construed to allow the elimination of fire protection systems or a reduction in the level of fire safety provided in buildings constructed in accordance with previously adopted codes.

Exception: Group U occupancies.

**TABLE 303.2.1 ([F] TABLE 1103.1)
OCCUPANCY AND USE REQUIREMENTS^a**

SECTION	USE			OCCUPANCY CLASSIFICATION																		
	High rise	Atrium or covered mall	Under-ground building	A	B	E	F	H1	H-2	H-3	H-4	H-5	I-1	I-2	I-3	I-4	M	R-1	R-2	R-3	R-4	S
301.3.5	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
301.3.6	R	-	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
301.3.7.1	R	-	R	-	-	-	-	-	-	-	-	-	R	R	R	R	-	-	-	-	-	-
301.3.7.2	R	-	R	R	R	R	R	R	R	R	R	R	-	-	-	-	R	R	R	-	R	R
301.3.7.3	R	-	R	R	R	R	R	R	R	R	R	R	-	-	-	-	R	R	R	-	R	R
301.3.7.4	-	R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
301.3.7.5	-	-	-	-	R	-	-	-	-	-	-	-	-	-	-	-	R	-	-	-	-	-
301.3.7.6	-	-	-	R	-	R	R	R	R	R	R	R	R	R	R	R	-	R	R	R	R	R
301.3.7.7	-	-	-	R	-	R	R	R	R	R	R	R	R	R	R	R	-	R	R	R	R	R
301.3.8.1	-	-	-	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R

<u>301.3.8.2</u>	-	-	-	-	-	-	-	-	-	-	-	-	-	R	-	-	-	-	-	-	-	-
<u>301.3.9.1</u>	R	-	R	R	R	R	R	R	R	R	-	-	R	R	R	R	R	R	R	-	R	R
<u>301.3.9.2</u>	R	-	R	R	R	R	R	R	R	R	-	-	R	R	R	R	R	R	R	-	R	R
<u>301.3.10.1</u>	-	-	-	-	-	R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>301.3.10.2</u>	-	-	-	-	-	-	-	-	-	-	-	-	R	-	-	-	-	-	-	-	-	-
<u>301.3.10.3</u>	-	-	-	-	-	-	-	-	-	-	-	-	-	R	-	-	-	-	-	-	-	-
<u>301.3.10.4</u>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	R	-	-	-	-	-	-	-
<u>301.3.10.5</u>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	R	-	-	-	-
<u>301.3.10.6</u>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	R	-	-	-
<u>301.3.10.7</u>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	R	-
<u>301.3.10.8</u>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	R	R	R	R	-
<u>301.3.11</u>	R	-	-	-	-	-	-	-	-	-	-	-	R	R	R	R	-	R	R	R	R	-
<u>301.3.12.4.1</u>	R	R	R	R	R	R	R	R	R	R	-	-	R	R	R	R	R	R	R	R	R	R

a. Existing buildings shall comply with the Sections identified as "Required" (R) based on occupancy classification or use, or both, whichever is applicable.

R = The building is required to comply.

303.2.2 (IF 1103.2) Emergency responder radio coverage in existing buildings. Existing buildings that do not have approved radio coverage for emergency responders within the building based upon the existing coverage levels of the public safety communication systems of the jurisdiction at the exterior of the building, shall be equipped with such coverage according to one of the following:

1. Whenever an existing wired communication system cannot be repaired or is being replaced, or where not approved in accordance with Section 510.1, Exception 1 of the *International Fire Code*.
2. Within a time frame established by the adopting authority.

Exception: Where it is determined by the fire code official that the radio coverage system is not needed.

303.2.3 (IF 1103.3) Elevator operation. Existing elevators with a travel distance of 25 feet (7620 mm) or more above or below the main floor or other level of a building and intended to serve the needs of emergency personnel for fire-fighting or rescue purposes shall be provided with emergency operation in accordance with ASME A17.3.

303.2.4 (IF 1103.4) Vertical openings. Interior vertical shafts, including but not limited to stairways, elevator hoistways, service and utility shafts, that connect two or more stories of a building, shall be enclosed or protected as specified in Sections 303.2.4.1 through 303.2.4.7.

303.2.4.1 (IF 1103.4.1) Group I occupancies. In Group I occupancies, interior vertical openings connecting two or more stories shall be protected with 1-hour fire-resistance-rated construction.

303.2.4.2 (IF 1103.4.2) Three to five stories. In other than Group I occupancies, interior vertical openings connecting three to five stories shall be protected by either 1-hour fire-resistance-rated construction or an automatic sprinkler system shall be installed throughout the building in accordance with Section 903.3.1.1 or 903.3.1.2 of the *International Building Code*.

Exceptions:

1. Vertical opening protection is not required for Group R-3 occupancies.
2. Vertical opening protection is not required for open parking garages and ramps.
3. Vertical opening protection for escalators shall be in accordance with Section 303.2.4.5, 303.2.4.6 or 303.2.4.7.

303.2.4.3 (IF) 1103.4.3 More than five stories. In other than Group I occupancies, interior vertical openings connecting more than five stories shall be protected by 1-hour fire-resistance-rated construction.

Exceptions:

1. Vertical opening protection is not required for Group R-3 occupancies.
2. Vertical opening protection is not required for open parking garages and ramps.
3. Vertical opening protection for escalators shall be in accordance with Section 303.2.4.5, 303.2.4.6 or 303.2.4.7.

303.2.4.4 (IF) 1103.4.4 Atriums and covered malls. In other than Group I occupancies, interior vertical openings in a covered mall building or a building with an atrium shall be protected by either 1-hour fire-resistance-rated construction or an automatic sprinkler system shall be installed throughout the building in accordance with Section 903.3.1.1 or 903.3.1.2 of the *International Building Code*.

Exceptions:

1. Vertical opening protection is not required for Group R-3 occupancies.
2. Vertical opening protection is not required for open parking garages and ramps.

303.2.4.5 (IF) 1103.4.5 Escalators in Group B and M occupancies. Escalators creating vertical openings connecting any number of stories shall be protected by either 1-hour fire-resistance-rated construction or an automatic sprinkler system in accordance with Section 903.3.1.1 of the *International Building Code* installed throughout the building, with a draft curtain and closely spaced sprinklers around the escalator opening.

303.2.4.6 (IF) 1103.4.6 Escalators connecting four or fewer stories. In other than Group B and M occupancies, escalators creating vertical openings connecting four or fewer stories shall be protected by either 1-hour fire-resistance-rated construction or an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 of the *International Building Code* shall be installed throughout the building, and a draft curtain with closely spaced sprinklers shall be installed around the escalator opening.

303.2.4.7 (IF) 1103.4.7 Escalators connecting more than four stories. In other than Group B and M occupancies, escalators creating vertical openings connecting five or more stories shall be protected by 1-hour fire-resistance-rated construction.

303.2.5 (IF) 1103.5) Sprinkler systems. An automatic sprinkler system shall be provided in existing buildings in accordance with Sections 303.2.5.1 and 303.2.5.2.

303.2.5.1 (IF) 1103.5.1 Pyroxylin plastics. An automatic sprinkler system shall be provided throughout existing buildings where cellulose nitrate film or pyroxylin plastics are manufactured, stored or handled in quantities exceeding 100 pounds (45 kg). Vaults located within buildings for the storage of raw pyroxylin shall be protected with an approved automatic sprinkler system capable of discharging 1.66 gallons per minute per square foot (68 L/min/m²) over the area of the vault.

303.2.5.2 (IF) 1103.5.2) Group I-2. An automatic sprinkler system shall be provided throughout existing Group I-2 fire areas. The sprinkler system shall be provided throughout the floor where the Group I-2 occupancy is located, and in all floors between the Group I-2 occupancy and the level of exit discharge.

303.2.6 (IF) 1103.6) Standpipes. Where required by Sections 303.2.6.1 or 303.2.6.2, standpipes shall be installed in accordance with Section 905 of the *International Building Code*. The code official is authorized to approve the installation of manual standpipe systems to achieve compliance with this Section where the responding fire department is capable of providing the required hose flow at the highest standpipe outlet.

303.2.6.1 (IF) 1103.6.1) Existing multiple-story buildings. Existing buildings with occupied floors located more than 50 feet (15 240 mm) above the lowest level of fire department access or more than 50 feet (15 240 mm) below the highest level of fire department access shall be equipped with standpipes.

303.2.6.2 (IF) 1103.6.2) Existing helistops and heliports. Existing buildings with a rooftop helistop or heliport located more than 30 feet (9144 mm) above the lowest level of fire department access to the roof level on which the helistop or heliport is located shall be equipped with standpipes in accordance with Section 905.3.6 of the *International Building Code*.

303.2.7 (IF) 1103.7) Fire alarm systems. An approved fire alarm system shall be installed in existing buildings and structures where required by Sections 303.2.7.1 through 303.2.7.7 and provide occupant notification in accordance with Section 907.6 of the *International Building Code* unless other requirements are provided by other Sections of this code.

Exception: Occupancies with an existing, previously approved fire alarm system.

303.2.7.1 (IF) 1103.7.1) Group E. A fire alarm system shall be installed in existing Group E occupancies in accordance with Section 907.2.3.

Exceptions:

1. A manual fire alarm system is not required in a building with a maximum area of 1,000 square feet (93 m²) that contains a single classroom and is located no closer than 50 feet (15 240 mm) from another building.
2. A manual fire alarm system is not required in Group E occupancies with an occupant load less than 50.

303.2.7.2 (IF) 1103.7.2) Group I-1. An automatic fire alarm system shall be installed in existing Group I-1 residential care/assisted living facilities in accordance with Section 907.2.6.1 of the *International Building Code*.

Exceptions:

1. Manual fire alarm boxes in resident or patient sleeping areas shall not be required at exits if located at all nurses' control stations or other constantly attended staff locations, provided such stations are visible and continuously accessible and that travel distances required in Section 907.5.2 of the *International Building Code* are not exceeded.
2. Where each sleeping room has a means of egress door opening directly to an exterior egress balcony that leads directly to the exits in accordance with Section 1019 of the *International Building Code*, and the building is not more than three stories in height.

303.2.7.3 (IF) 1103.7.3) Group I-2. An automatic fire alarm system shall be installed in existing Group I-2 occupancies in accordance with Section 907.2.6.2 of the *International Building Code*.

Exception: Manual fire alarm boxes in resident or patient sleeping areas shall not be required at exits if located at all nurses' control stations or other constantly attended staff locations, provided such stations are visible and continuously accessible and that travel distances required in Section 907.5.2.1 of the *International Building Code* are not exceeded.

303.2.7.4 (IF) 1103.7.4) Group I-3. An automatic and manual fire alarm system shall be installed in existing Group I-3 occupancies in accordance with Section 907.2.6.3 of the *International Building Code*.

303.2.7.5 (IF) 1103.7.5) Group R-1. A fire alarm system and smoke alarms shall be installed in existing Group R-1 occupancies in accordance with Sections 303.2.7.5.1 through 303.2.7.5.2.1.

303.2.7.5.1 (IF) 1103.7.5.1) Group R-1 hotel and motel manual fire alarm system. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.6 of the

International Building Code shall be installed in existing Group R-1 hotels and motels more than three stories or with more than 20 sleeping units.

Exceptions:

1. Buildings less than two stories in height where all sleeping units, attics and crawl spaces are separated by 1-hour fire-resistance-rated construction and each sleeping unit has direct access to a public way, egress court or yard.
2. Manual fire alarm boxes are not required throughout the building when the following conditions are met:
 - 2.1. The building is equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2 of the *International Building Code*;
 - 2.2. The notification appliances will activate upon sprinkler water flow; and
 - 2.3. At least one manual fire alarm box is installed at an approved location.

303.2.7.5.1.1 ([F] 1103.7.5.1.1) Group R-1 hotel and motel automatic smoke detection system. An automatic smoke detection system that activates the occupant notification system in accordance with Section 907.6 of the *International Building Code* shall be installed in existing Group R-1 hotels and motels throughout all interior corridors serving sleeping rooms not equipped with an approved, supervised sprinkler system installed in accordance with Section 903 of the *International Building Code*.

Exception: An automatic smoke detection system is not required in buildings that do not have interior corridors serving sleeping units and where each sleeping unit has a means of egress door opening directly to an exit or to an exterior exit access that leads directly to an exit.

303.2.7.5.2 ([F] 1103.7.5.2) Group R-1 boarding and rooming houses manual fire alarm system. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.6 of the *International Building Code* shall be installed in existing Group R-1 boarding and rooming houses.

Exception: Buildings less than two stories in height where all sleeping units, attics and crawl spaces are separated by 1-hour fire-resistance-rated construction and each sleeping unit has direct access to a public way, egress court or yard.

303.2.7.5.2.1 ([F] 1103.7.5.2.1) Group R-1 boarding and rooming houses automatic smoke detection system. An automatic smoke detection system that activates the occupant notification system in accordance with Section 907.6 of the *International Building Code* shall be installed in existing Group R-1 boarding and rooming houses throughout all interior corridors serving sleeping units not equipped with an approved, supervised sprinkler system installed in accordance with Section 903 of the *International Building Code*.

Exception: Buildings equipped with single-station smoke alarms meeting or exceeding the requirements of Section 907.2.11.1 of the *International Building Code* and where the fire alarm system includes at least one manual fire alarm box per floor arranged to initiate the alarm.

303.2.7.6 ([F] 1103.7.6) Group R-2. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.6 of the *International Building Code* shall be installed in existing Group R-2 occupancies more than three stories in height or with more than 16 dwelling or sleeping units.

Exceptions:

1. Where each living unit is separated from other contiguous living units by fire barriers having a fire-resistance rating of not less than 0.75 hour, and where each living unit has either its own independent exit or its own independent stairway or ramp discharging at grade.
2. A separate fire alarm system is not required in buildings that are equipped throughout with an approved supervised automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2 of the *International Building Code* and having a local alarm to notify all occupants.

3. A fire alarm system is not required in buildings that do not have interior corridors serving dwelling units and are protected by an approved automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2 of the *International Building Code*, provided that dwelling units either have a means of egress door opening directly to an exterior exit access that leads directly to the exits or are served by open-ended corridors designed in accordance with Section 1026.6, Exception 4 of the *International Building Code*.

303.2.7.7 (IF 1103.7.7) Group R-4. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.6 of the *International Building Code* shall be installed in existing Group R-4 residential care/assisted living facilities in accordance with Section 907.2.10.1 of the *International Building Code*.

Exceptions:

1. Where there are interconnected smoke alarms meeting the requirements of Section 907.2.11 of the *International Building Code* and there is at least one manual fire alarm box per floor arranged to continuously sound the smoke alarms.
2. Other manually activated, continuously sounding alarms approved by the code official.

303.2.8 (IF 1103.8) Single- and multiple-station smoke alarms. Single- and multiple-station smoke alarms shall be installed in existing Group I-1 and R occupancies in accordance with Sections 303.2.8.1 through 303.2.8.3.

303.2.8.1 (IF 1103.8.1) Where required. Existing Group I-1 and R occupancies shall be provided with single-station smoke alarms in accordance with Section 907.2.11 of the *International Building Code*, except as provided in Sections 303.2.8.2 or 303.2.8.3.

Exceptions:

1. Where the code that was in effect at the time of construction required smoke alarms and smoke alarms complying with those requirements are already provided.
2. Where smoke alarms have been installed in occupancies and dwellings that were not required to have them at the time of construction, additional smoke alarms shall not be required provided that the existing smoke alarms comply with requirements that were in effect at the time of installation.
3. Where smoke detectors connected to a fire alarm system have been installed as a substitute for smoke alarms.

303.2.8.2 (IF 1103.8.2) Interconnection. Where more than one smoke alarm is required to be installed within an individual dwelling or sleeping unit, the smoke alarms shall be interconnected in such a manner that the activation of one alarm will activate all of the alarms in the individual unit. Physical interconnection of smoke alarms shall not be required where listed wireless alarms are installed and all alarms sound upon activation of one alarm. The alarm shall be clearly audible in all bedrooms over background noise levels with all intervening doors closed.

Exceptions:

1. Interconnection is not required in buildings that are not undergoing alterations, repairs or construction of any kind.
2. Smoke alarms in existing areas are not required to be interconnected where alterations or repairs do not result in the removal of interior wall or ceiling finishes exposing the structure, unless there is an attic, crawl space or basement available which could provide access for interconnection without the removal of interior finishes.

303.2.8.3 (IF 1103.8.3) Power source. Single-station smoke alarms shall receive their primary power from the building wiring provided that such wiring is served from a commercial source and shall be equipped with a battery backup. Smoke alarms with integral strobes that are not equipped with battery backup shall be connected to an emergency electrical system. Smoke alarms shall emit a signal when the

batteries are low. Wiring shall be permanent and without a disconnecting switch other than as required for overcurrent protection.

Exceptions:

1. Smoke alarms are permitted to be solely battery operated in existing buildings where no construction is taking place.
2. Smoke alarms are permitted to be solely battery operated in buildings that are not served from a commercial power source.
3. Smoke alarms are permitted to be solely battery operated in existing areas of buildings undergoing alterations or repairs that do not result in the removal of interior walls or ceiling finishes exposing the structure, unless there is an attic, crawl space or basement available which could provide access for building wiring without the removal of interior finishes.

303.2.9 ([F] 1103.9) Carbon monoxide alarms. Existing Group I or R occupancies located in a building containing a fuel-burning appliance or a building which has an attached garage shall be equipped with single-station carbon monoxide alarms. The carbon monoxide alarms shall be listed as complying with UL 2034, and be installed and maintained in accordance with NFPA 720 and the manufacturer's instructions. An open parking garage, as defined in the International Building Code, or an enclosed parking garage ventilated in accordance with Section 404 of the *International Mechanical Code* shall not be deemed to be an attached garage.

Exception: Sleeping units or dwelling units which do not themselves contain a fuel-burning appliance or have an attached garage, but which are located in a building with a fuel-burning appliance or an attached garage, need not be equipped with single-station carbon monoxide alarms provided that:

1. The sleeping unit or dwelling unit is located more than one story above or below any story that contains a fuel-burning appliance or an attached garage;
2. The sleeping unit or dwelling unit is not connected by duct work or ventilation shafts to any room containing a fuel-burning appliance or to an attached garage; and
3. The building is provided with a common area carbon monoxide alarm system.

303.3 ([F] 1104.1). Means of egress. Means of egress in existing buildings shall comply with the minimum egress requirements when specified in Table 303.2.1 as further enumerated in Sections 303.3.1 through 303.3.23, and the building code that applied at the time of construction. Where the provisions of this chapter conflict with the building code that applied at the time of construction, the most restrictive provision shall apply. Existing buildings that were not required to comply with a building code at the time of construction shall comply with the minimum egress requirements when specified in Table 303.2.1 as further enumerated in Sections 303.3.1 through 303.3.23.

303.3.1 ([F] 1104.2) Elevators, escalators and moving walks. Elevators, escalators and moving walks shall not be used as a component of a required means of egress.

Exceptions:

1. Elevators used as an accessible means of egress where allowed by Section 1007.4 of the *International Building Code*.
2. Previously approved escalators and moving walks in existing buildings.

303.3.2 ([F] 1104.3) Exit sign illumination. Exit signs shall be internally or externally illuminated. The face of an exit sign illuminated from an external source shall have an intensity of not less than 5 footcandles (54 lux). Internally illuminated signs shall provide equivalent luminance and be listed for the purpose.

Exception: Approved self-luminous signs that provide evenly illuminated letters shall have a minimum luminance of 0.06 foot-lamberts (0.21 cd/m²).

303.3.3 ([F] 1104.4) Power source. here emergency illumination is required in Section 303.3.4, exit signs shall be visible under emergency illumination conditions.

Exception: Approved signs that provide continuous illumination independent of external power sources are not required to be connected to an emergency electrical system.

303.3.4 ([F] 1104.5) Illumination emergency power. The power supply shall normally be provided by the premises' electrical supply. In the event of power supply failure, illumination shall be automatically provided from an emergency system for the following occupancies where such occupancies require two or more means of egress:

1. Group A having 50 or more occupants.

Exception: Assembly occupancies used exclusively as a place of worship and having an occupant load of less than 300.

2. Group B buildings three or more stories in height, buildings with 100 or more occupants above or below a level of exit discharge serving the occupants or buildings with 1,000 or more total occupants.
3. Group E in interior stairs, corridors, windowless areas with student occupancy, shops and laboratories.
4. Group F having more than 100 occupants.

Exception: Buildings used only during daylight hours which are provided with windows for natural light in accordance with the International Building Code.

5. Group I.
6. Group M.

Exception: Buildings less than 3,000 square feet (279 m²) in gross sales area on one story only, excluding mezzanines.

7. Group R-1.

Exception: Where each sleeping unit has direct access to the outside of the building at grade.

8. Group R-2.

Exception: Where each dwelling unit or sleeping unit has direct access to the outside of the building at grade.

9. Group R-4.

Exception: Where each sleeping unit has direct access to the outside of the building at ground level.

303.3.4.1 ([F] 1104.5.1) Emergency power duration and installation. In other than Group I-2, the emergency power system shall provide power for not less than 60 minutes and consist of storage batteries, unit equipment or an on-site generator. In Group I-2, the emergency power system shall provide power for not less than 90 minutes and consist of storage batteries, unit equipment or an on-site generator. The installation of the emergency power system shall be in accordance with Section 1006.3 of the *international Building Code*.

303.3.5 ([F] 1104.6) Guards. Guards complying with this Section shall be provided at the open sides of means of egress that are more than 30 inches (762 mm) above the floor or grade below.

303.3.5.1 (IF 1104.6.1) Height of guards. Guards shall form a protective barrier not less than 42 inches (1067 mm) high.

Exceptions:

1. Existing guards on the open side of stairs shall be not less than 30 inches (760 mm) high.
2. Existing guards within dwelling units shall be not less than 36 inches (910 mm) high.
3. Existing guards in assembly seating areas.

303.3.5.2 (IF 1104.6.2) Opening limitations. Open guards shall have balusters or ornamental patterns such that a 6-inch-diameter (152 mm) sphere cannot pass through any opening up to a height of 34 inches (864 mm).

Exceptions:

1. At elevated walking surfaces for access to, and use of, electrical, mechanical or plumbing systems or equipment, guards shall have balusters or be of solid materials such that a sphere with a diameter of 21 inches (533 mm) cannot pass through any opening.
2. In occupancies in Group I-3, F, H or S, the clear distance between intermediate rails measured at right angles to the rails shall not exceed 21 inches (533 mm).
3. Approved existing open guards.

303.3.6 (IF 1104.7) Size of doors. The minimum width of each door opening shall be sufficient for the occupant load thereof and shall provide a clear width of not less than 28 inches (711 mm). Where this Section requires a minimum clear width of 28 inches (711 mm) and a door opening includes two door leaves without a mullion, one leaf shall provide a clear opening width of 28 inches (711 mm). The maximum width of a swinging door leaf shall be 48 inches (1219 mm) nominal. Means of egress doors in an occupancy in Group I-2 used for the movement of beds shall provide a clear width not less than 41.5 inches (1054 mm). The height of doors shall not be less than 80 inches (2032 mm).

Exceptions:

1. The minimum and maximum width shall not apply to door openings that are not part of the required means of egress in occupancies in Groups R-2 and R-3.
2. Door openings to storage closets less than 10 square feet (0.93 m²) in area shall not be limited by the minimum width.
3. Width of door leaves in revolving doors that comply with Section 1008.1.4.1 shall not be limited.
4. Door openings within a dwelling unit shall not be less than 78 inches (1981 mm) in height.
5. Exterior door openings in dwelling units, other than the required exit door, shall not be less than 76 inches (1930 mm) in height.
6. Exit access doors serving a room not larger than 70 square feet (6.5 m²) shall be not less than 24 inches (610 mm) in door width.

303.3.7 (IF 1104.8) Opening force for doors. The opening force for interior side-swinging doors without closers shall not exceed a 5-pound (22 N) force. For other side-swinging, sliding and folding doors, the door latch shall release when subjected to a force of not more than 15 pounds (66 N). The door shall be set in motion when subjected to a force not exceeding 30 pounds (133 N). The door shall swing to a full-open position when subjected to a force of not more than 50 pounds (222 N). Forces shall be applied to the latch side.

303.3.8 (IF 1104.9) Revolving doors. Revolving doors shall comply with the following:

1. A revolving door shall not be located within 10 feet (3048 mm) of the foot or top of stairs or escalators. A dispersal area shall be provided between the stairs or escalators and the revolving doors.
2. The revolutions per minute for a revolving door shall not exceed those shown in Table 303.3.8.
3. Each revolving door shall have a conforming side-hinged swinging door in the same wall as the revolving door and within 10 feet (3048 mm).

Exceptions:

1. A revolving door is permitted to be used without an adjacent swinging door for street-floor elevator lobbies provided a stairway, escalator or door from other parts of the building does not discharge through the lobby and the lobby does not have any occupancy or use other than as a means of travel between elevators and a street.
2. Existing revolving doors are permitted where the number of revolving doors does not exceed the number of swinging doors within 20 feet (6096 mm).

**303.3.8 TABLE ([F] 1104.9)
REVOLVING DOOR SPEEDS**

<u>INSIDE DIAMETER</u> <u>(feet-inches)</u>	<u>POWER-DRIVEN-TYPE</u> <u>SPEED CONTROL</u> <u>(rpm)</u>	<u>MANUAL-TYPE</u> <u>SPEED CONTROL</u> <u>(rpm)</u>
6-6	11	12
7-0	10	11
7-6	9	11
8-0	9	10
8-6	8	9
9-0	8	9
9-6	7	8
10-0	7	8

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

303.3.8.1 ([F] 1104.9.1) Egress component. A revolving door used as a component of a means of egress shall comply with Section 1104.9 and all of the following conditions:

1. Revolving doors shall not be given credit for more than 50 percent of the required egress capacity.
2. Each revolving door shall be credited with not more than a 50-person capacity.
3. Revolving doors shall be capable of being collapsed when a force of not more than 130 pounds (578 N) is applied within 3 inches (76 mm) of the outer edge of a wing.

303.3.9 ([F] 1104.10) Stair dimensions for existing stairs. Existing stairs in buildings shall be permitted to remain if the rise does not exceed 8 1/4 inches (210 mm) and the run is not less than 9 inches (229 mm). Existing stairs can be rebuilt.

Exception: Other stairs approved by the code official.

303.3.9.1 ([F] 1104.10.1) Dimensions for replacement stairs. The replacement of an existing *stairway* in a structure shall not be required to comply with the new *stairway* requirements of Section 1009 of the International Building Code where the existing space and construction will not allow a reduction in pitch or slope.

303.3.10 ([F] 1104.11) Winders. Existing winders shall be allowed to remain in use if they have a minimum tread depth of 6 inches (152 mm) and a minimum tread depth of 9 inches (229 mm) at a point 12 inches (305 mm) from the narrowest edge.

303.3.11 ([F] 1104.12) Circular stairways. Existing circular stairs shall be allowed to continue in use provided the minimum depth of tread is 10 inches (254 mm) and the smallest radius shall not be less than twice the width of the stairway.

303.3.12 ([F] 1104.13) Stairway handrails. Stairways shall have handrails on at least one side. Handrails shall be located so that all portions of the stairway width required for egress capacity are within 44 inches (1118 mm) of a handrail.

Exception: Aisle stairs provided with a center handrail are not required to have additional handrails.

303.3.12.1 (IF 1104.13.1) Height. Handrail height, measured above stair tread nosings, shall be uniform, not less than 30 inches (762 mm) and not more than 42 inches (1067 mm).

303.3.13 (IF 1104.14) Slope of ramps. Ramp runs utilized as part of a means of egress shall have a running slope not steeper than one unit vertical in 10 units horizontal (10-percent slope). The slope of other ramps shall not be steeper than one unit vertical in eight units horizontal (12.5-percent slope).

303.3.14 (IF 1104.15) Width of ramps. Existing ramps are permitted to have a minimum width of 30 inches (762 mm) but not less than the width required for the number of occupants served as determined by the *International Building Code*.

303.3.15 (IF 1104.16) Fire escape stairs. Fire escape stairs shall comply with Sections 303.3.15.1 through 303.15.7.

303.3.15.1 (IF 1104.16.1) Existing means of egress. Fire escape stairs shall be permitted in existing buildings but shall not constitute more than 50 percent of the required exit capacity.

303.3.15.2 (IF 1104.16.2) Protection of openings. Openings within 10 feet (3048 mm) of fire escape stairs shall be protected by opening protectives having a minimum $\frac{3}{4}$ -hour fire protection rating.

Exception: In buildings equipped throughout with an approved automatic sprinkler system, opening protection is not required.

303.3.15.3 (IF 1104.16.3) Dimensions. Fire escape stairs shall meet the minimum width, capacity, riser height and tread depth as specified in Section 303.3.9.

303.3.15.4 (IF 1104.16.4) Access. Access to a fire escape stair from a corridor shall not be through an intervening room. Access to a fire escape stair shall be from a door or window meeting the criteria of Section 1005.1 of the *International Building Code*. Access to a fire escape stair shall be directly to a balcony, landing or platform. These shall be no higher than the floor or window sill level and no lower than 8 inches (203 mm) below the floor level or 18 inches (457 mm) below the window sill.

303.3.15.5 (IF 1104.16.5) Materials and strength. Components of fire escape stairs shall be constructed of noncombustible materials. Fire escape stairs and balconies shall support the dead load plus a live load of not less than 100 pounds per square foot (4.78 kN/m²). Fire escape stairs and balconies shall be provided with a top and intermediate handrail on each side.

303.3.15.5.1 (IF 1104.16.5.1) Examination. Fire escape stairs and balconies shall be examined for structural adequacy and safety in accordance with Section 303.15.5 by a registered design professional or others acceptable to the fire code official every five years, or as required by the fire code official. An inspection report shall be submitted to the fire code official after such examination.

303.3.15.6 (IF 1104.16.6) Termination. The lowest balcony shall not be more than 18 feet (5486 mm) from the ground. Fire escape stairs shall extend to the ground or be provided with counterbalanced stairs reaching the ground.

Exception: For fire escape stairs serving 10 or fewer occupants, an approved fire escape ladder is allowed to serve as the termination.

303.3.15.7 (IF 1104.16.7) Maintenance. Fire escapes shall be kept clear and unobstructed at all times and shall be maintained in good working order.

303.3.16 (IF 1104.17) Corridors. Corridors serving an occupant load greater than 30 and the openings therein shall provide an effective barrier to resist the movement of smoke. Transoms, louvers, doors and other openings shall be kept closed or self-closing.

Exceptions:

1. Corridors in occupancies other than in Group H, which are equipped throughout with an approved automatic sprinkler system.
2. Patient room doors in corridors in occupancies in Group I-2 where smoke barriers are provided in accordance with the *International Building Code*.
3. Corridors in occupancies in Group E where each room utilized for instruction or assembly has at least one-half of the required means of egress doors opening directly to the exterior of the building at ground level.
4. Corridors that are in accordance with the *International Building Code*.

303.3.16.1 (IF) 1104.17.1) Corridor openings. Openings in corridor walls shall comply with the requirements of the *International Building Code*.

Exceptions:

1. Where 20-minute fire door assemblies are required, solid wood doors at least 1.75 inches (44 mm) thick or insulated steel doors are allowed.
2. Openings protected with fixed wire glass set in steel frames.
3. Openings covered with 0.5-inch (12.7 mm) gypsum wallboard or 0.75-inch (19.1 mm) plywood on the room side.
4. Opening protection is not required when the building is equipped throughout with an approved automatic sprinkler system.

303.3.16.2 (IF) 1104.17.2) Dead ends. Where more than one exit or exit access doorway is required, the exit access shall be arranged such that dead ends do not exceed the limits specified in Table 303.16.2.

Exception: A dead-end passageway or corridor shall not be limited in length where the length of the dead-end passageway or corridor is less than 2.5 times the least width of the dead-end passageway or corridor.

**303.3.16.2 TABLE (IF) 1104.17.2)
COMMON PATH, DEAD-END AND TRAVEL DISTANCE LIMITS (by occupancy)**

OCCUPANCY	COMMON PATH LIMIT		DEAD-END LIMIT		TRAVEL DISTANCE LIMIT	
	Unsprinklered (feet)	Sprinklered (feet)	Unsprinklered (feet)	Sprinklered (feet)	Unsprinklered (feet)	Sprinklered (feet)
Group A	20/75 ^a	20/75 ^a	20 ^b	20 ^b	200	250
Group B ⁱ	75	100	50	50	200	300
Group E	75	100	50	50	200	300
Group F-1, S-1 ^{d,f}	75	100	50	50	200	250
Group F-2, S-2 ^{d,f}	75	100	50	50	300	400
Group H-1	25	25	0	0	75	75
Group H-2	50	100	0	0	75	100
Group H-3	50	100	20	20	100	150
Group H-4	75	75	20	20	150	175
Group H-5	75	75	20	50	150	200
Group I-1	75	75	20	50	200	250
Group I-2 (Health care)	NR ^e	NR ^e	NR	NR	150	200 ^c
Group I-3 (Detention and correctional – Use Conditions II, III, IV, V)	100	100	NR	NR	150 ^c	200 ^c
Group I-4 (Day care centers)	NR	NR	20	20	200	250
Group M (Covered or open mall)	75	100	50	50	200	400
Group M (Mercantile)	75	100	50	50	200	250
Group R-1 (Hotels)	75	75	50	50	200	250
Group R-2	75	125	50	50	200	250

(Apartments)						
Group R-3 (One- and two-family)	NR	NR	NR	NR	NR	NR
Group R-4 (Residential care/assisted living)	NR	NR	NR	NR	NR	NR
Group U	75	100	20	50	300	400

NR = No requirements.

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m².

- a. 20 feet for common path serving 50 or more persons; 75 feet for common path serving less than 50 persons.
- b. See Section 1028.9.5 for dead-end aisles in Group A occupancies.
- c. This dimension is for the total travel distance, assuming incremental portions have fully utilized their allowable maximums. For travel distance within the room, and from the room exit access door to the exit, see the appropriate occupancy chapter.
- d. See the International Building Code for special requirements on spacing of doors in aircraft hangars.
- e. Any patient sleeping room, or any suite that includes patient sleeping rooms, of more than 1,000 square feet shall have at least two exit access doors placed a distance apart equal to not less than one-third of the length of the maximum overall diagonal dimension of the patient sleeping room or suite to be served, measured in a straight line between exit access doors.
- f. Where a tenant space in Group B, S and U occupancies has an occupant load of not more than 30, the length of a common path of egress travel shall not be more than 100 feet.

303.3.17 ([F] 1104.18) Exit access travel distance. Exits shall be located so that the maximum length of exit access travel, measured from the most remote point to an approved exit along the natural and unobstructed path of egress travel, does not exceed the distances given in Table 301.3.12.15.2.

303.3.18 ([F] 1104.19) Common path of egress travel. The common path of egress travel shall not exceed the distances given in Table 301.3.12.15.2.

303.3.19 ([F] 1104.20) Stairway discharge identification. An interior exit stairway or ramp which continues below its level of exit discharge shall be arranged and marked to make the direction of egress to a public way readily identifiable.

Exception: Stairs that continue one-half story beyond their levels of exit discharge need not be provided with barriers where the exit discharge is obvious.

303.3.20 ([F] 1104.21) Exterior stairway protection. Exterior exit stairs shall be separated from the interior of the building as required in Section 1026.6 of the *International Building Code*. Openings shall be limited to those necessary for egress from normally occupied spaces.

Exceptions:

1. Separation from the interior of the building is not required for buildings that are two stories or less above grade where the level of exit discharge serving such occupancies is the first story above grade.
2. Separation from the interior of the building is not required where the exterior stairway is served by an exterior balcony that connects two remote exterior stairways or other approved exits, with a perimeter that is not less than 50 percent open. To be considered open, the opening shall be a minimum of 50 percent of the height of the enclosing wall, with the top of the opening not less than 7 feet (2134 mm) above the top of the balcony.
3. Separation from the interior of the building is not required for an exterior stairway located in a building or structure that is permitted to have unenclosed interior stairways in accordance with Section 1022 of the *International Building Code*.
4. Separation from the interior of the building is not required for exterior stairways connected to open-ended corridors, provided that:
 - 4.1. The building, including corridors and stairs, is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 of the *International Building Code*.
 - 4.2. The open-ended corridors comply with Section 1018.2 of the *International Building Code*.

- 4.3. The open-ended corridors are connected on each end to an exterior exit stairway complying with Section 1026 of the *International Building Code*.
- 4.4. At any location in an open-ended corridor where a change of direction exceeding 45 degrees (0.79 rad) occurs, a clear opening of not less than 35 square feet (3 m²) or an exterior stairway shall be provided. Where clear openings are provided, they shall be located so as to minimize the accumulation of smoke or toxic gases.

303.3.21 ([F] 1104.22) Minimum aisle width. The minimum clear width of aisles shall be:

- 1. Forty-two inches (1067 mm) for aisle stairs having seating on each side.

Exception: Thirty-six inches (914 mm) where the aisle serves less than 50 seats.

- 2. Thirty-six inches (914 mm) for stepped aisles having seating on only one side.

Exception: Thirty inches (760 mm) for catchment areas serving not more than 60 seats.

- 3. Twenty inches (508 mm) between a stepped aisle handrail or guard and seating when the aisle is subdivided by the handrail.

- 4. Forty-two inches (1067 mm) for level or ramped aisles having seating on both sides.

Exception: Thirty-six inches (914 mm) where the aisle serves less than 50 seats.

- 5. Thirty-six inches (914 mm) for level or ramped aisles having seating on only one side.

Exception: Thirty inches (760 mm) for catchment areas serving not more than 60 seats.

- 6. Twenty-three inches (584 mm) between a stepped stair handrail and seating where an aisle does not serve more than five rows on one side.

303.3.22 ([F] 1104.23) Stairway floor number signs. Existing stairs shall be marked in accordance with Section 1022.8 of the *International Building Code*.

303.3.23 ([F] 1104.24) Egress path markings. Existing high-rise buildings of Group A, B, E, I, M and R-1 occupancies shall be provided with luminous egress path markings in accordance with Section 1024 of the *International Building Code*.

Exception: Open, unenclosed stairwells in historic buildings designated as historic under a state or local historic preservation program.

303.4 ([F] 1105) Requirements for outdoor operations. Outdoor operations shall be in accordance with Section 303.4.1 through 303.4.1.2.

303.4.1 ([F] 1105.1) Tire storage yards. Existing tire storage yards shall be provided with fire apparatus access roads in accordance with Sections 1105.1.1 and 1105.1.2 of the *International Building Code*.

303.4.1.1 ([F] 1105.1.1) Access to piles. Access roadways shall be within 150 feet (45 720 mm) of any point in the storage yard where storage piles are located, at least 20 feet (6096 mm) from any storage pile.

303.4.1.2 ([F] 1105.1.2) Location within piles. Fire apparatus access roads shall be located within all pile clearances identified in Section 3405.4 and within all fire breaks required in Section 3405.5 of the *International Fire Code*.

705.1 General. An area being altered within a facility that is altered shall comply with the applicable provisions in Sections 705.1.1 through 705.1.14, and Chapter 11 of the International Building Code unless it is technically infeasible. Where compliance with this Section is technically infeasible, the alteration shall provide access to the maximum extent that is technically feasible. Accessibility for existing buildings shall be determined as required by Section 302.1.1.

Add new standards to Chapter 16 as follows:

NFPA National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169-7471

NFPA 720-09 Standard for the installation of carbon monoxide(co) detection and warning equipment

UL Underwriters Laboratories, Inc.
333 Pfingsten Road
Northbrook, IL 60062-2096

UL 2034-08 Single and Multiple Station Carbon Monoxide Alarms with revisions through February 2009

Reason: This proposal does several things which include the following:

1. Revises the chapter title to more clearly reflect the content of the chapter
2. Restructures the requirements to more clearly point out the additional code requirements and make room for the existing minimum requirements
3. Adds some clarity on the applicable accessibility provisions
4. Places the minimum existing requirements from the fire code in the IEBC.

Title Change. The new title will make it more clear that the chapter both explains applicability and provides minimum requirements that apply to all methods of compliance.

Restructuring. Currently the additional code reference is lost at the end of the chapter. This will provide more visibility to this requirement. This also provides a better structure for future requirements such as those proposed for accessibility. In addition, it is felt that the provisions from Chapter 11 of the IFC which represent minimum existing requirements for all buildings, as applicable, should be stand alone for clarity.

Accessibility. Significant changes are being developed in the 2015 Edition of ANSI A117.1 Standard. No existing buildings have been designed to meet these standards and would be considered inaccessible under the new standard despite having complied with the 2003 standard. For example, Section 705.1.1 provides an exception for bringing an entrance into compliance if there is an accessible entrance elsewhere. A fully complying entrance under the older A117.1 would no longer be considered accessible under the new standard. Similarly, 705.2 requires the accessible route to conform where alterations are made to a primary function. Fully compliant access routes under the 2003 standard will not conform to the 2011 standard because of the changes to the minimum clearances reflecting the changed clear floor space.

With this change those elements that were compliant with the 2009 standard would continue to be considered compliant after the 2015 standard is made mandatory. This philosophy has been used with the changes in the new 2010 ADA Standard. Any existing building that conformed to the older standard is considered compliant under the new standard.

Existing requirements from IFC. Currently the IEBC only includes requirements for when an existing building is being repaired, altered or is undergoing a change of occupancy. The IFC includes minimum requirements for existing buildings in Chapter 11 that are applicable to all buildings. This change duplicates those requirements and moves them into the requirements for compliance in Chapter 3 of the IEBC so that owners and designers are aware of the additional minimums that may be imposed on an existing building beyond those required for the work anticipated. The intent is that these changes remain under the purview of the IFC Code Development Committee and are simply placed here to provide clarity to the code user that additional requirements may apply to the building if these minimums are not already met.

Changes from the IFC are only due to duplicate provisions that are already a part of the IEBC. For reference only we have included the original IFC Section number parenthetically.

- Fire code official has been revised to code official to address the fact that the authority enforcing this code may not be a fire code official.
- New Section 303.1.3 is based on IFC Section [F] 1101.3 that indicates that permits must be obtained per Sections 105.6 and 105.7 of the IFC and the IBC. The two referenced IFC Sections are not requiring permits for alterations necessary to conform, but for occupancies or systems in a building. A correction is made in this change to reference the IEBC permit requirements and a companion change is being submitted to make the same change to the IFC.

Cost Impact: This code change proposal will not increase the cost of construction.

Analysis: The proposed referenced standards are already referenced in the *International Building Code*.

EB3-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

301.1-EB-COLLINS.doc

EB4 – 13

301.1

Proponent: Maureen Traxler, City of Seattle, representing Seattle Dept. of Planning & Development
(Maureen.traxler@seattle.gov)

Revise as follows:

301.1 General. The *repair, alteration, change of occupancy, addition* or relocation of all *existing buildings* shall comply with one of the methods listed in Sections 301.1.1 through 301.1.3 as selected by the applicant. ~~Application of a method shall be the sole basis for assessing the compliance of work performed under a single permit unless otherwise approved by the code official.~~ Sections 301.1.1 through 301.1.3 shall not be applied in combination with each other. Where this code requires consideration of the seismic force-resisting system of an *existing building* subject to *repair, alteration, change of occupancy, addition* or relocation of *existing buildings*, the seismic evaluation and design shall be based on Section 301.1.4 regardless of which compliance method is used.

Reason: This paragraph says the same thing 3 different ways in the first 3 sentences. The first sentence states that the applicant has to choose one of the 3 compliance methods. The second sentence again says that one of the three compliance methods must be used. Then, the third sentence states that only one compliance method can be used. There may be a slight different in emphasis in the three sentences, but all three aren't necessary. The second and third sentences both say that one and only method can be applied to a project. We prefer the third sentence because it states most clearly that more than one method cannot be applied to a project. If special circumstances arise, the code official has authority under Sections 104.10 and 104.11 to approve modifications and alternative methods of design.

Cost Impact: This code change proposal will not increase the cost of construction.

EB4-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

301.1-EB-TRAXLER.doc

EB5 – 13

504.1.1 (NEW)

Proponent: David S. Collins, FAIA, The Preview Group, Inc., representing The American Institute of Architects

Add new text as follows:

504.1 Scope. Level 2 *alterations* include the reconfiguration of space, the addition or elimination of any door or window, the reconfiguration or extension of any system, or the installation of any additional equipment.

504.1.1 Except where aisles required in Groups B and M, table seating per Sections 1017.3 and 1017.4 of the *International Building Code* or assembly seating per Section 1028 of the *International Building Code*, are reconfigured, the movement, addition or removal of furniture, movable partitions less than 5 feet 9 inches in height, or fixtures within a space shall not be considered reconfiguration of space.

Reason: Reconfiguration of a space can occur simply by movement of furniture. It isn't the intent of the IEBC to require that furniture rearrangement be included as an alteration, except where the IBC specifically limits aisles, table seating or assembly seating. By this change the rearrangement of furniture is not a trigger for application of the requirement for Level 2 Alterations.

Cost Impact: This code change proposal will not increase the cost of construction.

EB5-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

504.1.1 (NEW)-EB-COLLINS.doc

EB6 – 13

505.1

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee

Revise as follows:

505.1 Scope. Level 3 *alterations* apply where the *work area* exceeds 50 percent of the aggregate ~~area of the building~~ building area of all stories in the building.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

This is the BCAC's attempt to clarify the scoping provisions for level 3 alterations. Some code users claim that the differing phrases used relative to area within the IEBC is confusing when those phrases are not one of the defined phrases. The BCAC believes that concern can best be addressed by referring to the defined term/phrase "building area" instead of the currently used phrase "aggregate area of the building". Because the phrase "building area" is already defined, by embedding that phrase in the modified text, the concerns of confusion and lack of consistency will be eliminated without changing the original intent. The BCAC is also aware that the current language located within IEBC Sections 410.4, 410.6, and 410.8.9 would benefit from a change to mimic the language being proposed by this code change, but cannot propose those changes at this time because those sections are located within the Group A changes. It is the intent of the BCAC to propose corresponding changes to those sections in the next code change cycle.

Cost Impact: This code change proposal will not increase the cost of construction.

EB6-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

505.1-EB-BAJNAI-BCAC.doc

EB7 – 13

505.1

Proponent: David S. Collins, FAIA, The Preview Group, Inc., representing The American Institute of Architects

Revise as follows:

505.1 Scope. Level 3 *alterations* ~~apply~~ include the reconfiguration of space, where the ~~work~~ reconfigured area exceeds 50 percent of the aggregate area of the building, ~~and shall include the reconfiguration or extension of any system that serves more than 50 percent of the aggregate area of the building.~~

Reason: In a separate change the definition of "work area" is being removed from the IEBC because it's lack of specificity and the confusion it causes when used in this section. We have submitted a series of changes to provide the type of direction needed to make the code more effective. This language is proposed to provide the needed guidance in Section 505.1 for what is within the scope of a Level 3 alteration.

Cost Impact: There is no cost impact associated with this change.

EB7-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

505.1-EB-COLLINS.doc

EB8 – 13

602.3 (New)

Proponent: Rebecca Morley, National Center for Healthy Housing

Add new text as follows:

602.3 Moisture and Mold. Surfaces such as but not limited to wood, textiles, paint, cellulose insulation, and paper, including paper-faced gypsum board, shall have no signs of excessive moisture after the material has been repaired. Materials that are discolored or deteriorated by mold or mildew shall be cleaned, dried and repaired and the underlying cause shall be determined and corrected. If the material is structurally unsound it shall be removed and replaced and the underlying cause shall be determined and corrected.

Reason: Mold typically grows in buildings affected by water damage. According to the Institute of Medicine of the National Academies' *Damp Indoor Spaces and Health* (2004), mold and damp indoor environments are associated with asthma symptoms in sensitized persons, coughing, wheezing, and upper respiratory tract symptoms. See www.nap.edu/books/0309091934/html/

In December 2007, the National Center for Healthy Housing (NCHH) and the U.S. Centers for Disease Control and Prevention (CDC) convened an Expert Panel consistent with National Institute of Health guidelines to assess the effectiveness of various interventions to make homes healthier and safer. NCHH and CDC published the report of the experts in January 2009. See www.nchh.org/LinkClick.aspx?fileticket=2lvaEDNBldU%3d&tabid=229 for the full report.

The Expert Panel reviewed five peer-reviewed research studies on the issue of mold and allergens and concluded that "when implemented together, eliminating moisture intrusion and leaks and removal of moldy items were found to be effective in reducing asthma triggers and reducing exposures." Other provisions of the IPMC address eliminating moisture intrusion. But no provisions require action on building materials with chronic moisture issues including those materials that have failed beyond repair.

This proposal implements the Expert Panel's recommendation while providing flexibility in response to actual conditions – repair for reparable material, replacement for failed material. To ensure the health of the building's occupants, mitigation of moisture problems must be a part of the code.

Cost Impact: This code change proposal will increase the cost of maintenance.

EB8-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

602.1-EB-MORLEY.doc

EB9 – 13

602.3, 702.4 (NEW), 702.5 (NEW)

Proponent: Carl Baldassarra, P.E., Chair, ICC Code Technology Committee
(cbaldassarra@rjagroup.com)

Revise as follows:

602.3 Glazing in hazardous locations. Replacement glazing shall be as required for new installations. Replacement glazing in hazardous locations shall comply with the safety glazing requirements of the *International Building Code* or *International Residential Code* as applicable.

Exception: Glass block walls, louvered windows, and jalousies repaired with like materials.

Add new text as follows:

702.4 Window opening control devices. In Group R-2 or R-3 buildings containing dwelling units, window opening control devices complying with ASTM F2090 shall be installed where an existing window is replaced and where all the following apply to the replacement window:

1. The window is operable;
2. The window replacement includes replacement of the sash and the frame;
3. The top of the sill of the window opening is at a height less than 36 inches (915 mm) above the finished floor;
4. The window will permit openings that will allow passage of a 4-inch diameter (102 mm) sphere when the window is in its largest opened position; and
5. The vertical distance from the top of the sill of the window opening to the finished grade or other surface below, on the exterior of the building, is greater than 72 inches (1829 mm).

The window opening control device, after operation to release the control device allowing the window to fully open, shall not reduce the minimum net clear opening area of the window unit to less than the area required by the *International Building Code*.

Exceptions:

1. Operable windows where the top of the sill of the window opening is located more than 75 feet (22.86 m) above the finished grade or other surface below, on the exterior of the room, space or building, and that are provided with window fall prevention devices that comply with ASTM F 2006.
2. Operable windows with openings that are provided with window fall prevention devices that comply with ASTM F2090.

702.5 Emergency Escape and Rescue Openings. Where windows are required to provide emergency escape and rescue openings in Group R-2 and R-3 occupancies, replacement windows shall be exempt from the requirements of Sections 1029.2, 1029.3 and 1029.5 of the *International Building Code* provided the replacement window meets the following conditions:

1. The replacement window is the manufacturer's largest standard size window that will fit within the existing frame or existing rough opening. The replacement window shall be permitted to be of the same operating style as the existing window or a style that provides for an equal or greater window opening area than the existing window.
2. The replacement of the window is not part of a change of occupancy.

Reason: This proposed change is a result of the CTC's investigation of the area of study entitled "Child Window Safety". The scope of the activity is noted as:

To evaluate the necessity of developing code proposals for the inclusion of requirements dealing with the conditions, circumstances and devices for window safety which could reduce the number of falls by children to surfaces below.

The purpose of this proposal is to coordinate the repair and alteration provisions of the IEBC with the changes approved to the IBC/IEBC in the 2012 Group A cycle. Code changes G225-12 and G227-12 were approved as modified by public comment to revise Section 3407 of the IBC (IEBC Section 406 – see below). In addition, Code change G201-12 last cycle removed the existing building provisions from Chapter 34 of the IBC in favor of a reference to the IEBC. This action was subsequently affirmed by the ICC Board as this was a code change related to I-Code scoping.

The IEBC includes 3 compliance methods for existing buildings:

- Prescriptive compliance per Chapter 4
- Work area compliance per Chapters 5 – 13
- Performance compliance per Chapter 14

As noted above, the prescriptive compliance provisions of Chapter 4 have been updated based on the approved code changes noted. Since there are no specific performance provisions in Chapter 14 for windows, this leaves the work area method of Chapters 5 – 13 in need of correlation. The correlation is as follows:

- Chapter 6 Repairs. The approved provisions in Chapter 4 of the IEBC only apply where the entire window is removed. As such, the provisions are not applicable to routine repairs such as the repair of a pane of broken glass. The revised text of Section 602.3 stipulates that only the glazing is required to comply with new construction requirements.
- Chapter 7 Alteration Level 1. In accordance with Section 503, an Alteration Level 1 is one where there is a removal or replacement of existing elements. This of and by itself may not be a complete replacement of the window frame and glass. As such, the proposed new text in Section 702.4 triggers the application of the provisions where “an existing window is replaced”.
- Chapter 8 Alteration Level 2. This code change does not include language specifically dealing with Alteration Level 2 as the provisions proposed in Chapter 7 cover Level 2 alterations by virtue of the text of Section 801.2 which requires Level 2 alterations to comply with the requirements of Chapter 7 for Level 1.
- Chapter 9 Alteration Level 3. Similar to Chapter 8 noted above, this code change does not include language specifically dealing with Alteration Level 3 as the provisions proposed in Chapter 7 cover Level 3 alterations by virtue of the text of Section 901.2 which requires Level 3 alterations to comply with the requirements of Chapters 7 and 8.

For reference, the approved IEBC text is as follows:

IEBC SECTION 406 GLASS REPLACEMENT AND REPLACEMENT WINDOWS

406.1 Replacement glass. *The installation or replacement of glass shall be as required for new installations.*

406.2 Replacement Window Opening Control Devices. *In Group R-2 or R-3 buildings containing dwelling units, window opening control devices complying with ASTM F2090 shall be installed where an existing window is replaced and where all the following apply to the replacement window:*

1. *The window is operable;*
2. *The window replacement includes replacement of the sash and the frame;*
3. *The top of the sill of the window opening is at a height less than 36 inches (915 mm) above the finished floor;*
4. *The window will permit openings that will allow passage of a 4-inch diameter (102 mm) sphere when the window is in its largest opened position; and*
5. *The vertical distance from the top of the sill of the window opening to the finished grade or other surface below, on the exterior of the building, is greater than 72 inches (1829 mm).*

The window opening control device, after operation to release the control device allowing the window to fully open, shall not reduce the minimum net clear opening area of the window unit to less than the area required by Section 1029.2.

Exceptions:

1. *Operable windows where the top of the sill of the window opening is located more than 75 feet (22.86 m) above the finished grade or other surface below, on the exterior of the room, space or building, and that are provided with window fall prevention devices that comply with ASTM F 2006.*
2. *Operable windows with openings that are provided with window fall prevention devices that comply with ASTM F2090.*

406.3 Replacement Window Emergency Escape and Rescue Openings. *Where windows are required to provide emergency escape and rescue openings in Group R-2 and R-3 occupancies, replacement windows shall be exempt from the requirements of Sections 1029.2, 1029.3 and 1029.5 provided the replacement window meets the following conditions:*

1. *The replacement window is the manufacturer's largest standard size window that will fit within the existing frame or existing rough opening. The replacement window shall be permitted to be of the same operating style as the existing window or a style that provides for an equal or greater window opening area than the existing window.*
2. *The replacement of the window is not part of a change of occupancy.*

This proposal is submitted by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as “areas of study”. Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website:

<http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty-five meetings - all open to the public. In 2012, three of the 25 face-to face meetings were held. In addition to the CTC meetings, the CTC established Study Groups (SG) of interested parties for each of the areas of study. These SG's are responsible for reviewing the available information and making recommendations to the CTC. All totaled, the SG's held over 70 conference calls in 2012.

Cost Impact: This code change proposal will not increase the cost of construction.

EB9-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

602.3-EB-BALDASSARRA-CTC.doc

EB10 – 13

603.1, 604.1, 605.1, 703.1, 704.1

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee

Revise as follows:

603.1 General. Repairs shall be done in a manner that maintains the level of fire protection provided before the repair was undertaken.

604.1 General. Repairs shall be done in a manner that maintains the level of protection provided for the means of egress before the repair was undertaken.

605.1 General. Repairs shall be done in a manner that maintains the level of accessibility provided before the repair was undertaken.

703.1 General. Alterations shall be done in a manner that maintains the level of fire protection provided before the alteration was undertaken.

704.1 General. Alterations shall be done in a manner that maintains the level of protection provided for the means of egress before the alteration was undertaken.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

The current text is missing the language that tells users of the code to what level the various subjects are to be maintained. The intent that a modification should not make a condition worse than before the work started is clear. That concept is stated in IEBC sections 603.1, 604.1, 605.1, 703.1 and 704.1. By adding the proposed text to each section, that original intent is not only made clearer, it is done so in a consistent manner.

Cost Impact: This code change proposal will not increase the cost of construction.

EB10-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

603.1-EB-BAJNAI-BCAC.doc

EB11 – 13

603.2(New)

Proponent: Andy Williams, Metal Construction Association

Add new text as follows:

603.2 Roof Assembly Fire Classification. Repairs made to roof coverings shall not reduce the fire classification that was required when originally installed.

Exception: Change of occupancy for historic buildings shall comply with Section 1205.5

Reason: The text is to clarify that the roof covering is required to comply with the fire classification mandated by the IBC or the IRC under which the roof covering was initially installed. For repairs to a roof covering, the repairs are required to maintain the roof covering fire classification required by the IRC when the roof covering was initially installed.

The exception is necessary since the IEBC provides a variance for historic buildings.

Cost Impact: The code change proposal will not increase the cost of construction.

EB11-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

603.2(NEW)-EB- WILLIAMS.DOC

EB12 – 13

608.3(New), 708(New)

Proponent: Andrew Scott Jones, President, A Better Deal Heating and Air Conditioning, Inc., a Texas Corporation, representing self

Add new text as follows:

608.3 Cleanouts. Where new condensate drain lines are installed as a result of the repair, such condensate drain lines shall be configured to permit the clearing of blockages and performance of maintenance without requiring the drain line to be cut.

SECTION 708 **MECHANICAL**

708.1 Cleanouts. Where new condensate drain lines are installed as a result of a level 1 alteration, such condensate drain lines shall be configured to permit the clearing of blockages and performance of maintenance without requiring the drain line to be cut.

Reason: This language is identical to the language of M 32-12 which was recently adopted In Portland, Oregon. We are advised by JB Engineering that this language will be in the IMC and IPC for 2015.

Similar language has been submitted to the IRC.

Cost Impact: The code change will increase the cost of construction, totaling an estimated \$15.00 per unit.

EB12-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

XXX-EB-JONES.doc

EB13 – 13

610 (NEW)

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

SECTION 610

ENERGY EFFICIENCY

610.1 General. Repairs to the building thermal envelope, mechanical systems, water heating systems, electrical systems or lighting systems shall meet the International Energy Conservation Code where the provisions therein are directly applicable to the repair(s) being undertaken.

Reason: This proposal requires equipment installed during repairs to meet the provisions of the International Energy Conservation Code (IECC) and insulation to be upgraded to current 2012 IECC requirements when structural components are exposed.

Forty percent of U.S. energy use and seventy percent of U.S. electrical use are associated with existing buildings. As such, existing buildings represent a significant opportunity to save energy, reduce operating costs, and enhance the environment. Section 610 of the International Existing Buildings Code (IEBC) currently provides no guidance on energy efficiency, nor does it reference the 2012 IECC. However, there are instances in which repairs can and should include consideration of energy efficiency. For instance, a storm could damage skylights or a glazed storefront necessitating repair of the fenestration assemblies or a flooding event could necessitate the repair of dampers associated with a duct system.

Those situations would likely result in the removal of the damaged fenestration or dampers and their replacement to address "the restoration to good or sound condition of those parts of the building for the purpose of maintenance". Section 502.1 further clarifies that such replacement of damaged materials would be considered a repair. It is recognized that not all repairs should or could comply with the IECC, such as normal repairs to HVAC equipment, electrical systems or building envelope assemblies. To address those situations the proposed text clarifies that the provision in the IECC must be directly applicable to the repair. So for instance patching a masonry wall, repairing or replacing siding, fixing an electrical lighting control problem or repairing a boiler or chiller that has stopped working would not be impacted since there are no specific provisions in the IECC that are directly applicable to those situations.

There will be an increase in cost to the degree that repairs that previously were not required to meet the energy code will now be required to meet the energy code.

Cost Impact: The code change proposal will increase the cost of construction in some buildings.

EB13-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

610 (NEW)-EB-WILLIAMS.doc

EB14 – 13

702.1, 702.2, 702.3

Proponent: Jerry R. Tepe, FAIA, JRT•AIA Architect, representing American Institute of Architects

Delete without substitution as follows:

~~**702.1 Interior finishes.** All newly installed interior wall and ceiling finishes shall comply with Chapter 8 of the *International Building Code*.~~

~~**702.2 Interior floor finish.** New interior floor finish, including new carpeting used as an interior floor finish material, shall comply with Section 804 of the *International Building Code*.~~

~~**702.3 Interior trim.** All newly installed interior trim materials shall comply with Section 806 of the *International Building Code*.~~

Reason: I realize these sections were just added in 2009, but they are repetitive of the following section which already requires all new work to comply with the *International Building Code*. It becomes confusing when single requirements are individually repeated for compliance and can lead to a misconception that other items are not required to comply. The code does not need to be filled with repetitive, duplicate requirements.

Cost Impact: This code change proposal will not increase the cost of construction.

EB14-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

702.1-EB-TEPE.doc

EB15 – 13

702.4 (NEW), 702.5 (NEW)

Proponent: Jeff Inks, Window & Door Manufacturers Association (jinks@wdma.com)

Revise as follows:

702.1 Interior finishes. All newly installed interior wall and ceiling finishes shall comply with Chapter 8 of the *International Building Code*.

702.2 Interior floor finish. New interior floor finish, including new carpeting used as an interior floor finish material, shall comply with Section 804 of the *International Building Code*.

702.3 Interior trim. All newly installed interior trim materials shall comply with Section 806 of the *International Building Code*.

702.4 Window opening control devices. In Group R-2 or R-3 buildings containing dwelling units and one- and two-family dwellings and townhouses regulated by the *International Residential Code*, window opening control devices complying with ASTM F2090 shall be installed where an existing window is replaced and where all the following apply to the replacement window:

1. The window is operable;
2. The window replacement includes replacement of the sash and the frame;
3. The top of the sill of the window opening is at a height less than 36 inches (915 mm) above the finished floor;
4. The window will permit openings that will allow passage of a 4-inch diameter (102 mm) sphere when the window is in its largest opened position; and
5. The vertical distance from the top of the sill of the window opening to the finished grade or other surface below, on the exterior of the building, is greater than 72 inches (1829 mm).

The window opening control device, after operation to release the control device allowing the window to fully open, shall not reduce the minimum net clear opening area of the window unit to less than the area required by the International Building Code.

Exceptions:

1. Operable windows where the top of the sill of the window opening is located more than 75 feet (22.86 m) above the finished grade or other surface below, on the exterior of the room, space or building, and that are provided with window fall prevention devices that comply with ASTM F 2006.
2. Operable windows with openings that are provided with window fall prevention devices that comply with ASTM F2090.

702.5 Emergency escape and rescue openings. Where windows are required to provide emergency escape and rescue openings in Group R-2 and R-3 occupancies and one- and two-family dwellings and townhouses regulated by the *International Residential Code*, replacement windows shall be exempt from the requirements of Sections 1029.2, 1029.3 and 1029.5 of the *International Building Code* and Sections R310.1.1, R310.1.2, R310.1.3 and R310.2 of the *International Residential Code* accordingly provided the replacement window meets the following conditions:

1. The replacement window is the manufacturer's largest standard size window that will fit within the existing frame or existing rough opening. The replacement window shall be permitted to be of the same operating style as the existing window or a style that provides for an equal or greater window opening area than the existing window.
2. The replacement of the window is not part of a change of occupancy.

Window opening control devices complying with ASTM F 2090 shall be permitted for use on windows required to provide *emergency escape and rescue openings*.

Reason: The intent of this proposal is to ensure window replacements meet the requirements for new construction for window fall protection and emergency escape and rescue openings when practical and avoid discouraging or preventing the replacement of windows when it is not -- provided there is no reduction in existing safety.

With respect to the proposed provisions for window opening control devices on replacement windows, they are intended to ensure window fall protection is provided where required for new construction when windows, including sash and frame, are replaced. The proposed WOCD provisions have already been approved for Chap. 4 of the IEBC (during the Group A proceedings) and are also being proposed for IRC Appendix J by us and the ICC CTC.

With respect to the proposed emergency escape and rescue opening provisions, they are based on Minnesota's residential code which actually (and effectively) incorporates them into the main body of the code in Chapter 3, under Section 310.1. The same provisions have also already been approved for Chap. 4 of the IEBC (during the Group A proceedings) and we, as well as the ICC CTC are also proposing the same provisions for IRC Appendix J (in addition to this proposal for the IEBC). Most importantly, it's important to note that the provisions do not allow for any decrease in safety and will help ensure improvements in safety can be made.

More specifically, the intent of this proposal is to ensure that the IRC does not discourage or prevent improvements in emergency escape and rescue openings, especially for fire safety, in older residential occupancies by requiring replacement windows to meet all of the provisions of Section 310 when doing so can only be accomplished by increasing the size of the rough opening or altering the interior wall.

Because many of these older buildings were constructed under codes that did not include the same emergency escape and rescue opening provisions that the IBC or IRC now require for new construction, the only way to fully meet all of the requirements of IBC Section 1029 or IRC Section 310 for new construction if required when windows are replaced, is to enlarge the rough opening and/or make significant alterations to the interior wall in order to accommodate any increase in window size or lowering of a sill.

At the very least, the significant cost and design challenges of altering the rough opening or interior wall can discourage or prevent window replacement and at worst can discourage or prevent the replacement of older windows that are harder to operate or inoperable all together because of their age or poor maintenance and, that are significantly less energy efficient. When that happens, improvements to safety as well as to energy efficiency are needlessly compromised.

Furthermore and on the whole, while some bedroom windows in older homes may not provide the full clear opening that is required for new construction or may have a sill height above 44 inches, they nonetheless still provide a viable emergency and escape rescue opening which is the primary intent of the code. Replacement of these windows with the same type of operating window or other type that can provide an equal or greater clear opening than the existing window -- even if they do not fully meet the clear opening or sill height requirements of IBC Section 1029 or IRC Section 310 accordingly -- is always an improvement in safety, especially when a replacement opening can provide a larger clear opening than the existing window. Such improvements in safety should not be discouraged or prevented by overly onerous requirements for replacement windows.

This proposal will help ensure that doesn't happen by providing limited exceptions to the requirements of IBC Section 1029 and IRC Section 310 accordingly that can only be applied when certain conditions are met and that as already noted, will not result in a decrease in safety.

The requirements for new construction that emergency escape and rescue openings be provided as well as the operational requirements of IBC Section 1029 and IRC Section 310 respectively are maintained and still applicable to replacement windows.

Cost Impact: This code change proposal will not increase the cost of construction.

EB15-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

702.4 (NEW)-EB-INKS.doc

EB16 – 13

705 (NEW)

Proponent: Rebecca Morley, National Center for Healthy Housing

Add new text as follows:

SECTION 705 **CARBON MONOXIDE ALARMS**

705.1 General. Carbon monoxide alarms shall be installed in existing Group I or R occupancies in accordance with Section 1103.9 of the *International Fire Code*.

Reason: Carbon monoxide (CO) is an odorless, tasteless, invisible gas that kills more than 300 people in homes each year. Thousands more are admitted to the hospital with carbon monoxide poisoning. This is a serious issue that affects people nationwide in all regions of the country. The International Residential Code requires CO alarms for residences with fuel-fired appliances or attached garages. This change would make the IEBC consistent with the IRC.

The following states have required CO alarms in existing residences: Alaska, California, Colorado, Illinois, Massachusetts, Michigan, Minnesota, Montana, New Jersey, New York, North Carolina, Oklahoma, Oregon, Rhode Island, Vermont and Wisconsin. Deaths from CO are spread throughout the country as residents unwittingly use dangerous methods to stay warm in unusually cold weather.

Cost Impact: Yes, this code change proposal will increase the cost of property maintenance. A carbon monoxide alarm typically costs approximately \$25.

EB16-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

705 (NEW)-EB-MORLEY.doc

EB17 – 13

705.1, 905.1, 905.4 (NEW), 905.4.1 (NEW), 1005.2 (NEW), 1105 (NEW)

Proponent: Gene Boecker, Code Consultants, Inc., representing self

705.1 General. A *facility* that is altered shall comply with the applicable provisions in Sections 705.1.1 through 705.1.14, and Chapter 11 of the *International Building Code* unless it is *technically infeasible*. Where compliance with this section is *technically infeasible*, the alteration shall provide access to the maximum extent that is technically feasible. A *facility* that is constructed or altered to be accessible shall be maintained accessible during occupancy. A facility shall not be altered such that the existing accessible means of egress is reduced.

Exceptions:

1. The altered element or space is not required to be on an accessible route unless required by Section 705.2.
2. Accessible means of egress required by Chapter 10 of the *International Building Code* are not required to be added ~~provided~~ in existing buildings undergoing less than a level 3 alteration.
3. Type B dwelling or sleeping units required by Section 1107 of the *International Building Code* are not required to be provided in existing *facilities* undergoing less than a Level 3 alteration.
4. The alteration to Type A individually owned dwelling units within a Group R-2 occupancy shall meet the provisions for Type B dwelling units.

905.1 General. The means of egress shall comply with the requirements of Section 805 except as specifically required in Sections 905.2 and ~~905.3~~ through 905.4.

905.4 Accessible means of egress. Not less than one accessible means of egress shall be provided in accordance with Section 905.4.1 and Section 1007 of the International Building Code in alterations affecting an area containing a primary function and in additions.

Exceptions:

1. Level 1 and Level 2 alterations.
2. Historic buildings.
3. Accessible means of egress is not required to exceed 20 percent of the costs of the alterations including any costs associated with compliance for Section 410.7. Where the costs to provide accessibility cannot accommodate compliance with both this Section and Section 410.7, Section 410.7 shall take precedence.
4. Alterations limited solely to windows, hardware, operating controls, electrical outlets and signs.
5. Alterations limited solely to mechanical systems, electrical systems, installation or alteration of fire protection systems and abatement of hazardous materials.
6. Alterations undertaken for the primary purpose of increasing the accessibility of a facility.
7. Altered areas limited to Type B dwelling and sleeping units

905.4.1 Means of egress through an existing building. Where the accessible means of egress from an portion of a building being alteration or addition requires occupants to egress through portions of existing building, compliance with Section 1007 of the International Building Code is required through the existing building, unless technically infeasible. Where compliance with this provision is technically infeasible, the accessible means of egress through the existing building shall provide access to the maximum extent technically feasible.

1005.2 Accessible means of egress. Where a change of occupancy includes a Level 3 Alteration to an area containing a primary function, at least one accessible means of egress shall be provided in compliance with Section 905.

SECTION 1105 **MEANS OF EGRESS**

1105.1 General. The means of egress shall comply with the requirements of Section 905.4.1 and Chapter 10 of the *International Building Code*.

Reason: During last code change cycle, a proposal similar to this was presented. The committee felt it was too confusing and that it did not address the concept of disproportionate cost effectively. This proposal seeks to address those issues more clearly. Where possible the language was changed to be uniform among the various codes and sections.

Common sense should dictate that where major alterations occur consideration for at least one accessible means of egress should be provided. Additionally, the simple idea that an accessible means of egress should be intentionally denied to a segment of the population does not seem appropriate. As the codes now stand, a building can be completely gutted with only the facades remaining and no accessible means of egress must be provided.

It is important to remember that the new construction requirements in the IBC only require a maximum of two accessible means of egress as noted in Section 1007.1 (assuming travel distance compliance is accommodated).

With the deletion of Chapter 34 from the IBC it is incumbent on the IEBC to address these issues.

705.1: A change was made to the second exception to indicate that means of egress requirements for existing building are not required for lesser alterations, similar to exception #3.

905.1: A change is made to address the added section.

905.4: A new section is added to specifically address accessible means of egress. Rather than the blanket statement in Section 1007.1 of the building code, this section will address the scope and extent of work necessary to address accessible means of egress for existing buildings. It directs the code user to Section 1007 for the technical requirements when an accessible means of egress is necessary as well as clearly delineate that when an alteration occurs affecting an area containing a primary function, an accessible means of egress must be provided. The threshold is limited to alterations affecting a primary function because that threshold relates to the importance of changes to an area and is understood due to its relationship with the Federal accessibility regulations for the past 20 years. The intent is to provide at least one accessible means of egress.

905.4, exception #1: Alterations with some magnitude should address accessible means of egress; if the alteration is relatively small then there is reason to limit the requirement. Even if the accessible means of egress would not be a disproportionate cost (exception #2), in small alterations the area required to create the accessible means of egress may be disproportionate to the space allowed for the alteration. If so, it may "steal" too much space from an otherwise small area and would not be appropriate.

905.4, exception #2: The exception makes it clear that an accessible means of egress is not required for alterations to historic buildings. To do so, may alter the historic character. While an accessible means of egress should be provided wherever possible, the exception recognizes that in historic buildings the ability to make the necessary changes to comply may be detrimental to the historic integrity.

905.4, exception #3: Existing buildings come in all shapes and sizes and the work proposed for creating an accessible means of egress can be a small part or major portion of the effort. This exception identifies that and uses the same 20% rule for the accessible route relative to the primary use area. The exception also clarifies that where funds cannot provide the accessible route and an accessible means of egress, it is more important to provide the accessible route. This maintains consistency with the Federal requirements for alterations affecting an area containing a primary function.

905.4, exceptions #4, #5, #6, #7: These are the same as exceptions #2, #3, #4 and #5 in Section 705.2 for alterations affecting an area containing a primary function. These are included here for consistency.

905.4.1: If an addition is designed such that the means of egress must enter the existing building then the general rule is that the egress design in the existing building must meet the requirements for egress as it passes through the existing building. This is simply the continuation of the means of egress from the addition for egress width, panic hardware (as applicable) and similar concerns. The same should be true for the design of the accessible means of egress. If one of the accessible egress paths leads through the existing building, it too needs to meet/continue the level of protection as designed in the addition. The limitation to this is that if the effort to make the existing means of egress accessible is "technically infeasible" then work should be done to what is possible. One example of this may be making sure that the slopes along the egress path in the existing building's corridor are proper even if the width cannot be altered to allow the proper maneuverability approach to the exit door.

1005.2: A change of occupancy by itself is not sufficient to trigger the requirement for an accessible means of egress. However, if a change in occupancy also includes a Level 3 Alteration, then it should be subject to the same requirements as any other Level 3 Alteration. This provision is added as a clarification to that effect.

1105.1: Chapter 11 (Additions) does not address means of egress specifically. A reference to compliance with the means of egress provisions in Chapter 10 of the IBC is included. This is similar to the first sentence in Section 402.1 which requires additions to comply with the requirements of the IBC for new construction but more specific as is done for the "non-prescriptive" methods. The added language is inserted before the accessibility section to make it consistent with its placement in other chapters.

The codes identify the minimums necessary for life safety. These proposed changes provide the disabled community with similar levels of life safety to the general public and still sets reasonable thresholds based on the extent of work for the project. With the adoption of the new 2010 ADA Standards for Accessible Design, it is clear that the IBC will set the standard for accessible means of egress. This organization has a responsibility to act in the best interests of the general public in all its diversity. Where major changes are proposed to an existing building due to a large alteration or an addition, it should be the desire of the ICC to incorporate appropriate accessible means of egress where possible.

Cost Impact: The code change proposal will increase the cost of construction in many situations but may have no effect in others.

Cost Impact Discussion: It is not easy to address what costs could be affecting this due to the myriad possible configurations for a building. A building that is a single story at grade may have no additional cost. Because an accessible entrance would be required, it would function as the accessible means of egress. Hence, a single story building with a total internal renovation may be unaffected cost-wise by this proposal.

The main costs are those involving an elevator of adequate size on emergency standby power and a two-way communications system. If the elevator is too small, the costs to alter that would be disproportionate and it would not be required according to IEBC Section 905.4, exception #3.

At the opposite end of the spectrum could be a nine story high-rise building that is being gutted on five floors. It would be required to have an accessible route to the upper floors. The IFC would require the emergency power for fire fighter operation so that cost for that part of the accessible means of egress is covered. In that situation only the two-way communication systems costs would apply.

Buildings without elevators would likely similarly fall into the category of disproportionate costs since the addition of an elevator can be costly. Moreover, the accessible means of egress is tied into alterations that affect an area containing a primary function. This already has accessibility requirements for access such as toilet room and accessible route renovations. If the costs to add an elevator are within the 20 percent cap but the cost to add emergency standby power would be beyond the 20 percent, the exceptions in IEBC Section 905.4, exception #3 make it clear that the costs for access take precedence over the costs for egress and that combined they are not required to exceed the 20 percent figure.

In many cases the 20 percent cap will be met by the required access features and there may be no funds remaining for an accessible egress. The important thing is that we should recognize the need to provide a means of egress for all of the occupants within the building to the greatest extent possible. No definitive numbers can be provided because the variations are so many. This discussion attempts to address only the possibilities.

EB17-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1007.1 #1-E-BOECKER.doc

EB18 – 13

705.1.6

Proponent: Carl Baldassarra, P.E., Chair, ICC Code Technology Committee

Delete without substitution as follows:

705.1.6 Performance areas. ~~Where it is technically infeasible to alter performance areas to be on an accessible route, at least one of each type of performance area shall be made accessible.~~

Reason: The exception for performance area does not make a lot of sense because there are typically not multiple performance areas of the same type. If access to the stage or pit is technically infeasible, how would you do even one? A correlative proposal was also been proposed and approved for IBC 3411.8.6 and IEBC 410.8.6.

The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

Cost Impact: This code change proposal will not increase the cost of construction.

EB18-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

705.1.6-EB-BALDASSARRA-CTC.doc

EB19 – 13

705.1.8, 806.3

Proponent: Carl Baldassarra, P.E., Chair, ICC Code Technology Committee

Revise as follows:

705.1.8 Accessible dwelling or sleeping units. Where Group I-1, I-2, I-3, R-1, R-2 or R-4 dwelling or sleeping units are being altered, the requirements of Section 1107 of the *International Building Code* for Accessible units and Chapter 9 of the *International Building Code* for visible alarms apply only to the quantity of the spaces being altered.

Revise as follows:

806.3 Accessible dwelling units and sleeping units. Where Group I-1, I-2, I-3, R-1, R-2 or R-4 dwelling or sleeping units are being added, the requirements of Section 1107 of the *International Building Code* for Accessible units and Chapter 9 of the *International Building Code* for visible alarms apply only to the quantity of spaces being added.

Reason: Alarms are required to be altered only when the system is being altered. The language in IEBC should be deleted to be consistent with this revision previously made to IBC 3411.8.7. (ADA 223.1.1 & 224.1.1)

IBC 3411.8.7 (IEBC [B] 410.8.7) Accessible dwelling or sleeping units. Where Group I-1, I-2, I-3, R-1, R-2 or R-4 *dwelling or sleeping units* are being altered or added, the requirements of Section 1107 for *Accessible* units apply only to the quantity of spaces being altered or added.

The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

Cost Impact: This code change proposal will not increase the cost of construction.

EB19-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

705.1.8-EB-BALDASSARRA-CTC.doc

EB20 – 13

705.1.10

Proponent: Carl Baldassarra, P.E., Chair, ICC Code Technology Committee

Revise as follows:

705.1.10 Toilet rooms. Where it is *technically infeasible* to alter existing toilet and bathing rooms to be *accessible*, an *accessible* family or assisted-use toilet or bathing room constructed in accordance with Section 1109.2.1 of the International Building Code is permitted. The family or assisted-use toilet or bathing room shall be located on the same floor and in the same area as the existing toilet or bathing rooms. At the inaccessible toilet and bathing rooms, directional signs indicating the location of the nearest family or assisted-use toilet room or bathing room shall be provided. These directional signs shall include the International Symbol of Accessibility and sign characters shall meet the visual character requirements in accordance with ICC A117.1.

Reason: This proposal will coordinate with ADA 216.8. The intent of this proposal is to add directional signage requirements for family/assisted-use bathrooms when the existing bathrooms are not fully accessible. The same proposal was made and approved for IBC Section 3411.8.11/IEBC 410.8.11.

The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

Cost Impact: This code change proposal will not increase the cost of construction.

EB20-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

705.1.10-EB-BALDASSARRA-CTC.doc

EB21 – 13

705.1, 705.1.15 (NEW)

Proponent: Carl Baldassarra, P.E., Chair, ICC Code Technology Committee
(cbaldassarra@rjagroup.com)

Revise as follows:

705.1 General. A *facility* that is altered shall comply with the applicable provisions in Sections 705.1.1 through ~~705.1.14~~ 705.1.15, and Chapter 11 of the *International Building Code* unless it is *technically infeasible*. Where compliance with this section is *technically infeasible*, the alteration shall provide access to the maximum extent that is technically feasible.

A *facility* that is constructed or altered to be accessible shall be maintained accessible during occupancy.

Exceptions:

1. The altered element or space is not required to be on an accessible route unless required by Section 705.2.
2. Accessible means of egress required by Chapter 10 of the *International Building Code* are not required to be provided in existing *facilities*.
3. Type B dwelling or sleeping units required by Section 1107 of the *International Building Code* are not required to be provided in existing *facilities* undergoing less than a Level 3 *alteration*.
4. The alteration to Type A individually owned dwelling units within a Group R-2 occupancy shall meet the provisions for Type B dwelling units.

705.1.15 Amusement rides. Where the structural or operational characteristics of an amusement ride are altered to the extent that the amusement ride's performance differs from that specified by the manufacturer or the original design, the amusement ride shall comply with requirements for new construction in the International Building Code, Section 1110.4.7.

Reason: The accessibility requirements for new construction for Amusement rides have been proposed to the IBC as part of a coordination effort with the 2010 ADA Standard for Accessible Design and 2009 ICC A117.1 Chapter 11, Recreation. The overall intent is to provide access to recreational facilities so that persons with mobility impairments can participate to the best of their ability. The requirements are not intended to change any essential aspects of that recreational activity.

The intent of this public comment is to match the provisions for existing amusement rides proposed and approved for IBC Chapter 34 and IEBC Chapter 4. This way the provisions for existing buildings will be consistent between Chapter 4 and 7 of the IEBC. Technical criteria can be found in the 2009 edition of the ICC A117.1, Section 1102 and includes accessible routes, load and unload areas, wheelchair spaces on rides, seats for transfer, and transfer devices.

The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

Cost Impact: This code change proposal will not increase the cost of construction. This will be required by the 2010 ADA Standard for Accessible Design.

EB21-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

705.1-EB-BALDASSARRA-CTC.doc

EB22 – 13

705.2

Proponent: Hope Reed, New Mexico Governor's Commission on Disability (hope.reed@state.nm.us)

Revise as follows:

705.2 Alterations affecting an area containing a primary function. Where an *alteration* affects the accessibility to a, or contains an area of, *primary function*, the route to the *primary function* area shall be accessible. The accessible route to the *primary function* area shall include toilet facilities ~~or~~ and drinking fountains serving the area of *primary function*.

Exceptions:

1. The costs of providing the accessible route are not required to exceed 20 percent of the costs of the alterations affecting the area of *primary function*.

(Portions of text not shown remain unchanged)

Reason: See this same change for IEBC 410.7 and IBC 3411.7

Modify one word to comply with **2010 ADA Standards** section 35.151(b)(4) Path of travel, and comply with **2010 ADA**

Standards section 36.403(a)(1) Path of travel.

People with disabilities need bathroom renovations and drinking fountain renovations along the "Path of Travel." When there is a choice, the easier solution is to change just the drinking fountains and look no further. The restroom renovations can be ignored. This does not benefit people with disabilities.

Those old restrooms need to be fixed and when full accessibility is not possible, some attempt at accessibility will provide a benefit to many. Widening the restroom door, installing a raised toilet, installing grab bars, and removing toilet partitions can be easy access renovations to comply with the intent of **2010 ADA**. Restroom and drinking fountain renovations need to be considered on an equal basis to comply with IEBC 705.1 where it states, "*alterations* shall provide access to the maximum extent that is technically feasible."

Cost Impact: The cost will not exceed 20% of the cost for the alteration as stated in IEBC 705.2 Exception 1. Renovations should include equal consideration of both restroom renovations and drinking fountain renovations.

The IEBC needs to help building code officials bring alteration projects closer to the 20% dollar amount. Restroom and drinking fountain renovations need to be considered on an equal basis to comply with IEBC 705.1 where it states, "*alterations* shall provide access to the maximum extent that is technically feasible."

EB22-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

705.2-EB-REED.doc

EB23 – 13

202, 706 (NEW)

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee

Add new definitions as follows:

SECTION 202

GENERAL DEFINITIONS

REROOFING. The process of recovering or replacing an existing roof covering. See “Roof recover” and “Roof replacement.”

ROOF RECOVER. The process of installing an additional roof covering over a prepared existing roof covering without removing the existing roof covering.

ROOF REPAIR. Reconstruction or renewal of any part of an existing roof for the purposes of its maintenance.

ROOF REPLACEMENT. The process of removing the existing roof covering, repairing any damaged substrate and installing a new roof covering.

Add new text as follows:

SECTION 706

REROOFING

706.1 General. Materials and methods of application used for recovering or replacing an existing roof covering shall comply with the requirements of Chapter 15 of the International Building Code.

Exception: Reroofing shall not be required to meet the minimum design slope requirement of one-quarter unit vertical in 12 units horizontal (2-percent slope) in Section 1507 of the International Building Code for roofs that provide positive roof drainage.

706.2 Structural and construction loads. Structural roof components shall be capable of supporting the roof-covering system and the material and equipment loads that will be encountered during installation of the system.

706.3 Recovering versus replacement. New roof coverings shall not be installed without first removing all existing layers of roof coverings down to the roof deck where any of the following conditions occur:

- 1. Where the existing roof or roof covering is water soaked or has deteriorated to the point that the existing roof or roof covering is not adequate as a base for additional roofing.**
- 2. Where the existing roof covering is wood shake, slate, clay, cement or asbestos-cement tile.**
- 3. Where the existing roof has two or more applications of any type of roof covering.**

Exceptions:

- 1. Complete and separate roofing systems, such as standing-seam metal roof systems, that are designed to transmit the roof loads directly to the building's structural system and that do not rely on existing roofs and roof coverings for support, shall not require the removal of existing roof coverings.**
- 2. Metal panel, metal shingle and concrete and clay tile roof coverings shall be permitted to be installed over existing wood shake roofs when applied in accordance with Section 706.4.**

3. The application of a new protective coating over an existing spray polyurethane foam roofing system shall be permitted without tear-off of existing roof coverings.
4. Where the existing roof assembly includes an ice barrier membrane that is adhered to the roof deck, the existing ice barrier membrane shall be permitted to remain in place and covered with an additional layer of ice barrier membrane in accordance with Section 1507 of the International Building Code.

706.4 Roof recovering. Where the application of a new roof covering over wood shingle or shake roofs creates a combustible concealed space, the entire existing surface shall be covered with gypsum board, mineral fiber, glass fiber or other approved materials securely fastened in place.

706.5 Reinstallation of materials. Existing slate, clay or cement tile shall be permitted for reinstallation, except that damaged, cracked or broken slate or tile shall not be reinstalled. Existing vent flashing, metal edgings, drain outlets, collars and metal counterflashings shall not be reinstalled where rusted, damaged or deteriorated. Aggregate surfacing materials shall not be reinstalled.

706.6 Flashings. Flashings shall be reconstructed in accordance with approved manufacturer's installation instructions. Metal flashing to which bituminous materials are to be adhered shall be primed prior to installation.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

1. This language is copied from Section 1510 of the International Building Code and should be in the IEBC. Reroofing occurs on existing buildings.
2. The provisions for reroofing should be in the existing building code.

Cost Impact: This code change proposal will not increase the cost of construction.

EB23-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

NNN.NN-NAME

EB24 – 13

803.1

Proponent: David S. Collins, FAIA, The Preview Group, Inc., representing The American Institute of Architects

Revise as follows:

803.1 Scope. The requirements of this section are limited to ~~work areas in which Level 2 alterations are being performed, and shall apply beyond the work area where specified.~~ alterations per Section 504.1.

Reason: Section 504.1 describes the scope of Level 2 alterations. Chapter 8 simply enumerates the items required for such alterations to conform to the code, and isn't required to restate what is included. The entire section should be eliminated, but for simplicity we are only referencing Section 504.1 for a scope, removing any conflict or confusion in the code.

Cost Impact: This code change proposal will not increase the cost of construction.

EB24-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

803.1-EB-COLLINS.doc

EB25 – 13

803.3, 803.3.1, 803.3.2

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Healthcare (John.Williams@DOH.WA.GOV) and Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee (cbaldassarra@rjagroup.com)

Revise as follows:

~~803.3 Smoke barriers. Smoke barriers in Group I-2 occupancies shall be installed where required by Sections 803.3.1 and 803.3.2~~

~~803.3.1 Compartmentation.~~ **803.3 Smoke Compartments.** In Group I-2 occupancies where the work area is on a story used for sleeping rooms for more than 30 patients, the story shall be divided into not less than two compartments by smoke barrier walls complying with Section 803.3.2 such that each compartment does not exceed 22,500 square feet (2093 m²) and the travel distance from any point to reach a door in the required smoke barrier shall not exceed 200 feet (60 960 mm). in accordance with Section 407.5 of the International Building Code as required for new construction.

Exception. Where neither the length nor the width of the smoke compartment exceeds 150 feet (45 720 mm), the travel distance to reach the smoke barrier door shall not be limited.

~~803.3.2 Fire-resistance rating. The smoke barriers shall be fire resistance rated for 30 minutes and constructed in accordance with the International Building Code.~~

Reason: This proposed change is a joint proposal from the ICC Ad Hoc Committee on Healthcare (AHC) and the Code Technology Committee (CTC). The scope of the AHC deals with Group I-2 hospitals (now Group I-2 Condition 2 as a result of approved code change G257-12) and the scope of the CTC's investigation of the area of study entitled "Care Facilities" addresses Group I-1 and Group I-2 Condition 1 (nursing homes).

Group I-2 hospitals and nursing homes are a unique environment which employ the defend in place strategy. When such an occupancy undergoes a substantial alteration, which is the case with a Level 2 Alteration where the space can be entirely configured, such work areas should be provided with a higher degree of fire safety. With a reference to Section 407.5 of the IBC, the current IEBC compartment size provisions (maximum 22,500 square feet in area and maximum 200 of travel) are maintained. In addition, by virtue of a reference to the IBC, a higher level of fire safety will be provided, as follows:

- The travel distance within the compartment will be limited to 200 feet while the current IEBC provides an exception which literally allows unlimited travel as a function of the physical size of the space.
- The smoke barrier rating will not be permitted to be reduced to 30 minutes, but rather will be required to meet the new construction requirements of the IBC which require a one hour rating.

This is a joint proposal submitted by the ICC Ad Hoc Committee for Healthcare and the ICC Code Technology Committee.

The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering, a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>.

The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. This proposal is submitted by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty-five meetings - all open to the public. In 2012, three of the 25 face-to-face meetings were held. In addition to the CTC meetings, the CTC established Study Groups (SG) of interested parties for each of the areas of study. These SG's are responsible for reviewing the available information and making recommendations to the CTC. All totaled, the SG's held over 70 conference calls in 2012.

Cost Impact: The code change proposal will not increase the cost of construction.

EB25-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

803.3-EB-BALDASSARRA-WILLIAMS-ADHOC.doc

EB26 – 13

803.6 (NEW)

Proponent: Robert J. Davidson, Davidson Code Concepts, LLC, representing self (rjd@davidsoncodeconcepts.com) and David S. Collins, FAIA, The Preview Group, Inc. (dcollins@preview-group.com), representing The American Institute of Architects

Add new text as follows:

803.6 Fire-resistance ratings. Where approved by the code official, buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 of the *International Building Code* has been added, and the building is now sprinklered throughout, the required fire-resistance ratings of building elements and materials shall be permitted to meet the requirements of the current building code. The building is required to meet the other applicable fire protection requirements of Chapter 9 of the *International Building Code*.

Plans, investigation and evaluation reports, and other data shall be submitted indicating which building elements and materials the applicant is requesting the code official to review and approve for determination of applying the current building code fire-resistance ratings. Any special construction features, conditions of occupancy, approved modifications or approved alternative materials, design and methods of construction, and equipment applying to the building that impact required fire-resistance ratings shall be identified in the evaluation reports submitted.

Reason: The topic of allowing the ability to apply sprinkler protection trade-offs that exist in the current code has been a matter of discussion in the code development arena for some time. How to apply the allowance for a potential reduction in fire-resistance ratings and in what code they belong have been discussed without a consensus.

The concept is that once a building without sprinkler protection has been sprinklered throughout, whether due to renovations or retroactive code application, the designer should be permitted to allow the same fire resistance rating provisions for new construction in an existing sprinklered building. The issue is how to provide for that application of code and ensure a proper review by the building code official is performed to ensure there are no impediments to granting an approval that may result in the reduction of existing levels of protection.

This proposal attempts to provide for that process by adding a new section to the IEBC under Section 806 Building Elements and Materials. The suggested language provides that once an existing building is sprinklered throughout and meets the other fire protection requirements of Chapter 9 of the IBC, plans, investigation and evaluation reports, and other data can be submitted seeking approval of the code official for the assignment of the new fire-resistance ratings which might me a reduction, or potentially an increase.

The suggested language also requires that any special construction features, conditions of occupancy, approved modifications or approved alternative materials, design and methods of construction, and equipment applying to the building that impact required fire-resistance ratings shall be identified in the evaluation reports submitted. This is to ensure special conditions are identified that may prevent a reduction in fire-resistance ratings.

Cost Impact: This code change proposal will not increase the cost of construction.

EB26-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

803.6 (NEW)-EB-DAVIDSON.doc

EB27 – 13

804.2.1

Proponent: Jeffrey M. Hugo, CBO, National Fire Sprinkler Association (hugo@nfsa.org)

Revise as follows:

804.2.1 High-rise buildings. In high-rise buildings, work areas ~~that have exits or corridors shared by more than one tenant or that have exits or corridors serving an occupant load greater than 30~~ shall be provided with automatic sprinkler protection ~~in~~ throughout the entire *work area* where the *work area* is located on a floor that has ~~a sufficient sprinkler water supply system from an existing standpipe or a sprinkler riser serving that floor.~~

Reason: This change would require a tenant doing Level 2 or 3 alterations to connect to the existing standpipe/sprinkler riser and install fire sprinklers throughout the work area. Currently, the IEBC only requires fire sprinklers when multiple tenants are in the same work area, use the same corridors or when the corridor exceeds 30 occupants.

Cost Impact: This code change proposal will not increase the cost of construction.

EB27-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

804.2.1-EB-HUGO.doc

EB28 – 13

804.2.1.1

Proponent: Jeffrey M. Hugo, CBO, National Fire Sprinkler Association (hugo@nfsa.org)

Revise as follows:

804.2.1.1 Supplemental automatic sprinkler system requirements. Where the *work area* on any floor exceeds 50 percent of that floor area, Section 804.2.1 shall apply to the entire floor on which the *work area* is located.

Exception: Occupied ~~T~~tenant spaces that are entirely outside the *work area*.

Reason: When the entire floor is sprinklered according to this section, a tenant space that is entirely outside the work area is exempt from retrofitting the space with fire sprinklers. Requiring a tenant that is outside the work scope to install fire sprinklers could bear undue financial burdens and disruptions. However, if the adjacent tenant space(s) are vacant or unoccupied during the Level 2 or 3 alterations, then the exception should not apply.

Cost Impact: This code change proposal will not increase the cost of construction.

EB28-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

804.2.1.1-EB-HUGO.doc

EB29 – 13

804.2.2

Proponent: Dave Frable, U.S. General Services Administration Public Buildings Service
(dave.frable@gsa.gov)

Revise as follows:

804.2.2 Groups A, B, E, F-1, H, I, M, R-1, R-2, R-4, S-1 and S-2. In buildings with occupancies in Groups A, B, E, F-1, H, I, M, R-1, R-2, R-4, S-1 and S-2, work areas that have exits or corridors shared by more than one tenant or that have exits or corridors serving an occupant load greater than 30 shall be provided with automatic sprinkler protection where all of the following conditions occur:

1. The *work area* is required to be provided with automatic sprinkler protection in accordance with the *International Building Code* as applicable to new construction; and
2. The *work area* exceeds 50 percent of the floor area.

Exceptions:

1. Work areas in Group R occupancies three stories or less in height.
2. If the building does not have sufficient municipal water supply for design and installation of a fire sprinkler system available ~~to the floor without installation of a new fire pump, at the site~~ work areas shall be protected by an automatic smoke detection system throughout all occupiable spaces other than sleeping units or individual dwelling units that activates the occupant notification system in accordance with Sections 907.4, 907.5 and 907.6 of the *International Building Code*.

Reason: The intent of this code change is to attempt to address a concern that the municipal water supply must be available at the floor where the work area is located without the installation of a new fire pump. This code change revises the subject text such that if a municipal water supply is available at the building site, and the work area exceeds 50% of the floor area, the installation of a new fire pump if needed to supplement the necessary flow and pressure for the sprinkler system should not be the deciding factor to address the need to increase the current degree of public safety in existing buildings.

Cost Impact: This code change proposal will increase the cost of construction.

EB29-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

804.2.2-EB-FRABLE.doc

EB30 – 13

804.2.3

Proponent: Dave Frable, U.S. General Services Administration, Public Buildings Service
(dave.frable@gsa.gov)

Revise as follows:

804.2.3 Windowless stories. Work located in a windowless story, as determined in accordance with the *International Building Code*, shall be sprinklered where the *work area* is required to be sprinklered under the provisions of the *International Building Code* for newly constructed buildings and the building has a sufficient municipal water supply ~~without installation of a new fire pump~~ for design and installation of a fire sprinkler system available at the site.

Reason: The intent of this code change is to attempt to address a concern that the municipal water supply must be available at the floor where the work area is located without the installation of a new fire pump. This code change revises the subject text such that if a municipal water supply is available at the building site, and the work area exceeds 50% of the floor area, the installation of a new fire pump if needed to supplement the necessary flow and pressure for the sprinkler system should not be the deciding factor to address the need to increase the current degree of public safety in existing windowless buildings.

Cost Impact: This code change proposal will increase the cost of construction.

EB30-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

804.2.3-EB-FRABLE.doc

EB31 – 13

804.2.3, 804.2.4

Proponent: Jeffrey M. Hugo, CBO, National Fire Sprinkler Association (hugo@nfsa.org)

Revise as follows:

804.2.3 Windowless stories. Work located in a windowless story, as determined in accordance with the *International Building Code*, shall be sprinklered where the *work area* is required to be sprinklered under the provisions of the *International Building Code* for newly constructed buildings and the building has a sufficient municipal water supply ~~without installation of a new fire pump.~~ for design of an automatic sprinkler system.

804.2.4 Other required automatic sprinkler systems. In buildings and areas listed in Table 903.2.11.6 of the *International Building Code*, *work areas* that have exits or corridors shared by more than one tenant or that have exits or corridors serving an occupant load greater than 30 shall be provided with an automatic sprinkler system under the following conditions:

1. The *work area* is required to be provided with an automatic sprinkler system in accordance with the *International Building Code* applicable to new construction; and
2. The building has sufficient municipal water supply for design of an automatic sprinkler system, ~~available to the floor without installation of a new fire pump.~~

Reason: The judgment on whether to use a fire pump or not can be easily altered due to the cost and providing the space by the design professional or the building owner. A building owner and the design professional sometimes cannot see the need for a sprinkler system and by the current language have an easy way out of providing an essential life safety operation. Having a sprinkler system in an existing building will provide a higher level of safety for the occupants and fire fighters. The IEBC doesn't incorporate all the safety measures as a new building in the IBC, meaning, many of the active and passive measures are eliminated in the IEBC for architectural, structural, aesthetic, and economic reasons.

This section covers a broad range of occupancies and already provides economic relief to structures outside of a municipal water system, saving several thousands of dollars in extending a water main and/or adding water storage tanks. By giving the owner another choice to eliminate a fire sprinkler system and saving more money, could cost in lives and property down the road. The code official has to rely on the word of the owner on the necessity of a fire pump in the current language. The truth is by adding a fire sprinkler system it will usually pay for itself in a range of 7-10+ years by insurance premium discounts, tax depreciation, business downtime in the event of a fire, and potential litigation in the event of death and injuries.

The necessity of a fire pump only comes into the equation when the hydraulic calculations are performed. In many cases pipe sizes and design will determine whether or not a fire pump is needed. For example, if a building owner has sufficient water supply at the street, but decides that he/she wants all 1 inch pipe for all four stories a fire pump would be needed. In this case water pressure is crucial and a fire pump would add the additional pressure. Anyone will tell you the owner is being unreasonable and this is the crux for removing the proposed language out of this section.

The code official needs this language out to insure the safety of lives and property in their jurisdiction and basing a life safety system solely on an economic decision is unwise. The current language is a loophole for dishonesty and a code official does not need any more of this in their day to day lives.

Cost Impact: This code change proposal will not increase the cost of construction.

EB31-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

804.2.3-EB-HUGO.doc

EB32 – 13

804.2.4

Proponent: Dave Frable, U.S. General Services Administration Public Buildings Service
(dave.frable@gsa.gov)

Revise as follows:

804.2.4 Other required automatic sprinkler systems. In buildings and areas listed in Table 903.2.11.6 of the *International Building Code*, *work areas* that have exits or corridors shared by more than one tenant or that have exits or corridors serving an occupant load greater than 30 shall be provided with an automatic sprinkler system under the following conditions:

1. The *work area* is required to be provided with an automatic sprinkler system in accordance with the *International Building Code* applicable to new construction; and
2. The building has sufficient municipal water supply for design and installation of an automatic sprinkler system available ~~to the floor without installation of a new fire pump.~~ at the site.

Reason: The intent of this code change is to attempt to address a concern that the municipal water supply must be available at the floor where the work area is located without the installation of a new fire pump. This code change revises the subject text such that if a municipal water supply is available at the building site, and the work area exceeds 50% of the floor area, the installation of a new fire pump if needed to supplement the necessary flow and pressure for the sprinkler system should not be the deciding factor to address the need to increase the current degree of public safety in existing buildings.

Cost Impact: This code change proposal will increase the cost of construction.

EB32-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

804.2.4-EB-FRABLE.doc

EB33 – 13

804.4.1.3

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Healthcare (John.Williams@DOH.WA.GOV) and Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee (cbaldassarra@rjagroup.com)

Revise as follows:

804.4.1 Occupancy requirements. A fire alarm system shall be installed in accordance with Sections 804.4.1.1 through 804.4.1.7. Existing alarm-notification appliances shall be automatically activated throughout the building. Where the building is not equipped with a fire alarm system, alarm-notification appliances within the *work area* shall be provided and automatically activated.

Exceptions:

1. Occupancies with an existing, previously approved fire alarm system.
2. Where selective notification is permitted, alarm notification appliances shall be automatically activated in the areas selected.

804.4.1.3 Group I-2. A fire alarm system shall be installed in work areas of Group I-2 occupancies as required by the International Fire Code for ~~existing~~ new Group I-2 occupancies.

Reason: This proposed change is a joint proposal from the ICC Ad Hoc Committee on Healthcare (AHC) and the Code Technology Committee (CTC). The scope of the AHC deals with Group I-2 hospitals (now Group I-2 Condition 2 as a result of approved code change G257-12) and the scope of the CTC's investigation of the area of study entitled "Care Facilities" addresses Group I-1 and Group I-2 Condition 1 (nursing homes).

This section in the IEBC refers you to the IFC for fire alarm requirements in existing buildings undergoing a Level 2 Alteration. Section 1103.7.3 of the IFC refers back to the new construction requirements of Section 907.2.6.2. This proposal removes the circuitous references by stipulating that the fire alarm system needs to be installed as required for new construction.

This is a joint proposal submitted by the ICC Ad Hoc Committee for Healthcare and the ICC Code Technology Committee.

The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering, a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>.

The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. This proposal is submitted by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty-five meetings - all open to the public. In 2012, three of the 25 face-to-face meetings were held. In addition to the CTC meetings, the CTC established Study Groups (SG) of interested parties for each of the areas of study. These SG's are responsible for reviewing the available information and making recommendations to the CTC. All totaled, the SG's held over 70 conference calls in 2012.

Cost Impact: This code change proposal will not increase the cost of construction.

EB33-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

804.4.1.3-EB-BALDASSARRA-WILLIAMS-ADHOC.doc

EB34 – 13

805.3.1.1

Proponent: Maureen Traxler, City of Seattle, representing Seattle Dept. of Planning & Development
(Maureen.traxler@seattle.gov)

Revise as follows:

805.3.1.1 Single-exit buildings. Only one exit is required from buildings and spaces of the following occupancies:

1. In Group A, B, E, F, M, U and S occupancies, a single exit is permitted in the story at the level of exit discharge when the occupant load of the story does not exceed 50 and the exit access travel distance does not exceed 75 feet (22 860 mm).
2. Group B, F-2, and S-2 occupancies not more than two stories in height that are not greater than 3,500 square feet per floor (326 m²), when the exit access travel distance does not exceed 75 feet (22 860 mm). The minimum fire-resistance rating of the exit enclosure and of the opening protection shall be 1 hour.
3. Open parking structures where vehicles are mechanically parked.
4. In Group R-4 occupancies ~~community residences for the developmentally disabled~~, the maximum occupant load excluding staff is 12.

(Portions to text not shown remain unchanged)

Reason: The term “community residence for the developmentally disabled” is a term not used by many jurisdictions. Group R-4 seems to be the term used in the International Codes that most closely resembles it. Community residences are defined in part by the State of New Jersey as providing “residential services for up to 16 developmentally disabled persons, including group homes, supervised apartments, and supportive living”; Group R-4 is defined in the IBC as “...buildings, structures or portions thereof for more than five but not more than 16 persons, excluding staff, who reside on a 24-hour basis in a supervised residential environment and receive *custodial care*...” Examples of R-4 occupancies include assisted living facilities, group homes, and residential board and custodial care facilities.

Cost Impact: The code change proposal will not increase the cost of construction.

EB34-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

805.3.1.1-EB-TRAXLER.doc

EB35 – 13

805.3.1.1

Proponent: Steve Thomas, Colorado Code Consulting, LLC (sthomas@coloradocode.net)

Revise as follows:

805.3.1.1 Single-exit buildings. Only one exit is required from buildings and spaces of the following occupancies:

1. In Group A, B, E, F, M, U and S occupancies, a single exit is permitted in the story at the level of exit discharge when the occupant load of the story does not exceed 50 and the exit access travel distance does not exceed 75 feet (22 860 mm).
2. Group B, F-2, and S-2 occupancies not more than two stories in height that are not greater than 3,500 square feet per floor (326 m²), when the exit access travel distance does not exceed 75 feet (22 860 mm). The minimum fire-resistance rating of the exit enclosure and of the opening protection shall be 1 hour.
3. Open parking structures where vehicles are mechanically parked.
4. In community residences for the developmentally disabled, the maximum occupant load excluding staff is 12.
5. Groups R-1 and R-2 not more than ~~two~~ three stories in height, when there are not more than four dwelling units per floor and the exit access travel distance does not exceed ~~50 125 feet (15 240 mm)~~ 38,100 mm. The minimum fire-resistance rating of the exit enclosure and of the opening protection shall be 1 hour. Each dwelling unit shall be provided with emergency escape and rescue openings in accordance with Section 1029 of the International Building Code.

(Portions of text not shown remain unchanged)

Reason: This change is intended to create consistency between the IEBC and the IBC. The travel distances for Group R-2 occupancies in Table 1021.2(1) were changed in the 2012 IBC. This change is consistent with that change. It eliminates any potential conflicts between the codes. We have also added the requirement for emergency escape and rescue openings to the section to be consistent with the footnote a of IBC Table 1021.2(1) for consistency as well.

Cost Impact: The code change proposal will not increase the cost of construction. It will reduce the cost of construction.

EB35-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

805.3.1.1-EB-THOMAS

EB36 – 13

805.3.1.2

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Healthcare
(John.Williams@DOH.WA.GOV)

Revise as follows:

805.3.1.2 Fire escapes required. For other than Group I-2 Condition 2, where ~~When~~ more than one exit is required, an existing or newly constructed fire escape complying with Section 805.3.1.2.1 shall be accepted as providing one of the required means of egress.

Reason: Based on the approval as modified of code change G257-12, Group I-2 hospitals are now classified as Group I-2, Condition 2. Where a Level 2 Alteration occurs, this proposal is intended to limit the use of fire escapes to all occupancies other than hospitals. Hospitals are a unique environment which employ the defend in place strategy which is one for which the use of a fire escape is neither practical nor appropriate. The minimum number of exits from such facilities needs to be held to the highest possible standard – that of new construction as stipulated in Section 805.3.1.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering, a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>.

Cost Impact: The code change proposal will not increase the cost of construction.

EB36-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

805.3.1.2-EB-WILLIAMS-ADHOC

EB37 – 13

805.5.2

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Healthcare (John.Williams@DOH.WA.GOV) and Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee (cbaldassarra@rjagroup.com)

Revise as follows:

805.5.2 Transoms. In all buildings of Group I-1, Group I-2, R-1 and R-2 occupancy, all transoms in corridor walls in work areas shall either be glazed with 1/4-inch (6.4 mm) wired glass set in metal frames or other glazing assemblies having a fire protection rating as required for the door and permanently secured in the closed position or sealed with materials consistent with the corridor construction.

Reason: This proposed change is a joint proposal from the ICC Ad Hoc Committee on Healthcare (AHC) and the Code Technology Committee (CTC). The scope of the AHC deals with Group I-2 hospitals (now Group I-2 Condition 2 as a result of approved code change G257-12) and the scope of the CTC's investigation of the area of study entitled "Care Facilities" addresses Group I-1 and Group I-2 Condition 1 (nursing homes).

Hospitals and nursing homes are a unique environment which employ the defend in place strategy which is one for which the means of egress and relocation of individuals from one smoke compartment another is of critical importance. Where a Level 2 Alteration occurs, resulting in a reconfiguration of the work area, the corridors provide a critical passageway which needs to be held to the highest possible standard while at the same time acknowledging practical construction limitations. The current code acknowledges this for Groups I-1, R-1 and R-2 occupancies where the occupants may be sleeping. This code change provides the same level of protection for Group I-2.

This is a joint proposal submitted by the ICC Ad Hoc Committee for Healthcare and the ICC Code Technology Committee.

The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering, a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>.

The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. This proposal is submitted by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty-five meetings - all open to the public. In 2012, three of the 25 face-to face meetings were held. In addition to the CTC meetings, the CTC established Study Groups (SG) of interested parties for each of the areas of study. These SG's are responsible for reviewing the available information and making recommendations to the CTC. All totaled, the SG's held over 70 conference calls in 2012.

Cost Impact: The code change proposal will not increase the cost of construction.

EB37-13

Public Hearing: Committee:	AS	AM	D
Assembly:	ASF	AMF	DF

805.5.2-EB-BALDASSARRA-WILLIAMS-ADHOC

EB38 – 13

805.6

Proponent: Gerald Anderson, City of Overland Park, Kansas (jerry.anderson@opkansas.org)

Revise as follows:

805.6 Dead-end corridors. Dead-end corridors in any *work area* created as a result of the alteration shall not exceed ~~35~~ 20 feet (6096 mm). Existing dead-end corridors in any work area shall not exceed 35 feet (10 670 mm).

Exceptions:

1. Where dead-end corridors of greater length are permitted by the *International Building Code*.
2. In other than Group A and H occupancies, the maximum length of an existing dead-end corridor shall be 50 feet (15 240 mm) in buildings equipped throughout with an automatic fire alarm system installed in accordance with the *International Building Code*.
3. In other than Group A and H occupancies, the maximum length of an existing dead-end corridor shall be 70 feet (21 356 mm) in buildings equipped throughout with an automatic sprinkler system installed in accordance with the *International Building Code*.
4. In other than Group A and H occupancies, the maximum length of an existing, newly constructed, or extended dead-end corridor shall not exceed 50 feet (15 240 mm) on floors equipped with an automatic sprinkler system installed in accordance with the *International Building Code*.

Reason: The intent of the code change is to make the base requirement for the allowable length of a dead-end corridor to be the same as the International Building code. The IBC limits dead-end corridors to 20 feet. The new wording will continue to make allowances for existing situations where existing dead-end corridor are found to be 35 feet length or less in length. It seems terribly inconsistent to require dead-end corridors on new construction be limited to 20 feet, and then yet allow for an alteration with a 35 foot dead end corridor.

Cost Impact: The code change proposal will not increase the cost of construction.

EB38-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

805.6-EB-ANDERSON

EB39 – 13

805.10 (NEW), 805.10.1 (NEW), 805.10.2 (NEW)

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care and Carl Baldassarra, Code Technologies Committee

Add new text as follows:

805.10 Refuge areas. Where alterations affect the configuration of an area utilized as a refuge areas, the capacity of the refuge area shall not be reduced below that required in Section 805.10.1 and 805.10.2.

805.10.1 Smoke compartments. In Group I-2 occupancies, the required capacity of the refuge areas for smoke compartments in accordance with Section 407.5.1 and 408.6.2 of the *International Building Code* shall be maintained.

805.10.2 Horizontal exits. The required capacity of the refuge area for horizontal exits in accordance with Section 1025.4 of the *International Building Code* shall be maintained.

Reason: When a space in a Group I-2 facility is being altered the designer needs to check that an alteration does not conflict with the area being used as a refuge area from an adjacent compartment. There was a correlative change proposed and accepted for IBC Chapter 34/IEBC Chapter 4.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering, a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>.

This proposal is being co-sponsored by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

Cost Impact: This code change proposal will not increase the cost of construction.

EB39-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

805.10 (NEW)-EB-BALDASSARRA-WILLIAMS-ADHOC.doc

EB40 – 13

805.10 (NEW), 805.10.1 (NEW), 805.10.2 (NEW)

Proponent: Robert J Davidson, Davidson Code Concepts, LLC, representing self
(rjd@davidsoncodeconcepts.com)

Add new text as follows:

805.10 Refuge areas. Where alterations affect the configuration of an area utilized as a refuge areas, the capacity of the refuge area shall not be reduced below that required in Section 805.10.1 and 805.10.2.

805.10.1 Smoke compartments. In Group I-3 occupancies, the required capacity of the refuge areas for smoke compartments in accordance with Section 407.5.1 and 408.6.2 of the International Building Code shall be maintained.

805.10.2 Horizontal exits. The required capacity of the refuge area for horizontal exits in accordance with Section 1025.4 of the International Building Code shall be maintained.

Reason: When a jail is being altered the designer needs to check that an alteration does not conflict with the area being used as a refuge area from an adjacent compartment. The intent is to mirror the language proposed by the Adhoc Health Care for hospitals for consistency in protection.

Cost Impact: This code change proposal will not increase the cost of construction.

EB40-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

805.10 (NEW)-EB-DAVIDSON.doc

EB41 – 13

805.10 (NEW), 805.10.1 (NEW), 808.10.2 (NEW)

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Healthcare

Revise as follows:

IEBC 805.10 Refuge areas. Where alterations affect the configuration of an area utilized as a refuge areas, the capacity of the refuge area shall not be reduced below that required in Section 805.10.1 and 805.10.2.

IEBC 805.10.1 Ambulatory care. In ambulatory care facilities required to be separated by Section 422.2 of the International Building Code, the required capacity of the refuge areas for smoke compartments in accordance with Section 422.4 of the International Building Code shall be maintained.

IEBC 805.10.2 Horizontal exits. The required capacity of the refuge area for horizontal exits in accordance with Section 1025.4 of the International Building Code shall be maintained.

Reason: The provisions to separate Ambulatory Care facilities with four or more persons may not be capable of self-preservation is fairly new in the code. However, when a different tenant in the building makes alterations, it needs to be verified that the areas of refuge are maintained. The intent is to mirror the language proposed by the Adhoc Health Care for hospitals.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering, a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>.

Cost Impact: This code change proposal will not increase the cost of construction.

Contact: Adhoc Health Committee, MOE Study Committee – Kim Paarlberg Secretariat

EB41-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

805.10 (NEW)-EB-WILLIAMS-ADHOC.doc

EB42 – 13

806.2

Proponent: Carl Baldassarra, P.E., Chair, ICC Code Technology Committee
(cbaldassarra@rjagroup.com)

Revise as follows:

806.2 Stairs and escalators in existing buildings. In *alterations* where an escalator or stair is added where none existed previously, an accessible route shall be provided in accordance with ~~Sections~~ Section 1104.4 and 1104.5 of the *International Building Code*.

Reason: The intent of this provisions is that the accessible route will be permitted to be provided in the same area as the new construction, and is not require it to be located elsewhere in the building. A reference to Section 1104.5 could require the accessible route to be provided in another part of the building is the new stairway was not on a general circulation route. A correlative change has been proposed and approved for IBC Section 3411.8.4/IEBC 410.8.4.

The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as “areas of study”. Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

Cost Impact: The code change proposal will not increase the cost of construction.

EB42-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

806.2-EB-BALDASSARRA-CTC

EB43 – 13

806.3, 806.4, 806.5, 906.2

Proponent: Carl Baldassarra, P.E., Chair, ICC Code Technology Committee

Revise as follows:

806.3 1105.2 Accessible dwelling units and sleeping units. Where Group I-1, I-2, I-3, R-1, R-2 or R-4 dwelling or sleeping units are being added, the requirements of Section 1107 of the *International Building Code* for accessible units and Chapter 9 of the *International Building Code* for visible alarms apply only to the quantity of spaces being added.

806.4 1105.3 Type A dwelling or sleeping units. Where more than 20 Group R-2 dwelling or sleeping units are being added, the requirements of Section 1107 of the *International Building Code* for Type A units and Chapter 9 of the *International Building Code* for visible alarms apply only to the quantity of the spaces being added.

806.5 1105.4 Type B dwelling or sleeping units. Where four or more Group I-1, I-2, R-1, R-2, R-3 or R-4 dwelling or sleeping units are being added, the requirements of Section 1107 of the *International Building Code* for Type B units and Chapter 9 of the *International Building Code* for visible alarms apply only to the quantity of the spaces being added.

906.2 Type B dwelling or sleeping units. Where four or more Group I-1, I-2, R-1, R-2, R-3 or R-4 dwelling or sleeping units are being altered ~~or added~~, the requirements of Section 1107 of the *International Building Code* for Type B units and Chapter 9 of the *International Building Code* for visible alarms apply only to the quantity of the spaces being altered ~~or added~~.

Reason: The intent of this change is to clarify when Accessible, Type A and Type B units are required in alterations and additions.

Units being added within an existing structure are considered an alteration; therefore, Accessible and Type A units that are added as part of a renovation are adequately addressed in Section 705.1.8 and 705.1.9, and the language in 806.3 and 806.4 is not needed.

Additions adjacent to or above a building must comply with new construction. Therefore, Section 806.3, 806.4 and 806.5 should be relocated to Section 1105. This clarifies that just the addition is considered for the number of units, not the addition plus the number of existing units. Section 705.1.14, Extent of application, would allow for a situation where Accessible and Type A units were provided in sufficient numbers, including the addition, in the existing building.

Type B units are currently required in existing building undergoing a Level 3 alteration, with or without a change of occupancy. This requirement will remain the same (see Section 705.1, Exception 3, Section 906.2 and the exception to Section 1012.8).

For reference these are the related sections with revisions included.

Level I Alterations

705.1 General. A facility that is altered shall comply with the applicable provisions in Sections 705.1.1 through 705.1.14, and Chapter 11 of the *International Building Code* unless it is *technically infeasible*. Where compliance with this section is *technically infeasible*, the alteration shall provide access to the maximum extent that is technically feasible. A facility that is constructed or altered to be accessible shall be maintained accessible during occupancy.

Exceptions:

1. The altered element or space is not required to be on an accessible route unless required by Section 705.2.
2. Accessible means of egress required by Chapter 10 of the *International Building Code* are not required to be provided in existing facilities.
3. Type B dwelling or sleeping units required by Section 1107 of the *International Building Code* are not required to be provided in existing facilities undergoing less than a Level 3 alteration.
4. The alteration to Type A individually owned dwelling units within a Group R-2 occupancy shall meet the provisions for Type B dwelling units.

705.1.8 Accessible dwelling or sleeping units. Where Group I-1, I-2, I-3, R-1, R-2 or R-4 dwelling or sleeping units are being altered, the requirements of Section 1107 of the *International Building Code* for accessible units and Chapter 9 of the *International Building Code* for visible alarms apply only to the quantity of the spaces being altered.

705.1.9 Type A dwelling or sleeping units. Where more than 20 Group R-2 dwelling or sleeping units are being altered, the requirements of Section 1107 of the *International Building Code* for Type A units and Chapter 9 of the *International Building Code* for visible alarms apply only to the quantity of the spaces being altered.

Level II Alterations

806.1 General. A building, *facility*, or element that is altered shall comply with this section and Section 705.

Level III Alterations

906.1 General. A building, *facility* or element that is altered shall comply with this section and Sections 705 and 806.

906.2 Type B dwelling or sleeping units. Where four or more Group I-1, I-2, R-1, R-2, R-3 or R-4 dwelling or sleeping units are being altered or added, the requirements of Section 1107 of the *International Building Code* for Type B units and Chapter 9 of the *International Building Code* for visible alarms apply only to the quantity of the spaces being altered or added.

Change of Occupancy

1006.1 General. Accessibility in portions of buildings undergoing a *change of occupancy* classification shall comply with Section 1012.8.

1012.8 Accessibility. *Existing buildings* that undergo a change of group or occupancy classification shall comply with this section.

Exception: Type B dwelling or sleeping units required by Section 1107 of the *International Building Code* are not required to be provided in existing buildings and facilities undergoing a *change of occupancy* in conjunction with less than a Level 3 *alteration*.

Additions

1105.1 Minimum requirements. Accessibility provisions for new construction shall apply to additions. An addition that affects the accessibility to, or contains an area of, *primary function* shall comply with the requirements of Sections 705, 806 and 906, as applicable.

1105.2 806.3 Accessible dwelling units and sleeping units. Where Group I-1, I-2, I-3, R-1, R-2 or R-4 dwelling or sleeping units are being added, the requirements of Section 1107 of the *International Building Code* for accessible units and Chapter 9 of the *International Building Code* for visible alarms apply only to the quantity of the spaces being added.

1105.3 806.4 Type A dwelling or sleeping units. Where more than 20 Group R-2 dwelling or sleeping units are being added, the requirements of Section 1107 of the *International Building Code* for Type A units and Chapter 9 of the *International Building Code* for visible alarms apply only to the quantity of the spaces being added.

1105.4 806.5 Type B dwelling or sleeping units. Where four or more Group I-1, I-2, R-1, R-2, R-3 or R-4 dwelling or sleeping units are being added, the requirements of Section 1107 of the *International Building Code* for Type B units and Chapter 9 of the *International Building Code* for visible alarms apply only to the quantity of the spaces being added.

The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

Cost Impact: This code change proposal will not increase the cost of construction.

EB43-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

906.2-EB-BALDASSARRA-CTC.doc

EB44 – 13

808.1

Proponent: Gerald Anderson, City of Overland Park, Kansas (jerry.anderson@opkansas.org)

Revise as follows:

808.1 New installations. All newly installed electrical equipment and wiring relating to work done in any *work area* shall comply with ~~the materials and methods requirements of Chapter 7.~~

Exception: ~~Electrical equipment and wiring in newly installed partitions and ceilings shall comply with all applicable requirements of NFPA 70~~ except as provided for in Section 808.3.

Reason: There are no requirements pertaining to electrical equipment and wiring in Chapter 7 thus it is inappropriate to refer back to chapter 7. Reference is made to Section 808.3 to make it clear that the requirements found in NFPA 70 would not override the special provisions related to residential occupancies.

Cost Impact: The code change proposal will not increase the cost of construction.

EB44-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

808.1-EB-ANDERSON

EB45 – 13

901.2, 903.2.1, 903.3

Proponent: David S. Collins, FAIA, The Preview Group, Inc., representing The American Institute of Architects

Revise as follows:

901.2 Compliance. In addition to the provisions of this chapter, work shall comply with all of the requirements of Chapters 7 and 8. The requirements of Sections 803, 804 and 805 shall apply ~~within all work areas~~ to all Level 3 alteration work per Section 505.1, whether or not they include exits and corridors shared by more than one tenant and regardless of the occupant load.

Exception: Buildings in which the reconfiguration of space affecting exits or shared egress access is exclusively the result of compliance with the accessibility requirements of Section 705.2 shall not be required to comply with this chapter.

903.2.1 Separation required. Where the ~~work area~~ Level 3 alteration work is in any attached dwelling unit in Group R-3 or any multiple single-family dwelling (townhouse), walls separating the dwelling units that are not continuous from the foundation to the underside of the roof sheathing shall be constructed to provide a continuous fire separation using construction materials consistent with the existing wall or complying with the requirements for new structures. All work shall be performed on the side of the dwelling unit wall that is part of the *work area*.

Exception: Where *alterations* or *repairs* do not result in the removal of wall or ceiling finishes exposing the structure, walls are not required to be continuous through concealed floor spaces.

903.3 Interior finish. Interior finish in exits serving the ~~work area~~ Level 3 alterations shall comply with Section 803.4 between the highest floor on which there is ~~a work area~~ an alteration to the floor of exit discharge.

Reason: This change is part of the package of changes to help clarify how alteration work is described and within what limitations they are to be applied. Section 505.1 will include the limitations for the 50 percent reconfiguration of space, along with the reconfiguration or extension of systems that serve more than 50 percent of the space in a building.

Cost Impact: The code change proposal will not increase the cost of construction. This will lower the cost of construction by eliminating confusion.

EB45-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

901.2-EB-COLLINS.doc

EB46 – 13

902.2, 902.2.1

Proponent: Carl Baldassarra, P.E., Chair, ICC Code Technology Committee

Revise as follows:

902.2 Boiler and furnace equipment rooms. Boiler and furnace equipment rooms adjacent to or within Groups I-1, I-2, I-4, R-1, R-2 and R-4 occupancies ~~the following facilities shall be enclosed by 1-hour fire-resistance-rated construction: day nurseries, children's shelter facilities, residential childcare facilities, and similar facilities with children below the age of 21/2 years or that are classified as Group I-2 occupancies, shelter facilities, residences for the developmentally disabled, group homes, teaching family homes, transitional living homes, rooming and boarding houses, hotels, and multiple dwellings.~~

Exceptions:

1. ~~Furnace and Steam boiler equipment of low-pressure type, operating at pressures of 15 pounds per square inch gauge (psig) (103.4 KPa) or less for steam equipment or is not required to be enclosed.~~
2. ~~Hot water boilers operating at pressures of 170 psig (1171 KPa) or less for hot water equipment, when installed in accordance with manufacturer recommendations are not required to be enclosed.~~
3. ~~2- Furnace and boiler equipment of residential R-3 type with 200,000 400,000 British thermal units (Btu) (2.11 4.22 x 10⁸ J) per hour input rating or less is not required to be enclosed.~~
4. ~~3- Furnace rooms protected with automatic sprinkler protection fire-extinguishing system are not required to be enclosed.~~

902.2.1 Emergency controls. Emergency controls for boilers and furnace equipment shall be provided in accordance with the *International Mechanical Code* in all buildings classified as day nurseries, children's shelter facilities, residential childcare facilities, and similar facilities with children below the age of 21/2 years or that are classified as Group I-2 occupancies, and in group homes, teaching family homes, and supervised transitional living homes in accordance with the following:

1. ~~Emergency shutoff switches for furnaces and boilers in basements shall be located at the top of the stairs leading to the basement; and~~
2. ~~Emergency shutoff switches for furnaces and boilers in other enclosed rooms shall be located outside of such room.~~

Reason: The list of occupancies is outdated and unclear in both Section 902.2 and 902.2.1. The exceptions in 902.2 should be consistent with IBC Table 508.2.5 for new construction, not have a much lower threshold for renovations versus new. The remainder of the revisions is a clarification of the existing language. Emergency controls for boilers and furnace equipment is never required in the IMC, so Section 902.2.1 should be deleted.

The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

Cost Impact: This code change proposal will not increase the cost of construction.

EB46-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

902.2-EB-BALDASSARRA-CTC.doc

EB47 – 13

904.1, 904.1.1

Proponent: Dave Fable, U.S. General Services Administration, Public Buildings Service
(dave.fable@gsa.gov)

Revise as follows:

904.1 Automatic sprinkler systems. ~~Automatic sprinkler systems~~ An automatic sprinkler system shall be provided in ~~all work areas~~ a work area when required by Section 804.2 or this section.

904.1.1 High-rise buildings. ~~In high-rise buildings, work areas shall be provided with automatic sprinkler protection where the building has a sufficient municipal water supply system to the site. Where the work area exceeds 50 percent of floor area, sprinklers shall be provided in the specified areas where sufficient municipal water supply for design and installation of a fire sprinkler system is available at the site. An automatic sprinkler system shall be provided in work areas when the high-rise building has a sufficient municipal water supply for the design and installation of an automatic sprinkler system at the site.~~

Reason: The intent of this code change is to attempt to simplify and provide some clarification to Section 904.1 and 904.1.1. Currently, the text as written is confusing for sprinkler protection in Level 3 alterations.

Cost Impact: This code change proposal will increase the cost of construction.

EB47-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

904.1-EB-FRABLE.doc

EB48 – 13

904.1.3 (NEW)

Proponent: Carl Baldassarra, P.E., Chair, ICC Code Technology Committee

Revise as follows:

904.1 Automatic sprinkler systems. Automatic sprinkler systems shall be provided in all *work areas* when required by Section 804.2 or this section.

904.1.1 High-rise buildings. In high-rise buildings, work areas shall be provided with automatic sprinkler protection where the building has a sufficient municipal water supply system to the site. Where the *work area* exceeds 50 percent of floor area, sprinklers shall be provided in the specified areas where sufficient municipal water supply for design and installation of a fire sprinkler system is available at the site.

904.1.2 Rubbish and linen chutes. Rubbish and linen chutes located in the *work area* shall be provided with automatic sprinkler system protection or an approved automatic fire-extinguishing system where protection of the rubbish and linen chute would be required under the provisions of the International Building Code for new construction.

904.1.3 Upholstered furniture or mattresses. *Work areas* shall be provided with automatic sprinkler protection in accordance with the *International Building Code* where any of the following conditions exist:

1. A Group F-1 occupancy used for the manufacture of upholstered furniture or mattresses exceeds 2,500 square feet (232 m²).
2. A Group M occupancy used for the display and sale of upholstered furniture or mattresses exceeds 5,000 square feet (464 m²).
3. A Group S-1 occupancy used for the storage of upholstered furniture or mattresses exceeds 2,500 square feet (232 m²).

Exception: Where an automatic sprinkler system is required by items 1, 2 or 3 and where the building does not have sufficient municipal water supply for the design and installation of an automatic sprinkler system available to the floor without installation of a new fire pump, *work areas* shall be protected by an automatic smoke detection system throughout all occupiable spaces. The automatic smoke detection system shall activate the occupant notification system in accordance with Sections 907.4, 907.5 and 907.6 of the *International Building Code*.

Reason: This proposed change is a result of the CTC's investigation of the area of study entitled "NIST Charleston Sofa Store Fire Recommendations". The scope of the activity is noted as:

"Review the NIST and other investigative reports on the fire that occurred on the evening of June 18, 2007 in the Sofa Super Store in Charleston, South Carolina to identify issues that can be addressed by the International Codes."

In connection with their investigation, NIST analyzed the fire ground, consulted with other experts, and performed computer simulations of fire growth alternatives. Based on these analyses, NIST concluded that the following sequence of events is likely to have occurred. A fire began in packing material and discarded furniture outside an enclosed loading dock area. The fire spread to the loading dock, then into both the retail showroom and warehouse spaces. During the early stages of the fire in the two latter locations, the fire spread was slowed by the limited supply of fresh air. This under-ventilation led to generation of a large mass of pyrolyzed and only partially oxidized effluent. The smoke and combustible gases flowed into the interstitial space below the roof and above the suspended ceiling of the main retail showroom. As this space filled with unburned fuel, the hot smoke also seeped through the suspended ceiling into the main showroom and formed a hot smoke layer below the suspended ceiling. Up to this time, the extent of fire spread into the interstitial space was not visible to fire fighters in the store. If the fire spread had been visible to the fire fighters in the store, it would have provided a direct indication of a fire hazard in the showroom. Meanwhile, the fire at the back of the main showroom and the gas mixture below the suspended ceiling were both still fuel rich. When the front windows were broken out or vented, the inflow of additional air allowed the heat release rate of the fire to intensify rapidly and added air to the layer of unburned fuel below the suspended ceiling enabling the ignition of the unburned fuel/air mixture. The fire swept from the rear to the front of the main showroom extremely quickly, and then into the west and east showrooms. Nine fire fighters were killed in the Sofa Super Store fire. NIST developed eleven recommendations to help mitigate such future losses.

Recommendation 4 of the NIST report reads as follows:

"NIST recommends that model codes require sprinkler systems and that state and local authorities adopt and aggressively enforce this provision:

- a) for all new commercial retail furniture stores regardless of size; and
- b) for existing retail furniture stores with any single display area of greater than 190 m² (2000 ft²).

An installed fire sprinkler system that complied with a national standard such as NFPA 13 [3] would have activated and would have controlled the fire growth. If the showrooms had been divided into smaller areas with fire barriers, the compartmentation would have slowed the spread of the fire as well."

Following a review of recommendation 4 of the NIST report, a new section, 904.1.3, is proposed to be added to the International Existing Building Code addressing Level 3 alterations. This new language would ensure that occupancies used for the merchandizing, storage or manufacture of upholstered furniture or mattresses have fire protection installed when the space occupied for these purposes undergo a Level 3 alteration.

Most of the targeted occupancies would already require the installation of automatic fire sprinkler systems if a Level 2 Alteration occurred, and Section 901.2 of the IEBC points to Chapters 7 and 8 as required to be complied with in such circumstance.

However, Chapter 8, specifically Section 804.2.2 as shown below, requires compliance when there are shared tenant egress paths or occupant loads of 30 or greater.

804.2.2 Groups A, B, E, F-1, H, I, M, R-1, R-2, R-4, S-1 and S-2. In buildings with occupancies in Groups A, B, E, F-1, H, I, M, R-1, R-2, R-4, S-1 and S-2, work areas that have exits or corridors shared by more than one tenant or that have exits or corridors serving an occupant load greater than 30 shall be provided with automatic sprinkler protection where all of the following conditions occur:

1. The work area is required to be provided with automatic sprinkler protection in accordance with the *International Building Code* as applicable to new construction; and
2. The work area exceeds 50 percent of the floor area.

Exceptions:

1. Work areas in Group R occupancies three stories or less in height.
2. If the building does not have sufficient municipal water supply for design of a fire sprinkler system available to the floor without installation of a new fire pump, work areas shall be protected by an automatic smoke detection system throughout all occupiable spaces other than sleeping units or individual dwelling units that activates the occupant notification system in accordance with Sections 907.4, 907.5 and 907.6 of the *International Building Code*.

This proposal defers to the square footage thresholds found in Chapter 9 of the International Building Code once the work area reaches a Level 3 threshold. In reality, the impact is minimal as far as added occupancies that would be covered by this provision. What it does is eliminate a more complicated determination for identifying the requirement for providing the protection levels. The S-1 occupancies and the storage areas of the F-1 would be covered by Chapter 32 (High-Piled Combustible Storage) of the IFC, where the threshold to provide automatic sprinkler protection is currently 2500 ft².

OCCUPANT LOAD COMPARISON WITH SUGGESTED THRESHOLDS

(Section 804.2.2 applies to multitenant shared egress paths or with occupant load of 30 or greater)

Using IBC Table 1004.1.2

F-1	Factor 100 ft ² gross per person	2500 ft ² =25 person
M	Factor 30 ft ² /60 ft ² (display areas)	5000 ft ² = 167/83 persons
S-1	Factor 500 ft ² gross per person	2500 ft ² = 5* persons

*IFC **TABLE 3206.2 GENERAL FIRE PROTECTION AND LIFE SAFETY REQUIREMENTS** already requires automatic sprinkler protection for high-piled storage areas over 2500 ft².

Based upon the above analysis, there will be a cost increase for only a minimal subset of the affected occupancies.

The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. This proposal is submitted by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty-five meetings - all open to the public. In 2012, three of the 25 face-to face meetings were held. In addition to the CTC meetings, the CTC established Study Groups (SG) of interested parties for each of the areas of study. These SG's are responsible for reviewing the available information and making recommendations to the CTC. All totaled, the SG's held over 70 conference calls in 2012.

Cost Impact: This code change proposal will increase the cost of construction.

EB48-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

904.1.3 (NEW)-EB-BALDASSARRA-CTC.doc

EB49 – 13

904.2

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee

Revise as follows:

904.2 Fire alarm and detection systems. Fire alarm and detection systems ~~complying with Sections 804.4.1 and 804.4.3~~ shall be provided ~~throughout the building~~ in accordance with Section 907 of the International Building Code as required for new construction.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

The reference back to Section 804.4.1 through 804.4.3 misses critical upgrades of alarm systems for other occupancies. The intent of this proposal is to eliminate the reference to Chapter 8 of the IEBC because the reference creates confusion. Section 904.2.1 implies that an alarm system for all occupancies in accordance with the IBC would be required, however the reference to Section 804.4 implies that only those occupancies found in Section 804.4 are required to have them installed. Section 804.4 does not cover the fire alarm requirements for all occupancies in the IBC. An alteration level 3 to an existing A occupancy is a significant change to more than 50% of the area of a building and an alarm system would not be required with the current reference to Section 804.4 left in the code.

Cost Impact: This code change proposal will increase the cost of construction.

EB49-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

904.2-EB-BAJNAI-BCAC.doc

EB50 – 13

906.2

Proponent: Ron Nickson, National Multi Housing Council (NMHC) (rnickson@nhmc.org), Steve Orlowski, National Association of Home Builders (NAHB) (sorlowski@nahb.org)

Revise as follows:

906.2 Type B dwelling or sleeping units. Where four or more Group I-1, I-2, R-1, R-2, R-3 or R-4 dwelling or sleeping units are being altered or added, the requirements of Section 1107 of the *International Building Code* for Type B units and Chapter 9 of the *International Building Code* for visible alarms apply only to the quantity of the spaces being altered or added.

Exception: Group I-1, I-2, R-2, R-3 and R-4 dwelling or sleeping units where the first certificate of occupancy was issued before March 15, 1991 are not required to provide Type B dwelling or sleeping units.

Reason: The purpose of this code change is to revise the provisions of the existing building code to be in line with the provisions of FHA, which state “*The design requirements apply to buildings built for first occupancy after March 13, 1991, which fall under the definition of “covered multifamily dwellings.”*” Too often existing building owners who submit plans to alter an existing residential building which was built before the FHA guidelines went into effect are told that they must comply with the accessible requirements for new buildings. This exception brings the IEBC in line with federal guidelines.

Cost Impact: This code change proposal will not increase the cost of construction.

EB50-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

906.2-EB-NICKSON-ORLOWSKI.doc

EB51 – 13

908.2 (NEW)

Proponent: Jim Edelson, New Buildings Institute (jedelson@comcast.net), Ric Cochrane, National Trust for Historic Preservation, David Collins, The Preview Group, representing The American Institute of Architects

Add new text as follows:

908.2 Requirements for underperforming nonresidential existing buildings. Nonresidential *existing buildings* undergoing *Level 3 alterations* that cannot demonstrate an Energy Star score of 26 or greater, or a source EUI equal to or greater than the source EUI in Table 908.2 and calculated in accordance with Section 908.2.1, shall meet the requirements of no less than two of the following:

1. Comply with “Walls, Above Grade” requirements of Table C402.1.2 of the *International Energy Conservation Code*
2. Comply with “Roofs” requirements of Table C402.1.2 of the *International Energy Conservation Code*
3. Comply with Table C402.3 of the *International Energy Conservation Code*
4. Where the *building* meets the conditions of Section C402.3.2, comply with Section C402.3.2 of the *International Energy Conservation Code* without exceptions
5. Comply with Section C402.4.1.2.3 of the *International Energy Conservation Code*
6. Comply with Section C403.2.7 of the *International Energy Conservation Code*
7. Where the *building* meets the conditions of Section C403.4.6, comply with Section C403.4.6 of the *International Energy Conservation Code* without exceptions
8. Comply with Sections C405.2 and C405.3 of the *International Energy Conservation Code*
9. Comply with Section C406 of the *International Energy Conservation Code*

TABLE 908.2
SOURCE ENERGY USE INTENSITY (sEUI) TARGETS

Climate Zone ^a	1A	2A	2B	3A	3B	3B	3C	4A	4B	4C	5A	5B	6A	6B	7	8
Use Types	sEUI Target (kBtu/sf/yr)															
Administrative/professional office	202	208	201	197	163	182	179	218	188	199	234	202	259	230	272	368
Bank/other financial	347	358	346	339	280	314	307	375	323	342	403	348	445	395	468	633
Government office	246	254	246	241	199	223	218	266	230	243	286	247	316	281	332	449
Medical office (non-diagnostic)	157	162	157	153	127	142	139	170	146	155	182	157	201	179	212	286
Mixed-use office	248	256	248	243	200	225	220	269	232	245	289	249	319	283	335	453
Other office	209	216	209	205	169	189	185	226	195	207	243	210	269	238	283	382
Laboratory	870	861	834	856	719	806	778	946	847	874	1021	914	1132	1031	1216	1614
Distribution/shipping center	151	97	100	95	74	92	79	107	100	94	125	117	149	137	171	268
Non-refrigerated warehouse	128	82	85	80	63	78	67	91	85	80	106	99	127	116	145	227
Convenience store	911	967	917	983	882	914	961	1061	972	1043	1124	1037	1201	1139	1286	1539
Convenience store with gas station	798	848	804	862	773	801	842	930	852	914	985	909	1053	998	1127	1349
Grocery store/food market	585	621	589	631	566	587	617	681	624	670	722	666	771	731	826	988
Other food sales	264	280	266	285	256	265	278	307	282	302	326	300	348	330	373	446
Fire station/police station	176	174	168	173	145	163	157	191	171	176	206	184	228	208	245	326
Other public order and safety	454	450	436	447	375	421	406	494	442	456	533	477	591	539	635	843
Medical office (diagnostic)	196	196	195	192	179	194	169	195	192	174	190	190	197	193	196	227

Clinic/other outpatient health	270	269	268	264	245	267	232	268	264	239	262	261	271	266	269	312
Refrigerated warehouse	601	595	577	591	497	557	538	654	585	604	706	632	782	713	840	1115
Religious worship	99	98	95	97	82	91	88	107	96	99	116	104	128	117	138	183
Entertainment/culture	229	227	220	225	189	212	205	249	223	230	269	241	298	272	320	425
Library	335	332	321	329	277	310	300	364	326	336	393	352	436	397	468	621
Recreation	157	156	151	155	130	146	141	171	153	158	185	165	205	186	220	292
Social/meeting	121	120	116	119	100	112	108	132	118	121	142	127	157	143	169	224
Other public assembly	149	147	143	146	123	138	133	162	145	149	175	156	194	176	208	276
College/university	325	332	320	332	241	309	287	395	333	353	438	371	517	445	564	816
Elementary/middle school	177	176	170	170	141	162	157	189	168	167	202	179	231	204	244	348
High school	166	170	163	170	123	158	147	202	170	180	224	189	264	228	288	417
Preschool/daycare	209	207	201	200	167	191	186	223	198	197	239	211	272	240	288	411
Other classroom education	126	129	124	128	93	120	111	153	129	137	170	143	200	172	218	316
Fast food	1817	1864	1827	1905	1685	1837	1781	2069	1925	1955	2232	2051	2423	2251	2599	3223
Restaurant/cafeteria	763	799	772	830	706	788	783	921	843	882	994	907	1077	1004	1164	1440
Other food service	716	749	724	778	662	739	734	864	791	827	933	851	1010	941	1092	1351
Hospital/inpatient health	561	568	534	548	530	523	547	572	492	536	572	503	590	530	600	716
Nursing home/assisted living	309	306	296	304	255	286	276	336	301	310	363	325	402	366	432	573
Dormitory/fraternity/sorority	175	176	171	173	142	164	148	192	170	173	215	188	247	219	269	345
Hotel	214	234	217	251	227	229	244	276	259	270	300	283	325	313	353	425
Motel or inn	231	231	225	230	201	220	209	245	228	226	260	240	283	260	300	366
Other lodging	229	229	224	228	200	218	207	243	226	224	259	239	281	259	298	364
Vehicle dealership/showroom	281	282	270	277	199	250	223	323	274	294	367	310	420	375	468	655
Retail store	194	195	187	191	138	173	154	223	189	203	253	214	290	259	323	453
Other retail	392	393	378	386	278	350	312	452	383	410	512	433	587	524	653	915
Post office/postal center	164	162	157	161	135	152	147	178	160	165	192	172	213	194	229	304
Repair shop	124	123	119	122	103	115	111	135	121	125	146	131	162	147	174	231
Vehicle service/repair shop	148	147	142	146	123	137	133	161	144	149	174	156	193	176	207	275
Vehicle storage/maintenance	112	111	107	110	93	104	100	122	109	112	131	118	146	133	157	208
Other service	315	312	302	310	260	292	282	343	307	317	370	331	410	374	441	585
Strip shopping mall	282	294	287	314	224	289	267	375	321	349	427	364	498	449	559	788
Enclosed mall	279	292	285	312	222	287	265	372	318	346	423	361	494	445	555	781

a. Climate zones as determined in accordance with Section C301 of the International Energy Conservation Code.

908.2.1 Calculation of Source EUI (sEUI). The sEUI shall be based on any 12 continuous months of energy use data for the whole *building* from the 24 month period immediately prior to the permit application. The annual sEUI for electric energy shall be calculated by converting energy use at the *building* to kBtu's and multiplying by the conversion factor in Table 908.2.1(1) based on the geographical location of the *building*. The annual sEUI for fossil fuels shall be calculated by converting energy use at the *building* to kBtu's and multiplying by the conversion factors in Table 908.2.1(2). The annual sEUI for

district cooling shall be calculated by converting energy use at the *building* to kBtu's, multiplying by 0.33, and then multiplying by the conversion factor in Table 908.2.1(1) based on the geographical location of the *building*. The annual sEUI for district heating shall be calculated by converting energy use at the *building* to kBtu's and multiplying by 1.35 for hot water and 1.45 for steam. The annual sEUI for all other energy shall be calculated by converting energy use at the *building* to kBtu's and multiplying by 1.1. Where a *building* has multiple use types from Table 908.2, the maximum allowable energy use shall be based on the total gross floor area of each use type in relation to the total gross floor area of all use types within the *building*.

TABLE 908.2.1(1)
ELECTRICITY GENERATION ENERGY CONVERSION FACTORS BY eGRID SUB REGION^a

eGRID 2007 Sub-region Acronym	eGRID 2007 Sub-region Name	Energy Conversion Factor
AKGD	ASCC Alaska Grid	2.97
AKMS	ASCC Miscellaneous	1.76
ERCT	ERCOT All	2.93
FRCC	FRCC All	2.97
HIMS	HICC Miscellaneous	3.82
HIOA	HICC Oahu	3.14
MORE	MRO East	3.40
MROW	MRO West	3.41
NYLI	NPCC Long Island	3.20
NEWE	NPCC New England	3.01
NYCW	NPCC NYC/Westchester	3.32
NYUP	NPCC Upstate NY	2.51
RFCE	RFC East	3.15
RFCM	RFC Michigan	3.05
RFCW	RFC West	3.14
SRMW	SERC Midwest	3.24
SRMV	SERC Mississippi Valley	3.00
SRSO	SERC South	3.08
SRTV	SERC Tennessee Valley	3.11
SRVC	SERC Virginia/Carolina	3.13
SPNO	SPP North	3.53
SPSO	SPP South	3.05
CAMX	WECC California	2.61
NWPP	WECC Northwest	2.26
RMPA	WECC Rockies	3.18
AZNM	WECC Southwest	2.95

TABLE 908.2.1(2)
**U.S. AVERAGE BUILDING FUELS ENERGY
CONVERSION FACTORS BY FUEL TYPE**

Fuel Type	Energy Conversion Factor
Natural Gas	1.09
Fuel Oil	1.13
LPG	1.12

Reason: According to the Urban Land Institute, New Construction and Major Renovations account for only 1-2% of the building stock in a typical year. For the larger population of existing buildings, energy codes' primary means of improving energy efficiency are through alterations. However, as current energy codes are formulated, the scope of that impact is generally limited to the scope of the alteration. Energy code requirements generally apply only to the alterations and not to the whole building. This misses a tremendous opportunity for the energy code to improve the energy efficiency of the whole building stock.

Bearing in mind the dangers of unintended consequences, the proposal narrowly targets its new code requirements for existing buildings, and the proposal is built on four principles:

- Requirements should focus on the largest class of alterations to reduce the possibility of discouraging alterations.
- Many existing buildings perform quite well, so requirements should focus on poorly performing buildings rather than indiscriminately targeting all buildings.

- Existing buildings encompass wildly variable features and conditions, so requirements should have a built-in flexibility to respond to this reality.
- As this represents new ground in codes, requirements should leverage existing code mechanisms, code language and code requirements as much as possible.

The International Existing Building Code provides an appropriate location and a suitable code structure for adding code provisions to affect improved energy use in existing buildings. The IEBC creates three classes of Alterations (I, II and III). This proposal creates a trigger only for the most extensive Level III alterations. The trigger itself is based on the actual energy performance of the building undergoing the extensive alteration, and is set so that only the worst performing buildings are affected. In this way, the requirements affect only buildings that are both undergoing extensive alterations and are poor energy performers. This approach maximizes the effectiveness of the requirements relative to the effort required from both building owners and code officials.

The Level III projects that fall below the performance threshold would then choose two measures from an extensive list of options. This list leverages code requirements already found in the International Energy Conservation Code (IECC) and so will be familiar to contractors and code officials. The list represents a full range of options affecting every part of the building so that projects can choose actions that are appropriate and cost effective for that particular building's particular circumstances. Flexibility of this type is fundamental in writing code provisions that seek to have a greater impact on a jurisdiction's existing building stock.

The performance threshold is based on the 2003 Commercial Building Energy Consumption Survey (the same dataset that serves as the basis for commercial building Energy Star Scores and the targets for existing buildings in ASHRAE Standard 100). Based on either the table of values or an Energy Star Score threshold of 26, the requirements will only kick in for a building that would have fallen in the worst performing quartile of the building stock in that building survey. This is the worst 25% of the buildings around a decade ago, effectively making these requirements only apply to buildings that can be reasonably considered "energy hogs." CBECS is a nationwide survey conducted by the Energy Information Administration, so climate zone diversity for the table was created using the same, nationally vetted process used to create the performance targets for existing buildings proposed for ASHRAE Standard 100.

The target EUIs in the proposal are presented in source kBtu units because the only EUI metric in an I-Code, the 2012 IgCC, uses the same source kBtu metric. The calculation language and conversion factors for source energy are taken directly from the IgCC to maintain their meaning, but the code language has been slightly edited for greater clarity. Likewise, the same electricity energy conversion factors are used in the IgCC and these were derived from EPA eGrid data (2007 version 1.1, 2005 data; EPA eGrid regional gross grid loss factors; EIA Table 8.4a (Sum tables 8.4 band 8.4c) and Table 8.2c (Breakout of Table 8.2b), 2005 data).

The performance thresholds in the table are based on the 2003 Commercial Building Energy Consumption Survey (the same dataset that serves as the basis for commercial building Energy Star Scores and the targets for existing buildings in ASHRAE Standard 100). Based on either the table of values or an Energy Star Score threshold of 26, the requirements will only kick in for a buildings that fall in the worst performing quartile of the building stock in that building survey, effectively making these requirements only apply to buildings that can be reasonably considered "energy hogs." CBECS is a national survey, so the climate zone diversity for the table was created using the same, nationally vetted process used to create the performance targets for existing buildings pending in ASHRAE Standard 100. The target EUIs are expressed in source kBtu units because the only EUI metric in an I-Code, the IgCC, uses source kBtu. The calculation language and conversion factors for source energy is also taken directly from the IgCC with minor edits for clarity.

The compliance options all refer to provisions from the 2012 IECC and apply to a broad variety of energy aspects within a building. This allows projects to select the most appropriate compliance option for the specifics of that project's alteration.

- Option 1 would require compliance with the "Above Wall" insulation requirements of the IECC.
- Option 2 would require compliance with the "Roof" insulation requirements of the IECC.
- Option 3 would require compliance with the fenestration performance requirements of the IECC.
- Option 4 would require compliance with the daylighting control requirements of the IECC for top lit spaces that meet the conditions of the provision.
- Option 5 would require compliance with the infiltration requirements of the IECC through the air leakage testing requirement.
- Option 6 would require compliance with the duct insulation and sealing requirements of the IECC.
- Option 7 would require compliance with the service hot water heat recovery requirements of the IECC for buildings that meet the conditions of the provision
- Option 8 would require compliance with all of the lighting control requirements of the IECC.
- Option 9 would require compliance with one of the "Additional Efficiency Package Options" (Efficient HVAC performance, Efficient Lighting System, Onsite Renewable Energy Supply) of the IECC

Current energy codes have a limited means of impacting the energy performance of the vast majority of buildings in the existing building stock. This proposed addition will create a new application point for IECC provisions in the IEBC when a building undergoes an extensive alteration. And it will limit the new requirements only to those buildings which are both wasting the most energy and presenting the largest opportunity to achieve savings, while not at all impacting buildings that are undergoing minor renovations or that already have some modest level of energy performance.

Cost Impact: This code change proposal will not increase the cost of construction.

Analysis: PM12-13 also proposes a similar requirements for the IPMC.

EB51-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

EB52 – 13

202, 1001.1, 1001.2, 1001.2.1, 1001.3, 1001.3.1

Proponent: Gerald Anderson, City of Overland Park, Kansas representing self
(jerry.anderson@opkansas.org)

Revise as follows:

SECTION 202 GENERAL DEFINITIONS

CHANGE OF OCCUPANCY. A change in the ~~purpose or level of activity within a building that involves a change in application of the requirements of this code~~ use of the building or a portion a building. A change of occupancy shall include any change of occupancy classification, any change from one group to another group within an occupancy classification or any change in an allowable use within a given group for a specific occupancy classification.

Revise as follows:

1001.1 Scope. The provisions of this chapter shall apply where a *change of occupancy* occurs, as defined in Section 202, ~~including:~~

- ~~1. Where the occupancy classification is not changed; or~~
- ~~2. Where there is a change in occupancy classification of the occupancy group designations changes~~

1001.2 Change in occupancy with no change of occupancy classification. A change in occupancy, as defined in Section 202, ~~with no change of occupancy classification~~ use shall not be made to any structure that will subject the structure to any special provisions of the applicable ~~International Codes~~, including the provisions of Sections 1002 through 1011, without the approval of the *code official*. A certificate of occupancy shall be issued where it has been determined that the requirements for the change in occupancy have been met.

1001.2.1 ~~Repair and alteration~~ Change in Occupancy with no change of occupancy classification. Any ~~repair or alteration~~ work undertaken in connection with a change of occupancy ~~in use~~ that does not involve a *change of occupancy* classification or a change to another group within a given occupancy classification shall conform to the applicable requirements for the work as classified in Chapter 4 and to the requirements of Section 1002 through 1011.

Exception: As modified in Section 1205 for *historic buildings*.

~~1001.3~~ 1001.2.2 Change of occupancy classification. Where the occupancy classification of a building changes, the provisions of Sections 1002 through 1012 shall apply. This includes a *change of occupancy* classification within a group as well as a *change of occupancy* classification from one group to a different group.

~~1001.3.1~~ 1001.2.2.1 Partial change of occupancy classification. Where a portion of an *existing building* is changed to a new occupancy classification, Section 1012 shall apply.

Reason: The purpose of the code change is to bring the IEBC definition for a change in occupancy more in line with the IBC definition for a change in occupancy. The additional portions of the code change clarify the intent of the code.

Definition: The definition for a change in occupancy should include all things that would constitute a change in occupancy. The IBC uses the words "use, groups and occupancy classification. For consistency and clarity it is important to stick with language used in the building code thus I changed out the word purpose with use. Example: Occupancy classifications are A,B,H,R,I,M,S & U. The different occupancy classifications can be divided into Groups, i.e. A-1, A-2, A-3 etc. and within the various groups there are examples of allowed uses for a particular group. Such as under group A-3, we find are art galleries, dance halls, & bowling alleys.

Some other reasons for changing the definition: The words "level of activity" is vague. It would also appear that a change in occupancy is somehow dependent on whether there are other code requirements for the new occupancy. A change in occupancy

should be a yes or no question. If the answer is yes then one proceeds to determine what new code provisions are applicable if any.

Section 1001.1 Scope. The stricken language is no longer necessary because the bullets points have been included in the definition. With the proposed language, I am trying to make a simple statement that the use of a building cannot be changed without the approval of the code official.

Section 1001.2 > The current language is vague. It appears that the existing language is trying to address a change in use. I have inserted the word use in order to make it clear as to what the code is trying to address. It is not necessary to speak to the special provisions of the applicable International codes whatever they are. A change in use is not dependent on special provisions of the code.

Section 1001.2.1, The current language is confusing and is in conflict with 1001.3. With the new wording, I am clarify that when there is a change of use that does not involve a change in occupancy classification or a change from one group to another in a given occupancy classification the code then refers one back to chapter 4 and sections 1002 through 1011. . It is not necessary to talk about "repair and alteration" for that is not the subject. The subject matter is change in occupancy which has resulted from a change in use.

I have renumbered the existing sections 1001.3 and 1001.3.1 making them subsections of 1001.2. All of the sections are addressing different types of occupancy change so it seems more appropriate to have one section with various subsections.

Cost Impact: This code change proposal will not increase the cost of construction.

EB52-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

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EB53 – 13

1001.1, 1001.2, 1004.1, 1012.1, 1012.1.1.1, 1012.1.1.2, 1012.2.1, 1012.2.2

Proponent: Robert J Davidson, Davidson Code Concepts, LLC, representing self
(rjd@davidsoncodeconcepts.com)

Revise as follows:

1001.1 Scope. The provisions of this chapter shall apply where a change of occupancy occurs, as defined in Section 202, including:

1. Where the occupancy classification is not changed; ~~or~~
2. Where there is a change in occupancy classification or the occupancy group designation changes; or
3. Where there is a change in use or occupancy with a fire protection threshold requirement in Chapter 9 of the *International Building Code*.

1001.2 Change in occupancy with no change of occupancy classification. A change in occupancy, as defined in Section 202, with no *change of occupancy* classification or where there is a change in use or occupancy with a fire protection threshold requirement in Chapter 9 of the *International Building Code* shall not be made to any structure that will subject the structure to any special provisions of the applicable *International Codes*, including the provisions of Sections 1002 through 1011, without the approval of the *code official*. A certificate of occupancy shall be issued where it has been determined that the requirements for the change in occupancy have been met.

1004.1 General. Fire protection requirements of Section 1012 shall apply where a building or portions thereof undergo a *change of occupancy* classification or where there is a change in use or occupancy with a fire protection threshold requirement in Chapter 9 of the *International Building Code*.

1012.1 General. The provisions of this section shall apply to buildings or portions thereof undergoing a change of occupancy classification. This includes a change of occupancy classification within a group as well as a change of occupancy classification from one group to a different group or where there is a change in use or occupancy with a fire protection threshold requirement in Chapter 9 of the *International Building Code*. Such buildings shall also comply with Sections 1002 through 1011. The application of requirements for the change of occupancy shall be as set forth in Sections 1012.1.1 through 1012.1.4. A *change of occupancy*, as defined in Section 202, without a corresponding change of occupancy classification shall comply with Section 1001.2.

1012.1.1 Compliance with Chapter 9. The requirements of Chapter 9 shall be applicable throughout the building for the new occupancy classification based on the separation conditions set forth in Sections 1012.1.1.1 and 1012.1.1.2.

1012.1.1.1 Change of occupancy classification without separation. Where a portion of an *existing building* is changed to a new occupancy classification or where there is a change in use or occupancy with a fire protection threshold requirement in Chapter 9 of the *International Building Code* and that portion is not separated from the remainder of the building with fire barriers having a fire-resistance rating as required in the *International Building Code* for the separate occupancy, the entire building shall comply with all of the requirements of Chapter 9 applied throughout the building for the most restrictive occupancy classification in the building and with the requirements of this chapter.

1012.1.1.2 Change of occupancy classification with separation. Where a portion of an *existing building* that is changed to a new occupancy classification or where there is a change in use or occupancy with a fire protection threshold requirement in Chapter 9 of the *International Building Code* and that portion is separated from the remainder of the building with fire barriers having a fire-resistance rating as required in the *International Building Code* for the separate occupancy, that portion shall comply with

all of the requirements of Chapter 9 for the new occupancy classification and with the requirements of this chapter.

1012.2 Fire protection systems. Fire protection systems shall be provided in accordance with Sections 1012.2.1 and 1012.2.2.

1012.2.1 Fire sprinkler system. Where a change in occupancy classification occurs or where there is a change in use or occupancy with a fire protection threshold requirement in Chapter 9 of the *International Building Code* that requires an automatic fire sprinkler system to be provided based on the new occupancy in accordance with Chapter 9 of the *International Building Code*, such system shall be provided throughout the area where the *change of occupancy* occurs.

1012.2.2 Fire alarm and detection system. Where a change in occupancy classification occurs or where there is a change in use or occupancy with a fire protection threshold requirement in Chapter 9 of the *International Building Code* that requires a fire alarm and detection system to be provided based on the new occupancy in accordance with Chapter 9 of the *International Building Code*, such system shall be provided throughout the area where the *change of occupancy* occurs. Existing alarm notification appliances shall be automatically activated throughout the building. Where the building is not equipped with a fire alarm system, alarm notification appliances shall be provided throughout the area where the *change of occupancy* occurs and shall be automatically activated.

Reason: This proposed change is a result of the NIST analysis and report on the Charleston Sofa Store Fire.

Recommendation 4 of the NIST report reads as follows:

"NIST recommends that model codes require sprinkler systems and that state and local authorities adopt and aggressively enforce this provision:

- a) for all new commercial retail furniture stores regardless of size; and
- b) for existing retail furniture stores with any single display area of greater than 190 m² (2000 ft²).

An installed fire sprinkler system that complied with a national standard such as NFPA 13 [3] would have activated and would have controlled the fire growth. If the showrooms had been divided into smaller areas with fire barriers, the compartmentation would have slowed the spread of the fire as well."

Upon investigation of recommendation 4 of the NIST report, a review of where in the family of I codes to put requirements for upgrading to automatic sprinkler protection for occupancies manufacturing, storing or merchandizing upholstered furniture and mattresses occurred. During this review it was noted that the International Existing Building Code applies the concept of "change of occupancy" broadly and not only to capture a change in the Group, but a change in the occupancy classification with a change in the Group, (see the classification breakdowns under each Group in Chapter 3 of the International Building Code).

The definition for Change of Occupancy drills down to a change "in the purpose of level of activity" for applying more current requirements of the IEBC and the IBC.

CHANGE OF OCCUPANCY. A change in the purpose or level of activity within a building that involves a change in application of the requirements of this code.

SECTION 1001 GENERAL

1001.1 Scope. The provisions of this chapter shall apply where a change of occupancy occurs, as defined in Section 202, including:

1. Where the occupancy classification is not changed; or
2. Where there is a change in occupancy classification or the occupancy group designation changes.

SECTION 1012 CHANGE OF OCCUPANCY CLASSIFICATION

1012.1 General. The provisions of this section shall apply to buildings or portions thereof undergoing a change of occupancy classification. This includes a change of occupancy classification within a group as well as a change of occupancy classification from one group to a different group.

What I noted was that when applying principals of fire protection, Chapter 9 of the International Building Code has use and levels of activity breakdowns separate and, in some cases, distinct from the occupancy classifications found in Chapter 3 of the International Building Code. In many cases these breakdowns are more significant than those found in Chapter 3 of the International Building Code.

What this proposal does is to suggest the insertion of language into Chapter 10 of the International Existing Building Code that would provide for capturing the fire protection thresholds found in Chapter 9 of the International Building Code as additional, and in many cases more accurate, triggers for the installation of fire protection systems and devices when a change of use or occupancy occurs within an existing building.

Cost Impact: This code change proposal will increase the cost of construction.

EB53-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

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EB54 – 13

1002.1

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Healthcare (John.Williams@DOH.WA.GOV) and Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee (cbaldassarra@rjagroup.com)

Revise as follows:

1002.1 Compliance with the building code. Where the character or use of an existing building or part of an existing building is changed to one of the following special use or occupancy categories as defined in the International Building Code, the building shall comply with all of the applicable requirements of the International Building Code:

1. – 10. *(No change text)*

11. Group I-2 occupancies

Reason: This proposed change is a joint proposal from the ICC Ad Hoc Committee on Healthcare (AHC) and the Code Technology Committee (CTC). The scope of the AHC deals with Group I-2 hospitals (now Group I-2 Condition 2 as a result of approved code change G257-12) and the scope of the CTC's investigation of the area of study entitled "Care Facilities" addresses Group I-1 and Group I-2 Condition 1 (nursing homes).

Ambulatory care facilities, Item 10, was added via code change EB27-09/10 following the inclusion of ambulatory care provisions in Chapter 4 of the 2009 IBC due to the unique nature of such facilities which require added protection features such as separation into smoke compartments. Similarly, Chapter 4 of the IBC requires enhanced fire protection features for Group I-2 which includes hospitals and nursing homes. Where a change in occupancy occurs, resulting in a Group I-2 classification, the new construction features must be employed to provide the requisite fire protection features.

This is a joint proposal submitted by the ICC Ad Hoc Committee for Healthcare and the ICC Code Technology Committee.

The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering, a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>.

The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. This proposal is submitted by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty-five meetings - all open to the public. In 2012, three of the 25 face-to face meetings were held. In addition to the CTC meetings, the CTC established Study Groups (SG) of interested parties for each of the areas of study. These SG's are responsible for reviewing the available information and making recommendations to the CTC. All totaled, the SG's held over 70 conference calls in 2012.

Cost Impact: This code change proposal will not increase the cost of construction.

EB54-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1002.1-EB-BALDASSARRA-WILLIAMS-ADHOC.doc

EB55 – 13

1009.1

Proponent: Maureen Traxler, City of Seattle, representing Seattle Dept. of Planning & Development
(Maureen.traxler@seattle.gov)

Revise as follows:

1009.1 Mechanical requirements. Where the occupancy of an *existing building* or part of an *existing building* is changed such that the new occupancy is subject to different kitchen exhaust requirements or to increased mechanical ventilation requirements in accordance with the *International Mechanical Code*, the new occupancy shall comply with the intent of the respective *International Mechanical Code* provisions.

Reason: The requirement to comply with the intent of a code is unenforceable.

Cost Impact: This code change will not increase the cost of construction.

EB55-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1009.1-EB-TRAXLER.doc

EB56 – 13

1011 (NEW)

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Add new text as follows:

SECTION 1011 **ENERGY EFFICIENCY**

1011.1 Increased demand. *Where the occupancy of an existing building or part of an existing building is changed such that the new occupancy results in an increase in the installed capacity of the building electrical or energy system from non-renewable sources the new occupancy shall comply with the International Energy Conservation Code.*

Reason: This proposal requires the building to meet the provisions of the 2012 International Energy Conservation Code (IECC) when there any change in occupancy resulting in increased demand for energy or power.

Forty percent of U.S. energy use and seventy percent of U.S. electrical use are associated with existing buildings. As such, existing buildings represent a significant opportunity to save energy, reduce operating costs, and enhance the environment. A portion of the total number of existing buildings undergoes a change in occupancy each year. Health and life safety codes currently address those changes in occupancy such that the resultant building after the occupancy change provides the necessary capabilities to protect the public health and safety. A review of Chapter 10 of the International Existing Buildings Code (IEBC) on changes in occupancy does not include a consideration of energy efficiency. The IEBC must appropriately address the opportunity to increase energy efficiency in existing buildings. One way to address this is when a change in use would result in an increase in energy use of the building between the pre- and post-occupancy change situation. This is consistent with, for instance, Section 1010 on plumbing, in which a change in occupancy that results in an increased demand for water triggers a requirement to meet the International Plumbing Code.

Consider the change in use from a storage warehouse to retail space, a portion of an office building to food service, or any other number of situations in which the energy use of the building or spaces associated with the change in occupancy will be increased. There currently is no way in the IEBC to address those situations, presenting a lost opportunity and even a way to circumvent the 2012 IECC, which does address this issue. Section C101.4.4 of the IECC clearly requires that spaces undergoing a change in occupancy that results in an increased demand for energy must comply with the IECC. This change ensures consistency between the IEBC and the IECC on this issue.

The proposed change addresses this by offering two options through which compliance can be achieved. One is to bring the building after the occupancy change up to the 2012 IECC, and the other is to accomplish the change with no increase in connected load thereby negating the need to address IECC compliance. This change will not undermine renovations to existing buildings. If a change of occupancy is considered a renovation then there are already a number of provisions in Chapter 10 of the IEBC applicable to renovated buildings such that application of the IECC where there is an increase in energy load should not pose a problem. If it were a problem, it is presumed the provisions in Section C101.4.4 would not appear in the IECC. It would also not be considered a way to impose the IECC on retrofits, alterations, renovations or repairs to existing building because those terms have specific definitions as does the specific subject of Chapter 10 and this code change – a change in occupancy. Clearly if located in Chapter 10 as proposed and specifically applied to a change in occupancy as specifically defined in the IEBC it would be unlikely that this would cause the incorrect application of the IECC to a retrofit, repair or renovation.

There will be an increase in cost to the degree that changes in occupancy that previously were not required to meet the energy code will now be required to meet the energy code.

Cost Impact: The code change proposal will increase the cost of construction in some buildings.

EB56-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1011 (NEW)-EB-WILLIAMS.doc

EB57 – 13

1012.2.1.1 (NEW)

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee

Add new text as follows:

1012.2.1 Fire sprinkler system. Where a change in occupancy classification occurs that requires an automatic fire sprinkler system to be provided based on the new occupancy in accordance with Chapter 9 of the International Building Code, such system shall be provided throughout the area where the change of occupancy occurs.

1012.2.1.1 Fire sprinkler system Group A occupancy. Where the new occupancy classification requiring an automatic sprinkler system is Group A-1, A-2, A-3 or A-4, an automatic sprinkler system shall be provided throughout the area where the Group A-1, A-2, A-3 or A-4 occupancy is located, and throughout all floors from the Group A occupancy to, and including, the nearest level of exit discharge serving the Group A occupancy.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

In almost all cases where Chapter 9 of the IBC specifies the need for a fire suppression system it is due to the inherent fire hazard of the use itself, thus justifying the protection only within the changed area. The exception to that rule is in the Assembly Groups. The trigger for the Assembly Groups A-1, A-2, A-3 and A-4 is the occupant load and it is clear from the expanded requirements found in IBC Section 903.2.1, the protection is to also include the intervening spaces and floors so their egress path is not compromised by a fire located in those areas. We feel that the IEBC should also reflect that intent by adding this new subsection.

Cost Impact: This code change proposal will increase the cost of construction.

EB57-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1012.2.1.1 (NEW)-EB-BAJNAI-BCAC.doc

EB58 – 13

1012.2.2

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee

Revise as follows:

1012.2.2 Fire alarm and detection system. Where a change in occupancy classification occurs that requires a fire alarm and detection system to be provided based on the new occupancy in accordance with Chapter 9 of the *International Building Code*, such system shall be provided throughout the area where the change of occupancy occurs. Existing alarm notification appliances shall be automatically activated throughout the building. Where the building is not equipped with a fire alarm system, alarm notification appliances shall be provided throughout the area where the *change of occupancy occurs* ~~and shall be automatically activated.~~ in accordance with Section 907 of the *International Building Code* as required for new construction.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

In almost all cases where Chapter 9 of the IBC specifies the need for a fire alarm and detection system it is due to the inherent fire hazard of the use. The level of hazard often warrants the notification be provided to all levels of the building even if the detection appliances are not required throughout the building. Section 907 of the IBC identifies when it is appropriate for everyone in the building to hear/see the notification and we believe that same insight is appropriate for existing buildings. Unlike a fire sprinkler system where placing the system in the area will effectively abate the fire hazard, that abatement does not take place with a fire alarm system. The value of the system is diminished without some notification throughout when the fire occurs in an area that is not occupied. Even though this will increase the costs to a change in occupancy project, it is a good compromise when considering the additional safety provided by the additional notification as would be required for new construction.

Cost Impact: This code change proposal will increase the cost of construction.

EB58-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1012.2.2-EB-BAJNAI-BCAC.doc

EB59 – 13

1012.5.1

Proponent: Gene Boecker, Code Consultants, Inc., representing self

Revise as follows:

1012.5.1 Height and area for change to higher hazard category. When a change of occupancy classification is made to a higher hazard category as shown in Table 1012.5, heights and areas of buildings and structures shall comply with the requirements of Chapter 5 of the *International Building Code* for the new occupancy classification.

Exceptions:

1. In other than Groups H, F-1 and S-1, in lieu of fire walls, use of fire barriers having a fire-resistance rating of not less than that specified in Table 706.4 of the *International Building Code*, constructed in accordance with Section 707 of the *International Building Code*, shall be permitted to meet area limitations required for the new occupancy in buildings protected throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 of the *International Fire Code*.
2. Regardless of height, for high-rise buildings, the type of construction reduction specified in Section 403.2.1 of the *International Building Code* is permitted. This shall include the reduction for columns. The high rise building is required to be equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 of the *International Building Code*.

Reason: When the International Building Code changed to disallow the reduction of ratings on columns for high-rise buildings, it created a problem for existing buildings which had previously used the allowed reduction. This provision in the IEBC does not recognize those previously complying buildings. To meet the requirements as currently written, any change in occupancy from an office to a retail area would require a complete upgrade in the fire-resistance rating for all the columns in the entire building. This is excessive for small changes in occupancy and often impractical.

The revised language makes it clear that if the building is protected throughout with an automatic fire sprinkler system, designed to meet NFPA 13 (not 13R), then the column ratings can be what was allowed prior to the code change to the IBC. Additions will need to meet the requirements for new construction, but a change in occupancy of this type should not require the entire building to fall into non-compliance when it was fully compliant when it was built as little as five years ago.

Cost Impact: This code change proposal will not increase the cost of construction.

EB59-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1012.5.1-EB-BOECKER.doc

EB60 – 13

1204.1.1

Proponent: Carl Baldassarra, P.E., Chair, ICC Code Technology Committee

Revise as follows:

1204.1.1 Site arrival points. At least one ~~main entrance shall be accessible~~ route from a site arrival point to an accessible entrance shall be provided.

Reason: For historical buildings, the requirement for the accessible routes from the site arrival point to the accessible entrance should read the same in IBC and IEBC. The current text in IEBC 1204.1.1 does not address where the route should be provided. The IBC text is as follows:

IBC 3411.9.1 (IEBC [B] 410.9.1) Site arrival points. At least one *accessible* route from a site arrival point to an *accessible* entrance shall be provided.

The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as “areas of study”. Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

Cost Impact: This code change proposal will not increase the cost of construction.

EB60-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1204.1.1-EB-BALDASSARRA-CTC.doc

EB61 – 13

1205.5, 1205.9, Chapter 16

Proponent: Marcelo M. Hirschler, GBH International (gbhint@aol.com)

Revise as follows:

1205.5 Roof covering. Regardless of occupancy or use group, roof-covering materials not less than Class C, when tested in accordance with ASTM E 108 or UL 790, shall be permitted where a fire-retardant roof covering is required.

1205.9 Finishes. Where interior finish materials are required to have a flame spread index of Class C or better, when tested in accordance with ASTM E84 or UL 723, existing nonconforming materials shall be surfaced with approved fire-retardant paint or finish.

Add new standards to Chapter 16 as follows:

ASTM

E84-12c Standard Test Method for Surface Burning Characteristics of Building Materials
E108-11 Standard Test Methods for Fire Tests of Roof Coverings

UL Underwriters Laboratories, Inc.
333 Pfingsten Road
Northbrook, IL 60062-2096

UL 723-2008 Standard for Test for Surface Burning Characteristics of Building Materials
UL 790-2004 Standard Test Methods for Fire Tests of Roof Coverings with revisions through October 2008

Reason: This is basically simple clarification, to avoid confusion between Class C for roof coverings (Section 1205.5) and Class C for flame spread index (Section 1205.9). It adds the same ASTM and UL standards contained in the IBC for the applications.

Cost Impact: This code change proposal will not increase the cost of construction.

Analysis: All of the proposed referenced standards are already referenced in the *International Building Code*.

EB61-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1205.5-EB-HIRSCHLER.doc

EB62 – 13

202 (NEW), 1301.1

Proponent: Carl Baldassarra, P.E., Chair, ICC Code Technology Committee

Add new definition as follows:

SECTION 202 GENERAL DEFINITIONS

RELOCATABLE BUILDING. A partially or completely assembled building constructed and designed to be reused multiple times and transported to different building sites.

Revise as follows:

1301.1 Scope. This chapter provides requirements for relocated or moved structures, including relocatable buildings as defined in Chapter 2.

Reason: This proposed change is a result of the CTC's investigation of the area of study entitled "Relocatable Modular Buildings". The scope of the activity is noted as:

Identify issues related to the administration, installation and relocation of relocatable modular buildings. Relocatable modular buildings present challenges to code enforcement due to the units be originally built to a specified code and then relocated to a new site which dictates that compliance for the new site be evaluated.

The IEBC includes 3 compliance methods for existing buildings:

- Prescriptive compliance per Chapter 4.
- Work area compliance per Chapters 5 – 13
- Performance compliance per Chapter 14

Code change G201-12 last cycle removed the existing building provisions from Chapter 34 of the IBC in favor of a reference to the IEBC. This action was subsequently affirmed by the ICC Board as this was a code change related to I-Code scoping. The end result is that all existing buildings are now uniquely covered by the IEBC. Since Chapter 14 does not address moved buildings, the end result is that the IEBC allows 2 alternatives when dealing with relocated or moved buildings:

- Prescriptive compliance. Section 409 requires moved buildings to comply with new construction requirements
- Work area compliance. Chapter 13 provides the requirements by which to analyze a moved structure to ensure its safety without requiring compliance with all the requirements for new construction.

The purpose of this proposal is effectively editorial. It clarifies that relocatable buildings, as defined, fall under the provisions of Chapter 13. The definition has been distilled from industry publications and definitions found in state statutes that govern modular (industrialized) buildings. This definition was also approved in the 2012 IGCC.

Unlike site-built buildings, which are typically intended to remain on their original site for the life of the building, relocatable modular buildings are designed and intended for relocation, reuse and/or repurposing. Many states have statutes that govern the building and relocating of relocatable modular buildings. For those that do not have state mandated requirements, much confusion and inconsistency exists about the requirements for relocatable modular buildings as existing buildings.

The Modular Building Institute (MBI) (www.modular.org) estimates that there are over 600,000 code compliant relocatable buildings in use in North America today. While it is impossible to determine the exact amount owned by the public at large, MBI estimates that public school districts across North America collectively own and operate about 180,000 relocatable classrooms with the industry owning and leasing an additional 120,000. Additionally, the industry owns and leases approximately 280,000 relocatable buildings for various other business occupancies, including construction site offices and temporary sales offices.

This proposal is submitted by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website:

<http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty-five meetings - all open to the public. In 2012, three of the 25 face-to-face meetings were held. In addition to the CTC meetings, the CTC established Study Groups (SG) of interested parties for each of the areas of study. These SG's are responsible for reviewing the available information and making recommendations to the CTC. All totaled, the SG's held over 70 conference calls in 2012.

Cost Impact: This code change proposal will not increase the cost of construction.

EB63-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1301.1-EB-BALDASSARRA-CTC.doc

EB63 – 13

602.1.1 (New), 702.1.1 (New), 1202.2.1 (New), Chapter 16

Proponent: Rebecca Morley, National Center for Healthy Housing

Add new text as follows:

SECTION 602 BUILDING ELEMENTS AND MATERIALS

602.1 Existing building materials. Materials already in use in a building in compliance with requirements or approvals in effect at the time of their erection or installation shall be permitted to remain in use unless determined by the *code official* to render the building or structure unsafe or *dangerous* as defined in Chapter 2.

602.1.1 Disturbance of existing painted surfaces. In any Group E, I-4, R-2, R-3, R-4 occupancies completed prior to 1978, where repairs disturb painted surfaces, the work shall comply with the information distribution, certification and work practice requirements of 40 CFR 745 for renovations.

Exception: Where documentation is provided from an approved test in accordance with 40 CFR 745.82(a)(1) or (2) that proves that the disturbed paint contains lead levels below specified levels, the work is not required to comply with this section.

SECTION 702 BUILDING ELEMENTS AND MATERIALS

702.1 Interior finishes. All newly installed interior wall and ceiling finishes shall comply with Chapter 8 of the *International Building Code*.

702.1.1 Disturbance of existing painted surfaces. In any Group E, I-4, R-2, R-3, R-4 occupancies completed prior to 1978, where alterations disturb painted surfaces, the work shall comply with the information distribution, certification and work practice requirements of 40 CFR 745 for renovations.

Exception: Where documentation is provided from an approved test in accordance with 40 CFR 745.82(a)(1) or (2) that proves that the disturbed paint contains lead levels below specified levels, the work is not required to comply with this section.

SECTION 1202 REPAIRS

1202.1 General. Repairs to any portion of an *historic building* or structure shall be permitted with original or like materials and original methods of construction, subject to the provisions of this chapter. Hazardous materials, such as asbestos and lead-based paint, shall not be used where the code for new construction would not permit their use in buildings of similar occupancy, purpose and location.

1202.2.1 Disturbance of existing painted surfaces. In any Group E, I-4, R-2, R-3, R-4 occupancies, where repairs disturb painted surfaces, the work shall comply with the information distribution, certification and work practice requirements of 40 CFR 745 for renovations.

Exception: Where documentation is provided from an approved test in accordance with 40 CFR 745.82(a)(1) or (2) that proves that the disturbed paint contains lead levels below specified levels, the work is not required to comply with this section.

Add the following standard to Chapter 16:

40 CFR 745 - July 1, 2012 Lead-Based Paint Poisoning Prevention in Certain Residential Structures

Reason: The purpose of this proposed code language is to incorporate protection from lead-based paint into the Code's requirements. These requirements are already law in every state through the Environmental Protection Agency's Renovation Repair and Painting Rule, which governs work with paint that may contain lead-based paint in order to prevent childhood lead poisoning. These regulations have been in effect since April 2010, and have been adopted by 12 states.

Renovation of painted surfaces is a significant source of lead dust that poisons children. The dangers associated with lead poisoning are well-known: serious health effects, detrimental effects on cognitive and behavioral development, with serious personal and social consequences that may persist throughout their lifetime.

Multiple studies have demonstrated that lead dust is the major source of lead poisoning for young children. There is no safe level of lead exposure for children; lead affects intelligence even at very low levels.^{1,2,5,8,9} Indeed, the rate of IQ loss per 1 microgram of lead per deciliter of blood ($\mu\text{g}/\text{dL}$) is greatest at lead levels below 10 $\mu\text{g}/\text{dL}$. As a child's BLL increases from 1 to 10 $\mu\text{g}/\text{dL}$, experts estimate a child may lose anywhere from 3.9 to 7.4 IQ points, but from 10 to 30 $\mu\text{g}/\text{dL}$ the decrement is 2.5 to 3.0 IQ points. Low-level chronic exposure may have an even greater effect on IQ than a single instance of very high BLL.¹⁰

Research indicates that a five-point negative shift in IQ at the population level would increase the number of children with an "extremely low" IQ by 57%, substantially increasing the cost of special education programs.³ Considering the costs to the special education system alone, one study conservatively estimated that it costs \$38,000 over three years to educate a child with lead poisoning.¹¹ Low-level exposure to lead has also been linked to factors other than IQ that can further impact educational outcomes. EBLLs are associated with Attention Deficit Hyperactivity Disorder (ADHD) and antisocial behavior, which in turn increase the likelihood of conduct disorder, criminal activity, and drug abuse.^{1,4} Each 1 $\mu\text{g}/\text{dL}$ reduction in the average preschool blood lead level saves \$13.4 billion from the direct and indirect costs of crime.¹

Several recent studies have explored the specific effects of lead on educational outcomes. These studies show a strong relationship between slightly elevated blood lead levels in young children and decreased scores on end-of-grade tests in elementary school. While similar educational effects were documented for higher blood levels decades ago,¹² the recent studies confirm that the connection between blood lead and poor educational outcomes remains true for blood levels as low as 3-4 $\mu\text{g}/\text{dL}$. A more recent study of 57,000 North Carolina children found that children with a BLL as low as 4 $\mu\text{g}/\text{dL}$ at three years of age were significantly more likely to be classified as learning-disabled than children with a BLL of 1 $\mu\text{g}/\text{dL}$.⁶

The consequences of lead exposure are clear. This code change proposal seeks to reduce the risk.

The additions to Sections 602, 702, and 1202 add health-protective requirements to protect children from lead poisoning by preventing the dispersal of lead before, during, and after work performed on a pre-1978 home. The information distribution, certification, and lead safe practices requirements are already in effect in federal and state regulation. This change would only affect structures likely to contain lead-based paint: pre-1978 homes. As noted under the exception, the requirement is waived if paint testing proves that the paint is not lead-based paint. A rebuttable presumption of lead's presence allows the builder to demonstrate that lead is not present and obtain exemption from the requirements. EPA-approved tests include lead-based paint inspection or risk assessment, test kit used by a certified renovator, and collection of a lead-based paint chips for laboratory analysis.

The EPA 40 CFR 745 standard is available at <http://www.gpo.gov/fdsys/pkg/CFR-2012-title40-vol32/xml/CFR-2012-title40-vol32-part745.xml>.

References

1. Gould E. Childhood lead poisoning: conservative estimates of the social and economic benefits of lead hazard control. *Environ. Health Perspect.* 2009;117(7):1162–1167.
2. Jusko TA, Henderson CR, Lanphear BP, Cory-Slechta DA, Parsons PJ, Canfield RL. Blood lead concentrations. *Environ. Health Perspect.* 2008;116(2):243–248.
3. Mazumdar M, Bellinger DC, Gregas M, Abanilla K, Bacic J, Needleman HL. Low-level environmental lead exposure in childhood and adult intellectual function: a follow-up study. *Environ. Health.* 2011;10:24.
4. Chandramouli K, Steer CD, Ellis M, Emond AM. Effects of early childhood lead exposure on academic performance and behaviour of school age children. *Arch. Dis. Child.* 2009;94(11):844–848.
5. Miranda ML, Kim D, Galeano MA, Paul CJ, Hull AP, Morgan SP. The relationship between early childhood blood lead levels and performance on end-of-grade tests. *Environ. Health Perspect.* 2007;115(8):1242–1247.
6. Miranda ML, Maxson P, Kim D. Early childhood lead exposure and exceptionality designations for students. *Int J Child Health Hum Dev.* 2010;3(1):77–84.
7. Advisory Committee on Childhood Lead Poisoning Prevention. Low Level Lead Exposure Harms Children: A Renewed Call for Primary Prevention. 2012:1–68. Available at: http://www.cdc.gov/nceh/lead/ACCLPP/Final_Document_030712.pdf. Accessed March 6, 2012.
8. Lanphear BP, Hornung R, Khoury J, et al. Low-level environmental lead exposure and children's intellectual function: an international pooled analysis. *Environ. Health Perspect.* 2005;113(7):894–899.
9. Canfield RL, Henderson CR, Cory-Slechta DA, Cox C, Jusko TA, Lanphear BP. Intellectual impairment in children with blood lead concentrations below 10 microg per deciliter. *N. Engl. J. Med.* 2003;348(16):1517–1526.
10. Lanphear BP, Dietrich K, Auinger P, Cox C. Cognitive deficits associated with blood lead concentrations. *Public Health Rep.* 2000;115(6):521–529.
11. Korfmacher KS. Long-term costs of lead poisoning: How much can New York save by stopping lead? Rochester, NY: University of Rochester; 2003.
12. Needleman HL, Leviton A, Bellinger D. Lead-associated intellectual deficit. *N Engl J Med.* 1982; 306(6):367.

Cost Impact: This code change proposal will not increase the cost of additions, alterations or repairs since these federal/state requirements are already in effect.

Staff analysis: A review of the standard proposed for inclusion in the code, 40 CFR 745 -July 1, 2012 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

EB63-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1510.1 (NEW)-EB-MORLEY.doc

2013 PROPOSED CHANGES TO THE INTERNATIONAL ENERGY CONSERVATION CODE- COMMERCIAL PROVISIONS

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TENTATIVE ORDER OF DISCUSSION

2013 PROPOSED CHANGES TO THE

INTERNATIONAL ENERGY CONSERVATION CODE – COMMERCIAL

The following is the tentative order in which the proposed changes to the code will be discussed at the public hearings. Proposed changes which impact the same subject have been grouped to permit consideration in consecutive changes.

Proposed change numbers that are indented are those which are being heard out of numerical order. Indentation **does not** necessarily indicate that one change is related to another. Proposed changes may be grouped for purposes of discussion at the hearing at the discretion of the chair. Please consult the Cross Index of Proposed Changes.

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Proponent: Deborah Taylor, RA, LEED AP, Deborah F. Taylor Consulting, LLC, representing self (taylor@dftconsultingny.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C101.2 Scope. This code applies to *commercial buildings and residential buildings*, and the building sites and associated systems and equipment. Commercial buildings shall meet the requirements of the commercial provisions of this code, designated with a prefix "C". Residential buildings shall meet the requirements of the residential provisions of this code, designated with a prefix "R". Provisions without a designation "C" or "R" apply to all buildings.

C101.3 Intent. This code shall regulate the design and construction of buildings for the effective use and conservation of energy over the useful life of each building. ~~This code is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve this objective.~~ This code is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.

C101.3.1 Alternate materials, systems, approaches or techniques. This code is intended to provide flexibility to permit the use of innovative materials, systems, approaches or techniques to achieve this objective, provided such alternate proposals are approved by the code official.

C101.3.2 Above-code programs. The code official or other authority having jurisdiction shall be permitted to deem a national, state or local energy efficiency program to exceed the energy efficiency required by this code. Buildings approved in writing by such an energy efficiency program shall be considered in compliance with this code. The requirements identified as «mandatory» in Chapters C4 and R4 shall be met.

~~**C101.4.2 Historic buildings.** Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, are exempt from this code.~~

C101.4.3 C101.4.2 Additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. ~~Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems.~~ An addition shall be deemed to

comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

Exception: The following need not comply provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
4. Construction where the existing roof, wall or floor cavity is not exposed.
5. Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.
6. Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed.
7. Alterations that replace less than 50 percent of the luminaires in a space less than 5000 square feet, provided that such alterations do not increase the installed interior lighting power.
8. Alterations that replace only the bulb lamp and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.

C101.4.4 C101.4.3 Change in occupancy or use. Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with this code. Where the use in a space changes from one use in Table C405.5.2(1) or (2) to another use in Table C405.5.2(1) or (2), the installed lighting wattage shall comply with Section C405.5.

C101.4.5 C101.4.4 Change in space conditioning. Any nonconditioned space that is altered to become *conditioned space* shall be required to be brought into full compliance with this code.

C101.4.6 C101.4.5 Mixed occupancy. Where a building includes both *residential* and *commercial* occupancies, each occupancy shall be separately considered and meet the applicable provisions of IECC—Commercial Provisions or IECC—Residential Provisions.

C101.4.6 Exempt buildings or work. The following buildings or portions thereof shall be exempt from this code:

C101.4.6.1 Historic buildings. Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, is exempt from this code.

C101.4.6.2 Certain additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs, to the extent that compliance with this code would create an unsafe or hazardous condition or overload existing building systems, and for which there is not a feasible compliant alternative, shall be exempt from this code.

C101.4.6.3 Envelope assemblies of low-energy buildings. The following buildings, or portions thereof, separated from the remainder of the building by *building thermal envelope* assemblies complying with this code, shall be exempt from the *building thermal envelope* provisions of this code:

1. Those with a peak design rate of energy usage less than 3.4. Btu/h /ft² (10.7 W/m²) or 1.0 watt/ft² (10.7 W/m²) of floor area for space conditioning purposes.

2. Those that do not contain conditioned space.

C101.5 Compliance. Residential buildings shall meet the provisions of IECC-Residential Provisions. Commercial buildings shall meet the provisions of IECC-Commercial Provisions.

C101.5 Compliance materials. The code official shall be permitted to approve specific computer software, worksheets, compliance manuals and other similar materials that meet the intent of this code.

C101.5.1 Compliance materials. ~~The code official shall be permitted to approve specific computer software, worksheets, compliance manuals and other similar materials that meet the intent of this code.~~

SECTION C102

ALTERNATE MATERIALS — METHOD OF CONSTRUCTION, DESIGN OR INSULATING SYSTEMS

C102.1 General. ~~This code is not intended to prevent the use of any material, method of construction, design or insulating system not specifically prescribed herein, provided that such construction, design or insulating system has been approved by the code official as meeting the intent of this code.~~

C102.1.1 Above code programs. ~~The code official or other authority having jurisdiction shall be permitted to deem a national, state or local energy efficiency program to exceed the energy efficiency required by this code. Buildings approved in writing by such an energy efficiency program shall be considered in compliance with this code. The requirements identified as "mandatory" in Chapter 4 shall be met.~~

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R101.2 Scope. This code applies to *residential buildings* and commercial buildings the buildings sites and associated systems and equipment. Commercial buildings shall meet the requirements of the commercial provisions of this code, designated with a prefix "C". Residential buildings shall meet the requirements of the residential provisions of this code, designated with a prefix "R". Provisions without a designation "C" or "R" apply to all buildings.

R101.3 (N1101.2) Intent. This code shall regulate the design and construction of buildings for the effective use and conservation of energy over the useful life of each building. ~~This code is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve this objective.~~ This code is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.

R101.3.1 (N1101.2.1) Alternate materials, systems, approaches or techniques. This code is intended to provide flexibility to permit the use of innovative materials, systems, approaches or techniques to achieve this objective, provided such alternate proposals are approved by the code official.

R101.3.2 (N1101.2.2) Above-code programs. The code official or other authority having jurisdiction shall be permitted to deem a national, state or local energy efficiency program to exceed the energy efficiency required by this code. Buildings approved in writing by such an energy efficiency program shall be considered in compliance with this code. The requirements identified as «mandatory» in Chapters C4 and R4 shall be met.

R101.4.2 Historic buildings. ~~Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, are exempt from this code.~~

~~R101.4.3 (N1101.3)~~ R101.4.2 Additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. ~~Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems.~~ An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

Exception: The following need not comply provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
4. Construction where the existing roof, wall or floor cavity is not exposed.
5. Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.
6. Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed.
7. Alterations that replace less than 50 percent of the luminaires in a space less than 5000 square feet, provided that such alterations do not increase the installed interior lighting power.
8. Alterations that replace only the ~~bulb~~ lamp and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.

~~R101.4.4~~ R101.4.3 Change in occupancy or use. Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with this code. Where the use in a space changes from one use in Table C405.5.2(1) or (2) to another use in Table C405.5.2(1) or (2), the installed lighting wattage shall comply with Section C405.5.

~~R101.4.5 (N1101.4)~~ R101.4.4 Change in space conditioning. Any nonconditioned space that is altered to become *conditioned space* shall be required to be brought into full compliance with this code.

~~R101.4.6~~ R101.4.5 Mixed occupancy. Where a building includes both *residential* and *commercial* occupancies, each occupancy shall be separately considered and meet the applicable provisions of IECC—Commercial Provisions or IECC—Residential Provisions.

R101.4.6 Exempt buildings or work. The following buildings or portions thereof shall be exempt from this code:

R101.4.6.1 Historic buildings. Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, is exempt from this code.

R101.4.6.2 Certain additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs, to the extent that compliance with this code would create an unsafe or hazardous condition or overload existing building systems, and for which there is not a feasible compliant alternative, shall be exempt from this code.

R101.4.6.3 Envelope assemblies of low-energy buildings. The following buildings, or portions thereof, separated from the remainder of the building by *building thermal envelope* assemblies complying with this code, shall be exempt from the *building thermal envelope* provisions of this code:

1. Those with a peak design rate of energy usage less than 3.4. Btu/h /ft² (10.7 W/m²) or 1.0 watt/ft² (10.7 W/m²) of floor area for space conditioning purposes.
2. Those that do not contain *conditioned space*.

R101.5 Compliance. Residential buildings shall meet the provisions of IECC-Residential Provisions. Commercial buildings shall meet the provisions of IECC-Commercial Provisions.

R101.5 (N1101.5) Compliance materials. The *code official* shall be permitted to approve specific computer software, worksheets, compliance manuals and other similar materials that meet the intent of this code.

R101.5.1 (N1101.5) Compliance materials. The *code official* shall be permitted to approve specific computer software, worksheets, compliance manuals and other similar materials that meet the intent of this code.

SECTION R102

~~ALTERNATE MATERIALS — METHOD OF CONSTRUCTION, DESIGN OR INSULATING SYSTEMS~~

R102.1 General. This code is not intended to prevent the use of any material, method of construction, design or insulating system not specifically prescribed herein, provided that such construction, design or insulating system has been *approved* by the *code official* as meeting the intent of this code.

R102.1.1 (N1101.7) Above code programs. The *code official* or other authority having jurisdiction shall be permitted to deem a national, state or local energy efficiency program to exceed the energy efficiency required by this code. Buildings *approved* in writing by such an energy efficiency program shall be considered in compliance with this code. The requirements identified as “mandatory” in Chapter 4 shall be met.

Reason: This proposed change reorganizes Section 101 to provide greater clarity regarding intent and flexibility, applicability and exemptions, and compliance materials, all as part of the Scope and General Requirements section. This will help both the code official and the registered design professional to understand how these important concepts apply.

Cost Impact: The code change proposal will not increase the cost of construction. It clarifies a framework for the energy code and does not affect either design or construction.

CE1-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C101.2-EC-TAYLOR.doc

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C101.3, R101.3 (N1101.2)

Proponent: William W Stewart, FAIA, PE, representing self (codedoc@sbcglobal.net)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C101.3 Intent. This code shall regulate the design and construction of buildings for the ~~effective~~ use and conservation of energy over the ~~useful~~ life of each building. This code is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve this objective. This code is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R101.3 (N1101.2) Intent. This code shall regulate the design and construction of buildings for the ~~effective~~ use and conservation of energy over the ~~useful~~ life of each building. This code is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve this objective. This code is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.

Reason: The deleted words are subjective and add nothing to the code. The “effective” use of energy is neither definable or enforceable. What is effective to some is not effective to others. No where in the code is the “useful” life of a building defined and it depends of the needs of the occupant. Is a building designed with cutting edge technology no longer useful when a higher level if technology is applied to newer buildings? Additionally, a remodeled building could have a longer “useful” life than anticipated by the original owner. As revised, the code would be understandable and enforceable.

Cost Impact: The code change will not increase the cost of construction.

CE2-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C101.3-CE-STEWART.doc

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C101.4.3, R101.4.3 (IRC N1101.3), IEBC 707.1, 811.1

Proponent: Randall R. Dahmen, P.E., Licensed Wisconsin Commercial Building Inspector, representing self

THIS IS A 3 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE, PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART III WILL BE HEARD BY THE EXISTING BUILDING CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Delete without substitution as follows:

~~**C101.4.3 Additions, alterations, renovations or repairs.** Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.~~

~~**Exception:** The following need not comply provided the energy use of the building is not increased:~~

- ~~1. Storm windows installed over existing fenestration.~~
- ~~2. Glass-only replacements in an existing sash and frame.~~
- ~~3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.~~
- ~~4. Construction where the existing roof, wall or floor cavity is not exposed.~~
- ~~5. Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.~~
- ~~6. Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed.~~
- ~~7. Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.~~
- ~~8. Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.~~

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

~~**R101.4.3 (N1101.4.3) Additions, alterations, renovations or repairs.** Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.~~

~~**Exception:** The following need not comply provided the energy use of the building is not increased:~~

1. ~~Storm windows installed over existing fenestration.~~
2. ~~Glass only replacements in an existing sash and frame.~~
3. ~~Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.~~
4. ~~Construction where the existing roof, wall or floor cavity is not exposed.~~
5. ~~Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.~~
6. ~~Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed.~~
7. ~~Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.~~
8. ~~Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.~~

PART III – IEBC

Delete and substitute as follows:

707.1 Minimum requirements. ~~Level 1 alterations to existing buildings or structures are permitted without requiring the entire building or structure to comply with the energy requirements of the *International Energy Conservation Code* or *International Residential Code*. The alterations shall conform to the energy requirements of the *International Energy Conservation Code* or *International Residential Code* as they relate to new construction only.~~

707.1 Minimum requirements. Alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of the *International Energy Conservation Code* as they relate to new construction without requiring the unaltered portions of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

Exception: The following need not comply provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
4. Construction where the existing roof, wall or floor cavity is not exposed.
5. Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.
6. Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door. An existing vestibule that separates a *conditioned space* from the exterior shall not be removed.
7. Alterations that replace less than 50 percent of the luminaires in a space, where such alterations do not increase the installed interior lighting power.
8. Alterations that replace only the bulb and ballast within the existing luminaires in a space where the *alteration* does not increase the installed interior lighting power.

Delete and substitute as follows:

811.1 Minimum requirements. ~~Level 2 alterations to existing buildings or structures are permitted without requiring the entire building or structure to comply with the energy requirements of the~~

~~International Energy Conservation Code or International Residential Code. The alterations shall conform to the energy requirements of the International Energy Conservation Code or International Residential Code as they relate to new construction only.~~

811.1 Minimum requirements. A building, building system, or portion thereof that is altered shall comply with Section 707.

Reason: The requirements referenced in this code section are issues that deal with existing buildings. As such, the requirements should be listed in the IEBC. If it is felt that the requirements need to remain as part of the IECC, then it is requested that the requirements be listed/referenced under both the IECC as well as the IEBC, as is commonly done throughout the ICC suite of codes. Having the same language in multiple ICC codes is commonly done throughout the ICC suites for issues such as fire dampers, etc. For example, review IBC 717.5 and IMC 607.5

Cost Impact: The code change proposal will not increase the cost of construction.

CE3-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART III – IEBC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C101.4.3-EC-DAHMEN.doc

CE4 – 13

C101.4.1 through C101.4.5, C202, C401.2.1, Chapter 5 (CE) (NEW), R101.4, R202 (IRC N1101.9); R402.3.6 (IRC N1102.3.6), Chapter 5 (RE) (NEW) (IRC N1106 (NEW))

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC – COMMERCIAL PROVISIONS

Delete without substitution as follows:

~~C101.4.1 Existing buildings.~~ Except as specified in this chapter, this code shall not be used to require the removal, ~~alteration~~ or abandonment of, nor prevent the continued use and maintenance of, an existing building or building system lawfully in existence at the time of adoption of this code.

~~C101.4.2 Historic buildings.~~ Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, are exempt from this code.

~~C101.4.3 Additions, alterations, renovations or repairs.~~ Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

Exception: The following need not comply provided the energy use of the building is not increased:

- ~~1. Storm windows installed over existing fenestration.~~
- ~~2. Glass only replacements in an existing sash and frame.~~
- ~~3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.~~
- ~~4. Construction where the existing roof, wall or floor cavity is not exposed.~~
- ~~5. Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.~~
- ~~6. Replacement of existing doors that separate conditioned space from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a conditioned space from the exterior shall not be removed.~~
- ~~7. Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.~~
- ~~8. Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the alteration does not increase the installed interior lighting power.~~

~~C101.4.4 Change in occupancy or use.~~ Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with this code. Where the use

in a space changes from one use in Table C405.5.2(1) or (2) to another use in Table C405.5.2(1) or (2), the installed lighting wattage shall comply with Section C405.5.

~~C101.4.5 Change in space conditioning.~~ Any nonconditioned space that is altered to become *conditioned space* shall be required to be brought into full compliance with this code.

Delete without substitution as follows:

~~C401.2.1 Application to existing buildings.~~ Additions, alterations and repairs to existing buildings shall comply with one of the following:

- ~~1. Sections C402, C403, C404 and C405; or~~
- ~~2. ANSI/ASHRAE/IESNA 90.1.~~

Add new text as follows:

CHAPTER 5 CE **EXISTING BUILDINGS**

SECTION C501 **GENERAL**

C501.1 Scope. The provisions of this chapter shall control the *alteration, repair, addition* and change of occupancy of existing buildings and structures.

C501.2 Existing buildings. Except as specified in this chapter, this code shall not be used to require the removal, *alteration* or abandonment of, nor prevent the continued use and maintenance of, an existing building or building system lawfully in existence at the time of adoption of this code.

C501.3 Maintenance. Buildings and structures, and parts thereof, shall be maintained in a safe and sanitary condition. Devices or and systems which are required by this code shall be maintained in conformance with the code edition under which installed. The owner or the owner's designated agent shall be responsible for the maintenance of buildings and structures. The requirements of this chapter shall not provide the basis for removal or abrogation of energy conservation, fire protection and safety systems and devices in existing structures.

C501.4 Compliance. *Alterations, repairs, additions* and changes of occupancy to, or relocation of, existing buildings and structures shall comply with the provisions for *alterations, repairs, additions* and changes of occupancy or relocation, respectively, in the *International Building Code, International Fire Code, International Fuel Gas Code, International Mechanical Code, International Plumbing Code, International Property Maintenance Code, International Private Sewage Disposal Code* and NFPA 70.

C501.5 New and replacement materials. Except as otherwise required or permitted by this code, materials permitted by the applicable code for new construction shall be used. Like materials shall be permitted for repairs, provided no hazard to life, health or property is created. Hazardous materials shall not be used where the code for new construction would not permit their use in buildings of similar occupancy, purpose and location.

C501.6 Historic buildings. *Historic buildings* are exempt from this code.

SECTION C502 **ADDITIONS**

C502.1 General. Additions to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion of the existing building or building system to comply with this code. Additions shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with

this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

Additions complying with ANSI/ASHRAE/IESNA 90.1. need not comply with Sections C402, C403, C404 and C405.

SECTION C503 **ALTERATIONS**

C503.1 General Alterations to any building or structure shall comply with the requirements of the code for new construction. Alterations shall be such that the existing building or structure is no less conforming with the provisions of this code than the existing building or structure was prior to the alteration. Alterations to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portions of the existing building or building system to comply with this code. Alterations shall not create an unsafe or hazardous condition or overload existing building systems.

Alterations complying with ANSI/ASHRAE/IESNA 90.1. need not comply with Sections C402, C403, C404 and C405.

Exception: The following alterations need not comply with the requirements for new construction provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
3. Construction where the existing roof, wall or floor cavity is not exposed.
4. Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.

C503.2 Change in space conditioning. Any nonconditioned or low energy space that is altered to become *conditioned space* shall be required to be brought into full compliance with this code.

SECTION C504 **REPAIRS**

C504.1 General. Buildings and structures, and parts thereof, shall be repaired in compliance with Section C501.3 and this section. Work on nondamaged components that is necessary for the required *repair* of damaged components shall be considered part of the *repair* and shall not be subject to the requirements for *alterations* in this chapter. Routine maintenance required by Section C501.3, ordinary repairs exempt from *permit*, and abatement of wear due to normal service conditions shall not be subject to the requirements for *repairs* in this section.

Where a building was constructed to comply with ANSI/ASHRAE/IESNA 90.1. repairs shall comply with the standard and need not comply with Sections C402, C403, C404 and C405.

C504.2 Application. For the purposes of this code, the following shall be considered repairs.

1. Glass only replacements in an existing sash and frame.
2. Roof repairs where neither the sheathing nor the insulation is exposed.
3. Replacement of existing doors that separate conditioned space from the exterior shall not require the installation of a vestibule or revolving door, provided however that an existing vestibule that separates a conditioned space from the exterior shall not be removed.
4. Repairs where only the bulb and/or ballast within the existing luminaires in a space are replaced provided that the replacement does not increase the installed interior lighting power.

SECTION C505
CHANGE OF OCCUPANCY OR USE

C505.1 General. Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with this code. Where the use in a space changes from one use in Table C405.5.2(1) or C405.5.2 (2) to another use in Table C405.5.2(1) or C405.5.2 (2), the installed lighting wattage shall comply with Section C405.5.

Add new definitions as follows:

HISTORIC BUILDINGS. Buildings that are listed in or eligible for listing in the National Register of Historic Places, or designated as historic under an appropriate state or local law.

REPAIR. The reconstruction or renewal of any part of an existing building for the purpose of its maintenance.

PART II – IECC – RESIDENTIAL PROVISIONS

Revise as follows:

R101.4 Applicability. Where, in any specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive shall govern. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall govern.

~~**R101.4.1 Existing buildings.** Except as specified in this chapter, this code shall not be used to require the removal, alteration or abandonment of, nor prevent the continued use and maintenance of, an existing building or building system lawfully in existence at the time of adoption of this code.~~

~~**R101.4.2 Historic buildings.** Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, are exempt from this code.~~

~~**R101.4.3 (N1101.3) Additions, alterations, renovations or repairs.** Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.~~

~~**Exception:** The following need not comply provided the energy use of the building is not increased:~~

- ~~1. Storm windows installed over existing fenestration.~~
- ~~2. Glass only replacements in an existing sash and frame.~~
- ~~3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.~~
- ~~4. Construction where the existing roof, wall or floor cavity is not exposed.~~
- ~~5. Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.~~

6. ~~Replacement of existing doors that separate conditioned space from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a conditioned space from the exterior shall not be removed,~~
7. ~~Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.~~
8. ~~Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the alteration does not increase the installed interior lighting power.~~

~~R101.4.4 Change in occupancy or use.~~ Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with this code.

~~R101.4.5 (N1101.4) Change in space conditioning.~~ Any nonconditioned space that is altered to become conditioned space shall be required to be brought into full compliance with this code.

~~R101.4.6 R101.4.1 Mixed occupancy.~~ Where a building includes both *residential* and *commercial* occupancies, each occupancy shall be separately considered and meet the applicable provisions of the IECC—Commercial and Residential Provisions.

Delete without substitution as follows:

~~R402.3.6 (N1102.3.6) Replacement fenestration.~~ Where some or all of an existing fenestration unit is replaced with a new fenestration product, including sash and glazing, the replacement fenestration unit shall meet the applicable requirements for *U*-factor and SHGC in Table R402.1.1.

Add new text as follows:

CHAPTER 5 (RE) **EXISTING BUILDINGS**

SECTION R501 (N1106) **GENERAL**

R501.1 (N1106.1) Scope. The provisions of this chapter shall control the *alteration, repair, addition and change of occupancy of existing buildings and structures.*

R501.2 (N1106.2) Existing buildings. Except as specified in this chapter, this code shall not be used to require the removal, *alteration* or abandonment of, nor prevent the continued use and maintenance of, an existing building or building system lawfully in existence at the time of adoption of this code.

R501.3 (N1106.3) Maintenance. Buildings and structures, and parts thereof, shall be maintained in a safe and sanitary condition. Devices or and systems which are required by this code shall be maintained in conformance with the code edition under which installed. The owner or the owner's designated agent shall be responsible for the maintenance of buildings and structures. The requirements of this chapter shall not provide the basis for removal or abrogation of energy conservation, fire protection and safety systems and devices in existing structures.

R501.4 (N1106.4) Compliance. *Alterations, repairs, additions and changes of occupancy to, or relocation of, existing buildings and structures shall comply with the provisions for alterations, repairs, additions and changes of occupancy or relocation, respectively, in the International Residential Code, International Building Code, International Fire Code, International Fuel Gas Code, International Mechanical Code, International Plumbing Code, International Property Maintenance Code, International Private Sewage Disposal Code and NFPA 70.*

R501.5 (N1106.5) New and replacement materials. Except as otherwise required or permitted by this code, materials permitted by the applicable code for new construction shall be used. Like materials shall be permitted for repairs, provided no hazard to life, health or property is created. Hazardous materials

shall not be used where the code for new construction would not permit their use in buildings of similar occupancy, purpose and location.

R501.6 (N1106.6) Historic buildings. *Historic buildings* are exempt from this code.

SECTION R502 (N1107) **ADDITIONS**

R502.1 (N1107.1) General. Additions to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion of the existing building or building system to comply with this code. Additions shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

SECTION R503 (N1108) **ALTERATIONS**

R503.1 (N1108.1) Alterations. Alterations to any building or structure shall comply with the requirements of the code for new construction. Alterations shall be such that the existing building or structure is no less conforming with the provisions of this code than the existing building or structure was prior to the alteration. Alterations to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portions of the existing building or building system to comply with this code. Alterations shall not create an unsafe or hazardous condition or overload existing building systems.

Exception: The following alterations need not comply with the requirements for new construction provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
3. Construction where the existing roof, wall or floor cavity is not exposed.
4. Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.

R503.2 (N1108.2) Change in space conditioning. Any nonconditioned or low energy space that is altered to become conditioned space shall be required to be brought into full compliance with this code.

R503.3. (N1108.3) Replacement fenestration . Where some or all of an existing fenestration unit is replaced with a new fenestration product, including sash and glazing, the replacement fenestration unit shall meet the applicable requirements for U-factor and SHGC in Table R402.1.1.

SECTION R504 (N1109) **REPAIRS**

R504.1 (N1109.1) General. Buildings and structures, and parts thereof, shall be repaired in compliance with Section C501.3 and this section. Work on nondamaged components that is necessary for the required repair of damaged components shall be considered part of the repair and shall not be subject to the requirements for alterations in this chapter. Routine maintenance required by Section C501.3, ordinary repairs exempt from permit, and abatement of wear due to normal service conditions shall not be subject to the requirements for repairs in this section.

R504.2 (N1109.2) Application. For the purposes of this code, the following shall be considered repairs.

1. Glass only replacements in an existing sash and frame.

2. Roof repairs where neither the sheathing nor the insulation is exposed.
3. Repairs where only the bulb and/or ballast within the existing luminaires in a space are replaced provided that the replacement does not increase the installed interior lighting power.

SECTION R505 (N1110) **CHANGE OF OCCUPANCY OR USE**

R505.1 (N1110.1) General. Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with this code.

Add new definitions as follows:

HISTORIC BUILDINGS. Buildings that are listed in or eligible for listing in the National Register of Historic Places, or designated as historic under an appropriate state or local law.

REPAIR. The reconstruction or renewal of any part of an existing building for the purpose of its maintenance.

Reason: (PART I) This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

The primary purpose of this proposal is to move the regulation of existing buildings under the IECC out of Chapter 1 and into its own Chapter. Chapter 1 should be reserved for administrative provisions of the code and not the technical standards applicable to renovating or expanding existing buildings. For the Commercial IECC there are additional provisions for existing buildings found in Section C401.2.1. Therefore the primary purpose is editorial. But the purpose is also forward looking. The vast majority of our building stock is existing. If more energy savings is to be found, a significant route is the upgrade of existing buildings. This change anticipates a growth in detail of such provisions, and the SEHPCAC feels that having a distinct existing buildings chapter will better accommodate the growth of such standards.

The committee used the general format of Chapter 34 of the IBC. It compared existing language in the IBC with that in the IECC and either chose language from one code or the other, or occasionally melded the two codes. The following table lists for each new section the source of the text.

Proposed Chapter Sections	Source code and Section
C501.1 Scope	IBC 3401.1
C501.2 Existing Buildings	IECC C101.4.1
C501.3 Maintenance	IBC 3401.2
C501.4 Compliance	IBC 3401.3
C501.5 New and replacement materials	IBC 3401.4
C501.6 Historic buildings	IECC C101.4.2
C502, Additions	IECC C101.4.3
C502.1 General	
C502.1 – General exception	IECC C401.2.1
C503 Alterations	IBC 3404.1 and IECC
C503.1 General	CC101.4.3
C503.2 Change in space conditioning	IECC 101.4.5
C504 Repairs	IBC 3405.1
C504.1 General	IECC C101.4.3
C504.2 Application	IECC C101.4.3
C505 Change of Occupancy or Use	IECC C101.4.4
C505.1 General	

The proposal does simplify the language of the historic building section to a simple exemption, but at the same time proposes a definition Historic Buildings to be added to the IECC. Most of the current text of Section C101.4.2 is actually definition. The Committee noted that there is a difference between the definitions of historic buildings in the IBC versus the IEBC. It chose the IBC version, for consistency with the lead code. The IRC does not define historic buildings.

Another substantive change – or perhaps clarification is regarding a potential of a low energy space becoming a fully conditioned space. The current text of the IECC does not address such a conversion. This proposal treats such changes the same as that of creating a conditioned space from a non-conditioned space.

Section C101.4.3 includes a list of 8 actions which are exempt from compliance with the code. Since C101.4.3 addresses all three actions (additions, alterations and repairs) it is unclear where the 8 exceptions applies. The Committee reviewed each and felt that 4 belonged in the alteration section and 4 in the repairs section.

Finally the provisions currently found in Section 401.2.1 allowing the use of ASHRAE 90.1 is translated into an alternate compliance path, for additions in Section C502. The assumption is that the design of an addition can comply with the IECC or the ASHRAE 90.1 regardless of the requirements applied to the original building. For Alterations a similar exception is provided allowing use of either IECC or ASHRAE 90.1. These are simply shown as text allowing alternate compliance and not exception. The term exception implies a lesser standard; ASHRAE 90.1 should not be viewed as a lesser standard. However for repairs, the proposal only allows use of ASHRAE 90.1 for repairs if the original design was per ASHRAE 90.1.

(PART II): This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

See the Reason statement for Part I of this proposal.

When the IECC was divided into two parallel documents, the provisions for existing buildings were copied nearly word for word into both C104 and R104. Therefore the IECC residential proposal mirrors the IECC Commercial proposal with 3 distinct differences.

1. ASHRAE 90.1 is not address as the standard is not applicable to 'residential' buildings.
2. Section R402.3.6 on replacement fenestration is added as it only applies to residential.
3. What is Item 3 in Section C504.2 does not appear in the residential version. This Item addresses maintaining door vestibules and/or revolving doors where such doors separate conditioned from non-conditioned space. Vestibules are a requirement in the IECC Commercial new construction provisions – but are not found in the residential. Therefore requiring maintenance under the residential provisions is inappropriate.

Cost Impact: The code change proposal will not increase the cost of construction. The proposal is an editorial relocation of existing text. There will be no impact on the cost of construction.

EC4-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

CHAPTER 5 (NEW)-EC-THOMPSON-SEHPCAC

CE5 – 13

C202, C101.4.3, C409 (NEW)

Proponent: Eric Makela, Britt/Makela Group, Inc., representing Northwest Energy Codes Group (eric@brittmakela.com)

Delete and substitute as follows:

~~C101.4.3 Additions, alterations, renovations or repairs.~~ ~~Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.~~

~~Exception:~~ ~~The following need not comply provided the energy use of the building is not increased:~~

- ~~1. Storm windows installed over existing fenestration.~~
- ~~2. Glass only replacements in an existing sash and frame.~~
- ~~3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.~~
- ~~4. Construction where the existing roof, wall or floor cavity is not exposed.~~
- ~~5. Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.~~
- ~~6. Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed.~~
- ~~7. Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.~~
- ~~8. Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.~~

C101.4.3 Additions, alterations, or repairs. Additions, alterations, or repairs to an existing building, building system or portion thereof shall comply with Section C409.

Add new text as follows:

SECTION C409

ADDITIONS, ALTERATIONS, OR REPAIRS

C409.1 Scope. The provisions of this chapter shall control the *alteration, repair, and addition* of existing buildings and structures for compliance with the *International Energy Conservation Code*.

C409.2 Existing buildings. Except as specified in this chapter, this code shall not be used to require the removal, *alteration*, or abandonment of, nor prevent the continued use and maintenance of, an existing building or building system lawfully in existence at the time of adoption of this code.

C409.3 Maintenance. Buildings and structures, and parts thereof, shall be maintained in a safe and sanitary condition. Devices and/or systems which are required by this code shall be maintained in conformance with the code edition under which installed. The owner or the owner's designated agent shall be responsible for the maintenance of buildings and structures. The requirements of this chapter shall not provide the basis for removal or abrogation of energy conservation, fire protection and safety systems and devices in existing structures.

C409.4 Additions, alterations, or repairs. Additions, alterations, or repairs to an existing building, building system, or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portions of the existing building or building supply system to comply with this code. Additions, alterations, or repairs shall not create an unsafe or hazardous condition or overload existing building systems.

C409.4.1 Additions. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply as a single building. Additions shall comply with Section C409.4.1.1.

Exception: Additions complying with ANSI/ASHRAE/IESNA 90.1. need not comply with Sections C402, C403, C404, and C405.

C409.4.1.1 Prescriptive compliance. Additions shall comply with Sections C409.4.1.1.1 through C409.4.1.1.5.

C409.4.1.1.1 Building envelope. New building envelope assemblies that are part of the addition shall comply with Sections C402.1 through C402.4.

C409.4.1.1.1.1 Vertical Fenestration. New vertical fenestration area that results in a total building fenestration area less than or equal to that specified in Section C402.3.1 shall comply with Section C402.3. Additions with vertical fenestration that results in a total building fenestration area greater than C402.4.1 shall comply with Section C402.3.1.1 for the addition only. Additions that result in a total building vertical glass area exceeding that specified in Section C402.3.1.1 shall comply with Section C407 or ASHRAE 90.1.

C409.4.1.1.1.2 Skylight area. New skylight area that results in a total building fenestration area less than or equal to that specified in Section C402.3.1 shall comply with Section C402.3. Additions with skylight area that result in a total building skylight area greater than C402.3 shall comply with Section C402.3.1.2 for the addition only. Additions that result in a total building skylight area exceeding that specified in Section C402.3.1.2 shall comply with Section C407 or ASHRAE 90.1.

C409.4.1.1.2 Building mechanical systems. New mechanical systems and equipment serving the building heating, cooling or ventilation needs, that are part of the addition, shall comply with Section C403.

C409.4.1.1.3 Service water heating systems. New service water-heating equipment, controls and service water heating piping shall comply with Section C404.

C409.4.1.1.4 Pools and inground permanently installed spas. New pools and inground permanently installed spas shall comply with Section C404.7.

C409.4.1.1.5 Electrical power and lighting systems. New lighting systems that are installed as part of the addition shall comply with Section C405.

C409.4.1.1.5.1 Interior lighting power. The total interior lighting power for the addition shall comply with Section C405.5.2 for the addition alone or if the existing building and the addition complies as a single building.

C409.4.1.1.5.2 Exterior lighting power. The total exterior lighting power for the addition shall comply with Section C405.6.2 for the addition alone or if the existing building and the addition complies as a single building.

C409.4.2 Alterations. Alterations to existing buildings shall comply with Section C409.4.2.1 through C409.4.2.4. Alterations shall be such that the existing building or structure is no less complying with the provisions of this code than the existing building or structure was prior to the alteration.

Exception: Alterations complying with ANSI/ASHRAE/IESNA 90.1. need not comply with Sections C402, C403, C404, and C405.

C409.4.2.1 Building envelope. New building envelope assemblies that are part of the alteration shall comply with Sections C402.1 through C402.4.

C409.4.2.1.1 Vertical Fenestration. The addition of vertical fenestration that results in a total building fenestration area less than or equal to that specified in Section C402.3.1 shall comply with Section C402.3. The addition of vertical fenestration that results in a total building fenestration area greater than C402.4.1 shall comply with Section C405.2.2.3.2 for the space adjacent to the new fenestration only. Alterations that result in a total building vertical glass area exceeding that specified in Section C402.3.1.1 shall comply with Section C407 or ASHRAE 90.1.

C409.4.2.1.2 Skylight area. The addition of skylight area that results in a total building skylight area less than or equal to that specified in Section C402.3.1 shall comply with Section C402.3. The addition of skylight area that results in a total building skylight area greater than C402.3 shall comply with Section C402.3.1.2 for the space adjacent to the new skylights. Alterations that result in a total building skylight area exceeding that specified in Section C402.3.1.2 shall comply with Section C407 or ASHRAE 90.1.

Exceptions: The following building envelope alterations are exempt from Section C409.4.2.1.

1. Storm windows installed over existing fenestration.
2. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
3. Construction where the existing roof, wall or floor cavity is not exposed.

C409.4.2.2 Heating and cooling systems. New heating, cooling, and duct systems that are part of the alteration shall comply with Sections C403.

C409.4.2.2.1 Economizers. New cooling systems that are part of alteration shall comply with section C403.3.1 or C403.4.1.

C409.4.2.3 Service hot water systems. New service hot water systems that are part of the alteration shall comply with Section C404.

C409.4.2.4 Lighting. New lighting systems that are part of the alteration shall comply with Section C405.

Exceptions.

1. Alterations that replace less than 10 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.
2. Alterations that replace on the bulb and ballast within the existing luminaires in a space provided that the alteration does not increase the installed interior lighting power.

C409.4.3 Repairs. Buildings and structures, and parts thereof, shall be repaired in compliance with Section C409.3 and this section. Work on nondamaged components that is necessary for the required repair of damaged components shall be considered part of the repair and shall not be subject to the requirements for alterations in this chapter. Routine maintenance required by Section C409.3, ordinary repairs exempt from permit, and abatement of wear due to normal service conditions shall not be subject to the requirements for repairs in this section. Where a building was constructed to comply with ANSI/ASHRAE/IESNA 90.1, repairs shall comply with the standard and need not comply with Sections C402, C403, C404 and C405.

Exceptions: The following alterations are exempt from Section C409.4.3.

1. Glass only replacements in an existing sash and frame this is a repair.
2. Reroofing for roofs where neither the sheathing nor the insulation is exposed this is a repair.

Revise definition as follows:

IECC SECTION C202 GENERAL DEFINITIONS

REPAIR. The reconstruction or renewal of any part of an existing building for the purpose of its maintenance.

Reason: The commercial provisions of the 2012 IECC require that additions, alterations, renovations, or repairs comply with the provisions of the energy code without providing a clear “roadmap” on the specific requirements that apply to these projects. The goal of this code change proposal is to provide clear direction to the code user on what provisions must be complied with based on the type of project. Increasing the clarity of the code will increase the compliance rate and result in increased energy savings for these projects.

This proposal places all of the requirements for additions, alterations, renovations, and repairs into a new section in the commercial provisions of the IECC and builds off the work conducted by the ICC SEHPCAC in the development of their existing building proposal. The additions portion of the proposal provides direction on what options are available for demonstrating compliance for projects up to 30% window to wall ratio and for those projects up to 40% window to wall ratio. References into the code are also provided when HVAC, water heating, and lighting systems are included in the project. The alteration portion of the proposal provides clear guidance on how to address alterations that increase fenestration area for the building that exceeds the prescriptive fenestration limits for the building as defined in the code. Exceptions currently included in Section C101.4.3 of the 2012 IECC have been moved into this new section and linked to the applicable references to the building envelope, HVAC, or lighting section. Repairs have been clearly identified and essentially exempted from the requirements of the IECC if they fall within certain defined parameters.

Cost Impact: The code change proposal will not increase the cost of construction.

CE5-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C409 (NEW)-EC-MAKELA.doc

CE6 – 13

C101.4.2, R101.4.2 (IRC N1101.3), IEBC 1207 (NEW)

Proponent: Randall R. Dahmen, P.E., Licensed Wisconsin Commercial Building Inspector, representing self

THIS IS A 3 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE, PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART III WILL BE HEARD BY THE EXISTING BUILDING CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Delete without substitution as follows:

~~**C101.4.2 Historic buildings.** Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, are exempt from this code.~~

PART II – IECC-RESIDENTIAL PROVISIONS

Delete without substitution as follows:

~~**R101.4.2 (N1101.3) Historic buildings.** Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, are exempt from this code.~~

PART III – IEBC

Add new text as follows:

SECTION 1207 **ENERGY CONSERVATION**

1207.1 Historic buildings. Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, are exempt from the IECC.

Reason: The requirements referenced in this code section are issues that deal with existing buildings, specifically, historic buildings. As such, the requirements should be listed in the IEBC. If it is felt that the requirements need to remain as part of the IECC, then it is requested that the requirements be listed/referenced under both the IECC as well as the IEBC, as is commonly done throughout the ICC suite of codes. Having the same language in multiple ICC codes is commonly done throughout the ICC suites for issues such as fire dampers, etc. For example, review IBC 717.5 and IMC 607.5

Cost Impact: The code change proposal will not increase the cost of construction.

CE6-13**PART I – IECC-COMMERCIAL PROVISIONS**

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART III – IEBC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C101.4.2-EC-DAHMEN.doc

CE7 – 13

C101.4.2, C202 (NEW), R101.4.2, R202 (NEW) (IRC N1101.9 (NEW))

Proponent: Jim Edelson, New Buildings Institute (jedelson@comcast.net), Ric Cochrane, National Trust for Historic Preservation, David Collins, The Preview Group representing The American Institute of Architects

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C101.4.2 Historic buildings. Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, are exempt from this code. The provisions of this code relating to the construction, repair, alteration, restoration and movement of structures, and change of occupancy shall not be mandatory for historic buildings. No provision of this code shall be used to require the alteration of an historic building.

Add new definition as follows:

SECTION C202 GENERAL DEFINITIONS

HISTORIC BUILDING. Any building or structure that is one or more of the following:

1. Listed, or certified as eligible for listing by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, in the National Register of Historic Places
2. Designated as historic under an applicable state or local law; or
3. Certified as a contributing resource within a National Register listed or locally designated historic district.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R101.4.2 Historic buildings. Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, are exempt from this code. The provisions of this code relating to the construction, repair, alteration, restoration and movement of structures, and change of occupancy shall not be mandatory for historic buildings. No provision of this code shall be used to require the alteration of an historic building.

Add new definition as follows:

SECTION R202 (N1101.9) GENERAL DEFINITIONS

HISTORIC BUILDING. Any building or structure that is one or more of the following:

1. Listed, or certified as eligible for listing by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, in the National Register of Historic Places
2. Designated as historic under an applicable state or local law; or
3. Certified as a contributing resource within a National Register listed or locally designated historic district.

Reason: The current language for Historic Buildings in the IECC-Commercial, the IECC-Residential and the IEBC is confusing, inconsistent with I-Code conventions for definitions, and does not clearly describe how buildings and districts are listed or determined to be eligible to be listed as historic. The charging language in C101.4.2 contains no fewer than three semi-colons and nine instances of the word "or". This makes the language very difficult to parse. The sentence structure in the current language that addresses eligibility is confusing and obfuscates who does the determinations.

The IECC mixes the definition of "historic building" with the charging language for historic buildings. Not only does this further make the charging language difficult to understand, it makes the language inconsistent with the way the I-Codes deal with definitions. Generally, the I-Codes keep definitions out of the code language and gather all definitions together into a definitions section.

Finally, the language does not align with how buildings and districts are officially designated by the governing authorities as eligible for listing as historic.

This proposal solves these three problems. First, it moves the definition of an historic building to the definitions sections in the IECC and edits the charging language of C101.4.2 to simply refer to that definition. It remedies the confusion caused by the sheer complexity of the defining language by converting the running list of qualifications into a clearly delineated numbered list. Finally, the proposal gives the language clarity and specificity as to how a building is officially determined to be eligible for the various lists of historic buildings. In accordance with the Code of Federal Regulations, Title 36, Chapter I, Part 63, determinations of eligibility for listing in the National Register of Historic Places are made by State Historic Preservation Offices in coordination with the Keeper of the National Register of Historic Places. This is an official process conducted in accordance with federal standards. This proposal aligns the code language with the language of this official process and removes any ambiguity as to who can make determinations of eligibility.

The charging language in the IECC also creates a rather large loophole. Historic buildings as defined by Section C101.4.1 are exempted completely from the code in its entirety. This means that no work being done on an historic building has to comply with the IECC at all - not alterations, not changes of use, not even additions. The definition of "historic building" is rather broad. It includes buildings that are certified as contributing to a local, state or national historic district. These are buildings that generally do not have enough historical significance/character to merit designation on their own, but do have enough to help define the overall significance/character of a district. Yet they are completely exempted from the energy code.

Buildings with historic significance may have social and aesthetic values, and the energy code should not be written in a way that will degrade these values. But rather than wholly exempting historic buildings like the current language in the IECC does, other I-Codes, especially the IBC and IFC, have balanced the protection of historic buildings with the intended goals of the codes. The IECC should follow this example and balance the competing values of historic preservation and energy conservation, rather than granting a wholesale exemption to historic buildings.

This proposal narrows the historic building loophole by eliminating the most egregious part, the exemption for additions to historic buildings. Additions to historic buildings are new construction, and in this case there is no historic character or historic fabric to protect. This change will make additions subject to the provisions of the IECC. However, it ensures that only the addition is subject to the IECC and exempts the historic building itself from any requirements that might be triggered by the addition.

This proposal is one of four proposals in Cycle B to create this consistency for Historic Buildings across the I-codes. The other three proposals are being made to the IECC-Commercial, the IEBC and the IPMC.

Cost Impact: The code change proposal will not increase the cost of construction.

Note: The term 'historic building' currently defined in the IBC, IEBC and IgCC. The definition in the IBC and IgCC is:

Historic buildings. Buildings that are listed in or eligible for listing in the National Register of Historic Places, or designated as historic under an appropriate state or local law.

The definition in the IEBC is:

Historical Building. Any building or structure that is listed in the State or National Register of Historic Places: designated as a historic property under local or state designation law or survey; certified as a contributing resource within a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Register of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places.

These proponents have submitted proposals to add this definition to the *International Property Maintenance Code* (PM2-13) and to the *International Existing Buildings Code* (EB1-13)

CE7-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C101.4.2-EC- COCHRANE-COLLINS-EDELSON .docm.doc

CE8 – 13

C101.4.2, C202 (NEW), R101.4.2, R202 (NEW) (IRC N1101.9 (NEW))

Proponent: Lee Kranz, City of Bellevue, WA, representing Washington Association of Building Officials Technical Code Development (WABO TCD) (lkranz@bellevuewa.gov)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C101.4.2 Historic buildings. Any buildings or structures that is are listed in the state or national register of historic places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a national register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the national or state registers of historic places either individually or as a contributing building to a historic district by the state historic preservation officer or the keeper of the national register of historic places, are exempt from this code. Alterations and repairs to *historic buildings* shall comply with this code to the extent that such compliance does not compromise the historic nature and function of the building.

Add new definition as follows:

SECTION C202 GENERAL DEFINITIONS

HISTORIC BUILDING. Any building or structure that is:

1. Listed in the State or National Register of Historic Places
2. Designated as a historic property under local or state designation law or survey
3. Certified as a contributing resource within a National or State Register listed or locally designated historic district, or
4. Determined or certified by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places to be eligible to be listed in the State or National Register of Historic Places either individually or as a contributing resource in an historic district.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R101.4.2 Historic buildings. Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, are exempt from this code. Alterations and repairs to *historic buildings* shall comply with this code to the extent that such compliance does not compromise the historic nature and function of the building.

Add new definition as follows:

**SECTION R202 (N1101.9)
GENERAL DEFINITIONS**

HISTORIC BUILDING. Any building or structure that is:

1. Listed in the State or National Register of Historic Places
2. Designated as a historic property under local or state designation law or survey
3. Certified as a contributing resource within a National or State Register listed or locally designated historic district, or
4. Determined or certified by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places to be eligible to be listed in the State or National Register of Historic Places either individually or as a contributing resource in an historic district.

Reason: The existing requirement exempts historic buildings from all energy efficiency requirements, even those that do not impact the historic value of the building at all, such as lighting controls, attic insulation, or mechanical equipment efficiency. This modification requires energy efficiency measures only where they will leave the historic value of the building undisturbed.

Cost Impact: The code change proposal will increase the cost of construction.

Note: The term 'historic building' currently defined in the IBC, IEBC and IgCC. The definition in the IBC and IgCC is:

Historic buildings. Buildings that are listed in or eligible for listing in the National Register of Historic Places, or designated as historic under an appropriate state or local law.

The definition in the IEBC is:

Historical Building. Any building or structure that is listed in the State or National Register of Historic Places: designated as a historic property under local or state designation law or survey; certified as a contributing resource within a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Register of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places.

In addition to this proposal, definitions of historic building are proposed in CE7-13, CE9-13 being heard by this committee, PM2-13 being heard by the Property Maintenance Committee and EB1-13 being heard by the Existing Buildings Committee..

CE8-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

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CE9 – 13

C101.4.2, C202 (NEW), R101.4.2, R202 (NEW) (IRC N1101.9 (NEW))

Proponent: Meg Waltner, Natural Resources Defense Council (mwaltner@nrdc.org), Ryan Meres, Institute for Market Transformation, Russell Unger, Urban Green Council

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C101.4.2 Historic buildings. ~~Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, are exempt from this code. Historic buildings shall comply with the provisions of this code with the following exceptions, provided that these exceptions shall not apply to any addition to an *historic building* that has not itself been designated an *historic building*. No provision of this code shall be used to require the *alteration of an historic building*.~~

Exceptions:

1. The provisions of Sections C402.
2. The provisions of C405.6.
3. Any portion of an energy system contained within a listed or designated interior.
4. Any provision of this code if the local, state, or federal historic commission having authority deems that compliance with such provision is not feasible or would undermine the historic integrity of the *historic building*.

Add new definition as follows:

SECTION C202 GENERAL DEFINITIONS

HISTORIC BUILDING. Any building or structure that is one or more of the following:

1. Listed, or certified as eligible for listing by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, in the National Register of Historic Places
2. Designated as historic under an applicable state or local law; or
3. Certified as a contributing resource within a National Register listed or locally designated historic district.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R101.4.2 Historic buildings. ~~Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, are exempt from this~~

~~code. Historic buildings shall comply with the provisions of this code with the following exceptions, provided that these exceptions shall not apply to any addition to an *historic building* that has not itself been designated an *historic building*. No provision of this code shall be used to require the *alteration* of an *historic building*.~~

Add new definition as follows:

HISTORIC BUILDING. Any building or structure that is one or more of the following:

1. Listed, or certified as eligible for listing by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, in the National Register of Historic Places
2. Designated as historic under an applicable state or local law; or
3. Certified as a contributing resource within a National Register listed or locally designated historic district.

Reason: This proposal follows a joint proposal by the New Buildings Institute, the National Trust for Historic Preservation, and the American Institute of Architects in two matters. First, it adjusts the structure of the provision on historic buildings to be more in line with standard code syntax by adding a definition of "Historic Building", and then deleting the definitional language from the charging provision. Second, it removes additions to historic buildings from the exemption to the energy code.

In addition, this language narrows the exemptions for Historic Buildings from the current blanket exemption to a narrower set of exemptions. There are many reasons to narrow the exemptions.

The current blanket exemption does not have the nuance that one would expect of a code, in which specific exemptions are made for clear and justifiable reasons; consequently, the exemption leads to some very counter-intuitive results. For example, is there any reason that water-heating equipment in historic commercial buildings could not or should not meet the performance standards of Table 504.2, or the requirements for temperature controls for such equipment as per 504.3, or the requirements for pipe insulation as per 504.5? The current language exempts historic properties from every one of these requirements. In fact, is there any reason why Section 504, for service water heating, should not pertain in its entirety to historic commercial buildings? Similarly, what is the justification for exempting historic residential buildings from the requirements on snow melt system controls as per 403.8, or from the requirements for energy-conserving measures for pools, as per 403.9?

Clearly a more careful consideration of the justifiable exemptions for historic buildings is in order. The attached proposal takes the approach that historic buildings can and should comply with the provisions of the energy code for interior energy systems, including lighting, hot water, and mechanical systems, while exempting such systems that are within landmarked interiors and in the event that any provision of the code would undermine the historic integrity of the building in the opinion of a local, state or federal historic commission. These exemptions should cover any unforeseen eventualities in which the provisions of the energy code governing interior energy systems could result in a conflict with the maintenance of the historic fabric.

In addition, given the complexities of the building envelope and exterior lighting provisions as they pertain to historic properties, this proposal takes the approach that, for now, historic buildings should continue to be exempted from the envelope and exterior lighting provisions in their entirety. Here, too, however, a more nuanced approach is warranted. For example, is there any reason that the flat roof of a historic building should be exempted from the energy code's requirements for insulation or that the parking lot on a historic property should be exempted from the lighting power provisions? We need to spark a national dialogue on this subject with experts analyzing each section of the envelope and exterior lighting provision of the code and determining which of them would necessitate an exemption for historic properties.

Finally, this proposal requires that additions to historic buildings comply with the energy code in its entirety, unless such addition has itself been deemed historic, as in a 1920's colonial addition to a 17th Century building. That is because additions to historic buildings are not themselves historic and do not deserve special treatment under the code.

Narrowing the exemptions for historic properties serves at least three important purposes. The first is the direct impact on energy use and greenhouse gas emissions. Given the size of landmarked districts, the area of impacted can be quite large. For example, in Manhattan 25% of all lots are either individual landmarks or landmarked districts and some of the individual landmarks, such as the Empire State Building or the Woolworth Building, are enormous skyscrapers. Exempting all such properties from all aspects of the energy code will significantly impede citywide progress on energy efficiency. Moreover, the recent renovation of the Empire State Building has provided a great example of a historic property that has achieved exemplary energy performance through energy retrofits without undermining its historic qualities.

The second is preserving the value of historic properties. One benefit of the energy code is that, as buildings undergo their natural renovation cycles, they are continually upgraded in terms of their energy performance because any new energy system, such as new lights or boilers, need to meet the provisions of the energy code. If historic properties are exempted from such requirements, their systems will become increasingly outmoded and expensive to run, making such properties less desirable in the real estate market.

Finally, a narrowing of the exemptions will help preserve the natural alliance between historic preservation and sustainability. Because of the embodied energy in historic buildings and the many environmental impacts of demolition and construction, saving existing buildings is generally a more sustainable approach. However, exempting historic buildings from all aspects of the energy code could lead to an unnecessary collision between these two agendas, since with the exemption in place the expansion of historic districts and the creation of new historic landmarks will be seen as detrimental to progress in energy efficiency.

Cost Impact: The code change proposal will increase the cost of construction.

Note: The term 'historic building' currently defined in the IBC, IEBC and IgCC. The definition in the IBC and IgCC is:

Historic buildings. Buildings that are listed in or eligible for listing in the National Register of Historic Places, or designated as historic under an appropriate state or local law.

The definition in the IEBC is:

Historical Building. Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource within a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Register of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places.

In addition to this proposal, definitions of historic building are proposed in CE7-13, CE8-13 being heard by this committee, PM2-13 being heard by the Property Maintenance Committee and EB1-13 being heard by the Existing Buildings Committee..

CE9-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C101.4.2-EC-MERES-UNGER-WALTNER.doc

CE10 – 13

C101.4.2, R101.4.2

Proponent: Al Godwin, CBO, CPM, Aon Fire Protection Engineering (al.godwin@aon.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C101.4.2 Historic buildings. Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, ~~are exempt from~~ shall comply with all of the provisions of this code.

Exception: Whenever a provision or provisions of this code shall invalidate or jeopardize the historical designation or listing, that provision or provisions shall be permitted to be exempted.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R101.4.2 Historic buildings. Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, ~~are exempt from~~ shall comply with all of the provisions of this code.

Exception: Whenever a provision or provisions of this code shall invalidate or jeopardize the historical designation or listing, that provision or provisions shall be permitted to be exempted.

Reason: There is no reason why historical buildings cannot install energy efficient electrical, plumbing, HVAC, etc. There is no justification for total blanket exemption.

Critical historical areas might include the exterior envelope (the outside look), 1st floor entry lobby and perhaps most of the first floor inclusive of specific light fixtures, elevator lobbies on other floors but not the entire building. New lay-in ceilings and lighting on other than the 1st floor usually have no historical significance at all.

Cost Impact: The code change proposal will increase the cost of construction.

CE10-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C101.4.2-EC-GODWIN.doc

CE11 – 13

C101.4.3, R101.4.3, (IRC N1101.3)

Proponent: Vickie Lovell, InterCode Incorporated, representing The International Window Film Association (vickie@intercodeinc.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C101.4.3 Additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

Exception: The following need not comply provided the energy use of the building in not increased.

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. Existing single pane fenestration assemblies with surface applied window film to reduce solar heat gain.
3. 4. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
4. 5. Construction where the existing roof, wall or floor cavity is not exposed.
5. 6. Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.
6. 7. Replacement of existing doors that separate conditioned space from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a conditioned space from the exterior shall not be removed.
7. 8. Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.
8. 9. Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the alteration does not increase the installed interior lighting power.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R101.4.3 (N1101.3) Additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

Exception: The following need not comply provided the energy use of the building is not increased.

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. Existing single pane fenestration assemblies with surface applied window film to reduce solar heat gain.
3. 4. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
4. 5. Construction where the existing roof, wall or floor cavity is not exposed.
5. 6. Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.
6. 7. Replacement of existing doors that separate conditioned space from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a conditioned space from the exterior shall not be removed.
7. 8. Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.
8. 9. Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the alteration does not increase the installed interior lighting power.

Reason: The IECC Section C401.2.1 requires compliance with Sections C402, C403, and C405 for existing buildings that are undergoing alternations and repairs. However, this section of the code (C 101.4.3) clarifies that certain features of the existing building are exempt from the requirements of the IECC.

Surface applied window film to existing fenestration has been added to the list because it can enhance the performance of existing single pane fenestration products for protection from injuries and property damage due to broken glass, reduces ultraviolet transmittance and glare, and improves performance when impacted. The foremost benefit of applied window film to existing windows is reduced solar heat gain and reduced energy use.

Without this addition to the list of exceptions, the code could be interpreted to unnecessarily require replacements of all existing windows to be with new materials and systems as for new construction.

This provision does not change the requirement for new windows when it is cost effective or otherwise desirable for older windows to be totally replaced. However, on some projects for additions, alternations, renovations or repairs simply and inexpensively improving the performance of the existing windows that are still fully functional can contribute to improved and more efficient total building energy use. Not recognizing this alternative to total window replacement in the code can also be a disincentive to make other needed improvements due to the cost of total replacement.

Buildings account for 16 percent of the world's energy consumption, and nearly 40 percent of this total is consumed by the United States. While roughly two percent of commercial floorspace is newly constructed each year, and a comparable amount renovated, the majority of opportunities to improve efficiency over the next several decades will be in existing building stock. Improving the energy efficiency of existing buildings through retrofitting and other measures will create a high-volume, low-cost approach to reducing energy use and greenhouse gas emissions.

Building owners must decide where to rank efficiency projects within a list of competing priorities—social, financial and environmental. Improving energy efficiency through retrofitting existing buildings certainly benefits the environment; however, it also benefits building owners from a cost standpoint. Allowing building owners to have the option to use window film on existing fenestration in order to improve the energy efficiency will create an incentive for reducing energy consumption and greenhouse emissions.

Cost Impact: The proposal will not increase the cost of construction.

CE11-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C101.4.3-EC-LOVELL

CE12 – 13

C101.4.3, C202 (NEW)

Proponent: Shirley Ellis, Energy Systems Laboratory, Texas A&M Engineering Experiment Station, Texas A&M University System (shirleyellis@tamu.edu)

Revise as follows:

C101.4.3 Additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

Exception: The following need not comply provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. Replacement of existing *fenestration*, provided, however, that the area of the replacement *fenestration* does not exceed 25 percent of the total *fenestration area* of an existing building and that the *U-factor* and *SHGC* will be equal to or lower than before the *fenestration* replacement.
- 3 4. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
45. Construction where the existing roof, wall or floor cavity is not exposed.
56. Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.
67. Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed.
78. Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.
89. Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.

Add new definition as follows:

SECTION C202 GENERAL DEFINITIONS

FENESTRATION AREA. The total area of the fenestration measured using the rough opening and including the glazing, sash, and frame. For doors where the glazed vision area is less than 50 percent of the door area, the fenestration area is the glazed vision area. For all other doors, the fenestration area is the door area, using the rough opening and including the frame.

Reason: Currently when a portion of the fenestration in a store-front or curtain wall building is damaged the IECC requires the replacement fenestration to meet the requirements of the current code. Often times this requires additional construction to the undamaged portions of the fenestration to ensure the code compliant replacement is compatible.

This code change will allow replacement of damaged fenestration in existing buildings to be replaced without requiring the fenestration to meet the current U-factor and SHGC requirements when falling within certain parameters.

The damaged area needing replacement must not exceed 25% of the total fenestration of the building and it must be equal or better than currently installed.

Cost Impact: The code change proposal will not increase the cost of construction.

CE12-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C101.4.3-EC-ELLIS.doc

CE13 – 13

C101.4.3, C101.4.3.1, 202 (NEW)

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C101.4.3 Additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

Exception: The following need not comply provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
4. Construction where the existing roof, wall or floor cavity is not exposed.
- ~~5. Reroofing of roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.~~
- 6 5. Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed,
- ~~7~~ 6. Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.
- ~~8~~ 7. Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.

C101.4.3.1 Insulation requirements for roof covering replacements. For roof covering replacement on an existing building where the insulation is entirely above the deck and where the roof slope is less than two units vertical in 12 units horizontal, the insulation shall conform to the energy conservation requirements as specified in Table C402.2.

Exception: Where the required R-value cannot be provided due to thickness limitations presented by existing rooftop conditions, including roof drainage, heating, ventilation and air-conditioning equipment, low door or glazing heights, parapet heights, proper roof flashing heights, the maximum thickness of insulation compatible with the available space and existing uses shall be installed.

Add new definition as follows:

ROOF COVERING REPLACEMENT. An alteration consisting of the removal of the existing roof covering, and installation of a new roof covering.

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

The prescriptive envelope requirement for re-roofing of low-slope roofs under the 2012 IECC is confusing and does not appropriately address the technical concerns that often arise during these projects. This proposed change would clarify existing requirements under the IECC, but would not add any new requirements. Also, this proposal is very similar to language adopted on October 31, 2011 by the International Code Council (ICC) as part of the International Green Construction Code (IgCC), Section 1003.3.11 (Code Change #GG722-11).

Application of the 2012 IECC to roof alterations is partly determined by interpretation of Section C101.4.3 (Additions, alterations, renovations or repairs) and exception #5 of that section. The ambiguities in this section and exception, as applied to low-slope roofs with insulation entirely above deck, have created an opportunity for intentional and unintentional misinterpretation. For instance, it is common practice to use a cover board or slip sheet between the primary insulation layer and the roof membrane. If these materials are left in place during the roof replacement process, then the insulation would not be "exposed" and compliance with the IECC as it applies to roof alterations could be avoided.

Cost Impact: This code change proposal will not increase the cost of construction. The proposal clarifies roof recovering. To the extent that even these elements were not being addressed by roof recovering's in the past

Note: While the other International Codes do not defined "roof covering replacement" the IgCC does define 'roof replacement' as follows:

ROOF REPLACEMENT. The process of removing the existing roof covering, repairing any substrate and installing a new roof covering.

CE13-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C101.4.3-EC-THOMPSON-SEHPCAC.doc

CE14 – 13

C101.4.3

Proponent: Michael A. Anthony, P.E., University of Michigan, Kevin Folsom, Dallas Theological Seminary, Larry Spielvogel, L. G. Spielvogel, Inc.

Revise as follows:

C101.4.3 Additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

Exception: The following need not comply provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
4. Construction where the existing roof, wall or floor cavity is not exposed.
5. Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.
 - 5.1. Roofs without insulation in the cavity and where equipment covers more than 10 percent of the roof area
 - 5.2. Roofs without insulation in the cavity and where a repaired area is less than 100 square feet.
6. Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed,
7. Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.
8. Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.

Reason: Our industry supports all energy conservation efforts but they have to be practical. We need to put a softer edge on the re-insulation requirement however. Often when a roof leak is "repaired" the existing damaged membrane may be removed (exposing the insulation) and wet insulation may be replaced. This might be less than 100 sq. feet. Adding additional insulation thickness (maybe up to twice the thickness) not only adds to the complexity without making any measurable or meaningful improvement in the thermal performance of the building. The net result of this section would be a patch and the wet insulation would be left in place.

Without an exception of this nature, Owners would be required to do the equivalent of updating an entire window just because the glass was broken.

Cost Impact: Granting Owners more scalable options regarding insulating programs over time generally reduces costs though, admittedly, cost impact is site specific.

CE14-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C101.4.3-EC-ANTHONY.doc

CE15 – 13

C101.4.3, C202 (NEW), C402.2.1.1, R101.4.3 (IRC N1101.3), R202 (NEW) (IRC N1101.9 (NEW))

Proponents: Michael D. Fischer, Kellen Company, representing Center for the Polyurethanes Industry (mfischer@kellencompany.com); Michael D. Fischer, Kellen Company, representing Polyisocyanurate Insulation Manufacturers Association; Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition.

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C101.4.3 Additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

Exception: The following need not comply provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
4. Construction where the existing roof, wall or floor cavity is not exposed.
5. ~~Reroofing for roofs where neither the sheathing nor the insulation is exposed.~~ Roof recover or roof repair.
6. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.
67. Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed,
78. Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.
89. Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.

Add new text as follows:

C402.2.1.1 Roof replacement. For roof replacements, where the existing roof assembly is part of the building thermal envelope and contains insulation entirely above deck, roof replacement shall include compliance with the requirements of Table C402.1.2 or Table C402.2.

Add new definitions as follows:

SECTION C202 GENERAL DEFINITIONS

[B] REROOFING. The process of recovering or replacing an existing *roof covering*. See “Roof recover” and “Roof replacement.”

[B] ROOF RECOVER. The process of installing an additional *roof covering* over a prepared existing *roof covering* without removing the existing *roof covering*.

[B] ROOF REPAIR. Reconstruction or renewal of any part of an existing roof for the purposes of its maintenance.

[B] ROOF REPLACEMENT. The process of removing the existing *roof covering*, repairing any damaged substrate and installing a new *roof covering*.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R101.4.3 (N1101.3) Additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

Exception: The following need not comply provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
4. Construction where the existing roof, wall or floor cavity is not exposed.
5. ~~Reroofing for roofs where neither the sheathing nor the insulation is exposed.~~ Roof recover or roof repair.
6. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.
67. Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed,
78. Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.
89. Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.

Add new definitions as follows:

SECTION R202 (N1101.9) GENERAL DEFINITIONS

[B] REROOFING. The process of recovering or replacing an existing *roof covering*. See “Roof recover” and “Roof replacement.”

[B] ROOF RECOVER. The process of installing an additional *roof covering* over a prepared existing *roof covering* without removing the existing *roof covering*.

[B] ROOF REPAIR. Reconstruction or renewal of any part of an existing roof for the purposes of its maintenance.

[B] ROOF REPLACEMENT. The process of removing the existing *roof covering*, repairing any damaged substrate and installing a new *roof covering*.

Reason: Fischer (Part I) The current requirements that govern envelope performance requirements during reroofing do not utilize definitions contained in the building codes. The use of the term reroofing in and of itself is overly broad and subject to confusion. Roof replacement, which is the specific condition intended for envelope compliance, provides an important opportunity to decrease building energy use in US buildings. This proposal provides needed clarity to ensure that buildings are evaluated for compliance to current energy code requirements when the roof is replaced. The proposal also improves the exception to ensure that roof repair and recover projects are clearly not intended to bear additional expense that could be burdensome.

Fischer (Part II) The exceptions to applicability of the IECC for reroofing are unclear, and include confusing language. This proposal includes definitions used in the roofing chapter of the IBC in order to better scope the appropriate exceptions to the envelope requirements in the IECC.

The proposed language clarifies that roof replacement triggers the envelope requirements, but only when the roof assembly is part of the thermal envelope and the insulation is entirely above the roof deck. If the insulation is located within an attic cavity, roof replacement itself does not trigger insulation upgrades. The proposal also makes it clear that recover and repairs are not intended to trigger energy upgrades, while ensuring that the opportunity to add roof insulation when the roof is replaced is not missed.

Reason: Dean, Harris, Misuriello, Prindle, Stone: The purpose of this code change is to clarify code requirements related to roofs on existing buildings by distinguishing between roof repairs, roof recovering, and roof replacement. The proposal creates new definitions for each of these actions (Chapter 2), clarifies that repair and recover are exceptions to the code (section C101.4.3), and clarifies that when certain roof replacements occur (new section C402.2.1.1), that the roof must meet the roof insulation requirements in Table C402.1.2 or C402.2.

While the code generally requires additions, alterations, renovations or repairs to comply with the code, the specific application in many instances may not be entirely clear or consistently interpreted and enforced. Roof replacements are a good example of this issue. This code proposal is intended to resolve any interpretation issues related to roof replacement and ensure that proper insulation is installed when the opportunity is presented. It is important that opportunities to improve the efficiency of existing buildings are seized when presented and the replacement of roofs is one such important opportunity.

Cost Impact: The code change proposal will not increase the cost of construction.

Note: The four proposed definitions are terms defined in the IBC, the term 'roof replacement' is also found in the IgCC. The definitions found in the other codes are the same as proposed here.

CE15-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C101.4.3-EC-FISCHER-DEAN-HARRIS-MISURIELLO- PRINDLE-STONE.doc

CE16 – 13

C101.4.3, R101.4.3 (N1101.3)

Proponent: Tim Manz, City of Blaine, MN, representing the Association of Minnesota Building Officials (tmanz@ci.blaine.mn.us)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C101.4.3 Additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building. Attic insulation shall not be installed unless accessible attic bypasses have been sealed. An attic bypass is any air passageway between a conditioned space and an unconditioned attic.

Exception: The following need not comply provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
4. Construction where the existing roof, wall or floor cavity is not exposed.
5. Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.
6. Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed.
7. Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.
8. Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R101.4.3 (N1101.3) Additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building. Attic insulation shall not be installed unless accessible attic bypasses have been sealed. An attic bypass is any air passageway between a conditioned space and an unconditioned attic.

Exception: The following need not comply provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
4. Construction where the existing roof, wall or floor cavity is not exposed.
5. Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.
6. Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed,
7. Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.
8. Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.

Reason: This has been a requirement in the Minnesota Residential Energy Code for many years, and the cost/benefit of this provision has already been proven as reasonable by its previous adoption into the Minnesota code. The practice of sealing accessible attic bypasses prior to adding additional insulation is highly cost effective as proven by weatherizing 18,000 homes in Minnesota in the past 2 years.

Cost Impact: The code change proposal will increase the cost of construction.

CE16-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C101.4.3-EC-MANZ.doc

CE17 – 13

C101.4.3.2 (NEW)

Proponent: Tim Nogler, Washington State Building Code Council (tim.nogler@des.wa.gov)

Add new text as follows:

C101.4.3.2 Mechanical systems: Those parts of mechanical systems which are altered or replaced shall comply with Section C403. Additions or alterations shall not be made to an existing mechanical system that will cause the existing mechanical system to become out of compliance with this code. New mechanical systems in existing buildings, including packaged unitary equipment and packaged split systems, shall comply with Section C403.

Exception: Alternate designs that are not in full compliance with this code are permitted where the code official determines that existing building or occupancy constraints make full compliance impractical or where full compliance would be economically impractical.

Existing equipment currently in use is permitted to be relocated within the same floor or same tenant space if removed and reinstalled within the same permit.

Reason: The 2012 IECC does not specifically address mechanical system alterations. This Proposal clarifies that new or altered mechanical systems must comply with the energy code, and provides the Code Official with discretionary authority to approve departures from this requirement where it doesn't make sense for the project.

Cost Impact: The code change proposal will increase the cost of construction.

CE17-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C101.4.3.2 (NEW)-EC-NOGLER.doc

CE18 – 13

C101.4.3, C101.4.3.1 (NEW)

Proponent: Tim Nogler, Washington State Building Code Council (tim.nogler@des.wa.gov)

Revise as follows:

C101.4.3 Additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

Exception: The following need not comply provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are insulated to full depth with insulation having a minimum nominal value of R-3.0 per inch installed per Section C402.
4. Construction where the existing roof, wall or floor cavity is not exposed.
5. Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.
6. Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed.
7. Alterations that replace less than ~~50~~ 60 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.
8. Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.

C101.4.3.1 Lighting and motors. Alterations that replace 60 percent or more of the luminaires in a space enclosed by walls or ceiling-height partitions shall comply with Sections C405. Where less than 60 percent of the fixtures in a space enclosed by walls or ceiling-height partitions are new, the installed lighting wattage shall be maintained or reduced.

Where new wiring is being installed to serve added fixtures and/or fixtures are being relocated to a new circuit, controls shall comply with Sections C405.2.1, C405.2.2.3, C405.2.3, and as applicable C408.3. In addition, office areas less than 300 square feet enclosed by walls or ceiling-height partitions, and all meeting and conference rooms, and all school classrooms, shall be equipped with occupancy sensors that comply with Section C405.2.2 and C408.3.. Where a new lighting panel (or a moved lighting panel) with all new raceway and conductor wiring from the panel to the fixtures is being installed, controls shall also comply with the other requirements in Sections C405.2.2 and C408.3.

Where new walls or ceiling-height partitions are added to an existing space and create a new enclosed space, but the lighting fixtures are not being changed, other than being relocated, the new enclosed space shall have controls that comply with Sections C405.2.1, C 405.2.2, C405.2.3 and C408.3. Those motors which are altered or replaced shall comply with Section C403.2.13.

Reason: These rules provide thresholds for alterations to upgrade lighting efficiency and controls as tenant improvements take place within existing buildings. This takes advantage of interior construction projects to gradually upgrade the overall lighting efficiency. The rules are summarized as follows:

Where 60% of the light fixtures are replaced in any one space, the space must comply with the interior lighting power density (LPD) requirements.

Where light fixtures are being re-circuited or new fixtures are added, the controls for those circuits must meet:

- Manual lighting controls
- Daylight zone controls
- Specific application controls
- Lighting systems functional testing
- Occupancy sensors for offices, classrooms and conference rooms

Where a lighting panel is new or relocated, and has new raceway and wiring to the fixtures:

- Time switch controls, daylight zone controls, and occupancy sensor controls are required per C405.2.2.

Where a space is being enclosed by new partitions

- Full lighting controls are required as they are for new construction.

New or altered motors must meet NEMA Standard MG-1, and fan motors smaller than 1 hp in series terminal units must be ECM motors or have 65% efficiency per NEMA Standard MG-1 at full load.

Cost Impact: The code change proposal will increase the cost of construction.

CE18-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C101.4.3-EC-NOGLER.doc

CE19 – 13

C101.4.4, C101.4.5, C101.4.6, R101.4.4, R101.4.5 (IRC N1101.4), R101.4.6, IEBC 1001.3.1.1 (NEW), 1001.3.1.2 (NEW), 1001.3.1.3 (NEW)

Proponent: Randall R. Dahmen, P.E., Licensed Wisconsin Commercial Building Inspector, representing self

THIS IS A 3 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE, PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART III WILL BE HEARD BY THE EXISTING BUILDING CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Delete without substitution as follows:

~~**C101.4.4 Change in occupancy or use.** Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with this code. Where the use in a space changes from one use in Table C405.5.2(1) or (2) to another use in Table C405.5.2(1) or (2), the installed lighting wattage shall comply with Section C405.5.~~

~~**C101.4.5 Change in space conditioning.** Any nonconditioned space that is altered to become conditioned space shall be required to be brought into full compliance with this code.~~

~~**C101.4.6 Mixed occupancy.** Where a building includes both residential and commercial occupancies, each occupancy shall be separately considered and meet the applicable provisions of IECC—Commercial Provisions or IECC—Residential Provisions.~~

PART II – IECC-RESIDENTIAL PROVISIONS

Delete without substitution as follows:

~~**R101.4.4 Change in occupancy or use.** Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with this code.~~

~~**R101.4.5 (N1101.4) Change in space conditioning.** Any nonconditioned space that is altered to become conditioned space shall be required to be brought into full compliance with this code.~~

~~**R101.4.6 Mixed occupancy.** Where a building includes both residential and commercial occupancies, each occupancy shall be separately considered and meet the applicable provisions of the IECC—Commercial and Residential Provisions.~~

PART III – IEBC

Add new text as follows:

1001.3.1.1 Change in occupancy or use. Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with the *International Energy Conservation Code*.

1001.3.1.2 Change in space conditioning. Any nonconditioned space that is altered to become conditioned space shall be required to be brought into full compliance with the *International Energy Conservation Code*.

1001.3.1.3 Mixed occupancy. Where a building changes use between either *residential* and *commercial* occupancies, each occupancy shall be separately considered and meet the applicable provisions of the *International Energy Conservation Code—Commercial and Residential Provisions*.

Reason: The requirements referenced in this code section are issues that deal with existing buildings. As such, the requirements should be listed in the IEBC. If it is felt that the requirements need to remain as part of the IECC, then it is requested that the requirements be listed/referenced under both the IECC as well as the IEBC, as is commonly done throughout the ICC suite of codes. Having the same language in multiple ICC codes is commonly done throughout the ICC suites for issues such as fire dampers, etc. For example, review IBC 717.5 and IMC 607.5

Cost Impact: The code change proposal will not increase the cost of construction.

CE19-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART III – IEBC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C101.4.4-EC-DAHMEN.doc

CE20 – 13

C101.4.4, C101.4.5, R101.4.4, R101.4.5 (IRC N1101.4)

Proponent: Lee Kranz, City of Bellevue, WA, representing Washington Association of Building Officials Technical Code Development (WABO TCD) (lkranz@bellevuewa.gov)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C101.4.4 Change in occupancy or use. Spaces undergoing a change in occupancy ~~that would result in an increase in demand for either fossil fuel or electrical energy from an F, S or U occupancy to an occupancy other than F, S or U~~ shall comply with this code. Any space that is converted to a dwelling unit or portion thereof, from another use or occupancy shall comply with this code. Where the use in a space changes from one use in Table C405.5.2(1) or (2) to another use in Table C405.5.2(1) or (2), the installed lighting wattage shall comply with Section C405.5.

Exception: Where the component performance building envelope option in Section C402.1.3 is used to comply with this section, the Proposed UA is permitted to be up to 110 percent of the Target UA. Where the total building performance option in Section C407 is used to comply with this section, the annual energy consumption of the proposed design is permitted to be 110 percent of the annual energy consumption otherwise allowed by Section C407.3 and Section C401.2 (3).

C101.4.5 Change in space conditioning. Any nonconditioned space that is altered to become *conditioned space* shall be required to be brought into full compliance with this code.

Exception: Where the component performance building envelope option in Section C402.1.3 is used to comply with this section, the Proposed UA is permitted to be up to 110 percent of the Target UA. Where the total building performance option in Section C407 is used to comply with this section, the annual energy consumption of the proposed design is permitted to be 110 percent of the annual energy consumption otherwise allowed by Section C407.3 and Section C401.2 (3).

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R101.4.4 Change in occupancy or use. Spaces undergoing a change in occupancy ~~that would result in an increase in demand for either fossil fuel or electrical energy from an F, S or U occupancy to an occupancy other than F, S or U~~ shall comply with this code. Any space that is converted to a dwelling unit or portion thereof, from another use or occupancy shall comply with this code.

Exception: Where the component performance building envelope option in Section C402.1.3 is used to comply with this section, the Proposed UA is permitted to be up to 110 percent of the Target UA. Where the total building performance option in Section C407 is used to comply with this section, the annual energy consumption of the proposed design is permitted to be 110 percent of the annual energy consumption otherwise allowed by Section C407.3 and Section C401.2 (3).

R101.4.5 (N1101.4) Change in space conditioning. Any nonconditioned space that is altered to become *conditioned space* shall be required to be brought into full compliance with this code.

Exception: Where the component performance building envelope option in Section C402.1.3 is used to comply with this section, the Proposed UA is permitted to be up to 110 percent of the Target UA. Where the total building performance option in Section C407 is used to comply with this section, the annual energy consumption of the proposed design is permitted to be 110 percent of the annual energy consumption otherwise allowed by Section C407.3 and Section C401.2 (3).

Reason: The existing IECC phrase “Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy...” (from Section C101.4.4) does not reference a standard for predicting energy demand, even in the Commentary, and could be subject to widely different interpretations. Storage, utility and industrial buildings are the most likely building types to have substantially deficient envelopes, and therefore this amendment replaces the current code language with a more straightforward requirement to bring any of those building types up to code when converting them to other uses.

The exceptions appended to both C101.4.4 and C101.4.5 are included to recognize the fact that converting an existing building to full compliance with current energy code is extremely difficult and costly. Conditions such as slab edges, structural thermal bridges, and window configurations cannot be practically remedied in many cases. Therefore, we propose an alternate compliance path allowing either a 10% higher envelope UxA value or a 10% higher Total Building Performance value. This will result in the preservation and adaptive reuse of more existing buildings, which itself is a significant energy conservation measure.

Note that the first sentence in each exception should be deleted if a separate proposal for a “component performance” building envelope U-value trade-off option is not approved.

Cost Impact: The code change proposal will not increase the cost of construction, it will decrease the cost.

CE20-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C101.4.4-EC-KRANZ.doc

CE21 – 13

C101.4.7 (NEW)

Proponent: John R. Norris, P.E., Fibrebond Corporation, representing self (bob.norris@fibrebond.com)

Add new text as follows:

C101.4.7 Exempt buildings. Buildings exempt from the provisions of the *International Energy Conservation Code*, include buildings designed for purposes other than general space comfort conditioning. Any building where heating or cooling systems are provided which are designed for purposes other than general space comfort conditioning. Buildings included in this exemption include:

1. Electrical equipment switching buildings which provide space conditioning for equipment only and in which no operators work on a regular and are less 1,000 square feet.

Reason: Additional insulation in these buildings will increase the amount of heat retained, thus making the air-conditioner run more often. It is not practical to comply with the *International Energy Conservation Code* envelope requirements.

Cost Impact: The code change proposed will not increase the cost of construction it will decrease the construction cost by as much as \$11.30 per square foot depending on the Climate Zone. In addition there will be a monthly savings based on energy consumption. Actual savings will vary by Climate Zone. The useable area of the building is reduced by about 9% and larger buildings may be required to maintain clearances for equipment.

CE21-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C101.4.7 (NEW)-EC-NORRIS.doc

CE22 – 13

C101.5.1, R101.5.1 (N1101.5)

Proponent: Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition.

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C101.5.1 Compliance materials. The *code official* shall be permitted to approve specific computer software, worksheets, compliance manuals and other similar materials that demonstrate compliance with ~~meet the intent~~ requirements of this code.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R101.5.1 (N1101.5) Compliance materials. The *code official* shall be permitted to approve specific computer software, worksheets, compliance manuals and other similar materials that demonstrate compliance with ~~meet the intent~~ requirements of this code.

Reason: The purpose of this code change is to clarify the code. Specifically, this proposal improves sections C101.5.1 and R101.5.1 by changing the reference from the “intent” to the “requirements” of the code and refocuses compliance materials on demonstrating compliance. As a result of this improved language, in order to be approved, compliance materials such as computer software or worksheets must be designed to demonstrate that a project meets the *requirements* of the IECC, not simply the “intent” of the IECC.

The current code language is vague because of the reference to the “intent” of the code. Presumably this is a reference to Sections C101.5.1 and R101.3, which provides no guidance as to specific compliance requirements. Alternately, some may claim that this language permits a subjective interpretation of “intent” by the authority enforcing the IECC. Neither interpretation is a suitable substitute for the specific requirements of the code.

Cost Impact: The code change proposal will not increase the cost of construction.

CE22-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C101.5.1-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE-VIGNEAU.doc

CE23 – 13

C101.5.2, C402.1, R101.5.2 (IRC N1101.6), R402.1 (IRC N1102.1)

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Delete without substitution as follows:

C101.5.2 Low energy buildings. The following buildings, or portions thereof, separated from the remainder of the building by *building thermal envelope* assemblies complying with this code shall be exempt from the *building thermal envelope* provisions of this code:

1. ~~Those with a peak design rate of energy usage less than 3.4 Btu/h ft² (10.7 W/m²) or 1.0 watt/ft² (10.7 W/m²) of floor area for space conditioning purposes.~~
2. ~~Those that do not contain conditioned space.~~

Revise as follows:

C402.1 General (Prescriptive). The building thermal envelope shall comply with Section C402.1.1. Section C402.1.2 shall be permitted as an alternative to the *R*-values specified in Section C402.1.1.

Exception: The following low energy buildings, or portions thereof, separated from the remainder of the building by *building thermal envelope* assemblies complying with this section shall be exempt from the *building thermal envelope* provisions of Section C402.

1. Those with a peak design rate of energy usage less than 3.4 Btu/h ft² (10.7 W/m²) or 1.0 watt/ft² (10.7 W/m²) of floor area for space conditioning purposes.
2. Those that do not contain conditioned space.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R101.5.2 (N1101.6) Low energy buildings. The following buildings, or portions thereof, separated from the remainder of the building by *building thermal envelope* assemblies complying with this code shall be exempt from the *building thermal envelope* provisions of this code:

1. ~~Those with a peak design rate of energy usage less than 3.4 Btu/h ft² (10.7 W/m²) or 1.0 watt/ft² (10.7 W/m²) of floor area for space conditioning purposes.~~
2. ~~Those that do not contain conditioned space.~~

Revise as follows:

R402.1 (N1102.1) General (Prescriptive). The building thermal envelope shall meet the requirements of Sections R402.1.1 through R402.1.4.

Exception: The following low energy buildings, or portions thereof, separated from the remainder of the building by *building thermal envelope* assemblies complying with this section shall be exempt from the *building thermal envelope* provisions of Section R402.

1. Those with a peak design rate of energy usage less than 3.4 Btu/h ft² (10.7 W/m²) or 1.0 watt/ft² (10.7 W/m²) of floor area for space conditioning purposes.
2. Those that do not contain *conditioned space*.

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

The proposal moves an existing exception found in each Administration chapter to the building thermal envelop provisions in C402 and R402. Chapter 1 should not be the location of specific code requirements nor exceptions to such requirements. Chapter 1 will be the location where exceptions to the scope of the code are provided. However such is not the case with these exceptions. These exceptions are for only the envelope and these buildings still need to comply with the requirements for lighting and HVAC systems.

Locating the exceptions at the beginning of the building envelope provisions places the exception immediately with the relevant requirements. This location does reduce the potential for people to interpret that low energy buildings are exempt from the code.

The proposed text is reworded slightly to reflect its location as an exception with Section 402. The change is editorial.

Cost Impact: This code change proposal will not increase the cost of construction. This is editorial in nature.

CE23-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C101.5.2-EC-THOMPSON-SEHPCAC.doc

CE24 – 13

C101.5.2, C202 (NEW)

Proponent: Vickie Lovell, InterCode Inc., representing National Greenhouse Manufacturers Association (vickie@intercodeinc.com)

Revise as follows:

C101.5.2 Low energy buildings. The following buildings, or portions thereof, separated from the remainder of the building by *building thermal envelope* assemblies complying with this code shall be exempt from the *building thermal envelope* provisions of this code:

1. Those with a peak design rate of energy usage less than 3.4 Btu/h · ft² (10.7 W/m²) or 1.0 watt/ft² (10.7 W/m²) of floor area for space conditioning purposes.
2. Those that do not contain *conditioned space*.
3. Greenhouses.

Add new definition as follows:

SECTION C202 GENERAL DEFINITIONS

GREENHOUSE. A structure or a separate area of a building that maintains a specialized environment essential for the cultivation, protection or maintenance of plants.

Reason: (for 101.5.2) Energy codes and standards have historically applied to buildings intended primarily for human occupancy and use. There are structures, buildings and space uses where strict application of the code poses increasing challenges. All types of agricultural buildings including barns, livestock shelters, sheds, and stables are unique structures in design, construction and operation and different from other commercial buildings in terms of internal loads, schedules, and building usage. Included in those types of structures are greenhouses and separated portions of buildings whose primary function is the cultivation, protection or maintenance of plants.

This proposal exempts greenhouses or separated portions of buildings whose primary function is the cultivation, protection or maintenance of plants from the building thermal envelope of the International Energy Conservation Code. This code change is intended to provide clarity to what the code already says about greenhouses, and what parts of the energy code should be required for compliance.

Strict application of the building envelope provisions of the code in greenhouses is cost prohibitive. Compliance with the building thermal envelope for greenhouses may actually be counterproductive, even detrimental to plant growth, since most plants require controlling the available natural light and highly specialized temperature-controlled conditions. Arbitrarily changing growing conditions can result in reduced output for greenhouse growers, and will have serious negative consequences to the US agricultural/horticultural/floricultural economy. Therefore, this topic merits thoughtful consideration of the implications and ramifications of requiring greenhouses to comply with the entirety of the IECC.

Although the current title of section C101.5.2 is somewhat narrow in scope, it provides for some exemptions to the building thermal envelope provisions in the code. The current provisions in Section C101.5.2 would exempt such buildings from the thermal envelope provisions in the code if they did not contain conditioned space (room or space within the building that is being heated or cooled) or the peak design rate of energy use was less than 1 watt per square foot for space conditioning purposes. However, some greenhouses do contain conditioned space that exceeds the stated peak connected load. In reality, the whole point of a greenhouse is to control a unique environment for the cultivation, protection or maintenance of plants, and such environment is not intended to maintain suitable conditions specifically for human occupancy. Currently such buildings are not exempt from the building thermal envelope provisions of the code. But greenhouses should be exempt.

Other requirements of the IECC and the IBC would still apply to Group U greenhouses. All other building code requirements would still apply for structural, fire, egress, accessibility for such cases where a greenhouse is also used as a retail business, such as garden centers and retail stores that sell plants to the public. This exemption is NOT intended to apply to retail businesses who may display plants and flowers in regular buildings that are not intended to be greenhouses and are environmentally controlled as retail spaces. This would not apply to office buildings and atriums where plants are displayed for aesthetical purpose. But it could capture botanical gardens which also maintain a specialized environment. In such businesses, the plants may be able to survive in the ambient temperature without specifically managing their growing conditions and environment. The proposed definition makes it clear that it is a unique climate controlled environment that defines a greenhouse or similar facility.

Some universities maintain greenhouses for research and studies in horticulture and should be exempt. In these cases, the IBC building, fire structural and other such requirements for mercantile, business and education still apply if the greenhouse is permitted as a Group B, E or M use or occupancy. These IBC provisions based on occupancy are primarily for the comfort and/or protection of people, and appropriately should apply. All Group U provisions of the IBC would still apply. Additionally, the IECC requirements for HVAC would still apply.

The proposed language is based on a current exemption used in the energy code of the State of Wisconsin. A NY Department of State Codes Division opinion on this topic considers all buildings used primarily for agricultural purposes as commercial

processes and do not need to comply with the energy codes of the state based upon an ASHRAE 90.1 exemption. This included any greenhouse whether built on a commercial or residential building property site since the greenhouse is not designed for occupancy and falls under their view of a “commercial processes”.

The initiatives to make this industry more energy efficient and sustainable are in motion. The USDA and other federal agencies and private organizations are making huge strides in helping growers be more energy efficient and sustainable by using soil amendments, reducing runoff from irrigation, using appropriate methods of reducing energy consumption, using improved pest management methods, reducing potable water or other natural surface or subsurface water resources, reducing waste, and promoting organic growing.

The current IECC requirements that reduce energy use for other aspects of greenhouses are appropriate EXCEPT the requirements that impede or inhibit the growth of plants, which is the primary function of a greenhouse.

(Section 202) The word “greenhouse” conjures up diverse images as to what a greenhouse might look like including the numerous ways plants are cultivated, marketed and sold. However, this definition captures the primary purpose of a greenhouse, which is to create unique environmental conditions inside a structure or a separated portion of a building that are ESSENTIAL for the cultivation, protection or maintenance of plants. This proposed definition is intended to exclude a retail business owner that brings plants indoors temporarily for display or seasonal promotions.

That environment includes control of the available natural or artificial light, managing the temperature and humidity, dispersing and managing water and controlling the growing medium regardless of the outside climate conditions. If that specific environment is not maintained, the plants cannot survive.

Previous code discussions regarding greenhouses have often bogged down because the focus gets shifted to whom or how the plants are being marketed and sold, public access or not, and other conditions. However, that information is irrelevant to this definition. The proposed definition makes it clear that **the primary descriptive feature of a greenhouse is the unique environment that must be maintained in order for the plants inside the greenhouse to survive.**

Cost Impact: This code change proposal will not increase the cost of construction.

CE24-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C202-GREENHOUSE (NEW)-EC-LOVELL.doc

CE25 – 13

C101.5.2

Proponent: Eric Makela, Britt/Makela Group, Inc., representing Northwest Energy Codes Group (eric@brittmakela.com)

Revise as follows:

C101.5.2 Low energy buildings. The following buildings, or portions thereof, separated from the remainder of the building by *building thermal envelope* assemblies complying with this code shall be exempt from the *building thermal envelope* provisions of this code:

1. Those with a peak design rate of energy usage less than 3.4 Btu/h – ft² (10.7 W/m²) or 1.0 watt/ft² (10.7 W/m²) or floor area for space conditioning purposes.
2. Those that do not contain conditioned space.
3. Agricultural buildings.

Reason: The purpose of this proposal is to ensure that buildings or portions of buildings used for agricultural purposes are exempt from the code when appropriate and likewise have to comply with appropriate provisions of the code. Energy codes and standards have historically applied to buildings intended primarily for human occupancy and use. There continue to be building and space uses where strict application of the code poses increasing challenges and can take considerable administrative time. One of those is agricultural use buildings. Through this code change it is hoped that additional clarity can be provided for agricultural use buildings as to when they are or are not required to meet the code. It is important to note that the current language in the parent section C101.5.2 limits such exemptions to only the building thermal envelope provisions in the code. Any HVAC, service water heating and/or lighting systems in such buildings would still be required to meet the provisions of the code.

Agricultural buildings such as barns, livestock shelters, sheds, and stables are commercial buildings as defined in the code but are much different in design, construction, and operation from other commercial buildings in terms of internal loads, schedules, and building usage. The current provisions in Section C101.5.2 would exempt such buildings from the thermal envelope provisions in the code if they did not contain conditioned space (room or space within the building that is being heated or cooled) or the peak design rate of energy use was less than 1 watt per square foot for space conditioning purposes. What about buildings that do contain conditioned space that exceed the stated peak connected load but that require such conditioning for other than human comfort conditions? Currently such buildings are not exempt from the building thermal envelope provisions of the code and should be if for no other reason than to specifically state the applicability of the code to these buildings and in so doing eliminate the situation where other buildings that should comply are being exempted.

Cost Impact: The code change proposal will not increase the cost of construction.

CE25-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C101.5.2-EC-MAKELA.doc

CE26 – 13

C101.5.2.1 (NEW), C202 (NEW), C402.1.3 (NEW)

Proponent: Tim Nogler, Washington State, representing Washington State Building Code Council
(tim.nogler@des.wa.gov)

Add new text as follows:

C101.5.2.1 Semi-heated spaces. A semi-heated space shall meet all of the building thermal envelope requirements, except that insulation is not required for opaque wall assemblies. Component performance calculations involving semi-heated spaces shall calculate fully insulated opaque walls for the Target UA calculation, and Total Building Performance calculations involving semi-heated spaces shall calculate fully insulated opaque walls for the Standard Reference Design.

C402.1.3 Semi-heated spaces. All spaces shall comply with the requirements in Section C402 unless the spaces meet the definition for semi-heated spaces. For semi-heated spaces, the building envelope shall comply with the same requirements as that for conditioned spaces in Section C402. Semi-heated spaces shall be calculated separately from other conditioned spaces for compliance purposes. Building envelope assemblies separating conditioned space from semi-heated space shall comply with exterior envelope insulation requirements. When choosing the un-insulated wall option, the wall shall not be included in Component Performance Building Envelope Option calculation.

Add new definition as follows:

SECTION C202 GENERAL DEFINITIONS

SEMI-HEATED SPACE : An enclosed space within a building, including adjacent connected spaces separated by an un-insulated component, including, but not limited to basements, utility rooms, garages, corridors, which:

1. Is heated but not cooled, and has a maximum heating system output capacity of 3.4 Btu/(h-ft²) but not greater than 8 Btu/(h ft²)
2. Is not a cold storage space or frozen storage space.

Reason: This proposal supplements the concept of “low energy buildings” with a separate category of “semi-heated spaces.” Semi-heated spaces allow just enough heat for freeze protection, and are exempt from wall insulation only, while low-energy buildings are exempt from all thermal envelope requirements.

The effect of this proposal is that buildings with less than 1 watt per SF of heating will still be considered as unheated and require no thermal envelope protection at all, while those with 1 – 2 watts per SF of heating (semi-heated spaces) require no opaque wall insulation, but require all other components such as roof, slab and windows to meet code requirements.

This has been an important concept in the Washington State energy code for many years, allowing less expensive construction for buildings such as warehouses and water treatment plants that are only heated enough for freeze protection. When such buildings are converted to conditioned space at a future point in their lives, it is relatively easy to add the wall insulation, and all the other building envelope components are already code-compliant.

Note that references to the “component performance” option and “target UA calculations” coordinates with the proposal to add those building envelope compliance options.

Cost Impact: The code change proposal will not increase the cost of construction.

CE26-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C101.5.2.1 (NEW)-EC-NOGLER.doc

CE27 – 13

C101.5.3 (NEW)

Proponent: Eric Makela, Britt/Makela Group, Inc., representing Northwest Energy Codes Group (eric@brittmakela.com)

Add new text as follows:

C101.5.3 Equipment buildings. Buildings that comply with all of the following shall be exempt from the *building thermal envelope* provisions of this code:

1. Are separate buildings with floor area no more than 500 square feet (50 m²).
2. Are intended to house electronic equipment with installed equipment power totaling at least 7 watts per square foot and not intended for human occupancy.
3. Have heating system capacity is no greater than 5 kW (17,000 Btu/hr) and heating thermostat setpoint is restricted to no more than 50°F (10°C).
4. Have an average wall and roof U-factor less than 0.120 in climate zones 1-5 and less than 0.200 in climate zones 6 through 8.
5. Comply with the roof solar reflectance and thermal emittance provisions for Climate Zone 1.

Reason: The application of energy codes and standards to buildings not intended primarily for human occupancy and use continue to pose increasing challenges to the strict application of the code. Equipment buildings, shelters, or sheds are installed to protect electronic equipment from the weather and provide primarily cooling conditioning. Heating is installed for emergency backup operation and is typically limited to 40°F or less by a setpoint. Due to the high density of electronic equipment installed, heat is rarely needed and cooling predominates. In this situation, less insulation is actually desirable from an annual energy use standpoint. This exemption is limited to stand alone equipment buildings no more than 500 square feet in area. Simplified insulation requirements that apply to an average of the roof and wall insulation are provided. This type of building is often made with 3" concrete, internal foam insulation, and a plywood interior with similar construction for roof and walls. To reduce insulation requirements, the ASHRAE 90.1 option may be pursued, as the building would qualify as a semi-heated space. The U-factors required for semi-heated spaces and available in standard construction are listed below, along with the U-factors required in the proposal. The proposed requirements can be met by readily available concrete, wood, or steel frame construction.

Target U-Factors for Equipment Shelters	U-factor
<i>Semi-heated U-factors from ASHRAE 90.1-2010</i>	
CZ-1 Semi-heated average wall/roof U-factor	0.251
CZ-5 Semi-heated average wall/roof U-factor	0.097
CZ-8 Semi-heated average wall/roof U-factor	0.087
<i>Wall U-factors based on Appendix A, ASHRAE 90.1-2010</i>	
Industry Standard: 3" Concrete with R-10	0.114
Metal studs, R-13, no continuous insulation	0.113
Wood studs, R-11, no continuous insulation	0.096
3" Concrete with R-5 insulation	0.195
Metal studs, R-6 insulation, no continuous insulation	0.184
<i>Proposed Equipment Shelter Average Wall & Roof U-factor</i>	
Climate Zone 1-5; Average U-factor shall be less than	0.200
Climate Zone 6-8; Average U-factor shall be less than	0.120

The basis of the exemption is that there is significant equipment installed that needs cooling most of the year. In this situation, less insulation reduces annual energy cost because it allows for beneficial heat loss. At around 7 watts per square foot of equipment load, the heat loss is offset by the equipment load, with the proposed insulation resulting in very little heating load. It is important to note that this exemption applies to the building thermal envelope provisions only. Any HVAC, service water heating, and/or lighting systems in such buildings would still be required to meet the provisions of the code. Through this code change it is hoped that additional clarity can be provided for equipment buildings as to when they are or are not required to meet the building thermal envelope provisions of the code.

Cost Impact: The code change proposal will not increase the cost of construction.

CE27-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C101.5.3 (NEW)-EC-MAKELA.doc

CE28 – 13

C102.1, R102.1

Proponent: (Part I) Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; Bill Prindle, Energy Efficient Codes Coalition; and Don Vigneau, Northeast Energy Efficiency Partnerships **(Part II)** Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition.

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C102.1 General. This code is not intended to prevent the use of any material, method of construction, design or insulating system not specifically prescribed herein, provided that such construction, design or insulating system has been *approved* by the *code official* as meeting the ~~intent~~ requirements of this code.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R102.1 General. This code is not intended to prevent the use of any material, method of construction, design or insulating system not specifically prescribed herein, provided that such construction, design or insulating system has been *approved* by the *code official* as meeting the ~~intent~~ requirements of this code.

Reason: The purpose of this code change is to clarify the code. This proposal removes uncertainty from the IECC by clarifying that alternative materials, methods of construction, designs, or systems still must meet the actual requirements, not just the “intent” of the IECC.

The current code language is vague because of the reference to the “intent” of the code. Presumably this is a reference to Section R101.3, which provides no guidance as to specific compliance requirements. Alternately, some may claim that this language permits a subjective interpretation of “intent” by the authority enforcing the IECC. Neither interpretation is a suitable substitute for the specific requirements of the code.

The current language may be viewed by some as creating a loophole that allows a code user to avoid meeting the requirements of the IECC while claiming that a product or system meets a subjective interpretation of the IECC’s “intent.” The lack of specificity places the code official in a difficult, and potentially risky position of making judgments based on a subjective interpretation of the code’s “intent.”

Cost Impact: The code change proposal will not increase the cost of construction.

CE28-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C102.1-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE-VIGNEAU.doc

CE29 – 13

C102.1, C102.1.1, C102.1.2 (NEW), R102.1, R102.1.1 (IRC N1101.7), R102.1.2 (NEW)

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

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PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C102.1 General. ~~This code is not intended to prevent the use of any material, method of construction, design or insulating system not specifically prescribed herein, provided that such construction, design or insulating system has been approved by the code official as meeting the intent of this code. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design or method of construction shall be approved where the code official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code.~~

C102.1.1 Above-code Alternate programs. The code official or other authority having jurisdiction shall be permitted to deem a national, state or local energy efficiency program to meet or exceed the energy efficiency required by this code. Buildings *approved* in writing by such an energy efficiency program shall be considered in compliance with this code. ~~The requirements identified as “mandatory” in Chapter 4 shall be met.~~

C102.1.2 Accredited programs and designs. The code official or other authority having jurisdiction shall be permitted to accept alternative national programs and designs that have received accreditation by an independent accreditation body. The independent accreditation body shall certify programs or designs as meeting or exceeding the energy efficiency required by this code. Buildings and designs that have received approval in writing and are verified by an approved party shall be considered in compliance with this code.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R102.1 General. ~~This code is not intended to prevent the use of any material, method of construction, design or insulating system not specifically prescribed herein, provided that such construction, design or insulating system has been approved by the code official as meeting the intent of this code. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design or method of construction shall be approved where the code official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code.~~

R102.1.1 (N1101.7) Above-code Alternate programs. The code official or other authority having jurisdiction shall be permitted to deem a national, state or local energy efficiency program to meet or exceed the energy efficiency required by this code. Buildings *approved* in writing by such an energy efficiency program shall be considered in compliance with this code. ~~The requirements identified as “mandatory” in Chapter 4 shall be met.~~

R102.1.2 Accredited programs and designs. The code official or other authority having jurisdiction shall be permitted to accept alternative national programs and designs that have received accreditation by an independent accreditation body. The independent accreditation body shall certify programs or designs as meeting or exceeding the energy efficiency required by this code. Buildings and designs that have received approval in writing and are verified by an approved party shall be considered in compliance with this code.

Reason: The last section is most important. It sets the stage for accrediting programs outside the code as at least as good as code. Some programs, such as RESNET's HERS are currently too proprietary to name in the code; however, they might be accredited, perhaps with restrictions, then that existing infrastructure can help deliver efficient homes. Just as important, there will be a variety of good programs that can help deliver energy efficiency. Some local, some national, some public, some private, some focused on specific types of homes, others broad; all can help. The code official does not have time to look at all the individual programs. We need a mechanism to accredit those programs or their energy efficient designs, This is a way to help deliver verified energy efficiency where this is acceptable to the code official. Code officials need a chance to catch their breath.

The "General" section lifts code text from the IRC to better describe the flexibility in the IECC.

In the middle section above, the IECC is made consistent with the I-code concept of potentially approving an alternative that is at least as good as the code, "meet or exceed", as in this change. It makes no sense to meet an alternative then go back and say to meet the code too, so the "mandatory" sentence was removed.

Cost Impact: The code change proposal will not increase the cost of construction.

CE29-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C102.1-EC-CONNER.doc

CE30 – 13

C102.1.1, R102.1.1 (IRC N1101.7)

Proponent: (Part I) Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; Bill Prindle, Energy Efficient Codes Coalition; and Don Vigneau, Northeast Energy Efficiency Partnerships **(Part II)** Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition.

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PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C102.1.1 Above code programs. The ~~code official or other~~ authority having jurisdiction shall be permitted to deem a national, state or local energy efficiency program to exceed the energy efficiency required by this code. Buildings *approved* in writing by such an energy efficiency program shall be considered in compliance with this code. The requirements identified as “mandatory” in Chapter 4 shall be met.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R102.1.1 (N1101.7) Above code programs. The ~~code official or other~~ authority having jurisdiction shall be permitted to deem a national, state or local energy efficiency program to exceed the energy efficiency required by this code. Buildings *approved* in writing by such an energy efficiency program shall be considered in compliance with this code. The requirements identified as “mandatory” in Chapter 4 shall be met.

Reason: The purpose of the proposed code change is to clarify the code -- this proposal clarifies that only the “authority having jurisdiction” can determine whether an alternative program qualifies as an “above code program” that can be used to demonstrate compliance with the IECC.

Since section C102.1.1 allows buildings to opt out of local energy code compliance and enforcement (except as to mandatory measures) where they are approved by an “above code program,” there should be a high standard for such programs and such programs should only be approved by the authority having jurisdiction.

- In some jurisdictions, the code official will be the “authority having jurisdiction”, so this proposal will not take that authority away from the code official.
- For jurisdictions in which the state or locality is the authority having jurisdiction (and not the individual code official), this proposal will ensure that only the proper authority makes the decision whether an alternative program meets or exceeds the IECC's requirements.

Cost Impact: The code change proposal will not increase the cost of construction.

CE30-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C102.1.1 #1-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE-VIGNEAU.docc

CE31 – 13

C102.1.1, R102.1.1 (IRC N1101.7)

Proponent: Don Surrena, CBO, National Association of Home Builders (NAHB) (dsurrena@nahb.org) and Craig Conner, Building Quality, representing self (craig.conner@mac.com)

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PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C102.1.1 Above code programs. The *code official* or other authority having jurisdiction shall be permitted to deem a national, state or local energy efficiency program to exceed the energy efficiency required by this code. Buildings *approved* in writing by such an energy efficiency program shall be considered in compliance with this code. ~~The requirements identified as “mandatory” in Chapter 4 shall be met.~~

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R102.1.1 (N1101.7) Above code programs. The *code official* or other authority having jurisdiction shall be permitted to deem a national, state or local energy efficiency program to exceed the energy efficiency required by this code. Buildings *approved* in writing by such an energy efficiency program shall be considered in compliance with this code. ~~The requirements identified as “mandatory” in Chapter 4 shall be met.~~

Reason: (Surrena): The key element of an above code program is that it must meet or exceed the energy efficiency requirements of the IECC. Requiring such a program to also meet the detailed prescriptive requirements labeled as “mandatory” in the IECC defeats the purpose of performance based above code program. This code change proposal will allow flexibility in the methodology used for any above code program to meet or exceed the minimum energy efficiency requirements of the IECC.

(Conner): This change corrects the erroneous use of the term “*mandatory*”. This moves the specification of what can be traded off with the performance approach into the code text about the performance approach, rather than spreading that information throughout the code, as was in energy codes prior to 2006.

The word “*shall*” and the concept of “*mandatory*” is woven throughout the I-codes. It is important that the energy code use “*shall*” correctly. The IRC definition is

SHALL. *The term, when used in this code, is construed to mean “mandatory”.*

Cost Impact: The code change proposal will not increase the cost of construction.

CE31-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C102.1.1-EC-CONNER-SURRENA.doc

CE32 – 13

C102.1.1, R102.1.1, (N1101.7)

Proponent: (Part I) Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; Bill Prindle, Energy Efficient Codes Coalition; and Don Vigneau, Northeast Energy Efficiency Partnerships **(Part II)** Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition

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PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C102.1.1 Above code programs. The *code official* or other authority having jurisdiction shall be permitted to ~~deem~~ approve a national, state or local energy efficiency program as an additional method of demonstrating compliance with this code, provided that:

1. The program is administered by a party who is independent from the parties involved in the construction or ownership of the *building*;
2. A review of all program requirements is conducted;
3. Documentation and analysis shows that the requirements of this program ~~to meet or exceed all of~~ the energy efficiency requirements of required by this code; and
4. Program compliance is verified by a party who is independent from the parties involved in the construction or ownership of the *building*.

Buildings *approved* in writing by such an energy efficiency program shall be considered in compliance with this code. Under such a program, the requirements identified as “mandatory” in Chapter 4 shall be met.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R102.1.1 (N1101.7) Above code programs. The *code official* or other authority having jurisdiction shall be permitted to ~~deem~~ approve a national, state or local energy efficiency program as an additional method of demonstrating compliance with this code, provided that:

1. The program is administered by a party who is independent from the parties involved in the construction or ownership of the *building*;
2. A review of all program requirements is conducted;
3. Documentation and analysis shows that the requirements of this program ~~to meet or exceed all of~~ the energy efficiency requirements of required by this code; and
4. Program compliance is verified by a party who is independent from the parties involved in the construction or ownership of the *building*.

Buildings *approved* in writing by such an energy efficiency program shall be considered in compliance with this code. Under such a program, the requirements identified as “mandatory” in Chapter 4 shall be met.

Reason: The purpose of the proposed code change is to establish new requirements for above code programs and to otherwise clarify the code. This proposal outlines specific criteria that must be applied in the determination of whether an alternative program is an “above code program” that may be allowed as a substitute for IECC compliance and code official enforcement.

Since section C102.1.1 allows buildings to opt out of local energy code compliance and enforcement (except as to mandatory measures) where they are approved by an “above code program,” there should be a high standard for such programs. The proposed changes ensure that any alternative program will have the following crucial elements:

- Third-party administration of the alternative program
- Requirements that meet or exceed the IECC requirements
- Documentation and analysis to support equivalence
- Independent verification of compliance

By contrast, the current language of section C102.1.1 gives no guidance to the authority having jurisdiction regarding how to determine whether a program is “above code” and should qualify as acceptable as an alternative compliance path. Given the recent flood of programs around the country that claim to be “above-code” and/or “green,” it is important that the IECC set the ground rules for how jurisdictions should evaluate these programs as alternatives to traditional code compliance and enforcement.

Cost Impact: The code change proposal will not increase the cost of construction.

CE32-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C102.1.1 #2-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE-VIGNEAU.doc

CE33 – 13

C102, C102.1.1 (NEW), R102, R102.1.1 (NEW)

Proponent: Don Surrena, CBO, National Association of Home Builders (NAHB) (dsurrena@nahb.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

SECTION C102

ALTERNATE MATERIALS METHOD OF CONSTRUCTION, DESIGN OR INSULATING SYSTEMS APPLICABILITY - DUTIES AND POWERS OF THE BUILDING OFFICIAL

C102.1.1 Alternative materials, design and methods of construction and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design or method of construction shall be approved where the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code. Compliance with the specific performance-based provisions of the International Codes in lieu of specific requirements of this code shall also be permitted as an alternate.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

SECTION R102

ALTERNATE MATERIALS — METHOD OF CONSTRUCTION, DESIGN OR INSULATING SYSTEMS APPLICABILITY - DUTIES AND POWERS OF THE BUILDING OFFICIAL

R102.1.1 Alternative materials, design and methods of construction and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design or method of construction shall be approved where the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code. Compliance with the specific performance-based provisions of the International Codes in lieu of specific requirements of this code shall also be permitted as an alternate.

Reason: The proposed new Section R102.1.1 is the exact same language used in IRC Section 104.11, IBC Section 104.11, IFC Section 104.9, IMC Section 105.2, IPC Section 105.2, and IFGC Section 105.2 and this code change proposal is needed to correlate and be consistent with the other I-Codes.

Cost Impact: The code change proposal will not increase the cost of construction.

CE33-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C102.1.1 (NEW)-EC-SURRENA.doc

CE34 – 13

C102.1.1 (NEW), Chapter 5 (NEW), R102.1.1 (NEW), Chapter 5

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C102.1.1 ICC 700 option. Buildings with a certificate of compliance stating the building complies with the ICC 700 Chapter 7 energy efficiency requirements at the Bronze level or above according to Table 303 of ICC 700 shall be considered in compliance with this code. The certificate of compliance shall be from an approved or accredited source.

Add new standard to Chapter 5 as follows:

ICC

ICC 700 National Green Building Standard

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R102.1.1 ICC 700 option. Buildings with a certificate of compliance stating the building complies with the ICC 700 Chapter 7 energy efficiency requirements at the Bronze level or above according to Table 303 of ICC 700 shall be considered in compliance with this code. The certificate of compliance shall be from an approved or accredited source.

Add new standard to Chapter 5 as follows:

ICC

ICC 700 National Green Building Standard

Reason: ICC 700 was built around the I-code family. For example, most of the requirements in the IECC are simply mandates (without points) in ICC 700. The 2012 ICC 700 version the “bronze” level equivalent to the 2012 IECC. With the verification, training, and other support already available and in use, ICC 700 could become one way of showing IECC compliance. Although the ICC 700 user would usually choose to go beyond the energy chapter, that would not be required to comply with the IECC.

Cost Impact: The code change proposal will not increase the cost of construction.

CE34-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

CE35 – 13

C103.2, C103.2.1 (NEW), C103.2.1.1 (NEW), C103.2.1.2 (NEW), C103.2.2 (NEW), C103.2.2.1 (NEW), C103.2.2.2 (NEW), C103.2.3 (NEW), C103.2.4 (NEW), C103.2.5 (NEW), C103.3, C104.2, C104.8, C202 (NEW), R103.2 (IRC N1101.8), R103.2.1 (NEW) (IRC N1101.8.1), R103.2.1.1 (NEW) (IRC N1101.8.1.1), R103.2.1.2 (NEW) (IRC N1101.8.1.2), R103.2.2 (NEW) (IRC N1101.8.2), R103.2.2.1 (NEW) (IRC N1101.8.2.1), C103.2.2.2 (NEW) (IRC N1101.8.2.2), R103.2.3 (NEW) (IRC N1101.8.3), R103.2.4 (NEW) (IRC N1101.8.4), R103.2.5 (NEW) (IRC N1101.8.5), R103.3, R104.2, R104.8, R202 (NEW)

Proponent: Deborah Taylor, RA, LEED AP, Deborah F. Taylor Consulting, LLC, representing self (taylor@dftconsultingny.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C103.2 Information on construction documents. Construction documents shall be drawn to scale upon suitable material. Electronic media documents are permitted to be submitted when approved by the *code official*. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building systems and equipment as herein governed. Details shall include, but are not limited to, as applicable, insulation materials and their R-values; fenestration U-factors and SHGCs; area-weighted U-factor and SHGC calculations; mechanical system design criteria; mechanical and service water heating system and equipment types, sizes and efficiencies; economizer description; equipment and systems controls; fan motor horsepower (hp) and controls; duct sealing, duct and pipe insulation and location; lighting fixture schedule with wattage and control narrative; and air sealing details. required for a building permit shall include a statement by one or more registered design professionals that the project design complies with or is exempt from this code, an *energy analysis* for the building design based on the chosen compliance strategy, the design itself, utilizing the specific energy values indicated by the *energy analysis*, a commissioning plan for mechanical and electrical systems where required and a description of the progress, commissioning and final inspections and tests required by this code for the project. Electronic media documents are permitted to be submitted when approved by the *code official*.

Exception: Project designs that are entirely exempt in accordance with this code are not required to provide either the *energy analysis*, supporting design documentation, commissioning plan or inspections listing required by this code.

C103.2.1 Registered design professional statement of compliance or exemption. Construction documents submitted for a building permit shall include a statement by at least one registered design professional that the project design complies with or is exempt from this code. If the project design is exempt or partially exempt from this code, the citation shall be provided that allows the exemption.

C103.2.1.1 Statements of compliance or exemption. The statement of compliance shall read as follows: "To the best of my knowledge, belief and professional judgment, all work under this application is in compliance with this code." The statement of exemption shall read as follows: "To the best of my knowledge, belief and professional judgment, all work under this application is exempt from this code in accordance with Section . If the proposed work is partially exempt, the registered design professional

shall use the statement of compliance and note the exempted work, providing the code citation allowing the exemption.

C103.2.1.2 Responsible registered design professional. If the project design team utilizes no energy trade-offs among design disciplines, each registered design professional of record may sign a statement of compliance with this code for the respective discipline. If the project design team utilizes energy trade-offs among design disciplines, at least one registered design professional shall sign the statement of compliance with this code for the entire project, including all disciplines.

C103.2.2 Energy analysis. The construction documents shall include an *energy analysis* showing the strategy for determining project design compliance with this code, and shall indicate the specific values for each unit of material, equipment and system that such analysis indicates must be met in the completed construction. The *code official* may require that the registered design professional show the values determined by the energy analysis in a table indicating, for each material, system or equipment type, the item, its required energy value, the citation from this code and the drawing reference where the item is drawn or described.

C103.2.2.1 Prescriptive approach. If the compliance strategy uses the prescriptive approach in conjunction with the mandatory requirements, such values will be derived from provisions referenced in either Section C401.2-1 or Section C401.2-2, or from provisions referenced in Section R401.2.

C103.2.2.2 Performance approach. If the compliance strategy uses the performance approach in conjunction with the mandatory requirements, such values will be derived from provisions referenced in either Section C401.2-1 or Section C401.2-3, or from provisions referenced in Section R405.

C103.2.3 Supporting design documentation. The construction documents shall indicate materials, systems and equipment for the proposed design as identified in the *energy analysis*, and shall specify the energy values determined by the analysis. Construction documents shall be fully coordinated and of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, materials, systems and equipment as herein governed. Details shall include as applicable, but are not limited to, envelope assembly U-factors; insulation materials and their R-values; fenestration areas, U-factors and SHGCs; area-weighted U-factor and SHGC calculations; mechanical system design criteria; mechanical and service water heating system and equipment types, sizes and efficiencies; economizer description; equipment and systems controls; fan motor horsepower (hp) and controls; duct sealing, duct and pipe insulation and location; lighting fixture schedule with input wattage, ballast type and control narrative; lighting power densities; and air sealing details for the *building thermal envelope* and penetrations through it.

C103.2.4 Commissioning plan. Where applicable, a commissioning plan shall be provided in the construction documents in accordance with Section C408. Construction document notes shall clearly indicate provisions for commissioning and completion requirements in accordance with such section. Copies of all documentation shall be made available to the *code official* upon request in accordance with Sections C408.2.4 and C408.2.5.

C103.2.5 Listing and description of required inspections and testing. The construction documents shall include a listing of the applicable progress, commissioning and final inspections and testing required by this code, when and how often each should be required in the project schedule, whether and what percentage of sampling will be permitted, applicable reference standards and the citation for the inspection or test.

C103.3 Examination of documents. The *code official* shall examine or cause to be examined the accompanying construction documents and shall ascertain whether the proposed construction indicated and described is in accordance with the requirements of this code and other pertinent laws or ordinances.

C104.2 Required approvals. Required inspections and testing shall be as provided in the *approved* construction documents, in accordance with Section C103.2.5. Work shall not be done beyond the point

indicated in each successive inspection without first obtaining the approval of the *code official*. The *code official*, upon notification, shall make the requested inspections and shall either indicate the portion of the construction that is satisfactory as completed, or notify the permit holder or his or her agent wherein the same fails to comply with this code. Any portions that do not comply shall be corrected and such portion shall not be covered or concealed until authorized by the *code official*.

C104.8 Approval. After the prescribed tests and inspections indicate that the work complies in all respects with this code as described in the *approved energy analysis*, a notice of approval shall be issued by the *code official*.

Add new definition as follows:

SECTION C202 GENERAL DEFINITIONS

ENERGY ANALYSIS. An analysis of this code as it affects a proposed building design, using the prescriptive or performance approach in conjunction with mandatory values, that results in the required values for each energy-related material, equipment or system in the construction. The energy analysis identifies whether the design team is using the International Energy Conservation Code or ANSI/ASHRAE/IESNA Standard 90.1 for compliance and, if applicable, where trade-offs are used.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R103.2 (N1101.8) Information on construction documents. Construction documents ~~shall be drawn to scale upon suitable material. Electronic media documents are permitted to be submitted when approved by the *code official*. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building systems and equipment as herein governed. Details shall include, but are not limited to, as applicable, insulation materials and their R-values; fenestration U-factors and SHGCs; area-weighted U-factor and SHGC calculations; mechanical system design criteria; mechanical and service water heating system and equipment types, sizes and efficiencies; economizer description; equipment and systems controls; fan motor horsepower (hp) and controls; duct sealing, duct and pipe insulation and location; lighting fixture schedule with wattage and control narrative; and air sealing details.~~ required for a building permit shall include a statement by one or more registered design professionals that the project design complies with or is exempt from this code, an *energy analysis* for the building design based on the chosen compliance strategy, the design itself, utilizing the specific energy values indicated by the *energy analysis*, a commissioning plan for mechanical and electrical systems where required and a description of the progress, commissioning and final inspections and tests required by this code for the project. Electronic media documents are permitted to be submitted when approved by the *code official*.

Exception: Project designs that are entirely exempt in accordance with this code are not required to provide either the *energy analysis*, supporting design documentation, commissioning plan or inspections listing required by this code.

R103.2.1 (N1101.8.1) Registered design professional statement of compliance or exemption.

Construction documents submitted for a building permit shall include a statement by at least one registered design professional that the project design complies with or is exempt from this code. If the project design is exempt or partially exempt from this code, the citation shall be provided that allows the exemption.

R103.2.1.1 (N1101.8.1.1) Statements of compliance or exemption. The statement of compliance shall read as follows: "To the best of my knowledge, belief and professional judgment, all work under this application is in compliance with this code." The statement of exemption shall read as follows: "To the best of my knowledge, belief and professional judgment, all work under this application is exempt from this code in accordance with Section . If the proposed work is partially exempt, the registered design

professional shall use the statement of compliance and note the exempted work, providing the code citation allowing the exemption.

R103.2.1.2 (N1101.8.1.2) Responsible registered design professional. If the project design team utilizes no energy trade-offs among design disciplines, each registered design professional of record may sign a statement of compliance with this code for the respective discipline. If the project design team utilizes energy trade-offs among design disciplines, at least one registered design professional shall sign the statement of compliance with this code for the entire project, including all disciplines.

R103.2.2 (N1101.8.2) Energy analysis. The construction documents shall include an *energy analysis* showing the strategy for determining project design compliance with this code, and shall indicate the specific values for each unit of material, equipment and system that such analysis indicates must be met in the completed construction. The *code official* may require that the registered design professional show the values determined by the energy analysis in a table indicating, for each material, system or equipment type, the item, its required energy value, the citation from this code and the drawing reference where the item is drawn or described.

R103.2.2.1 (N1101.8.2.1) (Prescriptive approach). If the compliance strategy uses the prescriptive approach in conjunction with the mandatory requirements, such values will be derived from provisions referenced in either Section C401.2-1 or Section C401.2-2, or from provisions referenced in Section R401.2.

R103.2.2.2 (N1101.8.2.2) Performance approach. If the compliance strategy uses the performance approach in conjunction with the mandatory requirements, such values will be derived from provisions referenced in either Section C401.2-1 or Section C401.2-3, or from provisions referenced in Section R405.

R103.2.3 (N1101.8.3) Supporting design documentation. The construction documents shall indicate materials, systems and equipment for the proposed design as identified in the *energy analysis*, and shall specify the energy values determined by the analysis. Construction documents shall be fully coordinated and of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, materials, systems and equipment as herein governed. Details shall include as applicable, but are not limited to, envelope assembly U-factors; insulation materials and their R-values; fenestration areas, U-factors and SHGCs; area-weighted U-factor and SHGC calculations; mechanical system design criteria; mechanical and service water heating system and equipment types, sizes and efficiencies; economizer description; equipment and systems controls; fan motor horsepower (hp) and controls; duct sealing, duct and pipe insulation and location; lighting fixture schedule with input wattage, ballast type and control narrative; lighting power densities; and air sealing details for the *building thermal envelope* and penetrations through it.

R103.2.4 (N1101.8.4) Commissioning plan. Where applicable, a commissioning plan shall be provided in the construction documents in accordance with Section C408. Construction document notes shall clearly indicate provisions for commissioning and completion requirements in accordance with such section. Copies of all documentation shall be made available to the *code official* upon request in accordance with Sections C408.2.4 and C408.2.5.

R103.2.5 (N1101.8.5) Listing and description of required inspections and testing. The construction documents shall include a listing of the applicable progress, commissioning and final inspections and testing required by this code, when and how often each should be required in the project schedule, whether and what percentage of sampling will be permitted, applicable reference standards and the citation for the inspection or test.

R103.3 Examination of documents. The code official shall examine or cause to be examined the accompanying construction documents and shall ascertain whether the proposed construction indicated and described is in accordance with the requirements of this code and other pertinent laws or ordinances.

R104.2 Required approvals. Required inspections and testing shall be as provided in the *approved* construction documents, in accordance with Section C103.2.5. Work shall not be done beyond the point indicated in each successive inspection without first obtaining the approval of the *code official*. The *code official*, upon notification, shall make the requested inspections and shall either indicate the portion of the construction that is satisfactory as completed, or notify the permit holder or his or her agent wherein the same fails to comply with this code. Any portions that do not comply shall be corrected and such portion shall not be covered or concealed until authorized by the *code official*.

R104.8 Approval. After the prescribed tests and inspections indicate that the work complies in all respects with this code as described in the *approved energy analysis*, a notice of approval shall be issued by the *code official*.

Add new definition as follows:

**SECTION R202 (N1101.9)
GENERAL DEFINITIONS**

ENERGY ANALYSIS. An analysis of this code as it affects a proposed building design, using the prescriptive or performance approach in conjunction with mandatory values, that results in the required values for each energy-related material, equipment or system in the construction. The energy analysis identifies whether the design team is using the International Energy Conservation Code or ANSI/ASHRAE/IESNA Standard 90.1 for compliance and, if applicable, where trade-offs are used.

Reason: The text added by this proposal establishes a protocol for what is required of the registered design professional to show compliance. This protocol identifies compliance or exemption; how the energy values were derived, what code or standard is being used and whether the prescriptive or performance path is being followed; what is required in construction documents to show that the appropriate values are being specified for construction; and the commissioning and inspections program by which the construction will be inspected, tested and evaluated. In addition, it provides guidance on how to state compliance when there are trade-offs among the envelope, mechanical and electrical systems.

Cost Impact: The code change proposal will not increase the cost of construction. Registered design professionals should already be providing the information required herein in some format; this proposal articulates the compliance process and sets a standard for code officials to evaluate.

CE35-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C103.2-EC-TAYLOR.doc

CE36 – 13

C103.2

Proponent: Dr. Thomas D. Culp, Birch Point Consulting LLC, representing the Glazing Industry Code Committee (culp@birchpointconsulting.com)

Revise as follows:

C103.2 Information on construction documents. Construction documents shall be drawn to scale upon suitable material. Electronic media documents are permitted to be submitted when *approved* by the *code official*. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, systems and equipment as herein governed. Details shall include, but are not limited to, as applicable:

1. Insulation materials and their *R*-values;
2. Fenestration *U*-factors and SHGCs;
3. Area-weighted *U*-factor and SHGC calculations;
4. Mechanical system design criteria;
5. Mechanical and service water heating system and equipment types, sizes and efficiencies;
6. Economizer description;
7. Equipment and systems controls;
8. Fan motor horsepower (hp) and controls;
9. Duct sealing, duct and pipe insulation and location;
10. Lighting fixture schedule with wattage and control narrative;
11. Location of *daylight zones* on floor plans; and
12. Air sealing details.

Reason: This proposal serves two purposes. First, this will help code enforcement by reformatting this section as a clear list rather than a cluttered paragraph, and also adding a requirement to show the location of daylight zones on floor plans, which will aid enforcement when daylight zones are used in sections C402.3.1-C402.3.3 (window and skylight area and properties), C405.2.2.3 (daylight controls), and C406.3 (efficient lighting path).

Second, this will encourage the architect to consider daylighting geometry earlier in the design process. While this is already good practice amongst leading architects, it is still common that by the time a lighting / daylighting designer is engaged on a project, the envelope geometry and properties have already been locked in, and are difficult and expensive to change. This change will help bring consideration of daylight zones earlier into the process.

Cost Impact: The code change proposal will not increase the cost of construction.

CE36-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C103.2-EC-SANDERS.doc

CE37 – 13

C103.2.1 (NEW), R103.2.1 (NEW)

Proponent: Robby Schwarz, EnergyLogic, Inc., (robby@nrglogic.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Add new text as follows:

C103.2.1. Thermal envelope definition. The building's thermal envelope shall be defined on the construction documents as the alignment of the air barrier and insulation systems separating conditioned space from unconditioned space. Where it is not possible to define the alignment of the air barrier and thermal barrier systems on the construction documents inspection shall determine success of accomplishing this requirement.

PART II – IECC-RESIDENTIAL PROVISIONS

Add new text as follows:

R103.2.1. Thermal envelope definition. The building's thermal envelope shall be defined on the construction documents as the alignment of the air barrier and insulation systems separating conditioned space from unconditioned space. Where it is not possible to define the alignment of the air barrier and thermal barrier systems on the construction documents inspection shall determine success of accomplishing this requirement.

Reason: The single most important energy and performance aspect of the home is the buildings thermal envelope and the alignment of the air barrier and thermal barrier systems. It is crucial that the design professional demonstrate an understanding of location of the thermal envelope and that they make an effort to draw its location so that the construction personnel can successfully implement the construction of the building in accordance with the code and the specifications that have been drawn. The air sealing details help make this possible but understanding where the details will be implemented helps ensure better implementation and enforcement.

Cost Impact: The code change proposal will not increase the cost of construction.

CE37-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C103.2.1 (NEW)-EC-SCHWARZ.doc

CE38 – 13

C103.3, C104.1, C104.2 (NEW), C104.3, C104.3.1 (NEW), C104.3.2 (NEW), C104.3.3 (NEW), C104.3.4 (NEW), C104.3.5 (NEW), C104.3.6 (NEW), C104.5, R103.3, R104.1, R104.2 (NEW), R104.3, R104.3.1 (NEW), R104.3.2 (NEW), R104.3.3 (NEW), R104.3.4 (NEW), R104.3.5 (NEW), R104.3.6 (NEW), R104.5

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C103.3 Examination of documents. The *code official* shall examine or cause to be examined the accompanying construction documents and shall ascertain whether the construction indicated and described is in accordance with the requirements of this code and other pertinent laws or ordinances. In causing the documents to be examined to verify compliance with this code, the *code official* shall be permitted to utilize a registered design professional or other *approved* entity not affiliated with the *building* design or construction in conducting the review of the plans and specifications for compliance with the code.

~~**C104.1 General.** Construction or work for which a permit is required shall be subject to inspection by the *code official*.~~

C104.1 General. Construction or work for which a permit is required shall be subject to inspection by the *code official* or his designated agent, and such construction or work shall remain accessible and exposed for inspection purposes until *approved*. Approved as a result of an inspection shall not be construed to be an approval of a violation of the provisions of this code or of other ordinances of the jurisdiction. Inspections presuming to give authority to violate or cancel the provisions of this code or of other ordinances of the jurisdiction shall not be valid. It shall be the duty of the permit applicant to cause the work to remain accessible and exposed for inspection purposes. Neither the *code official* nor the jurisdiction shall be liable for expense entailed in the removal or replacement of any material, product, system or building component required to allow inspection to validate compliance with this code.

~~**C104.2 Required approvals.** Work shall not be done beyond the point indicated in each successive inspection without first obtaining the approval of the *code official*. The *code official*, upon notification, shall make the requested inspections and shall either indicate the portion of the construction that is satisfactory as completed, or notify the permit holder or his or her agent wherein the same fails to comply with this code. Any portions that do not comply shall be corrected and such portion shall not be covered or concealed until authorized by the *code official*.~~

C104.2 Preliminary Inspection. Before issuing a permit, the *code official* is authorized to examine or cause to be examined the *building site*, and in the case of work to or on an existing building the *building*, for which an application has been filed.

~~**C104.3 Final inspection.** The building shall have a final inspection and not be occupied until *approved*.~~

C104.3 Required inspections. The *code official* or his designated agent, upon notification, shall make the inspections set forth in Sections C104.3.1 through C104.3.6.

C104.3.1 Footing and foundation inspection. Inspections associated with footings and foundations shall be made before backfilling and shall verify compliance with the code as to R-value, location, thickness, depth of burial and protection of insulation as required by the code and *approved plans and specifications* for:

1. Basement or crawl space walls having insulation applied exterior to or integral with the walls
2. Slabs on grade
3. Buried duct systems associated with HVAC systems
4. Piping systems associated with HVAC or service hot water systems
5. Freeze protection/snow melt systems.

C104.3.2 Framing and rough-in inspection. Inspections at framing and rough-in shall be made before application of interior finish and shall verify compliance with the code as to types of insulation and corresponding R-values and their correct location and proper installation, fenestration thermal properties (U-factor, SHGC and VT) and proper installation of fenestration, and air leakage controls as required by the code and *approved plans and specifications* for:

1. Opaque walls and wall assemblies
2. Floors and floor assemblies
3. Roof/ceilings and roof/ceiling assemblies
4. Fenestration
5. Required vestibules

C104.3.3 Plumbing rough-in inspection. Inspections at plumbing rough-in shall verify compliance as required by the code and *approved plans and specifications* for:

1. The R-value, location, thickness, depth of burial and protection of insulation on hot water piping
2. The existence of required temperature controls on potable hot water systems
3. The installation of automatic time switches on circulating hot water systems or heat trace
4. The installation of heat traps on hot water storage tanks associated with non-circulating systems.

C104.3.4 Mechanical rough-in inspection. Inspections at mechanical rough-in shall verify compliance as required by the code and *approved plans and specifications* for:

1. Installed HVAC equipment type, efficiency and size
2. Installation of gravity and motorized dampers where required and leakage rates of the dampers
3. Installation of required demand control ventilation
4. Required insulation type, R-value, thickness and proper installation of insulation for ducts, plenums and piping associated with the HVAC system
5. Sealing and any required leakage testing of ducts and plenums
6. Installation of required economizers and associated controls
7. Installation of required temperature, humidity and zone controls
8. Required sizing of HVAC system fans and motors
9. Required energy recovery capability
10. Existence of a means to balance HVAC systems
11. Installation of required controls for HVAC and hydronic systems
12. Required limitations on hot gas bypass for cooling systems
13. Installation of radiant heating systems where not allowed

C104.3.5 Electrical rough-in inspection. Inspections at electrical rough-in shall verify compliance as required by the code and *approved plans and specifications* for:

1. Proper installation of all required lighting controls
2. Installation of all lighting system components (fixtures and lamps)
3. Installation of individual electric meters for each dwelling unit in multi-family residential buildings.

C104.3.6 Final inspection. The *building* shall have a final inspection and shall not be occupied until *approved*. The final inspection shall include verification of the installation of all required *building* controls and their proper operation as well as documentation verifying the activities associated with required *building commissioning* have been conducted and the findings of non-compliance corrected. *Buildings*, or portions thereof, shall not be considered for a final inspection until the *code official* has received a letter of transmittal from the building owner acknowledging that the building owner has received the Preliminary Commissioning Report as required in Section C408.2.4.

~~**C104.5 Approved inspection agencies.** The *code official* is authorized to accept reports of *approved* inspection agencies, provided such agencies satisfy the requirements as to qualifications and reliability.~~

C104.5 Approved Inspection agencies. The *code official* is authorized to accept reports of third party inspection agencies not affiliated with the *building* design or construction, provided such agencies are *approved* as to qualifications and reliability relevant to the building components and systems they are inspecting.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R103.3 Examination of documents. The *code official* shall examine or cause to be examined the accompanying construction documents and shall ascertain whether the construction indicated and described is in accordance with the requirements of this code and other pertinent laws or ordinances. *In causing the documents to be examined to verify compliance with this code, the *code official* shall be permitted to utilize a registered design professional or other *approved* entity not affiliated with the *building* design or construction in conducting the review of the plans and specifications for compliance with the code.*

~~**R104.1 General.** Construction or work for which a permit is required shall be subject to inspection by the *code official*.~~

R104.1 General. Construction or work for which a permit is required shall be subject to inspection by the *code official* or his designated agent, and such construction or work shall remain accessible and exposed for inspection purposes until *approved*. *Approved* as a result of an inspection shall not be construed to be an approval of a violation of the provisions of this code or of other ordinances of the jurisdiction. Inspections presuming to give authority to violate or cancel the provisions of this code or of other ordinances of the jurisdiction shall not be valid. It shall be the duty of the permit applicant to cause the work to remain accessible and exposed for inspection purposes. Neither the *code official* nor the jurisdiction shall be liable for expense entailed in the removal or replacement of any material, product, system or building component required to allow inspection to validate compliance with this code.

~~**R104.2 Required approvals.** Work shall not be done beyond the point indicated in each successive inspection without first obtaining the approval of the *code official*. The *code official*, upon notification, shall make the requested inspections and shall either indicate the portion of the construction that is satisfactory as completed, or notify the permit holder or his or her agent wherein the same fails to comply with this code. Any portions that do not comply shall be corrected and such portion shall not be covered or concealed until authorized by the *code official*.~~

R104.2 Preliminary Inspection. Before issuing a permit, the *code official* is authorized to examine or cause to be examined the *building site*, and in the case of work to or on an existing building the *building*, for which an application has been filed.

~~**R104.3 Final inspection.** The building shall have a final inspection and not be occupied until *approved*.~~

R104.3 Required inspections. The *code official* or his designated agent, upon notification, shall make the inspections set forth in Sections R104.3.1 through R104.3.6.

R104.3.1 Footing and foundation inspection. Inspections associated with footings and foundations shall be made before backfilling and shall verify compliance with the code as to R-value, location, thickness, depth of burial and protection of insulation as required by the code and *approved* plans and specifications for:

1. Basement or crawl space walls having insulation applied exterior to or integral with the walls
2. Slabs on grade
3. Buried duct systems associated with HVAC systems
4. Piping systems associated with HVAC or service hot water systems
5. Freeze protection/snow melt systems .

R104.3.2 Framing and rough-in inspection. Inspections at framing and rough-in shall be made before application of interior finish and shall verify compliance with the code as to types of insulation and corresponding R-values and their correct location and proper installation, fenestration thermal properties (U-factor and SHGC) and proper installation of fenestration, and air leakage controls as required by the code and approved plans and specifications for:

1. Opaque walls and wall assemblies
2. Floors and floor assemblies
3. Roof/ceilings and roof/ceiling assemblies
4. Fenestration

R104.3.3 Plumbing rough-in inspection. Inspections at plumbing rough-in shall verify compliance as required by the code and *approved* plans and specifications for:

1. The R-value, location, thickness, depth of burial and protection of insulation on hot water piping
2. The installation of automatic or manual switches on circulating hot water systems

R104.3.4 Mechanical rough-in inspection. Inspections at mechanical rough-in shall verify compliance as required by the code and *approved* plans and specifications for:

1. Installed HVAC equipment type, efficiency and size
2. Installation of require programmable thermostats
3. Required heat pump supplementary heat controls
4. Installation of automatic or gravity dampers on outdoor air intakes and exhausts
5. Required insulation type, R-value, thickness and proper installation of insulation for ducts, air handlers and piping associated with the HVAC system
6. Sealing and any required leakage testing of ducts and plenums
7. Required sealing of and manufacturer's designation for air handlers
8. Required whole house ventilation and minimum fan efficacy

Exception: Systems serving multiple dwelling units shall be inspected in accordance with Section C104.3.4.

R104.3.6 Final inspection. The *building* shall have a final inspection and shall not be occupied until *approved*. The final inspection shall include verification of the installation of all required *building* systems, equipment and controls and their proper operation and the required number of high-efficacy lamps and fixtures.

R104.5 Approved inspection agencies. ~~The code official is authorized to accept reports of approved inspection agencies, provided such agencies satisfy the requirements as to qualifications and reliability.~~

R104.5 Approved Inspection agencies. The *code official* is authorized to accept reports of third party inspection agencies not affiliated with the *building* design or construction, provided such agencies are

approved as to qualifications and reliability relevant to the building components and systems they are inspecting.

Reason: This proposal improves and enhances the details governing inspections of construction and examination of documents associated with compliance verification.

The current provisions of Sections R 103.1 and C103.3 require the code official to examine the construction documents to verify compliance with the code. Those provisions also allow the code official to delegate that authority to another party (e.g., cause to be examined) but are not specific as to the qualifications of that party. Depending on the type and size of a residential or commercial building, the plans and specifications can be very complex and an appropriate level of review challenging for a jurisdiction that may not see many large commercial projects in a given year and/or have a unique or large residential building. Currently there is no specificity in the code about the qualifications of any third party reviewer, so the permittee could argue against the imposition of a registered design professional requirement by the jurisdiction. The proposed language makes it clear that, should the code official decide to delegate their authority to another party, such third party must be approved (a defined term in the code) by the code official; something very important because that party is acting on behalf of the code official.

The current provisions of Sections R104 and C104 covering inspections are not as specific as they could be with respect to energy efficiency. The proposed revisions to Sections R104 and C104, which are consistent with Section 109 of the International Existing Building Code (IEBC), provide the required detail to better ensure compliance with the code and through compliance delivery of the energy efficiency potential associated with the provisions of the code. It is important to point out that the provisions currently in Sections R104 and C104 are not being eliminated but instead enhanced.

- Sections R104.1 and C104.1 in the current code remain the same but have been enhanced to provide the additional detail provided in Section 109.1 of the IEBC, which is equally relevant to the IECC. In addition an allowance for the code official to have a designated agent conduct inspections has been added to recognize the ability for the code official should they so choose have a designated entity act on their behalf in conducting required inspections.
- New Sections R104.2 and C104.2 are added to the code and covers the issue of preliminary approvals. This provision appears for instance in the IEBC (109.2) and appears equally relevant to the IECC Residential and the IECC Commercial provisions.
- Sections R104.3 and C104.3 currently address a final inspection. There are, however, no provisions in the IECC that address the inspections that are necessary during the course of construction to ensure compliance with the IECC. The proposed Sections R104.3 and C104.3 include a provision for a final inspection but, as is the case in other ICC codes such as the IEBC (109), includes a number of other code-relevant inspections detailing by name what is to be assessed for compliance during key stages of construction. Having this direction, and notification to designers, builders and contractors via publication in the code, is intended to foster increased compliance with the IECC. Note also, as covered in the revisions to Sections R104.1 and C104.1, the code official can also have a designated agent conduct these inspections.
- Sections R104.5 and C104.5 as currently worded are circular in nature. They provide the code official certain authorization to accept reports from approved inspection agencies. The definition of the term approved is such that the end result of this criterion is that the code official is authorizing something based on his authority to authorize it. The proposed revisions provide the additional detail needed as to how approval of such third parties is to be addressed and the general criteria upon which they would be evaluated for acceptability.

Cost Impact: The code change proposal does not increase the cost of construction.

CE38-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C103.3-EC-WILLIAMS.doc

CE39 – 13

C104.1.1 (NEW), C104.2.1 (NEW), C104.2.2 (NEW), C104.3 (NEW), C104.3.1 (NEW), C104.4, C104.5, C104.6, C104.7, C104.8, C104.8.1, R104.1.1 (NEW), R104.2.1 (NEW), R104.2.2 (NEW), R104.3 (NEW), R104.3.1 (NEW), R104.4, R104.5, R104.6, R104.7, R104.8, R104.8.1

Proponent: Deborah Taylor, RA, LEED AP, Deborah F. Taylor Consulting, LLC, representing self (taylor@dftconsultingny.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C104.1.1 Approved inspection agencies. The *code official* is authorized to accept reports of *approved* inspection agencies, including *approved* commissioning agencies, provided such agencies satisfy the requirements as to qualifications and reliability.

C104.2.1 Inspection requests. It shall be the duty of the holder of the permit or the holder's duly authorized agent to notify the *code official* when work is ready for inspection. It shall be the duty of the permit holder to provide access to and means for inspections of such work that are required by this code.

C104.2.2 Reinspection and testing. Where any work or installation does not pass an initial test or inspection, the necessary corrections shall be made so as to achieve compliance with this code. The work or installation shall then be resubmitted to the *code official* for inspection and testing.

C104.3 C104.2.3 Final inspection. The building shall have a final inspection and not be occupied until approved.

C104.3 Notice of approval. After the prescribed tests and inspections, including but not limited to applicable commissioning tests and inspections as prescribed in Section C408, indicate that work complies in all respects with this code, and required documentation, including but not limited to the final commissioning report, has been accepted by the *code official*, a notice of approval shall be issued by the *code official*.

C104.3.1 Revocation. The *code official* is authorized to suspend or revoke in writing a notice of approval issued under the provisions of this code wherever the certificate has been issued in error, or on the basis of incorrect information supplied, or where it is determined that the building or structure, premise, or portion thereof is in violation of any ordinance or regulation or any of the provisions of this code.

C104.4 C104.3.2 Reinspection. A building shall be reinspected when determined necessary by the *code official*.

C104.5 Approved inspection agencies. The *code official* is authorized to accept reports of *approved* inspection agencies, provided such agencies satisfy the requirements as to qualifications and reliability.

C104.6 Inspection requests. It shall be the duty of the holder of the permit or their duly authorized agent to notify the *code official* when work is ready for inspection. It shall be the duty of the permit holder to provide access to and means for inspections of such work that are required by this code.

~~C104.7 Reinspection and testing.~~ Where any work or installation does not pass an initial test or inspection, the necessary corrections shall be made so as to achieve compliance with this code. The work or installation shall then be resubmitted to the *code official* for inspection and testing.

~~C104.8 Approval.~~ After the prescribed tests and inspections indicate that the work complies in all respects with this code, a notice of approval shall be issued by the *code official*.

~~C104.8.1 Revocation.~~ The *code official* is authorized to, in writing, suspend or revoke a notice of approval issued under the provisions of this code wherever the certificate is issued in error, or on the basis of incorrect information supplied, or where it is determined that the building or structure, premise, or portion thereof is in violation of any ordinance or regulation or any of the provisions of this code.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R104.1.1 Approved inspection agencies. The *code official* is authorized to accept reports of *approved* inspection agencies, including *approved* commissioning agencies, provided such agencies satisfy the requirements as to qualifications and reliability.

R104.2.1 Inspection requests. It shall be the duty of the holder of the permit or the holder's duly authorized agent to notify the *code official* when work is ready for inspection. It shall be the duty of the permit holder to provide access to and means for inspections of such work that are required by this code.

R104.2.2 Reinspection and testing. Where any work or installation does not pass an initial test or inspection, the necessary corrections shall be made so as to achieve compliance with this code. The work or installation shall then be resubmitted to the *code official* for inspection and testing.

R104.3 R104.2.3 Final inspection. The building shall have a final inspection and not be occupied until approved.

R104.3 Notice of approval. After the prescribed tests and inspections, including but not limited to applicable commissioning tests and inspections as prescribed in Section C408, indicate that work complies in all respects with this code, and required documentation, including but not limited to the final commissioning report, has been accepted by the *code official*, a notice of approval shall be issued by the *code official*.

R104.3.1 Revocation. The *code official* is authorized to suspend or revoke in writing a notice of approval issued under the provisions of this code wherever the certificate has been issued in error, or on the basis of incorrect information supplied, or where it is determined that the building or structure, premise, or portion thereof is in violation of any ordinance or regulation or any of the provisions of this code.

R104.4 R104.3.2 Reinspection. A building shall be reinspected when determined necessary by the *code official*.

~~R104.5 Approved inspection agencies.~~ The *code official* is authorized to accept reports of *approved* inspection agencies, provided such agencies satisfy the requirements as to qualifications and reliability.

~~R104.6 Inspection requests.~~ It shall be the duty of the holder of the permit or their duly authorized agent to notify the *code official* when work is ready for inspection. It shall be the duty of the permit holder to provide access to and means for inspections of such work that are required by this code.

~~R104.7 Reinspection and testing.~~ Where any work or installation does not pass an initial test or inspection, the necessary corrections shall be made so as to achieve compliance with this code. The work or installation shall then be resubmitted to the *code official* for inspection and testing.

~~**R104.8 Approval.** After the prescribed tests and inspections indicate that the work complies in all respects with this code, a notice of approval shall be issued by the code official.~~

~~**R104.8.1 Revocation.** The code official is authorized to, in writing, suspend or revoke a notice of approval issued under the provisions of this code wherever the certificate is issued in error, or on the basis of incorrect information supplied, or where it is determined that the building or structure, premise, or portion thereof is in violation of any ordinance or regulation or any of the provisions of this code.~~

Reason: The proposal better organizes this section and eliminates redundancy.

Cost Impact: The code change proposal will not increase the cost of construction.

CE39-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C104.1.1 (NEW)-EC-TAYLOR.doc

CE40 – 13

C104.3.1 (NEW), R104.3.1 (NEW)

Proponent: Hope Medina, Cherry Hills Village, representing self (hmedina@coloradocode.net)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Add new text as follows:

C104.3.1 Energy Inspections. Requirements of this code shall pass inspection prior to issuance of a certificate of occupancy for the building. Inspections shall be performed by the code official or a third party approved by the code official.

PART II – IECC-RESIDENTIAL PROVISIONS

Add new text as follows:

R104.3.1 Energy Inspections. Requirements of this code shall pass inspection prior to issuance of a certificate of occupancy for the building. Inspections shall be performed by the code official or a third party approved by the code official.

Reason: We are requiring for more energy efficient buildings to be built, but we do not require for any type of energy inspections to be performed. With the Federal government's energy mandates that our current building practices must increase energy conservation we are needing alter our current point of view. Section 110.3 of the IBC and section 109 of the IRC state that certain inspections are required to be done prior to obtaining a Certificate of Occupancy. Currently there are no energy code requirements listed that must be verified, but they are tied to many financial requirements, utility incentives, and local, state, and federal tax credits or incentives. There becomes a time when we can no longer over look this omission, and jump into the fire to start requiring that energy inspections be performed.

An example of a current issue is as follows. A construction services company is designing and constructing a green community affordable senior living facilities as a 2 phase project. The jurisdiction it was being built in does not perform plan reviews or inspections under the IECC. The two buildings were designed under the 2006 International Codes. With current lending requirements they were not able to obtain financing for the entire project under one loan. The project was split into two phases with two different financial loans procured. When submitting the second phase for finance they were informed that the money loaned is requiring for the building to be energy star certified. Due to the jurisdiction not performing energy plan reviews or inspections it may cost the builder it's financing or increase their budget to become compliant.

Cost Impact: This code change will not increase the cost of construction.

CE40-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C109.1.5-EC-MEDINA.doc

CE41 – 13

C104.5, C104.5.1 (NEW), C202 (NEW), R104.5, R104.5.1 (NEW), R202 (NEW) (IRC N1101.9 (NEW))

Proponent: Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; Bill Prindle, Energy Efficient Codes Coalition; and Don Vigneau, Northeast Energy Efficiency Partnerships

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C104.5 Approved inspection agencies. ~~The code official is authorized to accept reports of approved inspection agencies, provided such agencies satisfy the requirements as to qualifications and reliability.~~ or other authority having jurisdiction shall be permitted to designate an *approved agency* to determine compliance with any, some or all requirements of this code. Such *approved agency* shall:

1. Administer all necessary tests, review all relevant construction documents, and conduct all required inspections related to any code requirement where such agency is providing certification of compliance.
2. Produce a written report addressing all tests, inspections, review and analysis conducted and certifying compliance with such specific requirements of this code.

C104.5.1 Standard for approved agencies. An *approved agency* shall be *approved* after the *code official* or other authority having jurisdiction has determined that the agency meets the applicable requirements. An *approved agency* shall provide all of the information necessary to make such a determination. An *approved agency* shall:

1. Be objective, competent and independent from all interested parties, including all contractors responsible for the work being inspected, and disclose possible conflicts of interest so that objectivity can be confirmed.
2. Have adequate equipment to perform any required test or inspections.
3. Employ experienced personnel educated and qualified to conduct the necessary review, tests, inspections and other actions to determine compliance.

Add new definition as follows:

SECTION C202 GENERAL DEFINITIONS

APPROVED AGENCY. An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been *approved*.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R104.5 Approved inspection agencies. ~~The code official is authorized to accept reports of approved inspection agencies, provided such agencies satisfy the requirements as to qualifications and reliability.~~

or other authority having jurisdiction shall be permitted to designate an *approved agency* to determine compliance with any, some or all requirements of this code. Such *approved agency* shall:

1. Administer all necessary tests, review all relevant construction documents, and conduct all required inspections related to any code requirement where such agency is providing certification of compliance.
2. Produce a written report addressing all tests, inspections, review and analysis conducted and certifying compliance with such specific requirements of this code.

R104.5.1 Standard for approved agencies. An *approved agency* shall be *approved* after the *code official* or other authority having jurisdiction has determined that the agency meets the applicable requirements. An *approved agency* shall provide all of the information necessary to make such a determination. An *approved agency* shall:

1. Be objective, competent and independent from all interested parties, including all contractors responsible for the work being inspected, and disclose possible conflicts of interest so that objectivity can be confirmed.
2. Have adequate equipment to perform any required test or inspections.
3. Employ experienced personnel educated and qualified to conduct the necessary review, tests, inspections and other actions to determine compliance.

Add new definition as follows:

SECTION R202 (N1101.9) GENERAL DEFINITIONS

APPROVED AGENCY. An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been *approved*.

Reason: The purpose of the proposed code change is to establish new requirements for *approved agencies* and to otherwise clarify the code -- this proposal will improve the potential for approved agencies to assist in code compliance and enforcement efforts. The proposal imports the definition of "approved agency" from the 2012 *IBC* into the *IECC*, clarifies the role of approved agencies in verifying aspects of energy code compliance and establishes standards for such agencies to be approved. The *IECC* currently does not give enough direction about the role of such approved agencies or the minimum requirements for these entities. This proposal improves the code by outlining the requirements for approved agencies, including:

- Third-party administration of the verification activities
- Quality and reliability of the approved agency
- Written reports of code compliance

These requirements are all common-sense and already may be employed by jurisdictions that delegate testing or inspection authority to third parties. We believe that it makes sense to include these requirements in the *IECC* so that jurisdictions can apply more uniform criteria to approved agencies, and so that third parties can better tailor their compliance and enforcement programs to meet the expectations of the state or locality.

Cost Impact: The code change proposal will not increase the cost of construction.

Note: The term 'approved agency' is defined in other International Codes including *IBC*, *IRC*, *IMC*, *IPC* and *IgCC*. The definition proposed here is the same as that found in these other code.

CE41-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C104.5-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE-VIGNEAU.doc

CE42 – 13

C106.1.2, C106.2

Proponent: Shirley Ellis, Energy Systems Laboratory, Texas A&M Engineering Experiment Station, Texas A&M University System (shirleyellis@tamu.edu)

Revise as follows:

C106.1.2 Provisions in referenced codes and standards. Where the extent of the reference to a referenced code or standard includes subject matter that is within the scope of this code, the provisions of this code, as applicable, shall take precedence over the provisions in the referenced code or standard.

Exception. Where using ANSI/ASHRAE/IESNA 90.1 as a compliance path as allowed in Section C401.2 Item 1 or Section C401.2.1 Item 2.

~~**C106.2 Conflicting requirements.** Where the provisions of this code and the referenced standards conflict, the provisions of this code shall take precedence.~~

Reason: Adding the exception to C106.1.2 clarifies the intent in Section C401.2 that commercial buildings shall comply with either ANSI/ASHRAE/IESNA 90.1 in its entirety or the requirements of the IECC Sections in its entirety.

Section C106.2 is unnecessary as it simply restates the requirements in C106.1.1 and C106.1.2 and adds confusion in which section to cite.

Cost Impact: The code change proposal will not increase the cost of construction.

CE42-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C106.1.2-EC-ELLIS.doc

CE43 – 13

C106.2, R106.2

Proponent: Deborah Taylor, RA, LEED AP, Deborah F. Taylor Consulting, LLC, representing self
(taylor@dftconsultingny.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Delete without substitution as follows:

~~**C106.2 Conflicting requirements.** Where the provisions of this code and the referenced standards conflict, the provisions of this code shall take precedence.~~

PART II – IECC-RESIDENTIAL PROVISIONS

Delete without substitution as follows:

~~**R106.2 Conflicting requirements.** Where the provisions of this code and the referenced standards conflict, the provisions of this code shall take precedence.~~

Reason: Section C106.2 is redundant of Section C106.1.1.

Cost Impact: The code change proposal will not increase the cost of construction.

CE43-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C106.2-EC-TAYLOR.doc

CE44 – 13

C108.4, R108.4

Proponent: Shirley Ellis, Energy Systems Laboratory, Texas A&M Engineering Experiment Station, Texas A&M University System (shirleyellis@tamu.edu)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C108.4 Failure to comply. Any person who shall continue any work after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be liable to a fine ~~of not less than [AMOUNT] dollars or more than [AMOUNT] dollars~~ as set by the applicable governing authority.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R108.4 Failure to comply. Any person who shall continue any work after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be liable to a fine ~~of not less than [AMOUNT] dollars or more than [AMOUNT] dollars~~ as set by the applicable governing authority.

Reason: Codes are adopted in various ways by varying entities, federal agencies, states, counties, or municipalities. Often one level of government will adopt the code, while the enforcement is at a different level. Some of the adopting entities do not have the means to insert a specific fine amount, in some instances the enforcement may be by several entities that have fine amounts that vary and in some cases the fine amount may unknown to the adopting agency.

This proposal will also eliminate the need to amend the code ordinance when the fine structure is revised. This change allows the code to be adopted without relying on the amount to be determined at the time of adoption.

Cost Impact: The code change proposal will not increase the cost of construction.

CE44-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C108.4-EC-ELLIS.doc

CE45 – 13

C202

Proponent: Shaunna Mozingo, City of Cherry Hills Village, representing Colorado Chapter of ICC, Inc (smozingo@coloradocode.net)

Revise as follows:

SECTION C202 GENERAL DEFINITIONS

ABOVE-GRADE WALL. A wall more than ~~50~~ 15 percent above grade ~~and enclosing conditioned space~~. This includes between-floor spandrels, peripheral edges of floors, roof and basement knee walls, dormer walls, gable end walls, walls enclosing a mansard roof and skylight shafts.

BASEMENT WALL. A wall ~~50~~ 85 percent or more below grade ~~and enclosing conditioned space~~.

Reason: These original definitions actually belonged only in the residential portion of the Energy Code. Sections C402.2.2.1 and 402.2.2.2 clarify that for a commercial building an above grade wall is 15% or more above grade and below grade walls are 85% or more below grade. There is a big difference between the 50% and the 15% for above grade walls as well as the 50% and the 85% for below grade walls. It shouldn't matter if the space is conditioned or not, the requirements will apply differently to those walls depending on the conditioning but the definition shouldn't call out an above or below grade wall based on whether it is conditioned or not. The existing definitions came over from the residential code and were always in the definition section of the IECC, making it seem like they applied to both residential and commercial but in fact the afore mentioned commercial wall clarifications have always been in Chapter 5 of the IECC, making the definition in Chapter 2 a matter of confusion for the code user.

When the IECC was split up and new chapters 1-3 were created for both the residential and the commercial portions of the code some things were brought over into the commercial chapters that belonged only to residential and vice versa. It becomes necessary now to clean up these very separate and distinct chapters so that those who may be new to the energy code and were not aware of the previous combined versions of chapters 1-3 will not be confused by things that were brought forward by mistake.

Cost Impact: This code change proposal will not increase the cost of construction.

CE45-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C202-ABOVE GRADE WALL-EC-MOZINGO.doc

CE46 – 13

C202, R202 (IRC N1101.9)

Proponent: Robby Schwarz, EnergyLogic, Inc., (robby@nrglogic.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

Part I – IECC - COMMERCIAL

Revise definition as follows:

SECTION C202 GENERAL DEFINITIONS

AIR BARRIER. Material(s) assembled and joined together to provide a barrier to air leakage through the building envelope between conditioned space and unconditioned space, including necessary sealing to block air flow at edges and seams and adequate support to resist positive and negative pressures without displacement or damage. An air barrier may be a single material or a combination of materials that are in continuous alignment throughout the 3D structure of the air barrier and the thermal barrier of the building. The air barrier system is constructed of materials that are impermeable to the movement of air and are strong and durable to perform throughout the serviceable life of the building. An interior and exterior continuous air barrier system is utilized and installed in alignment with all fibrous cavity insulation systems. i.e. six sided encapsulation is walls and floor systems.

Part II – IECC - RESIDENTIAL

Revise definition as follows:

SECTION R202 (N1101.9) GENERAL DEFINITIONS

AIR BARRIER. Material(s) assembled and joined together to provide a barrier to air leakage through the building envelope between conditioned space and unconditioned space, including necessary sealing to block air flow at edges and seams and adequate support to resist positive and negative pressures without displacement or damage. An air barrier may be a single material or a combination of materials that are in continuous alignment throughout the 3D structure of the air barrier and the thermal barrier of the building. The air barrier system is constructed of materials that are impermeable to the movement of air and are strong and durable to perform throughout the serviceable life of the building. An interior and exterior continuous air barrier system is utilized and installed in alignment with all fibrous cavity insulation systems. i.e. six sided encapsulation is walls and floor systems.

Reason: The air barrier system is a crucial element of the buildings structure in creation of efficient homes. If they it is not clearly defined then identification, implementation, and enforcement of the energy code will continue to be ambiguous. The language here is intended clarify what is meant by the term so that implementation and enforcement of the code is less ambiguous.

Cost Impact: This code change proposal will not increase the cost of construction.

CE46-13

Part I – IECC – COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

Part II – IECC – RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
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Assembly:

ASF

AMF

DF

C202-AIR BARRIER-EC-SCHWARZ.doc

CE47 – 13

C202, R202 (IRC N1101.9), IRC 202

Proponent: Ellen Eggerton, representing Virginia Building and Code Officials Association

THIS IS A 3 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. PART III WILL BE HEARD BY THE IRC BUILDING CODE DEVELOPMENT COMMITTEE.

PART I - IECC – COMMERCIAL PROVISIONS

Revise definition as follows:

SECTION C202 GENERAL DEFINITIONS

BUILDING THERMAL ENVELOPE. The basement walls, exterior walls, floor, roof, and any other building elements that enclose *conditioned space* or provide a boundary between *conditioned space* and exempt or unconditioned space. An unconditioned space shall include those buildings or spaces, adjacent to a *conditioned space*, that are not heated or cooled due to periods of non-occupancy, such as an adjacent townhouse.

PART II - IECC – RESIDENTIAL PROVISIONS

Revise definition as follows:

SECTION R202 GENERAL DEFINITIONS

BUILDING THERMAL ENVELOPE. The basement walls, exterior walls, floor, roof, and any other building elements that enclose *conditioned space* or provide a boundary between *conditioned space* and exempt or unconditioned space. An unconditioned space shall include those buildings or spaces, adjacent to a *conditioned space*, that are not heated or cooled due to periods of non-occupancy, such as an adjacent townhouse.

PART III – IRC

Revise definition as follows:

SECTION 202 GENERAL DEFINITIONS

BUILDING THERMAL ENVELOPE. The basement walls, exterior walls, floor, roof, and any other building elements that enclose *conditioned space* or provide a boundary between *conditioned space* and exempt or unconditioned space. An unconditioned space shall include those buildings or spaces, adjacent to a *conditioned space*, that are not heated or cooled due to periods of non-occupancy, such as an adjacent townhouse.

Reason: The proposed change is intended to ensure that the thermal envelope boundary will include the separation between a conditioned space and those spaces which have a reasonable expectation of being unoccupied (and therefore unconditioned) for a significant albeit temporary period of time. Typical residential building example is an occupied townhouse that is adjacent to an unoccupied townhouse. If the common wall between the townhouses is uninsulated, there will be unnecessary heat transfer across that boundary. The proposal will prevent this situation from developing.

Cost Impact: There may be cost impacts of this proposal, but they are difficult to gage. Townhouses required "rated" separations which may include insulating materials that could also satisfy the wall R-value requirement. Common townhouse construction practice is to build a stud wall on the inside of the rated wall, which could be filled with materials with the required R-value.

CE47-13

PART I – IECC – COMMERICAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC – RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART III – IRC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C202-BUILDING THERMAL ENVELOPE-EC-EGGERTON.doc

CE48 – 13

C202, R202 (IRC N1101.9), IRC R202

Proponent: Robby Schwarz, EnergyLogic, Inc., (robby@nrglogic.com)

THIS IS A 3 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. PART III WILL BE HEARD BY THE IRC BUILDING CODE DEVELOPMENT COMMITTEE.

PART I - IECC – COMMERCIAL PROVISIONS

Revise definition as follows:

SECTION C202 GENERAL DEFINITIONS

BUILDING THERMAL ENVELOPE. The continuous alignment of the air barrier and thermal barrier in basement walls, exterior walls, floor, roof, and any other building elements that enclose *conditioned space* or provide a boundary between *conditioned space* and exempt or unconditioned space.

PART II - IECC – RESIDENTIAL PROVISIONS

SECTION R202 (N1101.9) GENERAL DEFINITIONS

Revise definition as follows:

BUILDING THERMAL ENVELOPE. The continuous alignment of the air barrier and thermal barrier in basement walls, exterior walls, floor, roof, and any other building elements that enclose *conditioned space* or provide a boundary between *conditioned space* and exempt or unconditioned space.

PART III – IRC

Revise definition as follows:

SECTION 202 GENERAL DEFINITIONS

BUILDING THERMAL ENVELOPE. The continuous alignment of the air barrier and thermal barrier in basement walls, exterior walls, floor, roof, and any other building elements that enclose *conditioned space* or provide a boundary between *conditioned space* and exempt or unconditioned space.

Reason: The thermal envelope is a crucial elements of the buildings structure in creation of efficient homes. If it not clearly defined then identification of the thermal boundary and implementation and enforcement of the energy code will continue to be ambiguous. The language here is intended to clarify what is meant by the term so that implementation and enforcement of the code is less ambiguous.

Cost Impact: This code change proposal will not increase the cost of construction.

CE48-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing: Committee:	AS	AM	D
Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART III – IRC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R202-BUILDING THERMAL ENVELOPE-EC-SCHWARZ.doc

CE49-13

C202 (NEW), R202 (NEW) (IRC N1101.9 (NEW)), IPC 202 (NEW)

THIS IS A 3 PART CODE CHANGE PROPOSAL. PARTS I AND II WILL BE HEARD BY THE IECC COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS 2 SEPARATE CODE CHANGES. PART III WILL BE HEARD BY THE IECC RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Greg Towsley, LEED AP BD+C Grundfos representing Grundfos (gtowsley@grundfos.com)

PART I – IECC-COMMERCIAL PROVISIONS

Add new definition as follows:

SECTION C202 GENERAL DEFINITIONS

CIRCULATING HOT WATER SYSTEM. A specifically designed water distribution system where one or more pumps are operated in the service hot water piping to circulate heated water from the water-heating equipment to fixtures and back to the water-heating equipment.

PART II – IPC

Add new definition as follows:

SECTION 202 GENERAL DEFINITIONS

CIRCULATING HOT WATER SYSTEM. A specifically designed water distribution system where one or more pumps are operated in the service hot water piping to circulate heated water from the water-heating equipment to fixtures and back to the water-heating equipment.

PART III – IECC-RESIDENTIAL PROVISIONS

Add new definition as follows:

SECTION R202 (N1101.9) GENERAL DEFINITIONS

CIRCULATING HOT WATER SYSTEM. A specifically designed water distribution system where one or more pumps are operated in the service hot water piping to circulate heated water from the water-heating equipment to fixtures and back to the water-heating equipment.

Reason: A definition of a “circulating hot water system” does not exist in the code, yet it is referenced in the IRC and other ICC codes. This definition brings clarity to how a “circulating hot water system” should be designed and operated. In the codes and sections where “circulating hot water system” is used, this definition would also reduce the probability of confusion between hot water systems used for space heating or tempered water. Currently, the only place that the term CIRCULATING HOT WATER SYSTEM shows up in the code is IECC Section C404.6, IPC [E] 607.2.1 and IECC Section R403.4.1 (IRC N1103.4.1). Other proposals by other proponents will most likely be adding language that uses this term so it is important to have the term defined.

As referenced in CHAPTER 50 - SERVICE WATER HEATING of *ASHRAE Handbook-HVAC Applications* (2011, American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.), “Some recirculation-loop systems...are equipped with circulating pumps to force water through the piping and back to the water heater, thus keeping water in the piping hot.” Adding this definition in the code will be consistent with industry’s understanding.

Cost Impact: The code change proposal will not increase the cost of construction.

CE49-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing: Committee: AS AM D

Assembly: ASF AMF DF

PART II– IPC

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

PART III – IECC-RESIDENTIAL PROVISIONS

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

C202-CIRCULATING HOT WATER SYSTEM (NEW)-EC-TOWLSEY.doc

CE50 – 13

C202 (NEW), R202 (NEW) (IRC N1101.9 (NEW)), IRC 202 (NEW)

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

THIS IS A 3 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE, PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART III WILL BE HEARD BY THE IRC BUILDING CODE DEVELOPMENT COMMITTEE.

PART I – IECC – COMMERCIAL PROVISIONS

Add new definition as follows:

SECTION C202 GENERAL DEFINITIONS

CLIMATE ZONE. A geographical region that has-been assigned climatic criteria as specified in this code.

PART II – IECC – RESIDENTIAL PROVISIONS

Add new definition as follows:

SECTION R202 (N1101.9) GENERAL DEFINITIONS

CLIMATE ZONE. A geographical region that has-been assigned climatic criteria as specified in this code.

PART III – IRC

Add new definition as follows:

SECTION 202 GENERAL DEFINITIONS

CLIMATE ZONE. A geographical region that has-been assigned climatic criteria as specified in this code.

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

Reasons for this specific proposal:

There are increasing numbers of proposals in which the term 'climate zone' is used in the proposed code text. This has primarily occurred in the *International Building Code* and the *International Green Construction Code*. In 2012 at least 8 proposals heard in Dallas included the term. The Code Development Committees generally tried to make sure that each approved action included that it was Climate Zones as established in the IECC.

The SEHPCAC submitted public comments to G147-12 and G149-12 to remove individual references in the text of the IBC stating that Climate Zones 'as established in the IECC' and proposed the inclusion in Chapter 2 of the IBC the following definition of Climate Zone.

CLIMATE ZONE. A geographic region that have been assigned climatic criteria as specified in Chapters 3CE and 3RE of the *International Energy Conservation Code*.

The public comments were approved by the membership and the definition is established in the IBC.

The proposed definition for the IECC is a further simplification of the version in the IBC as the extended reference isn't needed. The SEHPCAC reviewed the other codes which are part of Group B. Only the International Residential Code uses the term Climate Zone. This is addressed in Part III of this proposal. The intent of the public comments to the IBC was to simplify the reference each time Climate Zone is used to those zones 'defined' in the IECC. The issue is that 'Climate Zones' are established in the IECC, but there is no definition.

In Cycle C, the SEHPCAC will submit a code change to the IgCC to add a definition of Climate Zone. This will allow all future references to Climate Zone to be simple and not have to say "as established in the International Energy Conservation Code.

Cost Impact: This code change proposal will not increase the cost of construction.

CE50-13

PART I – IECC – COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC – RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART III – IRC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C202-CLIMATE ZONE-EC-THOMPSON-SEHPCAC.doc

CE51 – 13

C202, R202 (IRC N1101.9)

Proponent: Shaunna Mozingo, City of Cherry Hills Village, representing Colorado Chapter of ICC, Inc (smozingo@coloradocode.net), Brent Ursenbach, Salt Lake County, representing Utah Chapter ICC and Utah Association of Plumbing and Mechanical Officials Chapter ICC (bursenbach@slco.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC – COMMERICAL PROVISIONS

Delete and substitute as follows:

SECTION C202 GENERAL DEFINITIONS

~~**CONDITIONED SPACE.** An area or room within a building being heated or cooled, containing uninsulated ducts, or with a fixed opening directly into an adjacent conditioned space.~~

CONDITIONED SPACE. An area, room or space that is enclosed within the building thermal envelope and that is directly heated or cooled or that is indirectly heated or cooled. Spaces are indirectly heated or cooled where they communicate thru openings with conditioned spaces, where they are separated from conditioned spaces by un-insulated walls, floors or ceilings, or where they contain un-insulated ducts, piping or other sources of heating or cooling.

PART II – IECC RESIDENTIAL PROVISIONS

Delete and substitute as follows:

SECTION R202 (N1101.9) GENERAL DEFINITIONS

~~**CONDITIONED SPACE.** For energy purposes, space within a building that is provided with heating and/or cooling equipment or systems capable of maintaining, through design or heat loss/gain, 50°F (10°C) during the heating season and 85°F (29°C) during the cooling season, or communicates directly with a conditioned space. For mechanical purposes, an area, room or space being heated or cooled by any equipment or appliance.~~

CONDITIONED SPACE. An area, room or space that is enclosed within the building thermal envelope and that is directly heated or cooled or that is indirectly heated or cooled. Spaces are indirectly heated or cooled where they communicate thru openings with conditioned spaces, where they are separated from conditioned spaces by un-insulated walls, floors or ceilings, or where they contain un-insulated ducts, piping or other sources of heating or cooling.

Reason: (Mozingo) Currently the definition for conditioned space differs in each code. The proposed change to the definition would bring the IECC and IRC in line with what was approved in Group A for the 2015 IMC as proposal M2-12. This proposal shows the modifications that were made by the committee and then went on to the consent agenda as there were no public comments received. This proposed change is similar to the definition in ASHRAE 90.1 – 2010.

(Ursenbach) (Part I) Confusion exists between the definitions in the IMC, IRC and IECC. The IECC attempts to define how a space may be indirectly conditioned; however, further clarification is needed. The definition for conditioned space as proposed above is the definition approved in the Group A hearings for the IMC under M2-12. This proposed change is similar to the definition in ASHRAE 90.1 – 2010. **(Part II)** Confusion exists between the definitions in the IMC, IRC and IECC. The IECC attempts to define how a space may be indirectly conditioned; however, further clarification is needed. The definition for conditioned space as proposed above is the definition approved for the IMC in the Group A hearings under M2-12. This proposed change is similar to the definition in ASHRAE 90.1 – 2010.

Cost Impact: This code change proposal will not increase the cost of construction.

CE51-13

PART I – IECC- COMMERICAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC- RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C202-CONDITIONED SPACE-EC-MOZINGO-URSENBACH.doc

CE52 – 13

C202 (NEW), R202 (NEW) (IRC N1101.9 (NEW))

Proponent: Jay Crandell, ARES Consulting, representing American Chemistry Council- Foam Sheathing Committee (jcrandell@aresconsulting.biz Eric Makela, Britt/Makela Group, Inc., representing Northwest Energy Codes Group (Eric@BrittMakela.com), Steve Ferguson, ASHRAE (sferguson@ashrae.org), Theresa A. Weston, PhD., DuPont Building Innovations (theresa.a.weston@usa.dupont.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC – COMMERICAL PROVISIONS

Add new definition as follows:

SECTION C202 GENERAL DEFINITIONS

CONTINUOUS INSULATION (ci): Insulating material that is continuous across all structural members without thermal bridges other than fasteners and service openings. It is installed on the interior or exterior or is integral to any opaque surface of the building envelope.

PART II – IECC – RESIDENTIAL PROVISIONS

Add new definition as follows:

SECTION R202 (N1101.9) GENERAL DEFINITIONS

CONTINUOUS INSULATION (ci): Insulating material that is continuous across all structural members without thermal bridges other than fasteners and service openings. It is installed on the interior or exterior or is integral to any opaque surface of the building envelope.

Reason: (Crandell) This proposal provides a needed definition for continuous insulation (a term presently used in the IRC and IECC). The proposed definition is from the 2010 edition of ASHRAE 90.1 and provides an effective definition that is inclusive of all types of continuous insulation materials, including spray foam, insulated siding, foam sheathing, and others.

(Makela) The term continuous insulation was introduced to the commercial provisions of the IECC in 2006. Unfortunately, the term has never been defined in the code. Since its introduction into the code, questions have arisen concerning what is and is not considered continuous insulation. For example, if furring strips are installed on a mass wall and insulation is installed between the furring strips over the face of the wall, is this considered continuous insulation or insulation installed in the cavity? This proposal provides a reasonable definition for continuous insulation that doesn't prohibit different types of materials from being used. The definition uses the term "Insulating material" which can be a variety of products including wood. The R-value requirements for walls in Table C402.2 provides the minimum R-values for the insulating material and as long as the material can be demonstrated to meet the minimum R-value it can be considered an insulating material. The key to maintaining the effectiveness of continuous insulation is to reduce or eliminate thermal bridging, which this definition achieves.

(Ferguson) In table C402.2, the term continuous insulation has been added, though it is undefined. This adds a definition for the term which is identical to the already existing definition in ANSI/ASHRAE/IES Standard 90.1-2010

(Weston) This proposal adds a definition for continuous insulation. Continuous insulation is used within the code, but the definition is missing. The proposed definition is consistent with that in ASHRAE 90.1

Cost Impact: This code change proposal will not increase the cost of construction.

CE52-13

PART I – IECC-COMMERICAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C202-CONTINUOUS INSULATION (ci) (NEW)-EC-CRANDELL-MAKELA-FERGUSON-WESTON.doc

CE53 – 13

C202

Proponent: Tim Manz, City of Blaine, MN, representing Association of Minnesota Building Officials
(tmanz@ci.blaine.mn.us)

Revise definition as follows:

SECTION C202 GENERAL DEFINITIONS

INFILTRATION. The uncontrolled inward air leakage into a building caused by the pressure effects of wind ~~or~~ The effect of differences in the indoor and outdoor air density or both, or imbalance between supply and exhaust air systems.

Reason: The imbalance between supply and exhaust air systems can be a major contributor to air infiltration into a building. The reason for this proposed code change is to include this imbalance as a part of the definition, which is already contained in the definitions in the current Minnesota Commercial Energy Code that adopts ASHRAE Standard 90.1-2004.

Cost Impact: This code change proposal will not increase the cost of construction.

CE53-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C202-INFILTRATION-EC-MANZ.doc

CE54 – 13

C202 (New)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new definitions as follows:

SECTION C202 GENERAL DEFINITIONS

LINER SYSTEM (Ls). A continuous vapor barrier liner membrane is installed below the purlins and uninterrupted by framing members. Uncompressed, unfaced insulation rests on top of the liner membrane between the purlins. For multilayer installations, the last *rated R-value of insulation* is for unfaced insulation draped over purlins and then compressed when the metal roof panels are attached.

FILLED CAVITY (FC). The first *rated R-value of insulation* represents faced or unfaced insulation installed between the purlins. The second *rated R-value of insulation* represents unfaced insulation installed above the first layer, perpendicular to the purlins and compressed when the metal roof panels are attached. A supporting structure retains the bottom of the first layer at the prescribed depth required for the full thickness of insulation.

Reason: Liner systems and filled cavity metal building roof assemblies can be used for compliance with the Opaque assemblies in table C402.2. This adds definitions for the terms, which are identical to the already existing definition in ANSI/ASHRAE/IES Standard 90.1-2010

Cost Impact: The code change proposal will not increase the cost of construction.

CE54-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C202-LINEAR SYSTEM (Ls) (NEW)-EC-FERGUSON.doc

CE55 – 13

C202 (New)

Proponent: Steve Ferguson, ASHRAE (sferguson@ashrae.org), Amanda Hickman, InterCode Incorporated, representing AMCA International (amanda@intercodeinc.com)

Add new definition as follows:

SECTION C202 GENERAL DEFINITIONS

POWERED ROOF/WALL VENTILATORS. A fan consisting of a centrifugal or axial impeller with an integral driver in a weather-resistant housing and with a base designed to fit, usually by means of a curb, over a wall or roof opening.

Reason: This is a companion proposal to the Fan Efficiency Grade (FEG) proposal submitted by AMCA International. Adding this definition for powered roof/wall ventilators to the code will help to clarify this term, which occurs in the list of proposed exceptions to the FEG proposal.

The language was taken from ANSI/AMCA Standard 99-10 *Standards Handbook*, and identical language was used in the ASHRAE 90.1-2010 Addendum u, which added a fan efficiency requirement and which is expected to be in the 2013 version of the Standard.

It is only relevant IF the FEG proposal is approved for addition into the IECC.

Cost Impact: The code change proposal will not increase the cost of construction.

CE55-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C202-POWERED ROOF-WALL VENTILATORS-EC-FERGUSON-HICKMAN.doc

CE56 – 13

C202 (NEW)

Proponent: Mark S. Graham, National Roofing Contractors Association (mgraham@nrca.net)

Add new definitions as follows:

SECTION C202 GENERAL DEFINITIONS

REROOFING. The process of recovering or replacing an existing roof covering.

ROOF RECOVER. The process of installing an additional roof covering over an existing roof covering without removing the existing roof covering.

ROOF REPAIR. Reconstruction or renewal of any part of an existing roof for the purpose of its maintenance.

ROOF REPLACEMENT. The process of removing the existing roof covering, repairing any damaged substrate and installing a new roof covering.

Reason: This code change proposal is intended to clarify the Code's intent by defining specific roofing-related terms.

The term "reroofing" is not currently defined in the I-codes. The definition proposed here is taken from IBC Section 1510-Reroofing.

The terms and definitions for "roof recover", "roof repair" and "roof replacement" are taken from IBC Section 202-Definitions and are consistent with those understood by the roofing industry.

Cost Impact: The code change proposal will not increase the cost of construction.

CE56-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C202-REROOFING (NEW)-EC-GRAHAM.doc

CE57 – 13

C202 (NEW)

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Add new definition as follows:

SECTION C202 GENERAL DEFINITIONS

ROOFTOP MONITOR. A raised section of a roof containing vertical fenestration along one or more sides.

Reason: There is currently no definition of rooftop monitor, yet the term is used in Section C402.3.2.1 (4). This proposal provides a definition of the term "Rooftop Monitor" as used in Section C402.3.2.1 (4). A definition of rooftop monitor is needed to clarify the intent and ensure uniform application of the exception.

Cost Impact: This code change proposal will not increase the cost of construction.

CE57-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C202-ROOFTOP MONITOR (NEW)-EC-WILLIAMS.doc

CE58 – 13

C202, R202 (IRC N1101.9)

Proponent: Jeff Inks, Window & Door Manufacturers Association (jinks@wdma.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC – COMMERCIAL PROVISIONS

Revise definition as follows:

SECTION C202 GENERAL DEFINITIONS

SKYLIGHT AND SLOPED GLAZING. Glass or other transparent or translucent glazing material installed at a slope of ~~less than 60 degrees (1.05 rad) from horizontal~~ 15 degrees (0.26 rad) or more from vertical. Glazing material in skylights, including unit skylights, tubular daylighting devices, solariums, sunrooms, roofs and sloped walls is included in this definition.

PART II – IECC – RESIDENTIAL PROVISIONS

SECTION R202 GENERAL DEFINITIONS

Revise definition as follows:

SKYLIGHT AND SLOPED GLAZING. Glass or other transparent or translucent glazing material installed at a slope of ~~less than 60 degrees (1.05 rad) from horizontal~~ 15 degrees (0.26 rad) or more from vertical. Glazing material in skylights, including unit skylights, tubular daylighting devices, solariums, sunrooms, roofs and sloped walls is included in this definition.

Reason: The definitions for skylights and sloped glazing were amended during the last code cycle to align with the definitions in ASHRAE 90.1 and not because of technical substantiation with respect to improvements in energy efficiency justifying the change. The definitions now conflict with the definitions for skylights and sloped glazing in the IBC and IRC. Given the IECC is an I-code and should there include definitions that are consistent with other I-codes, and that the alignment with ASHRAE 90.1 was not based on technical substantiation with respect to improvements in energy efficiency, the definitions for skylights and sloped glazing should be consistent with the definitions for them in the IBC and IRC. This proposal corrects that inconsistency.

Cost Impact: This code change proposal will not increase the cost of construction.

CE58-13

PART I – IECC – COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC – RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C202-SKYLIGHT-EC-INKS.doc

CE59 – 13

C202, R202 (IRC N1101.9)

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

SECTION C202 GENERAL DEFINITIONS

Revise definitions as follows:

FENESTRATION VERTICAL FENESTRATION. ~~Skylights, roof windows, vertical w-~~Windows (fixed or movable), opaque doors, glazed doors, glazed block and combination opaque/glazed doors composed of: ~~Fenestration includes products with glass and nonglass or other transparent or translucent glazing materials and installed at a slope of at least 60 degrees from horizontal.~~

SKYLIGHT SKYLIGHT. Glass or other transparent or translucent glazing material installed with a slope of less than 60 degrees (1.05 rad) from horizontal. ~~Glazing material in skylights, including unit skylights, solariums, sunrooms, roofs and sloped walls is included in this definition.~~

PART II – IECC-RESIDENTIAL PROVISIONS

Revise definitions as follows:

SECTION R202 (N1101.9) GENERAL DEFINITIONS

FENESTRATION. VERTICAL FENESTRATION. ~~Skylights, roof windows, vertical w-~~Windows (fixed or movable), opaque doors, glazed doors, glazed block and combination opaque/glazed doors composed of: ~~Fenestration includes products with glass and nonglass or other transparent or translucent glazing materials and installed at a slope of at least 60 degrees (1.05 rad) from horizontal.~~

SKYLIGHT SKYLIGHT. Glass or other transparent or translucent glazing material installed with a slope of less than 60 degrees from horizontal. ~~Glazing material in skylights, including unit skylights, solariums, sunrooms, roofs and sloped walls is included in this definition.~~

Reason: The code currently has no thermal provisions (U-factor or SHGC) for any fenestration material or product installed at an angle of greater than 0 up to and including 30 degrees from vertical. This proposal clarifies the application of thermal provisions (U-factor or SHGC) for fenestration materials or products installed at an angle greater than 0 up to and including 30 degrees from vertical.

There are a number of commercial and residential building designs in which sloped glazing is used, and as such is clearly not vertical but in addition does not meet the greater than 30 degrees from vertical (at least 60 degrees from horizontal) criterion to consider it a skylight. While it may be inferred that vertical fenestration is intended to include all fenestration other than skylights, technically the code does not apply to the fenestration in question. Vertical fenestration is used in Sections C402.3.1, C402.3.1.1, C402.3.3, C402.3.3.1, C402.3.3.2, R402.5 and Table C402.3. This loophole needs to be corrected and rather than change the term in the code from vertical fenestration to some other term, it is considered more appropriate to define what is intended when using the term "vertical fenestration" even though it is not truly vertical. Another change makes it clear that fenestration can be either glass **or** nonglass glazing materials and does not need to include both glass **and** nonglass glazing materials. The last sentence in the current definition of skylight can be deleted because the terms for the products are added to the previous sentence and it is not necessary to indicate the location of the skylights as they will always be in a roof or wall assembly. The focus of both definitions is simply the angle of the fenestration as installed.

Cost Impact: This code change proposal will not increase the cost of construction.

Note: The IBC, IRC and the igCC have two defined terms related to skylights. They are 'skylights and sloped glazing' and 'skylight unit' as follows

SKYLIGHT, UNIT. A factory-assembled, glazed fenestration unit, containing one panel of glazing material that allows for natural lighting through and opening in the roof assembly while preserving the weather-resistant barrier of the roof.

SKYLIGHTS AND SLOPED GLAZING. Glass or other transparent or translucent glazing material installed at a slope of 15 degrees (0.26 rad) or more from vertical. Glazing materials in skylights, including unit skylights, solariums, sunrooms, roofs and sloped walls, are included in this definition.

CE59-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

Part II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C202-FENESTRATION-EC-WILLIAMS.doc

CE60 – 13

C301, C301.1, Figure C301.1, Table C301.1, C301.2, C301.3

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

Delete and substitute as follows:

SECTION C301 CLIMATE ZONES

~~**C301.1 General.** Climate zones from Figure C301.1 or Table C301.1 shall be used in determining the applicable requirements from Chapter 4. Locations not in Table C301.1 (outside the United States) shall be assigned a climate zone based on Section C301.3.~~

FIGURE C301.1 CLIMATE ZONES

TABLE C301.1 CLIMATE ZONES, MOISTURE REGIMES, AND WARM HUMID DESIGNATIONS BY STATE, COUNTY AND TERRITORY

~~**C301.2 Warm humid counties.** Warm humid counties are identified in Table C301.1 by an asterisk.~~

~~**C301.3 International climate zones.** The climate zone for any location outside the United States shall be determined by applying Table C301.3(1) and then Table C301.3(2).~~

TABLE C301.3(1) INTERNATIONAL CLIMATE ZONE DEFINITIONS

TABLE C301.3(2) INTERNATIONAL CLIMATE ZONE DEFINITIONS

C301 CLIMATE ZONES

C301.1 Climates zones shall be as specified in Section R301.

Reason: If multiple climate zone maps are retained within the I-codes, these maps may diverge over time. It is best to have one climate zone map that all use for the I-codes.

Cost Impact: The code change proposal will not increase the cost of construction.

CE60-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C301 (NEW)-EC-CONNER.doc

CE61 – 13

Table C301.1, Table R301.1

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

**TABLE C301.1
CLIMATE ZONES, MOISTURE REGIMES, AND WARM-HUMID DESIGNATIONS BY STATE, COUNTY
AND TERRITORY**

COLORADO

5B Adams
6B Alamosa
5B Arapahoe
6B Archuleta
4B Baca
5B Bent
5B Boulder
5B Broomfield
6B Chaffee

(Portions of Table not shown remain unchanged)

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

**TABLE R301.1
CLIMATE ZONES, MOISTURE REGIMES, AND WARM-HUMID DESIGNATIONS BY STATE, COUNTY
AND TERRITORY**

COLORADO

5B Adams
6B Alamosa
5B Arapahoe
6B Archuleta
4B Baca
5B Bent
5B Boulder
5B Broomfield
6B Chaffee

(Portions of Table not shown remain unchanged)

Reason: Broomfield County is a consolidated city-county and a suburb of Denver. Constituted on November 15, 2001, it was apparently missing from the county database(s) used to establish the IECC's county-zone mappings. See [http://en.wikipedia.org/wiki/Broomfield, Colorado](http://en.wikipedia.org/wiki/Broomfield,_Colorado).

Cost Impact: The code change proposal will not increase the cost of construction.

CE61-13**PART I – IECC-COMMERCIAL PROVISIONS**

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C301.1T-EC-WILLIAMS.doc

CE62 – 13

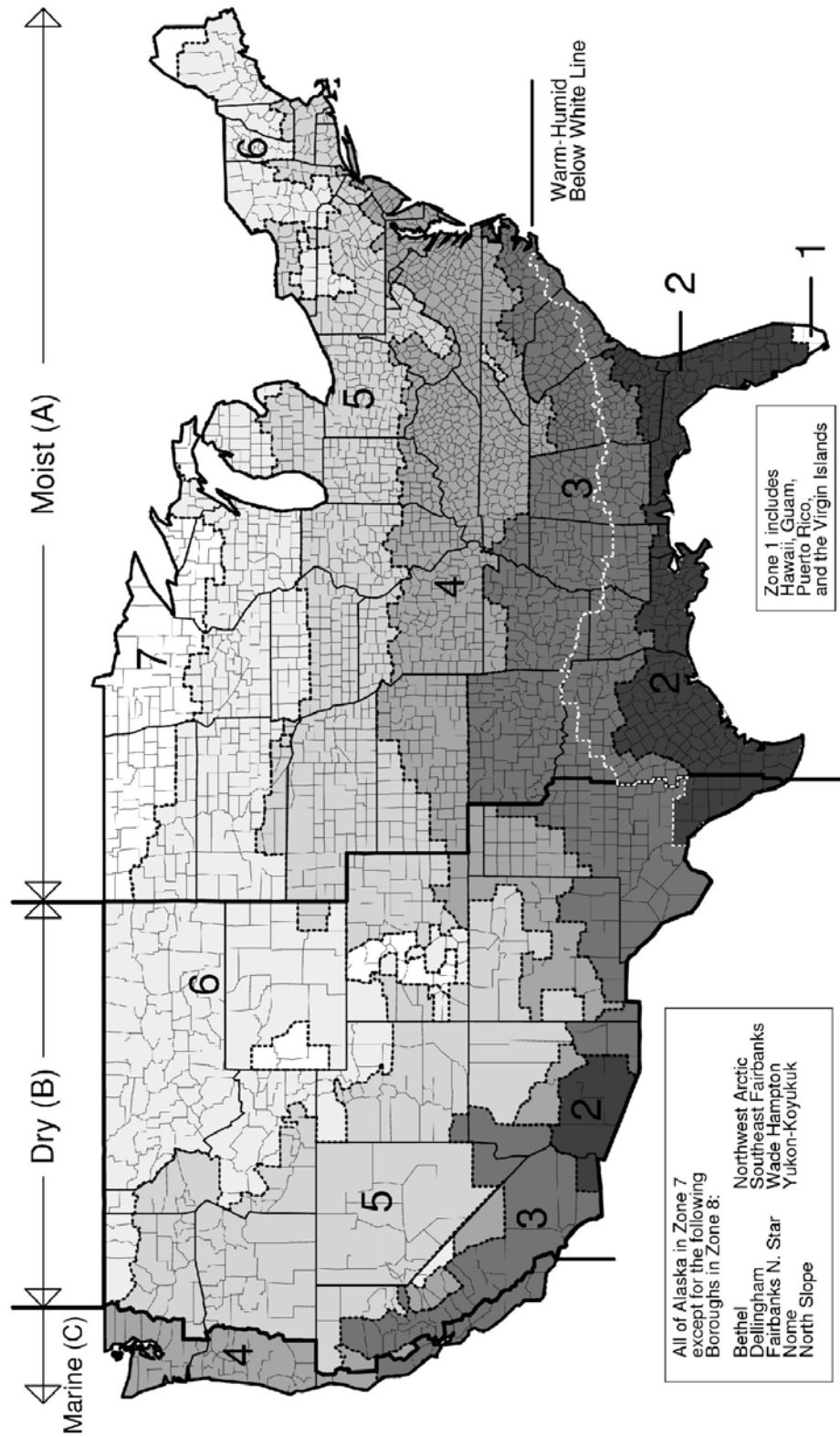
Figure C301.1, Table C301.1, Figure R301.1 (IRC Figure N1101.10), Table R301.1 (IRC Table N1101.10)

Proponent: Shirley Ellis, Energy Systems Laboratory, Texas A&M Engineering Experiment Station, Texas A&M University System (shirleyellis@tamu.edu)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows: End the Warm-Humid white line at the line separating the Dry (B) and Moist (A) moisture zones.



**FIGURE C301.1
CLIMATE ZONES**

Revise as follows: Remove the asterisk (*) from the following Counties, thereby removing the warm-humid location designation.

**TABLE C301.1
CLIMATE ZONES, MOISTURE REGIMES, AND WARM-HUMID
DESIGNATIONS BY STATE, COUNTY AND TERRITORY**

TEXAS

Bandera*
Dimmit*
Edwards*
Frio*
Kinney*
La Salle*
Maverick*
Medina*
Real*
Uvalde*
Val Verde*
Webb*
Zapata*
Zavala*

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows: End the Warm-Humid white line at the line separating the Dry (B) and Moist (A) moisture zones.

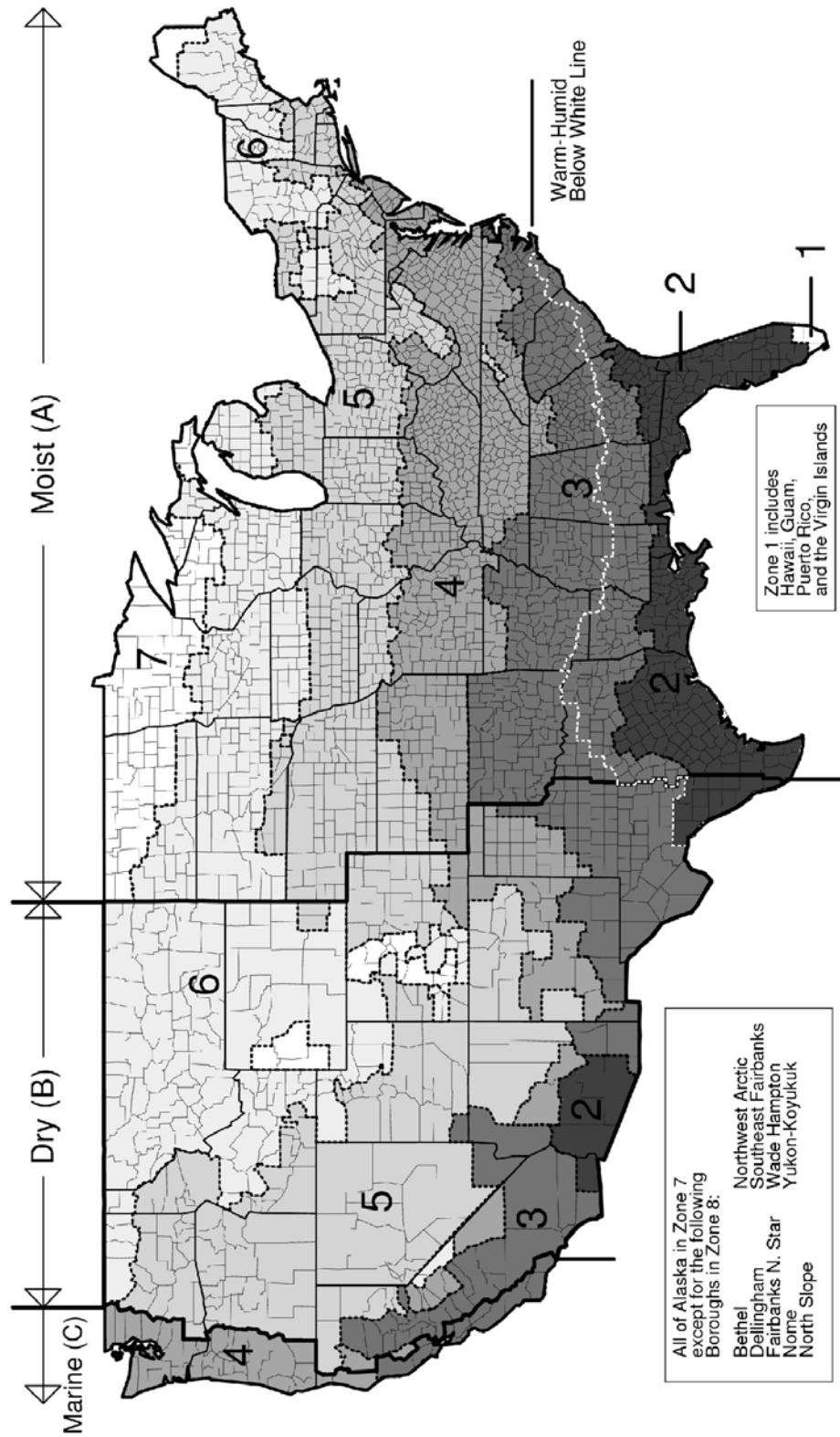


FIGURE R301.1 (N1101.10)
CLIMATE ZONES

Revise as follows: Remove the asterisk (*) from the following Counties, thereby removing the warm-humid location designation.

TABLE R301.1 (N1101.10)
CLIMATE ZONES, MOISTURE REGIMES, AND WARM-HUMID
DESIGNATIONS BY STATE, COUNTY AND TERRITORY

TEXAS

Bandera*
Dimmit*
Edwards*
Frio*
Kinney*
La Salle*
Maverick*
Medina*
Real*
Uvalde*
Val Verde*
Webb*
Zapata*
Zavala*

Reason: These 14 counties are in the Dry (B) moisture zone and therefore do not need to meet the requirements for Warm-Humid locations. This is based on the following studies *Calculation of Precipitation Data and Climate Zones for ASHRAE Standard 169*, Prepared by: *Sonia Zhang and Didier Thevenard and Numerical Logics Inc. and Steve Cornick National Research Council of Canada*. ASHRAE Std 169 is also working on revisions to these Figures and Tables based on the above studies.

Cost Impact: The code change proposal will not increase the cost of construction.

CE62-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C301.1-EC-ELLIS.doc

CE63 – 13

C303.1.1, R303.1.1 (IRC N1101.12.1)

Proponent: Matt Dobson, Vinyl Siding Institute (mdobson@vinylsiding.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C303.1.1 Building thermal envelope insulation. An *R*-value identification mark shall be applied by the manufacturer to each piece of *building thermal envelope* insulation 12 inches (305 mm) or greater in width. Alternately, the insulation installers shall provide a certification listing the type, manufacturer and *R*-value of insulation installed in each element of the *building thermal envelope*. For blown or sprayed insulation (fiberglass and cellulose), the initial installed thickness, settled thickness, settled *R*-value, installed density, coverage area and number of bags installed shall be *listed* on the certification. For sprayed polyurethane foam (SPF) insulation, the installed thickness of the areas covered and *R*-value of installed thickness shall be *listed* on the certification. For insulated siding the *R*-value shall be labeled on the product's package and shall be *listed* on the certification. The insulation installer shall sign, date and post the certification in a conspicuous location on the job site.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R303.1.1 (N1101.12.1) Building thermal envelope insulation. An *R*-value identification mark shall be applied by the manufacturer to each piece of *building thermal envelope* insulation 12 inches (305 mm) or greater in width. Alternately, the insulation installers shall provide a certification listing the type, manufacturer and *R*-value of insulation installed in each element of the *building thermal envelope*. For blown or sprayed insulation (fiberglass and cellulose), the initial installed thickness, settled thickness, settled *R*-value, installed density, coverage area and number of bags installed shall be *listed* on the certification. For sprayed polyurethane foam (SPF) insulation, the installed thickness of the areas covered and *R*-value of installed thickness shall be *listed* on the certification. For insulated siding the *R*-value shall be labeled on the product's package and shall be *listed* on the certification. The insulation installer shall sign, date and post the certification in a conspicuous location on the job site.

Reason: This change will help building officials and energy specialists/raters identify insulated siding, including its specified *R*-value based on ASTM C1363 testing. Currently, labeling or identification marks are not specified for insulated siding, but have been developed and established since the publication of the last energy code. For more information, go to www.insulatedsiding.info.

Cost Impact: The code change proposal will have minimal cost impact as many insulated siding products are on the market and are certified and labeled in the way.

CE63-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

CE64 – 13

C202 (NEW), C303.1.1, C303.1.1.1 (NEW), C303.1.1.2 (NEW), C303.1.1.3 (NEW), Chapter 5, R202 (NEW) (IRC N1101.9 (NEW)), R303.1.1 (IRC N1101.12.1), R303.1.1.1 (NEW) (IRC N1101.12.1.1 (NEW)), R303.1.1.2 (NEW) (IRC N1101.12.1.1.2 (NEW)), R303.1.1.3 (NEW) (IRC N1101.12.1.1.3 (NEW)), Chapter 5

Proponent: Vickie Lovell, InterCode Incorporated, representing Reflective Insulation manufacturers Association International (Vickie@intercodeinc.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C303.1.1 Building thermal envelope insulation. An *R* value identification mark shall be applied by the manufacturer to each piece of *building thermal envelope* insulation 12 inches (305 mm) or greater in width. Alternately, the insulation installers shall provide a certification listing the type, manufacturer and *R*-value of insulation installed in each element of the *building thermal envelope*. ~~For blown or sprayed insulation (fiberglass and cellulose), the initial installed thickness, settled thickness, settled *R*-value, installed density, coverage area and number of bags installed shall be listed on the certification. For sprayed polyurethane foam (SPF) insulation, the installed thickness of the areas covered and *R*-value of installed thickness shall be listed on the certification.~~ The insulation installer shall sign, date and post the certification in a conspicuous location on the job site.

C303.1.1.1 Blown or sprayed fiberglass and cellulose insulation. For blown or sprayed fiberglass and cellulose insulation the initial installed thickness, settled thickness, settled *R*-value, installed density, coverage area and number of bags installed shall be *listed* on the certification.

C303.1.1.2 Sprayed polyurethane foam insulation. For sprayed polyurethane foam (SPF) insulation the installed thickness of the areas covered and *R*-value of installed thickness shall be *listed* on the certification.

C303.1.1.3 Reflective insulation. Reflective insulation shall be labeled with the number of reflective sheets and the number and thickness of the enclosed air spaces to attain the product *R*-value as determined in accordance with ASTM C1224.

Add new definitions as follows:

ENCLOSED AIR SPACE. An unventilated cavity between two continuous surfaces (sheets) with a continuous border of building components.

REFLECTIVE INSULATION. An assembly with one or more surfaces with emittance of 0.1 or less with at least one low emittance surface that faces an enclosed air space.

Add new standard to Chapter 5 as follows:

ASTM

C1224-11 Standard Specifications for Reflective Insulation for Building Applications

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R303.1.1 (N1101.12.1) Building thermal envelope insulation. An *R* value identification mark shall be applied by the manufacturer to each piece of *building thermal envelope* insulation 12 inches (305 mm) or greater in width. Alternately, the insulation installers shall provide a certification listing the type, manufacturer and *R*-value of insulation installed in each element of the *building thermal envelope*. ~~For blown or sprayed insulation (fiberglass and cellulose), the initial installed thickness, settled thickness, settled *R*-value, installed density, coverage area and number of bags installed shall be listed on the certification. For sprayed polyurethane foam (SPF) insulation, the installed thickness of the areas covered and *R*-value of installed thickness shall be listed on the certification.~~ The insulation installer shall sign, date and post the certification in a conspicuous location on the job site.

R303.1.1.1 (N1101.12.1.1) Blown or sprayed fiberglass and cellulose insulation. For blown or sprayed fiberglass and cellulose insulation the initial installed thickness, settled thickness, settled *R*-value, installed density, coverage area and number of bags installed shall be *listed* on the certification.

R303.1.1.2 (N1101.12.1.2) Sprayed polyurethane foam insulation. For sprayed polyurethane foam (SPF) insulation the installed thickness of the areas covered and *R*-value of installed thickness shall be *listed* on the certification.

R303.1.1.3 (N1101.12.1.3) Reflective insulation. Reflective insulation shall be labeled with the number of reflective sheets and the number and thickness of the enclosed air spaces to attain the product *R*-value as determined in accordance with ASTM C1224.

Add new definitions as follows:

ENCLOSED AIR SPACE. An unventilated cavity between two continuous surfaces (sheets) with a continuous border of building components.

REFLECTIVE INSULATION. An assembly with one or more surfaces with emittance of 0.1 or less with at least one low emittance surface that faces an enclosed air space.

Add new standard to Chapter 5 as follows:

ASTM

C1224-11 Standard Specifications for Reflective Insulation for Building Applications

Reason: The section at present incorporates requirements that are specific to blown or sprayed fiberglass and cellulose insulation and to sprayed polyurethane foam insulation together with general requirements for building thermal envelope insulation materials. This proposal separates the generic and specific requirements.

The proposal also adds specific requirements similar to those for the other insulation materials (as well as appropriate definitions) for a type of material that has been in the market place for over 20 years and has had nationwide distribution and installation, namely reflective insulation. These products are well established and have two associated ASTM Standards, namely ASTM C727, Standard Practice for Installation and Use of Reflective Insulation in Building Constructions, and ASTM C1224, Standard Specification for Reflective Insulation for Building Applications. ASTM C1224 should be included in the IECC to provide the appropriate product specifications for reflective insulations.

ASTM C1224 can be viewed at: <http://reflectixinc.com/literature/securedpdfs/C1224.pdf>.

The products are currently included in the following state codes:

- FL – 2007 Florida Building Code, Section 719.1; 719.2.1 & Table 13-C1.2.3 & ASTM References Subchapter 13-3 (C1224)
- FL – 2010 Florida Building Code, Table 303.2 (ASTM Standards)
- MN - Thermal Insulation Standards, Section 7641.0130, Subpart 7

The purpose of this proposal is to incorporate into the IECC language that clarifies the pertinent requirements regarding reflective insulation *R*-values that are based on ASTM standards and shall be listed on certifications.

A companion proposal is being provided for section C303.

Cost Impact: This code change proposal will not increase the cost of construction.

Note: The two terms defined in this proposal are not found in other International Codes. However, the IBC does define 'reflective plastic core foil insulation' as follows:

REFLECTIVE PLASTIC CORE FOIL INSULATION. An insulation material packaged in rolls, that is less than 0.5 inches thick, with at least one exterior low emittance surface (0.1 or less) and a core material containing voids or cells.

Analysis: A review of the standard proposed for inclusion in the code, C1224-2011 Standard Specifications for Reflective Insulation for Building Applications, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

CE64-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C303.1.1-EC-LOVELL.doc

CE65 – 13

C303.1.3, Chapter 5, R303.1.3 (IRC N1101.12.3), Chapter 5

Proponent: Joseph R. Hetzel, P.E., Thomas Associates, Inc., representing the Door & Access Systems Manufacturers Association (DASMA) International (jhetzel@thomasamc.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C303.1.3 Fenestration product rating. U-factors of fenestration products (windows, doors and skylights) shall be determined in accordance with NFRC 100 ~~by an accredited, independent laboratory, and labeled and certified by the manufacturer.~~

Exception: Where required, garage door U-factors shall be determined in accordance with either NFRC 100 or ANSI/DASMA 105.

U-factors shall be determined by an accredited, independent laboratory, and labeled and certified by the manufacturer. Products lacking such a labeled U-factor shall be assigned a default U-factor from Table C303.1.3(1) or C303.1.3(2). The solar heat gain coefficient (SHGC) and *visible transmittance* (VT) of glazed fenestration products (windows, glazed doors and skylights) shall be determined in accordance with NFRC 200 by an accredited, independent laboratory, and labeled and certified by the manufacturer. Products lacking such a labeled SHGC or VT shall be assigned a default SHGC or VT from Table C303.1.3(3).

Add new standard to Chapter 5 as follows:

DASMA

ANSI/DASMA 105-2004 Test Method for Thermal Transmittance and Air Infiltration of Garage Doors

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R303.1.3 (N1101.12.3) Fenestration product rating. U-factors of fenestration products (windows, doors and skylights) shall be determined in accordance with NFRC 100 ~~by an accredited, independent laboratory, and labeled and certified by the manufacturer.~~

Exception: Where required, garage door U-factors shall be determined in accordance with either NFRC 100 or ANSI/DASMA 105.

U-factors shall be determined by an accredited, independent laboratory, and labeled and certified by the manufacturer. Products lacking such a labeled U-factor shall be assigned a default U-factor from Table R303.1.3(1) or R303.1.3(2). The solar heat gain coefficient (SHGC) and *visible transmittance* (VT) of glazed fenestration products (windows, glazed doors and skylights) shall be determined in accordance with NFRC 200 by an accredited, independent laboratory, and labeled and certified by the manufacturer. Products lacking such a labeled SHGC or VT shall be assigned a default SHGC or VT from Table R303.1.3(3).

Add new standard to Chapter 5 as follows:

DASMA

ANSI/DASMA 105-2004 Test Method for Thermal Transmittance and Air Infiltration of Garage Doors

Reason: Although NFRC 100 has been updated to include procedures for garage doors, there are instances where companies do not and cannot manufacture the 7' by 7' door size required to validate the NFRC 100 simulation by testing to NFRC 102. Research has shown that garage doors tested to ANSI/DASMA 105 result in U-factor values comparable to NFRC 100/NFRC 102. "Where required" indicates that the Exception only applies where garage doors are affected by conditioned space since there may be detached, non-conditioned structures where U-factor is not needed. We have separated the laboratory and labeling/certifying information since it applies to all doors including garage doors.

Cost Impact: The code change proposal will not increase the cost of construction.

CE65-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C303.1.3-EC-HETZEL.doc

CE66-13

C301.4 (NEW), R301.4 (NEW) (IRC N1101.10.3 (NEW)), R406 (NEW) (IRC N1106 (NEW))

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com), Agustin Mujica, Levitt Homes, Puerto Rico

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Add new text as follows:

C301.4 Tropical climate zone. The tropical climate zone shall be defined as:

1. Hawaii, Puerto Rico, Guam, American Samoa, U.S. Virgin Islands, Commonwealth of Northern Mariana Islands, and
2. Islands in the area between the Tropic of Cancer and the Tropic of Capricorn

PART II – IECC-RESIDENTIAL PROVISIONS

Add new text as follows:

R301.4 (N1101.10.3) Tropical climate zone. The tropical climate zone shall be defined as:

1. Hawaii, Puerto Rico, Guam, American Samoa, U.S. Virgin Islands, Commonwealth of Northern Mariana Islands, and
2. Islands in the area between the Tropic of Cancer and the Tropic of Capricorn.

R406. (N1106) Tropic zone option. *Residential buildings* in the tropical zone shall be deemed to comply with this Chapter where the following conditions are met:

1. Not more than one half of the *occupied space* is air conditioned.
2. The *occupied space* is not heated.
3. Solar, wind, or other renewable energy source supplies at least 80 percent of the energy for service water heating.
4. Glazing in *conditioned space* has a *solar heat gain coefficient* of less than or equal to 0.40, or has an overhang with a projection factor equal to or greater than 0.30.
5. Permanently installed lighting is in accordance with Section R404.
6. The exterior roof surface complies with one of the options in Table C402.2.1.1, or the roof has insulation with an *R-value* of R-15 or greater. If present, attics above the insulation are vented and attics below the insulation are unvented.
7. Roof surfaces have a minimum slope of one quarter inch per foot of run. The finished roof does not have water accumulation areas.
8. Operable fenestration provides ventilation area equal to a minimum of 14% of the floor area in each room. Alternatively, equivalent ventilation is provided by a ventilation fan.
9. Bedrooms with walls facing two different directions have operable fenestration facing two directions.
10. Interior doors to bedrooms are capable of being secured in the open position.
11. A ceiling fan or ceiling fan rough-in is provided for bedrooms and the largest non-bedroom space.

Reason: This creates a Chapter 4 alternative for residences in the tropical climates as a new section. Tropical areas are quite different from the US mainland in climate, construction techniques, traditional construction, and energy prices. The IECC treats tropical climates as if they were simply a southern extension of the US mainland. Traditional residences, especially the less expensive residences, have evolved inexpensive ways to work with the tropical climates to provide comfortable interior spaces

without the need for substantial space conditioning. Tropical electrical prices, usually over 20 cents per kWh, provide a substantial incentive for energy conservation. Solar water heating works particularly well in tropical climates.

This proposed change is meant to add a simple option for a newly defined climate zone, the "tropical zone". The area between the Tropic of Cancer and the Tropic of Capricorn is the area between 23.5° northern and southern latitude of the equator. A zone that recognizes the unusually constant and unique climate of this region would help make the ICC Codes more of an "international code".

Traditional construction, especially with solar water heating, is usually more energy efficient than the construction style assumed in the IECC, as is shown by an analysis done for Puerto Rico.¹ Using energy efficient versions of traditional construction saves more energy and is much more cost-effective than pushing those in tropical climates to adopt mainland construction practices. Traditional tropical construction focuses on greatly reducing or eliminating the need for space conditioning by making a living space that is comfortable without space conditioning.

The requirements proposed here are based on informal conversations with those who live in tropical regions. The proponent does not live in the proposed tropical zone and will continue to solicit the input of those who do. Some items were taken from energy codes proposed or in place in the tropical regions. This is not intended as a replacement for existing topical codes, such as the energy codes recently adopted in Hawaii and Puerto Rico. This is meant as a simple climate-appropriate alternative for tropical climates.

Reason by item:

#1 Air conditioning only a portion of the residence is common in some residences and saves energy compared to air conditioning the whole occupied space.

#2 Heating is seldom needed.

#3 Consistently warm temperatures and high power costs make solar water heating very attractive. Solar water heating is widely used. Water heating is often 35% or more of the residential energy use.^{1,2} Substantial energy savings come from solar water heating.

#4 Limiting solar gains and providing ventilation is the energy focus for windows. Window U-factor has little impact. Window air tightness is of little value when the important feature of the windows is their ability to be operable and provide ventilation.

#5 High efficiency lighting makes sense with tropical energy prices.

#6 This references the "cool roof" provisions. This is similar to an option in Hawaii's code and the Puerto Rico Energy Center's analysis. Insulation is less valuable in mild climates where the outside temperature is often comfortable as an inside temperature.

#7 Even flat roofs need to drain.

#8 Ventilation provided by tropical winds makes occupied spaces more comfortable. 14% is an option for unconditioned residences in Hawaii's new energy code.

#9 When bedroom walls facing two directions are available, ventilation on both walls will be more effective.

#10 Interior doors should not block bedroom ventilation. This is similar to Hawaii's new energy code and recommended by the Puerto Rico Energy Center.

#11 Ceiling fans increase comfort without conditioning the air. This is similar to Hawaii's new energy code and recommended by the Puerto Rico Energy Center.

1. "Energy Modeling of Low Income Residencies" by C. G. Morales & A. J. Malavé

<http://library.witpress.com/pages/PaperInfo.asp?PaperID=22547>

The paper above is not free. The proponents will send a Puerto Rico Energy Center presentation done for DOE that summarizes that work to anyone who requests this by email.

2. Typical Hawaiian energy use for hot water: <http://www.hawaiienergy.com/16/water-heating>

Cost Impact: The code change proposal will not increase the cost of construction.

CE66-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C301.4 (NEW)-CONNER-MUJICA.doc

CE67 – 13

C303.1.4.1 (NEW), Chapter 5, R303.1.4.1 (N1101.12.4) (NEW), Chapter 5

Proponent: Matt Dobson, Vinyl Siding Institute (mdobson@vinylsiding.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Add new text as follows:

C303.1.4 Insulation product rating. The thermal resistance (*R*-value) of insulation shall be determined in accordance with the U.S. Federal Trade Commission *R*-value rule (CFR Title 16, Part 460) in units of $\text{h} \cdot \text{ft}^2 \cdot ^\circ\text{F}/\text{Btu}$ at a mean temperature of 75°F (24°C).

C303.1.4.1 Insulated siding. The thermal resistance (*R*-value) of insulated siding shall be determined in accordance with ASTM C1363. Installation for testing shall be in accordance with the manufacturer's installation instructions.

Add new standard to Chapter 5 as follows:

ASTM

C1363 Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus

PART II – IECC-RESIDENTIAL PROVISIONS

Add new text as follows:

R303.1.4 (N1101.12.4) Insulation product rating. The thermal resistance (*R*-value) of insulation shall be determined in accordance with the U.S. Federal Trade Commission *R*-value rule (CFR Title 16, Part 460) in units of $\text{h} \cdot \text{ft}^2 \cdot ^\circ\text{F}/\text{Btu}$ at a mean temperature of 75°F (24°C).

R303.1.4.1 (N1101.12.4.1) Insulated siding. The thermal resistance (*R*-value) of insulated siding shall be determined in accordance with ASTM C1363. Installation for testing shall be in accordance with the manufacturer's installation instructions.

Add new standard to Chapter 5 as follows:

ASTM

C1363 Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus

Reason: This additional requirement is necessary so that the testing protocol is spelled out clearly as the valid method for testing of *R*-value for insulated siding.

The Federal Trade Commission agrees that ASTM C1363 is the appropriate test method for insulated siding and further supported specific protocol as a part of ASTM C1363, established in ASTM D7793, is in the spirit of the home insulation rule.

Without adding this information to the energy code, manufacturers could try to enter the home insulation/insulated siding marketplace with product that has not been tested appropriately for *R*-value. This addition will ensure that proper, close to field condition testing, is required for any type of insulated siding to qualify as home insulation and in the energy code. This will ultimately result in a manufacturer compliance requirement and create easy enforcement for the building official and energy specialists. It will also further ensure that insulated siding's determined *R*-value will be legitimate in determining energy performance calculations and consumer confidence that it will provide specific energy performance.



This is a photo of a test chamber and insulated siding being tested to ASTM C1363.

Cost Impact: The code change proposal will have minimal cost impact as many insulated siding products are on the market and are certified and labeled in the way.

CE67-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C303.1.4.1 (NEW)-EC-DOBSON.doc

CE68 – 13

C303.1.4, R303.1.4 (IRC N1101.12.4)

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Delete without substitution as follows:

~~**C303.1.4 Insulation product rating.** The thermal resistance (R-value) of insulation shall be determined in accordance with the U.S. Federal Trade Commission R-value rule (CFR Title 16, Part 460) in units of $\text{h ft}^2\text{°F/Btu}$ at a mean temperature of 75°F (24°C).~~

PART II – IECC-RESIDENTIAL PROVISIONS

Delete without substitution as follows:

~~**R303.1.4 (N1101.12.4) Insulation product rating.** The thermal resistance (R-value) of insulation shall be determined in accordance with the U.S. Federal Trade Commission R-value rule (CFR Title 16, Part 460) in units of $\text{h ft}^2\text{°F/Btu}$ at a mean temperature of 75°F (24°C).~~

Reason: These references were judged non-compliant with CP-28 by ICC staff in the year they were brought into the code. The IECC does not need to repeat Federal law. The code official is not responsible for enforcing the FTC requirements on the insulation manufacturers. When Federal law changes the reference will be out of date.

Cost Impact: This code change proposal will not increase the cost of construction.

CE68-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C303.1.4-EC-CONNER.doc

CE69 – 13

C401.1

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C401.1 Scope. The ~~provisions requirements contained~~ in this chapter are applicable to commercial buildings and their *building sites* ~~or portions of commercial buildings~~.

Reason: This proposal includes building sites in the scope of the IECC (consistent with C101.2). The other ICC codes use the terminology “provisions in this chapter....” The code was revised during the last code development cycle to clarify that building sites associated with the building are included due to the scope of the provisions in the lighting chapter. There is no need to include “or portions of commercial buildings” because that higher level scope is covered in Chapter 1.

Cost Impact: The code change proposal will not increase the cost of construction.

CE69-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C401.1-EC-WILLIAMS.doc

CE70 – 13

C401.2, C401.2.1

Proponent: Larry Spielvogel, PE, FASHRAE, representing self

Revise as follows:

C401.1 Scope. The requirements contained in this chapter are applicable to commercial buildings, or portions of commercial buildings.

C401.2 Application. Commercial buildings shall comply with one of the following:

- ~~1. The requirements of ANSI/ASHRAE/IESNA 90.1.~~
2. 1. The requirements of Sections C402, C403, C404 and C405. In addition, commercial buildings shall comply with either Section C406.2, C406.3 or C406.4.
3. 2. The requirements of Section C407, C402.4, C403.2, C404, C405.2, C405.3, C405.4, C405.6 and C405.7. The building energy cost shall be equal to or less than 85 percent of the standard reference design building.

C401.2.1 Application to existing buildings. Additions, alterations and repairs to existing buildings shall comply with one of the following:

1. Sections C402, C403, C404 and C405; or
- ~~2. ANSI/ASHRAE/IESNA 90.1.~~

Reason: The purpose of this code change is to delete the current option that exists to use ASHRAE 90.1 in lieu of all of the requirements in Chapter 4 of the Commercial Provisions in the IECC. This code change will make the IECC simpler, less expensive to use, easier to learn, and will prevent people from using ASHRAE 90.1 to get around the provisions of IECC Chapter 4 and other I Codes, such as the IMC.

1. ASHRAE 90.1-2013 Is Not and Will Not Be Available. Just like in previous code cycles, ASHRAE is not likely to publish an ANSI approved version of 90.1-2013 until just before or during the Final Action Hearings in Atlantic City in October 2013. Thus, it is not possible to see even a working draft of 90.1-2013 by the Committee Action Hearing in Dallas in April, and it may not even be possible to see the final published and ANSI approved 90.1 before the Final Action Hearings in October.

Therefore, any proposal to allow ASHRAE 90.1-2013 or even a working draft to be used by anyone in lieu of all of the specific requirements in IECC Chapter 4 is just not fair or equitable. ASHRAE must follow the ICC rules, just like all other consensus documents that are referenced, by providing ANSI approved and published copies well before the hearings. Otherwise, it is not possible for the IECC Committee or the ICC Members and the public to adequately review, comment, and testify on the content and provisions of the specific version of ASHRAE 90.1 that will be adopted.

2. ASHRAE 90.1 Circumvents IECC Requirements. The current option to use the less stringent ASHRAE 90.1 in lieu of all of the requirements in IECC Chapter 4 provides any user with multiple ways to circumvent many of the IECC and other I Code requirements. Thus, compliance with ASHRAE 90.1 can be less stringent than with IECC Chapter 4 compliance. It will not be possible for anyone to know until after all changes are made and adopted at the Final Action Hearings whether ASHRAE 90.1 is at least as stringent as Chapter 4 of the IECC. If 90.1 is not at least as stringent as Chapter 4, then you will allow these less stringent requirements in 90.1 to be used at will, defeating the purpose of having an energy code.

At least some of the lighting provisions in ASHRAE 90.1 (as yet unknown) are likely to be less stringent than those in C405.5.2(1) and (2) of IECC. ASHRAE 90.1 also allows additional lighting power allowances in that can be much higher than those in the footnotes to IECC Table C405.5.2(2). The IECC should not allow people to unilaterally circumvent IECC voted and adopted lighting power allowances without justification and public hearings. As another example, IECC C402.4.5.1 and C402.4.5.2 require the use of the 2010 AMCA standard 500D for dampers in Chapter 4, while ASHRAE 90.1-2010 requires the use of the 2007 AMCA Standard 500D in Section 12, and then only for damper leakage, while IECC requires AMCA 500-D-2010 for both damper leakage and for stairway and shaft vents. Thus, the option to use ASHRAE 90.1 circumvents the IECC required use of the current 2010 AMCA damper standard and ASHRAE 90.1 does not require its use in as many places as does the IECC.

3. ASHRAE 90.1 Is Unenforceable. ASHRAE 90.1 is unenforceable because the requirements are so numerous and so complex that most code officials do not have and cannot readily or economically get the extensive training and experience to be able to understand and enforce the ASHRAE 90.1 requirements. ASHRAE 90.1 has many more requirements than the IECC. The 2012 IECC is 89 pages, while 90.1-2010 is already 228 pages, with over 100 more new addenda to be included in the 2013 edition. The ASHRAE 90.1-2010 User's Manual is another 469 pages long. There are almost no local training courses or training programs on ASHRAE 90.1 at the many locations and jurisdictions where the IECC is adopted that are specifically for code officials. At best, there may be a dozen or so competent and comprehensive training programs on ASHRAE 90.1 each year in the entire country, mostly in a few major cities, and none of those is specifically for code officials. Learning and completely understanding ASHRAE 90.1 is also difficult even for most practicing architects, engineers, and contractors, making it difficult for them to comply, thus imposing an even greater burden on code officials to verify compliance.

Even the ASHRAE 90.1 committee itself has difficulty writing and understanding the standard, since they issue hundreds of addenda, errata, formal interpretations, and informal interpretations every year in attempts to change or clarify their intent and rectify their own numerous errors. The one-year-old addenda for ASHRAE 90.1-2010 is 44 pages long and many more pages are coming. So far, ASHRAE has issued 14 errata sheets to 90.1-2010. The addenda to 90.1-2007 that were incorporated into 90.1-2010 are designated from a to dr. The addenda so far to 90.1-2010 that will be incorporated into 90.1-2013 are designated from a to cr. Thus, the criteria, requirements, and corrections for ASHRAE 90.1 change almost weekly. Nor are the changes from the prior edition clearly marked by ASHRAE, as they are in the IECC, so the reader can readily see the changes and deletions. Which of these many documents and provisions are to be applied and enforced for any specific permit application on any specific day?

4. ASHRAE 90.1 is Not Coordinated. The IECC is carefully coordinated with the other International Codes, and ASHRAE 90.1 is not. This results in conflicts and contradictions. For example, just Chapter 4 of the IECC has at least eleven references to and requirements for compliance with the other International Codes, while ASHRAE 90.1 has not one. While some of the provisions in IECC are similar to ASHRAE 90.1, ASHRAE 90.1 has many more requirements and exceptions that do not exist in the IECC, providing more latitude and less stringency for users than in the IECC and other I Codes.

5. ASHRAE 90.1 is Not Unified. Providing the option to use ASHRAE 90.1 in lieu of IECC Chapter 4 diverts efforts from pursuing a unified and comprehensive set of International Codes. The option to use ASHRAE 90.1 in lieu of IECC Chapter 4 provides an unsupervised and unmonitored path for special and vested interests to include their provisions in ASHRAE 90.1 that would never be accepted in the IECC. For example, ASHRAE does not hold any public hearings on any changes to or on the entire standard. Thus, the “back door” to ASHRAE 90.1 opens wider than that for the IECC, especially since so many of the ASHRAE 90.1 voting members work for or represent special interests, so they can pursue those interests from the inside. For example, a significant percentage of the members of the ASHRAE 90.1 Mechanical Subcommittee are employed by manufacturers of heating, air conditioning, and water heating equipment, or by their trade associations. Most of the other voting members of the ASHRAE 90.1 Committee do not know enough to debate and vote intelligently on those issues, which are then adopted and included in the Standard. As another example, the majority of the voting members of the ASHRAE 90.1 Committee know little or nothing about lighting, so there is a great tendency to “rubber stamp” recommendations that come from the Lighting Subcommittee. Accordingly, many provisions in ASHRAE 90.1 diverge from those in IECC.

6. ASHRAE 90.1 Copies Unavailable. ASHRAE does not normally offer and provide free copies of 90.1 (\$125 per copy last year plus another \$99 for the User's Manual) to code officials. Very few code jurisdictions have budgets to purchase copies of the ASHRAE documents for each plan checker and inspector; much less the estimated thousands of dollars per user to purchase the many mandatory ASHRAE references (beyond those in the IECC) needed to determine compliance. Few code jurisdictions, and similarly few architectural, engineering, or construction firms have the sophisticated software, training, and experience, much less the time and computers required to run and check the 90.1 Section 11 Energy Cost Budget (ECB) Method calculations allowed by ASHRAE 90.1 for further compliance options.

7. The Use of ASHRAE 90.1 is Not Precluded. Most, if not all relevant provisions of ASHRAE 90.1 can still be used at the discretion of the user, so long as they are at least as stringent as Chapter 4 of IECC. People who wish to comply with ASHRAE 90.1 for any other reasons, such as, but not limited to LEED® certification can still easily do so, provided they also meet the requirements of Chapter 4 of IECC.

Cost Impact: This code change proposal will not increase the cost of construction. There will be a very substantial cost savings since code officials and users of the IECC will not have to buy additional standards and references or spend the time and pay for additional training. The provisions proposed in this code change for deletion are simply optional already in the IECC, and no other provisions in the IECC will be changed or affected.

CE70-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C401.2-EC-SPIELVOGEL.doc

CE71 – 13

C401.2, C406

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

Revise as follows:

C401.2 Application. Commercial buildings shall comply with one of the following:

1. The requirements of ANSI/ASHRAE/IESNA 90.1.
2. The requirements of Sections C402, C403, C404 and C405. ~~In addition, commercial buildings shall comply with either Section C406.2, C406.3 or C406.4.~~
3. The requirements of Section C407, C402.4, C403.2, C404, C405.2, C405.3, C405.4, C405.6 and C405.7. The building energy cost shall be equal to or less than ~~85~~ 90 percent of the standard reference design building.

Delete without substitution as follows:

SECTION C406

~~ADDITIONAL EFFICIENCY PACKAGE OPTIONS~~

Reason: Stringency increases in the energy codes don't necessarily mean energy savings. Parts of the energy code are usually ignored. The sections eliminated here were added primarily to increase stringency, not because they solve a problem.

Most parts of Section C406 are problematic. As the Federally required equipment efficiency changes, the heating and cooling equipment in Section C406.2 will become out of date. As Federal minimum equipment efficiency requirements change the tables in Section 406.2 will become out of date; for example, the minimum air conditioner and heat pump efficiencies just changed. The minimum furnace efficiencies are expected to change in the next few years. Efficiencies sufficiently above the Federal requirements to be in that table may not even be available for some types of equipment. The solar renewable option in C406.4 will be difficult in dense urban settings, for example when buildings shade other buildings, or worse, when future buildings end up shading existing buildings where the renewables were dependent on sunshine. If efficient equipment is unavailable and renewables are impractical due to shading, the only remaining option is a lower lighting power density (LPD) in Section C406.3. The LPDs could be quite a challenge-- most required LPDs in Section C406.3 are more restrictive than ASHRAE's green standard (ASHRAE 189.1).

The goal of Section C406 was to reduce energy use by 5%. The 85% factor in Section C401.2 includes that 5%, so it is increased to 90% by this change to align it with the deletion of Section C406.

The IECC is changing too fast and becoming too complicated. We need to let code enforcement and those using the code catch up. The code complexity has outpaced the code enforcement community's ability to absorb more and more requirements. At some point we have to ask what is the contribution to energy efficiency for requirements that are not implemented? Or worse, what is the contribution for requirements that alienate potential users of the energy code to the point that they don't enforce, or even adopt, the IECC?

Cost Impact: The code change proposal will not increase the cost of construction.

CE71-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C401.2-EC-CONNER

CE72 – 13

C401.2

Proponent: Mark Nowak, M. Nowak Consulting, LLC, representing Steel Framing Alliance

Revise as follows:

C401.2 Application. Commercial buildings shall comply with one of the following:

1. The requirements of ANSI/ASHRAE/IESNA 90.1.
2. ~~The requirements of Sections C402, C403, C404 and C405. In addition, commercial buildings shall comply with either Section C406.2, C406.3 or C406.4.~~
- 3 2. The requirements of Section C407, C402.4, C403.2, C404, C405.2, C405.3, C405.4, C405.6 and C405.7. The building energy cost shall be equal to or less than 85 percent of the standard reference design building.

Exception: Buildings 25,000 gross square feet and less in floor area shall be permitted to comply with the same approach as for existing buildings and alterations in Section C401.2.1 and either Section C406.2, C406.3 or C406.4.

Reason: In order to reach the ultimate goal of net zero energy buildings, it will be necessary to move toward a code that is 100% performance oriented. The proposal will require designers to look at the most cost-effective ways to meet the code rather than rely on prescriptive solutions that offer less and less benefit at substantial cost to the owner and consumer. This proposal will also facilitate future improvements to the code for larger buildings. As cost effectiveness continues to be a difficult concept to address with any sort of consensus, this proposal will shift the debate toward the overall energy savings goal rather than continued debate over a range of individual components.

The proposal also recognizes that some smaller buildings, including multifamily buildings, are not as complex as larger buildings and thus retains alternative compliance paths for these building types.

Cost Impact: This proposal will not increase the cost of construction

CE72-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C401.2-EC-NOWAK.doc

CE73 – 13

C202 (New), C401.2, C407.1, C407.3, C407.4 through C407.6.2

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C401.2 Application. Commercial buildings shall comply with one of the following:

1. The requirements of ANSI/ASHRAE/IESNA 90.1.
2. The requirements of Sections C402, C403, C404 and C405. In addition, commercial buildings shall comply with either Section C406.2, C406.3 or C406.4.
3. The requirements of Section C402.4, C403.2, C404, C405.2, C405.3, C405.4, C405.6 C405.7 and C407. The building energy cost shall be equal to or less than 85 percent of the standard reference design building.

C407.1 Scope. This section establishes criteria for compliance using total expected building performance of a proposed building design in terms of regulated energy use. The following systems and loads shall be included in determining the total building performance: heating systems, cooling systems, service water heating, fan systems, lighting power, receptacle loads and process loads.

C407.3 Performance-based compliance. Compliance based on total building performance requires that a proposed building (*proposed design*) be shown to have an annual energy cost that is less than or equal to the annual energy cost of the *standard reference design*. Energy prices shall be taken from a source approved by the code official, such as the Department of Energy, Energy Information Administration's *State Energy Price and Expenditure Report*. Code officials shall be permitted to require time-of-use pricing in energy cost calculations. Nondepletable energy collected off site shall be treated and priced the same as purchased energy. Energy from nondepletable energy sources collected on site shall be omitted from the annual energy cost of the *proposed design*.

Exception: Jurisdictions that require site energy (1 kWh = 3413 Btu) rather than energy cost as the metric of comparison.

C407.3 Performance-based compliance. Total building performance shall be calculated and documented by a *registered design professional* in accordance with Appendix G of ANSI/ASHRAE/IESNA 90.1, and shall show a minimum a performance percentage improvement of 26 percent of *regulated energy use* when calculated in accordance with Section G.1.2 of Appendix G. Energy that is not *regulated energy use* shall be subtracted from both the *proposed design* and the baseline building after building performance simulations are completed, but prior to calculating the percentage improvement.

C407.4 Documentation.

C407.4.1 Compliance report.

C407.4.2 Additional documentation.

C407.5 Calculation procedure.

C407.5.1 Building specifications

C407.5.2 Thermal blocks.

C407.5.2 Thermal blocks.

~~C407.5.2.2 HVAC zones not designed.~~

~~C407.5.2.3 Multifamily residential buildings.~~

**~~TABLE C407.5.1(1)
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS~~**

**~~TABLE C407.5.1(2)
HVAC SYSTEMS MAP
TABLE C407.5.1(3)
SPECIFICATIONS FOR THE STANDARD REFERENCE DESIGN HVAC SYSTEM DESCRIPTIONS~~**

**~~TABLE C407.5.1(4)
NUMBER OF CHILLERS~~**

**~~TABLE C407.5.1(5)
WATER CHILLER TYPES~~**

~~C407.6 Calculation software tools.~~

~~C407.6.1 Specific approval.~~

~~C407.6.2 Input values.~~

Add new definition as follows:

**SECTION C202
GENERAL DEFINITIONS**

REGULATED ENERGY USE. Energy used for HVAC, lighting, service water heating, motors, transformers and other building systems, equipment, components, and processes with requirements prescribed in this code.

Reason: The target of 26% improvement in proposed section C407.3 above will change based on the final development of 90.1-2013 Appendix G. The percentage is intended to represent the improvement from the Appendix G baseline to the 90.1-2013 requirements. The percentage improvement required to satisfy the performance path is under development in the ASHRAE committees and is expected to be ready before the final 2015 IECC code hearings. The final percentage improvement required could range from 45% if the Appendix G baseline is set at 90.1-2004 levels (as currently proposed by SSPC 90.1) to 0% if the Appendix G baseline is set at 90.1-2013 levels.

This proposal intends to create in the IECC a singular performance path to compliance, and require compliance be based on a set reduction in energy cost for the proposed design over the standard design building.

Since the first energy codes and standards were published almost 40 years ago, there has always been a path to compliance that recognizes the ability for a building design to meet the intent of the energy code or standard without necessarily meeting each and every minimum prescriptive requirement. This path in the energy codes continues the concept embodied in the long-standing building code provision entitled "alternative methods and materials." In short, the intent is to allow a designer to show that their building as designed will perform at or better than if it was just designed to meet the minimum code provisions.

While energy codes and standards provide criteria for HVAC, service water heating systems, and lighting systems on an independent basis with each provision having to be satisfied, it is understandable that one may wish to modify the design of prescriptive items and make up for increased energy use by increasing efficiency elsewhere in the building. For instance, one might want to provide fenestration that does not meet the prescriptive minimum code while at the same time implementing a reduction in connected lighting power below that allowed in the code. The intent is to allow the degree to which one building component or system does not meet minimum to be "traded off" against the degree to which one or more others exceed the minimum. This provision allows consideration of the building as a whole, recognizing that energy use and associated operating costs of a building occur "at the meter" and are the result of many interactions between the structure and the systems that provide the myriad of services in the building.

Although the concept of "equal or better" performance of the actual building design seems to indicate code compliance, it is not that simple. For most commercial buildings, such calculations require computer simulation by well-versed professionals along with a number of directions to ensure accurate results and minimization of gaming. Initially energy codes and standards had a singular set of criteria that were followed when conducting such building performance analysis. Since ASHRAE Standard 90 and the MEC (now the IECC) were maintained by different entities, the criteria associated with this compliance path digressed, in part because of the amount of time and effort stakeholders and others expended to update, maintain, and enhance the building performance approach. ASHRAE 90.1 has had and continues to have a long-standing focus on this path to compliance and is a referenced compliance path

to the IECC pursuant to C401.2 (1). This raises the question—why have two separate processes focused on the same complex problem when it is simpler to rely on one?

It is for the following reasons that this change is proposed:

- Annual energy analysis and simulation is complicated and the governing rules more likely to improve if all interested and affected parties (e.g., design professionals) can focus their efforts on one approach.
- Code officials receiving compliance documentation associated with this path will have a uniform and singular set of inputs and outputs to get comfortable with in addition to knowing all results they receive are developed with the same identical “black box.”
- Those with expertise in building energy modeling are heavily involved in development and updating of ASHRAE Standard 90.1, putting in easily a man-year of labor each year to keep the provisions in the standard current.

There is a possible reduction in construction cost and the costs associated with plan review and approval associated with this proposed change. Designers will have a single robust and technically supported approach to use for building performance, which should streamline their efforts. Similarly, code officials and plan reviewers will have a singular and uniform type of documentation to review.

Cost Impact: The code change proposal will not increase the cost of construction it may reduce the cost of construction.

CE73-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C401.2-EC-WILLIAMS.doc

CE74 – 13

C401.2, C401.2.1, Chapter 5

Proponent: Michael A. Anthony, P.E., University of Michigan, representing US Education Facilities Industry – APPA.ORG – Leadership in Education

Revise as follows:

C401.2 Application. Commercial buildings shall comply with one of the following:

1. The requirements of ANSI/ASHRAE/IESNA 90.1.
2. The requirements of Sections 502, 503, 504 and 505. In addition, commercial buildings shall comply with either Section 506.2, 506.3 or 506.4.
3. The requirements of Section 507, 502.4, 503.2, 504, 505.2, 505.3, 505.4, 505.6 and 505.7. The building energy cost shall be equal to or less than 85 percent of the standard reference design building.
4. The requirements of ISO 50001.

401.2.1 Application to existing buildings. Additions, alterations and repairs to existing buildings shall comply with one of the following:

1. Sections 502, 503, 504 and 505; or
2. ANSI/ASHRAE/IESNA 90.1.
3. The requirements of ISO 50001.

Add new standard to Chapter 5 as follows:

ISO

50001-2011 Energy management systems – Requirements with guidance for use.

Reason: The US education facilities industry believes that a performance standard such as ISO 50001 is a more economical and faster path to meet our industry's energy conservation goals for the following reasons:

1. ISO 50001 provides a flexible template for states and local jurisdiction to implement local energy conservation programs that are most effective for their climates, risk aggregations and economy. For example, Section 4.4.4 of ISO 50001 states:

"The organization shall establish an energy baseline(s) using the information from the initial energy review, considering a data period suitable to the organization's energy use and consumption. Change in energy performance shall be measured against the energy baseline(s)"

2. The US Department of Energy (DOE) supports the ISO 50001 Standard as a proven approach for U.S. industrial and commercial facilities to plan, manage, measure, and continually improve energy performance.

Note to Committee: release of restricted copies of ISO 50001 for committee examination is in process

Cost Impact: The code change proposal will not increase the cost of construction. Lower cost because local jurisdictions will be able to a) establish their own baselines, and b) scale into energy conservation measures as technical and budget conditions allow as long as they meet established goals.

Analysis: A review of the standard proposed for inclusion in the code, ISO 50001-2011 Energy management systems – Requirements with guidance for use, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

CE74-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C401.2-EC-ANTHONY

CE75 – 13

C401.2.2 (NEW)

Proponent: Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; Bill Prindle, Energy Efficient Codes Coalition; and Don Vigneau, Northeast Energy Efficiency Partnerships.

Add new text as follows:

C401.2.2 Application to replacement fenestration products. Where some or all of an existing fenestration unit is replaced with a new fenestration product, including sash and glazing, the replacement fenestration unit shall meet the applicable requirements for *U-factor* and *SHGC* in Table C402.3.

Exception: An area-weighted average of the *U-factor* of replacement fenestration products being installed in the building for each fenestration product category listed in Table C402.3 shall be permitted to satisfy the *U-factor* requirements for each fenestration product category listed in Table C402.3. Individual fenestration products from different product categories listed in Table C402.3 shall not be combined in calculating the area-weighted average *U-factor*.

Reason: The purpose of this code change is to create a new code section to clarify that whenever an entire new fenestration product or assembly replaces some or all of an existing fenestration product (typically in the remodeling or modernizing of an existing building), the new fenestration product must meet the U-factor and SHGC requirements of the fenestration table. Section C401.2.1 of the 2012 IECC already requires that additions, alterations and repairs comply with C402 (thermal building envelope) – as a result this proposal does not add any additional requirements. However, this proposal will further clarify the application of the requirements, increase effective enforcement, and reduce the likelihood of confusion and differing interpretations:

- This proposed commercial fenestration requirement is identical to the residential requirement in Section R402.3.6. This specific requirement has been in the residential chapter of the IECC since at least the 2000 IECC. The exception adds additional flexibility by allowing the U-factor requirement to be satisfied on a weighted average basis by product category consistent with the current area-weighting approach to U-factor in section C402.3.4.
- Existing buildings represent one of the greatest untapped sources of energy efficiency, yet there are few ways to effectively require improvements to these buildings. This section does not mandate the replacement of windows; however, if windows are going to be replaced, the code should expressly require that the replacement windows achieve the same efficiency level as windows in newly constructed buildings.
- There is no valid reason why replacement windows cannot meet the same thermal efficiency requirements as windows installed in new buildings, so there is no reason to have separate requirements for them.
- Common repairs to damaged windows, such as the replacement of a broken pane of glass, would not be covered under C401.2.2.

Cost Impact: The code change proposal will not increase the cost of construction.

CE75-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C401.2.2-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE-VIGNEAU.doc

CE76 – 13

C401.3 (NEW), C401.3.1 (NEW), C401.3.2 (NEW), C401.3.3 (NEW)

Proponent: Tim Manz, City of Blaine, MN, representing the Association of Minnesota Building Officials (tmanz@ci.blaine.mn.us)

Add new text as follows:

C401.3 Additional requirements for inflated structures. Inflated structures with heating equipment installed shall be in accordance with this section.

C401.3.1 Envelope requirements. Foundation walls and slab-on-grade floors shall meet the requirements for conditioned spaces.

C401.3.2 Membrane insulation. Membranes shall have a minimum insulation value of R-12.

Exception: Inflated structures that are designed to deflate during the summer months.

C401.3.3 Air pressure controls. Structure air pressure shall have capacity to be controlled both manually and automatically with respect to outdoor wind speed.

Reason: These provisions have been in the Minnesota Commercial Energy Code for many years and are necessary to address inflated structures that are used in northern climates, especially during the winter months. A minimum insulation value of R-12 is reasonable when a heating system is installed to ensure that energy is conserved. based on a report completed for the Minnesota Department of Commerce, State Energy Office, in May 2002 titled "Energy Conservation Strategies for Air Supported Structures."

Cost Impact: The code change proposal will increase the cost of construction.

CE76-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C401.3 (NEW)-EC-MANZ.doc

CE77 – 13

C402.1, C402.1.1, C402.1.1

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C402.1 General (Prescriptive). ~~The building thermal envelope shall comply with Section C402.1.1. Section C402.1.2 shall be permitted as an alternative to the *R*-values specified in Section C402.1.1. Building thermal envelope assemblies for buildings that are intended to comply with the code on a prescriptive basis, in accordance with the compliance path described in Item 2 of Section C401.2, shall comply with the following:~~

1. The opaque portions of the building thermal envelope shall comply with the specific insulation requirements of Section C402.2 and the thermal requirements of either the *R*-value based method of Section C402.1.1 or the *U*-, *C*- and *F*-factor based method of Section C402.1.2;
2. Fenestration in building envelope assemblies shall comply with Section C402.3; and
3. Air leakage of building envelope assemblies shall comply with Section C402.4.

Alternatively, where buildings have a vertical fenestration area or skylight area that exceeds that allowed in Section C402.3, the building and the building thermal envelope shall comply with Section C401.2 Item 1 or Section C401.2 Item 3.

C402.1.1 Insulation and fenestration criteria. Insulation component *R*-value-based method. ~~The building thermal envelope shall meet the requirements of Tables C402.2 and C402.3~~ For opaque portions of the building thermal envelope intended to comply on an insulation component *R*-value-basis, the *R*-values for insulation in framing cavities, and for continuous insulation, shall be not less than that specified in Table C402.2, based on the climate zone specified in Chapter 3. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *R*-values from the “Group R” column of Table C402.2. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *R*-values from the “All other” column of Table C402.2. Buildings with a vertical fenestration area or skylight area that exceeds that allowed in Table C402.3 shall comply with the building envelope provisions of ANSI/ASHRAE/IESNA 90.1.

C402.1.2 *U*-factor alternative. Assembly *U*-factor, *C*-factor and *F*-factor-based method. ~~An assembly with a *U*-factor, *C*-factor, or *F*-factor equal or less than that specified in Table C402.1.2 shall be permitted as an alternative to the *R*-values in Table C402.2. Building thermal envelope opaque assemblies intended to comply on an assembly *U*-factor, *C*-factor or *F*-factor basis shall have a *U*-factor, *C*-factor, or *F*-factor that is not greater than that specified in Table C402.1.2. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *U*-factor, *C*-factor, or *F*-factor from the “Group R” column of Table C402.1.2. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *U*-factor, *C*-factor or *F*-factor from the “All other” column of Table C402.1.2.~~

Reason: This proposal is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

Reasons for this proposal are as follows:

- a) This proposal is intended to clarify the use and application of the codes prescriptive building thermal envelope provisions and does not contain changes to the technical requirements of the code.
- b) These sections are proposed to be revised to *clarify* that fact that the code contains both *insulation component R-value* and *assembly U-/C-/F-factor* methods, either of which can be used to comply with the code's prescriptive building thermal

envelope provisions, and that they both methods are equally valid and independently useable. These proposed revisions are also intended to clarify the application of both of these available methods.

- c) The reference to Section C401.2, Item 2, in the first sentence of this proposal is intended to tie to the general scoping provisions of Chapter 4 and, in particular, the prescriptive IECC path.) Section C401.2 clearly indicates that Section C402 is applicable only in the compliance path outlined in Item 2 and is *not* applicable to the compliance paths outlined in Items 1 and 3.
- d) The intent of the code is that the method described in Section C402.1.1 is applicable to insulation components, while the method described in Section C402.1.2 is intended to apply to entire assemblies. As currently written, however, there is unnecessary interaction between the two prescriptive building thermal envelope methods/sections and the tables that they reference. This clouds their application. It also makes the *U*-factor method in particular extremely difficult to decipher and apply.

For example, the verbiage as written in Section C402.1.1 gives the appearance that the insulation layers are mandatory. In reality, however, these "prescriptive" R-values are only one of many possible wall combinations. This creates confusion in building community: they feel that the R-values are required and there is not an option.

In many scenarios it becomes critical that the availability of these options is communicated effectively by the code. For example, most seismically active locations (Oregon, WA, ID, MT) utilize 6" stud construction for low rise commercial construction. The walls under Table C402.1.2, however, are for 4" stud construction, which is uncommon in all but high-rise construction in these regions. It becomes critical, therefore, that the requirements related to Table C402.2 be readily understood and useable.

- e) This proposal takes the references to the U-factor method out of the R-value method provisions of Section C402.1.1 and moves them to a more appropriate location: to the general building envelope provisions of Section 402.1.
- f) Although current text indicates that the U-factor method is an alternative in Section C402.1.1, the current text of Section C402.1.1 appears to presents another alternative: to comply with the prescriptive building envelope provisions of ASHRAE 90.1. This alternative is presented in the last sentence of the current text of Section C402.1.1. However, Section C401.2 clearly indicates that Section C402 is applicable only to the prescriptive compliance path outlined in Item 2 to Section C401.2. This proposal, therefore, moves the text referencing ASHRAE 90.1 from the last sentence of Section C402.1.1 to the general prescriptive provisions of Section C402.1 but, instead of directly referencing ASHRAE 90.1, the proposed language now references the ASHRAE 90.1 compliance path of Item 1 to Section C401.2 and the IECC performance path of Item 3 to Section C401.2. The SEHPCAC has been advised by the original proponents of Sections C401.2 and C402.1.1 that the intent is that these compliance paths outlined in Items 1, 2 and 3 to Section C401.2 be used separately and should not be mixed and matched. This change clarifies that by essentially sending the user to ASHRAE 90.1 or the IECC performance path whenever the IECC prescriptive building envelope provisions of Section C402 are not satisfied. Specifically, high glass buildings (buildings with over 30% vertical fenestration area) do not comply with Section C402.3 (or, more specifically, subsection C402.3.1) and, as such, are directed by the proposed language to Item 1 or 3 of Section C401.2.

In reality, the proposed language in the last sentence to Section C402.1 is unnecessary. Any reference to ASHRAE 90.1 for prescriptive building thermal envelope requirements should be deleted from Section C402.1 because Section C401.2 already puts forth the three available commercial energy compliance paths and adequately covers the ASHRAE 90.1 alternative issue. Thus, references to ASHRAE 90.1 or other alternative energy compliance paths in Sections C402.1 or C402.1.1 only serve to add confusion. However, in the spirit of this code change, which is to reorganize and clarify, not to raise questions regarding intent, the language addressing these issues was simply moved from Section C402.1.1 to Section C402.1 and modified. Thus the tie to ASHRAE 90.1 remains in Section C402 but is clarified. So as not to jeopardize the success of this proposal, the SEHPCAC has also created a separate proposal to delete the existing reference to ASHRAE 90.1 in Section C402.1.1.

- g) The general provisions of Section C402.1 have been revised to clearly indicate the requirements in Section C402 that are specifically applicable to the R-value method of Section C402.1.1, the U-factor method of Section C402.1.2, and the ASHRAE 90.1 building envelope alternative method. Where a provision is applicable to all methods/alternatives, the information now appears in the general provisions of Section C402.1. Where a provision applies to only one method, the provision is referenced in the body of the provisions for that specific method.
- h) This proposal revises the section titles, as well as the text of the indicated sections, to clarify that the R-value method applies to individual insulation components, while the U-factor method applies to entire assemblies. Furthermore, typical I-Code format conventions require that code text stand on their own without the aid of the title. These revisions achieve that. That said, the use of the code is simplified wherever section titles are accurate, and this gives further justification to the proposed title revisions.
- i) As *R*-values are minimum values and *U*-factors are maximum values, these sections have been revised to clearly indicate this and eliminate unintended misapplication of the tables. Note that many users incorrectly assumed that both tables contained minimum values.

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: This code change proposal will not increase the cost of construction. This proposal is a clarification and, as such, will not increase the cost of construction.

CE77-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.1 #1-EC-THOMPSON-SEHPCAC.doc

CE78 – 13

C402.1, C402.1.1, C402.1.2, Table C402.1.2, C402.2, Table C402.2, C402.2.1, C402.2.3, C402.2.4, C402.2.5, C402.2.6, C402.2.7, C407.5.1, Table C407.5.1(1)

Proponent: Larry Williams, Steel Framing Industry Association

Revise as follows:

C402.1 General (Prescriptive). The building thermal envelope shall comply with Section C402.1.1. ~~Section C402.1.2 shall be permitted as an alternative to the *R*-values specified in Section C402.1.1.~~

C402.1.1 Insulation and fenestration criteria. *The building thermal envelope* shall meet the requirements of Tables C402.1 and ~~C402.2, C402.3~~ based on the climate zone specified in Chapter 3. ~~Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *R*-values from the "Group R" column of Table C402.2. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *R*-values from the "All other" column of Table C402.2. Buildings with a vertical fenestration area or skylight area that exceeds that allowed in Table C402.3 shall comply with the building envelope provisions of ANSI/ASHRAE/IESNA 90.1.~~

C402.1.2 *U*-factor alternative. ~~An assembly with a *U*-factor, *C*-factor, or *F* factor equal or less than that specified in Table C402.1.2 shall be permitted as an alternative to the *R*-value in Table C402.2.~~ Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *U*-factor, *C*-factor, or *F*-factor from the "Group R" column of Table ~~C402.1.2~~ C402.1. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *U*-factor, *C*-factor or *F*-factor from the "All other" column of Table ~~C402.1.2~~ C402.1.

TABLE C402.1.2 C402.1
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS^a

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Roofs																
Insulation entirely above deck	U-0.048	U-0.048	U-0.048	U-0.048	U-0.048	U-0.048	U-0.039	U-0.039	U-0.039	U-0.039	U-0.032	U-0.032	U-0.028	U-0.028	U-0.028	U-0.028
Metal buildings	U-0.044	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.031	U-0.031	U-0.029	U-0.029	U-0.029	U-0.029
Attic and other	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.021	U-0.021	U-0.021	U-0.021	U-0.021	U-0.021	U-0.021
Walls, Above Grade																
Mass	U-0.142	U-0.142	U-0.142	U-0.123	U-0.110	U-0.104	U-0.104	U-0.090	U-0.078	U-0.078	U-0.078	U-0.071	U-0.061	U-0.061	U-0.061	U-0.061
Metal building	U-0.079	U-0.079	U-0.079	U-0.079	U-0.079	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.039	U-0.052	U-0.039
Metal framed	U-0.077	U-0.077	U-0.077	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.057	U-0.064	U-0.052	U-0.045	U-0.045
Wood framed and other	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.051	U-0.051	U-0.051	U-0.051	U-0.036	U-0.036
Walls, Below Grade																
Below-grade wall ^p	C-1.140	C-1.140	C-1.140	C-1.140	C-1.140	C-1.140	C-0.119	C-0.119	C-0.119	C-0.119	C-0.119	C-0.119	C-0.092	C-0.092	C-0.092	C-0.092
Floors																
Mass	U-0.322	U-0.322	U-0.107	U-0.087	U-0.076	U-0.076	U-0.076	U-0.074	U-0.074	U-0.064	U-0.064	U-0.057	U-0.055	U-0.051	U-0.055	U-0.051
Joist/framing	U-0.066	U-0.066	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033
Slab-on-Grade Floors																
Unheated slabs	F-0.73	F-0.73	F-0.73	F-0.73	F-0.73	F-0.73	F-0.54	F-0.54	F-0.54	F-0.54	F-0.54	F-0.52	F-0.40	F-0.40	F-0.40	F-0.40
Heated slabs	F-0.70	F-0.70	F-0.70	F-0.70	F-0.70	F-0.70	F-0.65	F-0.65	F-0.58	F-0.58	F-0.58	F-0.58	F-0.55	F-0.55	F-0.55	F-0.55
Opaque Doors^e																
Swinging	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37

- Use of opaque assembly *U*-factors, *C*-factors, and *F*-factors from ANSI/ASHRAE/IESNA 90.1 Appendix A shall be permitted, provided the construction complies with the applicable construction details from ANSI/ASHRAE/IESNA 90.1 Appendix A.
- Where heated slabs are below grade, below-grade walls shall comply with the *F*-factor requirements for heated slabs.
- Roll-up or sliding doors shall have a maximum *U* factor of 0.21 or minimum *R*-4.75

C402.2 Specific insulation requirements (Prescriptive). ~~Opaque assemblies shall comply with Table C402.2.~~ Where two or more layers of continuous insulation board are used in a construction assembly, the continuous insulation boards shall be installed in accordance with Section C303.2. If the continuous insulation board manufacturer's installation instructions do not address installation of two or more layers, the edge joints between each layer of continuous insulation boards shall be staggered.

TABLE C402.2
OPAQUE THERMAL ENVELOPE REQUIREMENTS^a

C402.2.1 Roof assembly. ~~The minimum thermal resistance (*R*-value) of the insulating material installed either between the roof framing or continuously on the roof assembly shall be as specified in Table C402.2, based on construction materials used in the roof assembly.~~ Roof assemblies shall meet the requirements of Table 402.1. Skylight curbs shall be insulated to the level of roofs with insulation entirely above deck or R-5, whichever is less.

Exceptions:

1. Continuously insulated roof assemblies where the thickness of insulation varies 1 inch (25 mm) or less and where the area-weighted *U*-factor is equivalent to the same assembly ~~with the *R*-value specified in Table C402.2~~ C402.1.
2. Unit skylight curbs included as a component of an NFRC 100 rated assembly shall not be required to be insulated.

Insulation installed on a suspended ceiling with removable ceiling tiles shall not be considered part of the minimum thermal resistance of the roof insulation.

C402.2.3 Thermal resistance of Above-grade walls. ~~The minimum thermal resistance (*R*-value) of the insulating materials installed in the wall cavity between the framing members and continuously on the walls shall be as specified in Table C402.2, based on framing type and construction materials used in the wall assembly.~~ The *R*-value of Above-grade walls shall meet the requirements of Table 402.1. Integral insulation installed in concrete masonry units (CMU) shall not be used in determining compliance with ~~Table C402.2~~ C402.1.

"Mass walls" shall include walls weighing not less than:

1. 35 psf (170 kg/m²) of wall surface area; or
2. 25 psf (120 kg/m²) of wall surface area if the material weight is not more than 120 pounds per cubic foot (pcf) (1900 kg/m³).

C402.2.4 Thermal resistance of Below-grade walls. ~~The minimum thermal resistance (*R*-value) of the insulating material installed in, or continuously on, the below-grade walls shall be as specified in Table C402.2, and Below-grade walls shall meet the requirements of Table 402.1.~~ Insulation required to comply with Table 402.1 shall extend to a depth of 10 feet (3048 mm) below the outside finished ground level, or to the level of the floor, whichever is less.

C402.2.5 Floors over outdoor air or unconditioned space. ~~The minimum thermal resistance (*R*-value) of the insulating material installed either between the floor framing or continuously on the floor assembly shall be as specified in Table C402.2, based on construction materials used in the floor assembly.~~ Floors over outdoor or unconditioned space shall meet the requirements of Table 402.1.

"Mass floors" shall include floors weighing not less than:

1. 35 psf (170 kg/m²) of floor surface area; or
2. 25 psf (120 kg/m²) of floor surface area if the material weight is not more than 12 pcf (1,900 kg/m³).

C402.2.6 Slabs on grade. Where the slab on grade is in contact with the ground, the ~~minimum thermal resistance (R-value) of the insulation around the perimeter of unheated or heated slab-on-grade floors shall be as specified in Table C402.2. The slab shall meet the requirements of Table 402.1.~~ Insulation required to comply with Table 402.1 shall be placed on the outside of the foundation or on the inside of the foundation wall. The insulation shall extend downward from the top of the slab for a minimum distance as shown in the table or to the top of the footing, whichever is less, or downward to at least the bottom of the slab and then horizontally to the interior or exterior for the total distance shown in the table. Insulation extending away from the building shall be protected by pavement or by a minimum of 10 inches (254 mm) of soil.

Exception: Where the slab-on-grade floor is greater than 24 inches (61 mm) below the finished exterior grade, perimeter insulation is not required.

C407.5.1 Building specifications. The *standard reference design* and *proposed design* shall be configured and analyzed as specified by Table C407.5.1(1). Table C407.5.1(1) shall include by reference all notes contained in ~~Table C402.2~~ C402.1.

TABLE C407.5.1(1)
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT CHARACTERISTICS	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Roofs	Type: Insulation entirely above deck Gross area: same as proposed U-factor: from Table C402.1.2 <u>C402.1</u> Solar absorptance: 0.75 Emittance: 0.90	As proposed As proposed As proposed As proposed As proposed
Walls, above-grade	Type: Mass wall if proposed wall is mass; otherwise steel-framed wall Gross area: same as proposed U-factor: from Table C402.1.2 <u>C402.1</u> Solar absorptance: 0.75 Emittance: 0.90	As proposed As proposed As proposed As proposed As proposed
Walls, below-grade	Type: Mass wall Gross area: same as proposed U-Factor: from Table C402.1.2 <u>C402.1</u> with insulation layer on interior side of walls	As proposed As proposed As proposed
Floors, above-grade	Type: joist/framed floor Gross area: same as proposed U-factor: from Table C402.1.2 <u>C402.1</u>	As proposed As proposed As proposed
Floors, slab-on-grade	Type: Unheated F-factor: from Table C402.1.2 <u>C402.1</u>	As proposed As proposed
Doors	Type: Swinging Area: Same as proposed U-factor: from Table C402.2 <u>C402.1</u>	As proposed As proposed As proposed

(Portions of Table not shown remain unchanged)

Reason: This proposal eliminates the compliance path based on R-values and leaves only the U factor alternative. In practice, the Opaque Thermal Envelope Requirements (R values) in existing Table C 402.2 are used as default values in early project cost estimating. Given these values are far from optimal or cost effective solutions, they introduce a bias against major groups of building materials. A far better approach would be a total building simulation or component U factor approach independent of materials. This proposal is a move toward a material-neutral code.

Cost Impact: The code change proposal will not increase the cost of construction.

CE78-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.1-EC-WILLIAMS rev.doc

CE79 – 13

C402.1.1, Table C402.2

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C402.1.1 Insulation and fenestration criteria. The building thermal envelope shall meet the requirements of Tables ~~C402.2~~ C402.1.1 and C402.3 based on the climate zone specified in Chapter 3. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *R*-values from the “Group R” column of Table ~~C402.2~~ C402.1.1. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *R*-values from the “All other” column of Table ~~C402.2~~ C402.1.2. Buildings with a vertical fenestration area or skylight area that exceeds that allowed in Table C402.3 shall comply with the building envelope provisions of ANSI/ASHRAE/IESNA 90.1.

TABLE ~~C402.2~~ C402.1.1
OPAQUE THERMAL ENVELOPE REQUIREMENTS^a

(Portions of Table not shown remains unchanged.)

Reason: This proposal is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

This proposal is intended to clarify the use and application of the codes prescriptive building thermal envelope provisions and does not contain changes to the technical requirements of the code. Detailed reasons are as follows:

- The current numbering of Table C402.2 adds confusion to the application of the codes prescriptive building thermal envelope *R*-value method.
- This proposal changes the numbering of Table C402.2 to Table C402.1.1 to coordinate with number of the primary and initial section that references it: Section C402.1.1 (which references the table three times).
- Due to the existing numbering anomaly, Table C402.2 is currently located in the code AFTER the table for the U-factor method referenced in Section C402.1.2 (which, by the way, appropriately references a table of the same number: Table C402.1.2). Code officials tell us that many architects, engineers, and contractors are confused by the order and incorrectly conclude that the only way to comply is to have the continuous insulation, regardless of the U-value of the assembly.

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: This code change proposal will not increase the cost of construction. This proposal is a clarification and, as such, will not increase the cost of construction.

CE79-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.1.1 #2-EC-THOMPSON-SEHPCAC.doc

CE80 – 13

C402.1.1

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov); Jeff Inks, Window & Door Manufacturers Association (jinks@wdma.com)

Revise as follows:

C402.1.1 Insulation and fenestration criteria. The *building thermal envelope* shall meet the requirements of Tables C402.2 and C402.3, based on the climate zone specified in Chapter 3. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *R*-values from the “Group R” column of Table C402.2. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *R*-values from the “All other” column of Table C402.2. ~~Buildings with a vertical fenestration area or skylight area that exceeds that allowed in Table C402.3 shall comply with the building envelope provisions of ANSI/ASHRAE/IESNA 90.1.~~

Reason: Thompson: This proposal is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

Reasons for this proposal are as follows: The last sentence of Section C402.1.1 was intended to prohibit buildings with vertical fenestration or skylight area that exceeds that allowed by Section C402.3 from using the IECC prescriptive envelope provisions. It was also intended to send the user to alternative compliance paths where they exceed the vertical fenestration or skylight area allowed by Section C402.3. However, as written, the language appears to allow ASHRAE 90.1 building envelope prescriptive provisions to be mixed with other IECC prescriptive path requirements. That is not the intent. This proposal deletes the last sentence of Section C402.1.1 to add clarity and ensure that only one of three paths available in Section C402.1 are applied to each building and that these available energy compliance paths are not mixed and matched.

Note that, though this proposed change was also submitted by the SEHPCAC as a part of a larger package of related proposals, in the event that the larger proposal might fail, it was considered important enough to also be considered independently.

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Inks: This provision needs to be removed as the building envelope provisions of ASHRAE 90.1 are too inconsistent with the envelope provisions of the IECC especially for vertical fenestration. Allowing an increase in fenestration area under the prescriptive path by way of ASHRAE 90.1 works for non-metal fenestration products as the U-factor requirements in ASHRAE 90.1 are more stringent for them than the IECC. However, that is not the case for nearly all other fixed and operable metal framed products in zones 2-8 for which the U-factor requirements in ASHRAE 90.1 are far less stringent than those in the IECC meaning that as the fenestration area of metal framed products increases, the thermal performance requirements for them decreases. That should not be permitted. If the intent of IECC is to allow the fenestration area under the prescriptive path to exceed that which is allowed under Section C402.3.1, then it should be expressly permitted in the IECC where the intent of IECC can be maintained and not compromised by allowing a decrease in the energy efficiency requirements when the fenestration area exceeds 30%.

Cost Impact: This code change proposal will not increase the cost of construction. This proposal is a clarification and, as such, will not increase the cost of construction.

CE80-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.1.1-EC-THOMPSON-SEHPCAC-INKS.doc

CE81 – 13

C402.1.1

Proponent: Brian Dean,, ICF, International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; Bill Prindle, Energy Efficient Codes Coalition; and Don Vigneau, Northeast Energy Efficiency Partnerships.

Revise as follows:

C402.1.1 Insulation and fenestration criteria. The *building thermal envelope* shall meet the requirements of Sections C402.2 and C402.3, including Tables C402.2 and C402.3 based on the climate zone specified in Chapter 3. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *R*-values from the “Group R” column of Table C402.2. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *R*-values from the “All other” column of Table C402.2. Buildings with a vertical fenestration area or skylight area that exceeds that allowed in Table by Section C402.3.1 shall use one of the other compliance methods specified in Section C401.2 ~~comply with the building envelope provisions of ANSI/ASHRAE/IESNA 90.1.~~

Reason: The purpose of the proposed code change is to clarify that commercial buildings built to the prescriptive option under Section 402 must meet all the requirements of the insulation and fenestration sections, and not just the prescriptive tables. We are not aware of any widespread misapplication of these requirements, but it is important to refine code language wherever there is any potential ambiguity. The revision above will ensure that the opaque envelope components meet the requirements of the prescriptive *R*-value or *U*-factor table, as well as all of the specific requirements as to the proper installation of insulation components. Likewise, the revisions will ensure that fenestration meets all of the associated requirements outlined in Section C402.3, and not just the prescriptive *U*-factor and SHGC requirements in Table C402.3.

In addition, the proposal correctly points buildings with more than the maximum allowed prescriptive fenestration area to the two other compliance methods available under section C401.2 – the performance path under section C407 and *ASHRAE 90.1*. The current language incorrectly suggests that compliance can be achieved only through the provisions of *ASHRAE 90.1*.

Cost Impact: The code change proposal will not increase the cost of construction.

CE81-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.1.1-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE-VIGNEAU.docx

CE82 – 13

C402.1.1, C402.1.2, C402.2.4

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C402.1.1 Insulation and fenestration criteria. The building thermal envelope shall meet the requirements of Tables C402.2 and C402.3, based on the climate zone specified in Chapter 3. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *R*-values from the “Group R” column of Table C402.2. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *R*-values from the “All other” column of Table C402.2. Buildings with a vertical fenestration area or skylight area that exceeds that allowed in Table C402.3 shall comply with the building envelope provisions of ANSI/ASHRAE/IESNA 90.1. The thermal resistance or *R*-value of the insulating material installed in, or continuously on, below grade exterior walls of the building envelope required in accordance with Table C402.2 shall extend to a depth of 10 feet (3048 mm) below the outside finished ground level, or to the level of the lowest floor, whichever is less.

C402.1.2 *U*-factor alternative. An assembly with a *U*-factor, *C*-factor, or *F*-factor equal or less than that specified in Table C402.1.2 shall be permitted as an alternative to the *R*-values in Table C402.2. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *U*-factor, *C*-factor, or *F*-factor from the “Group R” column of Table C402.1.2. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *U*-factor, *C*-factor or *F*-factor from the “All other” column of Table C402.1.2. The *C*-factor for the below grade exterior walls of the building envelope, as required in accordance with Table C402.1.2, shall extend to a depth of 10 feet (3048 mm) below the outside finished ground level, or to the level of the lowest floor, whichever is less.

~~**C402.2.4 Thermal resistance of below grade walls.** The minimum thermal resistance (*R*-value) of the insulating material installed in, or continuously on, the below grade walls shall be as specified in Table C402.2, and shall extend to a depth of 10 feet (3048 mm) below the outside finished ground level, or to the level of the lowest floor, whichever is less.~~

Reason: This proposal is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

This proposal is intended to clarify the use and application of the codes prescriptive building thermal envelope provisions and does not contain changes to the technical requirements of the code. Detailed reasons are as follows:

This proposal moves and clarifies, but does not delete the provisions of Section C402.2.4 of the 2012 IECC.

As originally written, Section C402.2.4 requires that both the *R*-value and the *U*-factor methods of Sections C402.1.1 and C402.1.2 comply with the *R*-values for above grade wall insulation indicated in Table C402.2. However, only *R*-values are listed in Table R402.2. It does not make sense to require the *U*-factors method of Table R401.1.1, which contains values for below grade insulation, to also comply with the *R*-value method for below grade insulation. Section C402.2.4 is really intended to require that the thermal properties required for below-grade walls under either method extend at least 10 feet below grade or to the floor level, whichever is less. This proposal clarifies that by adding footnotes to the tables associated with both of these methods. It is only by the application of these tables that this information becomes relevant. Where these requirements are currently located they become disconnected and their application to the tables becomes unclear and unlikely.

Note that the *R*-values in Table C402.2 are based on analysis of the insulation components only. Although a wall without any insulation would have an *R*-value of 0, it has a *C*-factor of 0.1140. This is because the *U*-values for walls in Table C402.1.2 are based on the impact of all components of the building envelope assembly, not just the insulation components. The values in Table C402.1.2 consider the impact of all materials that compose each building envelope assembly, including whether block, wood stud, metal stud, solid concrete or other materials are used, and the amount of and location of the insulation components. Because Tables C402.1.2 and C402.2 evaluate thermal properties in different

ways, it is important that the thermal resistance of below grade walls are addressed in a manner that consistent with the manner that they are addressed in each table. This proposal accomplishes that goal and preserves the potential application of each table to below grade walls.

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: This code change proposal will not increase the cost of construction. This proposal is a clarification and, as such, will not increase the cost of construction.

CE82-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.1.1 #4-EC-THOMPSON-SEHPCAC.doc

CE83 – 13

C402.1.2

Proponent: Deborah Taylor, RA, LEED AP, Deborah F. Taylor Consulting, LLC, representing self
(taylor@dftconsultingny.com)

Revise as follows:

C402.1.2 U-factor alternative. An assembly with a U-factor, C-factor, or F-factor equal to or less than that specified in Table C402.1.2 shall be permitted as an alternative to the R-value in Table C402.2.

Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the U-factor, C-factor, or F-factor from the "Group R" column of Table C402.1.2. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the U-factor, C-factor or F-factor from the "All other" column of Table C402.1.2. All U-factor and C-factor calculations shall take into account as applicable exposed edges of floor slabs.

Reason: Slab edges are a location for heat loss and are frequently omitted from calculations.

Cost Impact: The change proposal will not increase the cost of construction. It adds no new energy requirement.

CE83-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.1.2-EC-TAYLOR.doc

CE84 – 13

C202 (NEW), C402.1.2.1 (NEW), R202 (NEW) (IRC N1101.9 (NEW)), R402.1.3.1 (NEW) (IRC N1102.1.3.1 (NEW)), R402.1.4 (IRC N1102.1.4)

Proponent: Jay Crandell, ARES Consulting, representing American Chemistry Council- Foam Sheathing Committee (jcrandell@aresconsulting.biz)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Add new text as follows:

SECTION C202 GENERAL DEFINITIONS

C402.1.2.1 Airspace U-factor. Where the U-factor of an airspace enclosed within an assembly is used as part of the calculation of the assembly U-factor, the airspace shall be constructed as an *ideal airspace*. The thermal resistance of the air-space shall be determined in accordance with the ASHRAE *Handbook of Fundamentals* or tested in accordance with Section C303.1.4 for the applicable direction of heat flow. Where the air-space is not constructed as an *ideal airspace*, thermal resistance of the air-space shall not be included in the assembly U-factor.

Add new definition as follows:

IDEAL AIRSPACE. An airspace contained within a cavity of a field-built assembly that, where used to contribute to thermal resistance of the assembly, is bounded on all sides by solid materials with joints and gaps between bounding materials or holes in bounding materials sealed to prevent air movement into or out of the airspace.

PART II – IECC-RESIDENTIAL PROVISIONS

SECTION R202 (N1101.9) GENERAL DEFINITIONS

Revise as follows:

R402.1.3.1 (N1102.1.3.1) Airspace U-factor. Where the U-factor of an airspace enclosed within an assembly is used as part of the calculation of the assembly U-factor, the airspace shall be constructed as an *ideal airspace*. The thermal resistance of the air-space shall be determined in accordance with the ASHRAE *Handbook of Fundamentals* or tested in accordance with Section R303.1.4 for the applicable direction of heat flow. Where the air-space is not constructed as an *ideal airspace*, thermal resistance of the air-space shall not be included in the assembly U-factor.

R402.1.4 (N1102.1.4) Total UA alternative. If the total *building thermal envelope* UA (sum of U-factor times assembly area) is less than or equal to the total UA resulting from using the U-factors in Table R402.1.3 (multiplied by the same assembly area as in the proposed building), the building shall be considered in compliance with Table R402.1.1. The UA calculation shall be done using a method consistent with the ASHRAE *Handbook of Fundamentals* and shall include the thermal bridging effects of framing materials. The U-factor contribution of airspaces enclosed within an assembly shall comply with Section R402.1.3.1. The SHGC requirements shall be met in addition to UA compliance.

Add new definition as follows:

IDEAL AIRSPACE. An airspace contained within a cavity of a field-built assembly that, where used to contribute to thermal resistance of the assembly, is bounded on all sides by solid materials with joints and gaps between bounding materials or holes in bounding materials sealed to prevent air movement into or out of the airspace.

Reason: The ASHRAE Handbook of Fundamentals, Chapter 26, Table 3 lists the allowable thermal properties for airspaces in a variety of configurations. Footnote b to this table says in part "... Values apply for ideal conditions (i.e., air spaces of uniform thickness bounded by plane, smooth, parallel surfaces with no air leakage to or from the space)..". This concern is unique to the use of an air-space for thermal resistance for a number of reasons. First, an air-space creates a path of least resistance for any air infiltration and this makes air-space thermal performance particularly susceptible to loss of thermal performance due to air infiltration. The test basis and analytical basis of these airspace thermal values are based on ideal conditions or an "ideal airspace" that, most importantly, allows for no air leakage to or from the airspace. In essence, a field-built air-space is intended to trap air as well as sealed or manufactured mass insulation products that provide at least some resistance to air-movement. Furthermore, air-space thermal performance is dynamic, dependent on both heat flow direction and temperature difference. As such, use of the ASHRAE Fundamentals values for thermal resistance of airspaces requires the user to use boundary conditions similar to those used to establish the thermal values. Alternatively, the performance of non-ideal air spaces which allow some amount of air-leakage into or out of the airspace must have reduced (non-ideal) thermal performance qualified by appropriate testing with representative boundary conditions. Unfortunately, such a standardized test method does not currently exist. Without this proposal to provide clear enforceable language consistent the technical basis of airspace thermal performance, use of air-space thermal properties will continue to be determined based on ideal conditions that are often far from those actually provided in practice, resulting in performance that can be, in worst case, as little as 15% of that claimed based on ideal airspace conditions (refer to independent lab test data reported at <http://fsc.americanchemistry.com/Energy-Code/Energy-Code-Compliance.pdf>) .

Cost Impact: The code change proposal will not increase the cost of construction.

CE84-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.1.2.1 (NEW)-EC-CRANDELL.doc

CE85 – 13

C402.1.2.1 (NEW), Table C402.2.3 (NEW)

Proponent: Mark Nowak, M. Nowak Consulting LLC, representing Steel Framing Alliance

Add new text as follows:

C402.1.2.1 Thermal resistance of cold-formed steel walls. U-factors of walls with cold-formed steel studs shall be permitted to be determined in accordance with Equation 4-X:

$$U = 1/[R_s + (R_{ins} \times F_c)] \quad \text{Equation 4-x}$$

Where:

R_s = The cumulative R-value of the wall components along the path of heat transfer, excluding the cavity insulation and steel studs.

R_{ins} = The R-value of the cavity insulation.

F_c = The correction factor from Table 402.2.3

TABLE C402.2.3
 F_c VALUES FOR STEEL STUD WALL ASSEMBLIES

<u>Nominal stud depth</u> <u>(inches)</u>	<u>Spacing of framing</u> <u>(inches)</u>	<u>Cavity R-Value</u>	<u>Correction factor</u> <u>(F_c)</u>
<u>3-1/2</u>	<u>16</u>	<u>13</u>	<u>0.46</u>
		<u>15</u>	<u>0.43</u>
<u>3-1/2</u>	<u>24</u>	<u>13</u>	<u>0.55</u>
		<u>15</u>	<u>0.52</u>
<u>6</u>	<u>16</u>	<u>19</u>	<u>0.37</u>
		<u>21</u>	<u>0.35</u>
<u>6</u>	<u>24</u>	<u>19</u>	<u>0.45</u>
		<u>21</u>	<u>0.43</u>
<u>8</u>	<u>16</u>	<u>25</u>	<u>0.31</u>
<u>8</u>	<u>24</u>	<u>25</u>	<u>0.38</u>

Reason: This proposal addresses a gap in the code in regard to calculating U-factors for steel stud wall assemblies. The proposed equation and correction factors are the same as those in the 2003 IECC residential section. They were removed in favor of simplistic prescriptive solutions in the 2004 and later editions. The code has lacked direction in the commercial section for determining U factors of cold-formed steel assemblies. Although the 2003 edition only contained this equation in the residential section, the assumptions underlying the methodology are equally applicable to commercial buildings. The same calculation procedure is recognized in ASHRAE 90.2. It is also the same methodology used by the ASHRAE 90.1 envelope subcommittee in developing the U factor tables in Appendix Table A.3.3 (Assembly U-Factors for Steel-Framed Walls) for non-residential buildings. Inclusion of the equation and correction factors in this section of the IECC will provide users with a calculation method without the need to refer to additional references for U-factors of conventional C-shaped steel stud walls. It will enable calculations with varying levels of cavity and continuous insulation for compliance with the envelope requirements in Section C402.

Cost Impact: The code change proposal will not increase the cost of construction.

CE85-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

C402.1.2.1 (NEW)-EC-NOWAK.doc

CE86 – 13

C402.1, C402.1.3 (NEW)

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

Revise as follows:

C402.1 General (Prescriptive). The building thermal envelope shall comply with Section C402.1.1. Section C402.1.2 or Section C402.1.3 shall be permitted as an alternative to the *R*-values specified in Section C402.1.1.

C402.1.3 Total UA alternative. Proposed buildings with a total building UA equal or less than the code-target total building UA shall be considered in compliance with Section C402.1. The UA for each assembly is the area or perimeter of that assembly times the applicable U-factor, C-factor or F-factor for that assembly. The building total UA is the sum of UAs for the assemblies. The area or perimeter for each assembly shall be as proposed. The code-target U-factor, C-factor or F-factor shall be the applicable value from Tables C402.1.2 and C402.3. The proposed building U-factor, C-factor or F-factor shall be that of the proposed assembly.

The code-target *U*-factors for skylight areas greater than 3 percent of the roof and above-grade wall fenestration areas greater than 30 percent shall be the *U*-factors of the surrounding opaque assembly.

C402.3.4 Area-weighted SHGC. An area-weighted average of fenestration products more than 50-percent glazed shall be permitted to satisfy the SHGC requirements.

Reason: The commercial IECC does not specifically allow a UA tradeoff. This UA tradeoff similar to the residential UA tradeoff in Section R402.1.4 in the residential IECC. This change explicitly allows an area-weighted average of fenestration SHGC as is currently allowing for residential in Section R402.3.2.

Cost Impact: The code change proposal will not increase the cost of construction.

CE86-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.1-EC-CONNER

CE87 – 13

C402.1, C402.1.3 (NEW), C402.3.4 (NEW)

Proponent: Eric Makela, Britt/Makela Group, Inc., representing Northwest Energy Codes Group (eric@brittmakela.com)

Revise as follows:

C402.1 General (Prescriptive). The building thermal envelope shall comply with Section C402.1.1, Section C402.1.2, or Section C402.1.3 shall be permitted as an alternative to the *R*-values specified in Section C402.1.1.

C402.1.3 Total UA alternative. Proposed buildings with a total building UA equal to or less than the code-target total building UA shall be considered in compliance with Section C402.1. The UA for each assembly is the area or perimeter of that assembly times the applicable U-factor, C-factor, or F-factor for that assembly. The building total UA is the sum of UAs for the assemblies. Proposed fenestration and skylights shall be subject to limits under Section C402.3.1. The area or perimeter for each assembly shall be as proposed. The code-target U-factor, C-factor, or F-factor shall be the applicable value from Tables C402.1.2 and C402.3. The proposed building U-factor, C-factor, or F-factor shall be that of the proposed assembly and shall be calculated in accordance with the ASHRAE Fundamentals Handbook, from ANSI/ASHRAE/IESNA 90.1 Appendix A, or results of laboratory measurements according to acceptable methods of test. Use of opaque assembly U-factors, C-factors, and F-factors from ANSI/ASHRAE/IESNA 90.1 Appendix A shall be permitted for the proposed assemblies, provided that the construction complies with the applicable construction details from ANSI/ASHRAE/IESNA 90.1 Appendix A.

The code-target U-factors for skylight areas greater than 3 percent of the roof and above-grade wall fenestration areas greater than 30 percent shall be the U-factors of the surrounding opaque assembly.

C402.3.4 Area-weighted SHGC. An area weighted SHGC shall be permitted to satisfy SHGC requirements.

Reason: The proposed UA approach allows for a design heat loss rate UA approach and solar heat gain coefficient rate (SHGC) area weighted average approach to demonstrate compliance with the IECC. Currently there are no prescriptive trade-off options within the IECC for the commercial envelope. The code user can either comply with Table C402.1.2, Opaque Thermal Envelope Assembly Requirements (U-factor table), or Table C402.2 Opaque Thermal Envelope Requirements (R-value Table). The only option for flexibility is by using Section C407 Total Building Performance requirements or using an ASHRAE approach. The DOE-developed COMCheck software tool is available but this is not specifically referenced in the IECC and is allowed under C102 Alternate Materials – Method of Construction, Design, or Insulating Systems. This is the most widely used energy code compliance software in the country but is dependent on continued funding from the U.S. Department of Energy to upgrade and maintain the software.

The UA option is modeled after Section R402.1.4 Total UA Alternative in the residential provisions of the IECC. The language has been enhanced to provide more guidance for the code user on how to perform the code-target budget calculations and the proposed UA calculation. This type of calculation will allow the user flexibility without decreasing the stringency of the code. The concept has been and is currently being used in Washington State as part of their commercial building energy code.

Cost Impact: The code change proposal will not increase the cost of construction. It offers an alternative method to comply with the IECC that may actually reduce the first cost of compliance with the code because of envelope optimization.

CE87-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.1-EC-MAKELA.doc

CE88 – 13

C402.1, C402.1.3 (NEW)

Proponent: Lee Kranz, City of Bellevue, WA, representing Washington Association of Building Officials Technical Code Development (WABO TCD) (lkranz@bellevuewa.gov)

Revise as follows:

C402.1 General (Prescriptive). The building thermal envelope shall comply with Section C402.1.1. Section C402.1.2 or Section C402.1.3 shall be permitted as an alternative to the R-values specified in Section C402.1.1.

C402.1.3 Component performance alternative. Building envelope values and fenestration areas determined in accordance with Equation 4-3 shall be permitted in lieu of compliance with the U-factors, F-factors and C-factors in Tables C402.1.2 and C402.3 and the maximum allowable fenestration areas in Section C402.3.1.

$$(UA \text{ Sum}) + (FL \text{ Sum}) + (CA \text{ Sum}) + (XVG) + (XSky) \leq \text{Zero.} \quad \textbf{(Equation 4-3)}$$

Where:

UA Sum = Sum of the (UA Dif) values for each assembly that comprises a portion of the building thermal envelope.

UA Dif = (UA Proposed) – (UA Table).

UA Table = (Maximum allowable U-factor specified in Table C402.1.2 or Table C402.3) x (Area).

UA Proposed = (Proposed U-value) x (Area).

FL Sum = Sum of the (FL Dif) values for each slab on grade assembly that comprises a portion of the building thermal envelope.

FL Dif = (FL Proposed) – (FL Table).

FL Table = (Maximum allowable F-factor specified in Table C402.1.2) x (Perimeter length).

FL Proposed = (Proposed F-value) x (Perimeter length) .

CA Sum = Sum of the (CA Dif) values for each below-grade wall assembly that comprises a portion of the building thermal envelope.

CA Dif = (CA Proposed) – (CA Table).

CA Table = (Maximum allowable C-factor specified in Table C402.1.2) x (area).

CA Proposed = (Proposed C-value) x (area).

XVG (Excess Vertical Glazing Value) = (XVGArea x UVG) – (XVGArea x UWall), but not less than zero.

XVGArea (Excess Vertical Glazing Area) = (Proposed Vertical Glazing Area) – (Allowable Vertical Glazing Area determined in accordance with Section C402.3.1).

UA Wall = Sum of the (UA Proposed) values for each opaque assembly comprising a portion of the exterior wall.

UWall = UA Wall / total opaque exterior wall area.

UA VG = Sum of the (UA Proposed) values for each vertical glazing assembly.

UVG = UA VG / total vertical glazing area.

XSky (Excess Skylight Value) = (XSArea x USky) – (XSArea x U Roof), but not less than zero.

XSArea (Excess Skylight Area) = (Proposed Skylight Area) – (Allowable Skylight Area determined in accordance with Section C402.3.1).

UA Roof = Sum of the (UA Proposed) values for each opaque assembly comprising a portion of a roof.

URoof = UA Roof / total opaque roof area.

UA Sky = Sum of the (UA Proposed) values for each skylight assembly.

$$USky = UA_{Sky} / \text{total skylight area.}$$

Reason: This proposal provides an Alternative component performance path for commercial buildings parallel to the "Total UA Alternative" for residential buildings in Section R402.1.4, but accounting for slab edge F-factors, basement wall C-Factors, and fenestration areas in excess of the code limits.

This optional path provides significant additional flexibility for design teams, allowing them to trade off the U values of various building envelope components, without having to do a full Total Building Performance computation. The calculation can be done by an architect or engineer using a simple calculator. It is variation of a widely-used method in the Washington State code, and results in lower overall costs and more design freedom without any sacrifice of energy conservation.

The formula allows various envelope components to be traded off against each other, provided that the overall calculated building heat loss of the proposed design is no greater than a code-compliant design. Thus, greater window area might be acceptable with lower window U-values, or wall insulation might be reduced in certain areas while roof insulation is increased.

The five principal factors in the equation are:

- (UA Sum) The sum of the U-value for each envelope assembly times its area.
- (FL Sum) The sum of the F-value for each slab edge assembly times its length.
- (CA Sum) The sum of the C-value for each basement wall assembly times its area.
- (XSky) Additional amount for skylight area in excess of code maximum – Substitutes the average roof U-value for the average skylight U-value in the base case for the excess skylight area.
- (XVG) Additional amount for vertical glazing area in excess of maximum – Substitutes the average wall U-value for the average vertical glazing U-value in the base case for the excess vertical glazing area

Cost Impact: The code change proposal will not increase the cost of construction.

CE88-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.1.3 (NEW)-EC-KRANZ.doc

CE89 – 13

Table C402.1.2, Table C402.2

Proponent: Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; Bill Prindle, Energy Efficient Codes Coalition; and Don Vigneau, Northeast Energy Efficiency Partnerships.

Revise as follows:

Table C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS

Climate Zone	1		2		3		4		5		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Roofs																
Insulation entirely above deck	U-0.048	U-0.048 0.039	U-0.048 0.039	U-0.048 0.039	U-0.048 0.039	U-0.048 0.039	U-0.039 0.032	U-0.039 0.032	U-0.039 0.032	U-0.039 0.032	U-0.032	U-0.032	U-0.028	U-0.028	U-0.028	U-0.028
Metal buildings	U-0.044 0.041	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.031	U-0.031 0.029	U-0.029	U-0.029	U-0.029 0.026	U-0.029 0.026
Attic and other	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027 0.021	U-0.027 0.021	U-0.027 0.021	U-0.021	U-0.021	U-0.021	U-0.021 0.017	U-0.021 0.017	U-0.021 0.017	U-0.021 0.017
Walls, Above Grade																
Mass	U-0.142	U-0.142	U-0.142	U-0.123	U-0.110	U-0.104	U-0.104	U-0.090	U-0.078	U-0.078	U-0.078	U-0.071	U-0.061	U-0.061	U-0.061 0.048	U-0.061 0.048
Metal building	U-0.079	U-0.079	U-0.079	U-0.079	U-0.079	U-0.052	U-0.052	U-0.052 0.050	U-0.052	U-0.052 0.050	U-0.052 0.050	U-0.052 0.050	U-0.052 0.044	U-0.039	U-0.052 0.039	U-0.039
Metal framed	U-0.077	U-0.077	U-0.077	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064 0.055	U-0.064 0.055	U-0.064 0.049	U-0.057 0.049	U-0.064 0.042	U-0.052 0.042	U-0.045 0.037
Wood framed and other	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064 0.051	U-0.064 0.051	U-0.051	U-0.051	U-0.051	U-0.051	U-0.036 0.032
Walls, Below Grade																
Below-grade wall	C-1.140	C-1.140	C-1.140	C-1.140	C-1.140	C-1.140	C-0.119	C-0.119 0.092	C-0.119	C-0.119 0.092	C-0.119 0.092	C-0.119 0.063	C-0.092 0.063	C-0.092 0.063	C-0.092 0.063	C-0.092 0.063
Floors																
Mass	U-0.322	U-0.322	U-0.107	U-0.087	U-0.076	U-0.076	U-0.076 0.057	U-0.074 0.051	U-0.074	U-0.064 0.051	U-0.064 0.051	U-0.057 0.051	U-0.055 0.042	U-0.051 0.042	U-0.051 0.038	U-0.051 0.038
Joist/framing	U-0.066	U-0.066	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033
Slab-on-Grade Floors																

Unheated slabs	F-0.73	F-0.73	F-0.73	F-0.73	F-0.73	F-0.73 <u>0.54</u>	F-0.54 <u>0.52</u>	F-0.54 <u>0.52</u>	F-0.54 <u>0.52</u>	F-0.54 <u>0.51</u>	F-0.54 <u>0.51</u>	F-0.52 <u>0.434</u>	F-0.40	F-0.40	F-0.40	F-0.40
Heated slabs	F-0.70	F-0.70	F-0.70	F-0.70	F-0.70	F-0.70	F-0.65	F-0.65	F-0.58	F-0.58	F-0.58	F-0.58	F-0.55	F-0.55	F-0.55	F-0.55 <u>0.373</u>

(Footnotes not shown remain unchanged.)

Table C402.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS

Climate Zone	1		2		3		4		5		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Roofs																
Insulation entirely above deck	R-20ci	R-20 25ci	R-20 25ci	R-20 25ci	R-20 25ci	R-20 25ci	R-25 30ci	R-25 30ci	R-25 30ci	R-25 30ci	R-30ci	R-30ci	R-30 35ci	R-35ci	R-35ci	R-35ci
Metal buildings (with R-5 thermal blocks)	R-19+ R-11 LS	R-19+ R-11 LS	R-19+ R-11 LS	R-19+ R-11 LS	R-19+ R-11 LS	R-19+ R-11 LS	R-19+ R-11 LS	R-19+ R-11 LS	R-19+ R-11 LS	R-19+ R-11 LS	R-25+ R-11 LS	R-2530+ R-11 LS	R-30+ R-11 LS	R-30+ R-11 LS	R-30 25+ R-11+ R-11 LS	R-30 25+ R-11+ R-11 LS
Attic and other	R-38	R-38	R-38	R-38	R-38	R-38	R-38 49	R-38 49	R-38 49	R-49	R-49	R-49	R-49 60	R-4960	R-49 60	R-49 60
Walls, Above Grade																
Mass	R-5.7ci	R-5.7ci	R-5.7ci	R-7.6ci	R-7.6ci	R-9.5ci	R-9.5ci	R-11.4ci	R-11.4ci	R-13.3ci	R-13.3ci	R-15.2ci	R-15.2ci	R-15.2ci	R-25ci	R-25ci
Metal Building	R-13 + R-6.5ci	R-13 + R-6.5ci	R-13 + R-6.5ci	R-13 + R-13ci	R-13 + R-6.5ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13 19ci	R-13 + R-13 19ci	R-13 + R-13 19ci	R-13 + R-13 19ci	R-13 + R-13 19ci	R-13 + R-13 22.1ci	R-13 + R-19.5ci	R-13 + R-13 25ci	R-13 + R-19.5 25ci
Metal framed	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-5ci	R-13 + 7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5 10ci	R-13 + R-7.5 10ci	R-13 + R-7.5 12.5ci	R-13 + R-7.5 12.5ci	R-13 + R-7.5 12.5ci	R-13 + R-15.6ci	R-13 + R-7.5 18.8ci	R-13 + R-17.5 18.8ci
Wood framed & other	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8 7.5ci or R-20 + R-5ci	R-13 + R-7.5ci or R-20 + R-3.8 5ci	R-13 + R-7.5ci or R-20 + R-3.8 5ci	R-13 + R-7.5ci or R-20 + R-3.8 5ci	R-13 + R-7.5ci or R-20 + R-3.8 5ci	R-13 + R-7.5ci or R-20 + R-3.8 5ci	R-13 + R-15.6 18.8ci or R-20 + R-10 ci	R-13 + R-15.6 18.8ci or R-20 + R-10 ci
Walls, Below Grade																
Below-grade wall	NR	NR	NR	NR	NR	NR	R-7.5ci	R-7.5 10ci	R-7.5ci	R-7.5 10ci	R-7.5 10ci	R-7.5 15ci	R-10 15ci	R-10 15ci	R-10 15ci	R-12.5 15ci
Floors																
Mass	NR	NR	R-6.3ci	R-8.3ci	R-10ci	R-10ci	R-10 14.6ci	R-10.4 16.7ci	R-10 14.6ci	R-12.5 16.7ci	R-12.5 16.7ci	R-12.5 16.7ci	R-15 20.9ci	R-16.7 20.9ci	R-15 23ci	R-16.7 23ci
Joist/framing	NR	NR	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30 38	R-30 38	R-30 38	R-30 38	R-30 38	R-30 38
Slab-on-Grade Floors																
Unheated slabs	NR	NR	NR	NR	NR	NR R-10 for 24" below	R-1015 for 24" below	R-1015 for 24" below	R-1015 for 24" below	R-10 20 for 24" below	R-1020 for 24" below	R-1520 for 24"48" below	R-15 20 for 24" below	R-1520 for 24"48" below	R-1520 for 24"48" below	R-2025 for 24"48" below
Heated slabs	R-7.5 for 12"	R-7.5 for 12"	R-7.5 10 for	R-7.515 for	R-1015 for 24"	R-1015 for 24"	R-1520 for 24"	R-1520 for	R-1520 for	R-1520 for	R-1520 for	R-20 25 for 48"	R-2025 for	R-2025 for 48"	R-2025 for 48"	R-20 for 48"

	below	below	<u>12"24"</u> below	<u>12"24"</u> below	below	below	below	<u>24"48"</u> below	<u>36"48"</u> below	<u>36"48"</u> below	<u>36"48"</u> below	below	<u>24"48"</u> below	below	below	below <u>full slab</u>
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(Footnotes not shown remain unchanged.)

Reason: The purpose of this proposed code change is to update and increase the stringency of the opaque thermal envelope insulation tables in the *IECC* based on the values in *ANSI/ASHRAE/IES Addendum bb to ANSI/ASHRAE/IES Standard 90.1-2010* (approved in 2012). Specifically, where *IECC* values remain more stringent and energy efficient, the proposal retains the *IECC* values. Where the *ASHRAE* values are more stringent and energy efficient, those values have replaced the current *IECC* values. Since *ASHRAE 90.1* and the *IECC* use similar approaches to opaque envelope criteria, *ASHRAE 90.1* is an option for compliance under the *IECC*, and *ASHRAE 90.1* is the federal baseline commercial energy code standard, it is reasonable at this time to update *IECC* values to reflect improved *ASHRAE* values in the absence of a separate comprehensive analysis of opaque envelope values. However, where the *IECC* remains more stringent, *IECC* values should be retained to avoid backsliding and reductions in energy efficiency, in order to keep the *IECC* a premier commercial energy code.

Cost Impact: The code change proposal will increase the cost of construction.

CE89-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

C402.1.2T-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE-VIGNEAU.doc

CE90 – 13

Table C402.1.2, Table C402.2

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers
(sferguson@ashrae.org)

Revise as follows:

TABLE C402.1.2 OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS^a

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Roofs																
Insulation entirely above deck	U-0.048	U-0.048 <u>0.039</u>	U-0.048 <u>0.039</u>	U-0.048 <u>0.039</u>	U-0.048 <u>0.039</u>	U-0.048 <u>0.039</u>	U-0.039 <u>0.032</u>	U-0.039 <u>0.032</u>	U-0.039 <u>0.032</u>	U-0.039 <u>0.032</u>	U-0.032	U-0.032	U-0.028	U-0.028	U-0.028	U-0.028
Metal buildings	U-0.044 <u>0.041</u>	U-0.035 <u>0.041</u>	U-0.035 <u>0.041</u>	U-0.035 <u>0.041</u>	U-0.035 <u>0.041</u>	U-0.035 <u>0.041</u>	U-0.035 <u>0.037</u>	U-0.035 <u>0.037</u>	U-0.035 <u>0.037</u>	U-0.035 <u>0.037</u>	U-0.031	U-0.031 <u>0.029</u>	U-0.029	U-0.029	U-0.029 <u>0.026</u>	U-0.029 <u>0.026</u>
Attic and other	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027 <u>0.021</u>	U-0.027 <u>0.021</u>	U-0.027 <u>0.021</u>	U-0.027 <u>0.021</u>	U-0.021	U-0.021	U-0.021 <u>0.017</u>	U-0.021 <u>0.017</u>	U-0.021 <u>0.017</u>	U-0.021 <u>0.017</u>
Walls, Above Grade																
Mass	U-0.142 <u>0.580</u>	U-0.142 <u>0.151^c</u>	U-0.142 <u>0.151^c</u>	U-0.123	U-0.110 <u>0.123</u>	U-0.104	U-0.104	U-0.090	U-0.078 <u>0.090</u>	U-0.078 <u>0.080</u>	U-0.078 <u>0.080</u>	U-0.071	U-0.061 <u>0.071</u>	U-0.061 <u>0.071</u>	U-0.061 <u>0.048</u>	U-0.061 <u>0.048</u>
Metal building	U-0.079 <u>0.094</u>	U-0.079 <u>0.094</u>	U-0.079 <u>0.094</u>	U-0.079 <u>0.094</u>	U-0.079 <u>0.094</u>	U-0.052 <u>0.071</u>	U-0.052 <u>0.060</u>	U-0.052 <u>0.050</u>	U-0.052 <u>0.050</u>	U-0.052 <u>0.050</u>	U-0.052 <u>0.050</u>	U-0.052 <u>0.050</u>	U-0.052 <u>0.044</u>	U-0.039 <u>0.044</u>	U-0.052 <u>0.039</u>	U-0.039
Metal framed	U-0.077 <u>0.124</u>	U-0.077 <u>0.124</u>	U-0.077 <u>0.084</u>	U-0.064	U-0.064 <u>0.077</u>	U-0.064	U-0.064	U-0.064	U-0.064 <u>0.055</u>	U-0.064 <u>0.055</u>	U-0.064 <u>0.049</u>	U-0.057 <u>0.049</u>	U-0.064 <u>0.049</u>	U-0.052 <u>0.042</u>	U-0.045 <u>0.037</u>	U-0.045 <u>0.037</u>
Wood framed and other	U-0.064 <u>0.089</u>	U-0.064 <u>0.089</u>	U-0.064 <u>0.089</u>	U-0.064 <u>0.089</u>	U-0.064 <u>0.089</u>	U-0.064	U-0.064	U-0.064	U-0.064 <u>0.051</u>	U-0.064 <u>0.051</u>	U-0.051	U-0.051	U-0.051	U-0.051	U-0.036 <u>0.032</u>	U-0.036 <u>0.032</u>
Walls, Below Grade																
Below-grade wall ^b	C-1.140	C-1.140	C-1.140	C-1.140	C-1.140	C-1.140	C-0.119	C-0.119 <u>0.092</u>	C-0.119	C-0.119 <u>0.092</u>	C-0.119 <u>0.092</u>	C-0.19 <u>0.063</u>	C-0.092 <u>0.063</u>	C-0.092 <u>0.063</u>	C-0.092 <u>0.063</u>	C-0.092 <u>0.063</u>
Floors																
Mass	U-0.322	U-0.322	U-0.107	U-0.087	U-0.076 <u>0.076</u>	U-0.076 <u>0.076</u>	U-0.076 <u>0.057</u>	U-0.074 <u>0.051</u>	U-0.074 <u>0.057</u>	U-0.064 <u>0.051</u>	U-0.064 <u>0.051</u>	U-0.057 <u>0.051</u>	U-0.055 <u>0.042</u>	U-0.051 <u>0.042</u>	U-0.055 <u>0.038</u>	U-0.051 <u>0.038</u>
Metal Joist/framing	U-0.066 <u>0.350</u>	U-0.066 <u>0.350</u>	U-0.033 <u>0.038</u>	U-0.033 <u>0.038</u>	U-0.033 <u>0.038</u>	U-0.033 <u>0.032</u>	U-0.033 <u>0.038</u>	U-0.033 <u>0.038</u>	U-0.033 <u>0.038</u>	U-0.033 <u>0.038</u>	U-0.033 <u>0.032</u>	U-0.033 <u>0.032</u>	U-0.033 <u>0.032</u>	U-0.033 <u>0.032</u>	U-0.033 <u>0.032</u>	U-0.033 <u>0.032</u>
Wood Framed and Other	U-0.282	U-0.282	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027
Slab-on-Grade Floors																
Unheated slabs	F-0.73	F-0.73	F-0.73	F-0.73	F-0.73	F-0.73 <u>0.54</u>	F-0.54 <u>0.52</u>	F-0.54 <u>0.52</u>	F-0.54 <u>0.520</u>	F-0.54 <u>0.510</u>	F-0.54 <u>0.510</u>	F-0.52 <u>0.434</u>	F-0.40 <u>0.510</u>	F-0.40 <u>0.434</u>	F-0.40 <u>0.434</u>	F-0.40 <u>0.424</u>
Heated slabs	F-0.70 <u>1.020</u>	F-0.70 <u>1.020</u>	F-0.70 <u>0.900</u>	F-0.70 <u>0.860</u>	F-0.70 <u>0.860</u>	F-0.70 <u>0.860</u>	F-0.65 <u>0.843</u>	F-0.65 <u>0.688</u>	F-0.58 <u>0.688</u>	F-0.58 <u>0.688</u>	F-0.58 <u>0.688</u>	F-0.58 <u>0.671</u>	F-0.55 <u>0.671</u>	F-0.55 <u>0.671</u>	F-0.55 <u>0.671</u>	F-0.55 <u>0.373</u>

- Use of opaque assembly *U*-factors, *C*-factors, and *F*-factors from ANSI/ASHRAE/IESNA 90.1 Appendix A shall be permitted, provided the construction complies with the applicable construction details from ANSI/ASHRAE/IESNA 90.1 Appendix A.
- Where heated slabs are below grade, below-grade walls shall comply with the *F*-factor requirements for heated slabs.
- R-5.7ci is allowed to be substituted with concrete block walls complying with ASTM C 90, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores filled with materials having a maximum thermal conductivity of 0.44 Btu-in/h-f °F.

TABLE C402.2 OPAQUE THERMAL ENVELOPE REQUIREMENTS^a

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Roofs																
Insulation entirely above deck	R-20ci	R-20ei R-25ci	R-20ei R-25ci	R-20ei R-25ci	R-20ei R-25ci	R-20ei R-25ci	R-25ei R-30ci	R-25ei R-30ci	R-25ei R-30ci	R-25ei R-30ci	R-30ci	R-30ci	R-35ci	R-35ci	R-35ci	R-35ci
Metal buildings (with R-5 thermal blocks) ^{a, b}	R-19 + R-11 LS R-10 + R-19 FC	R-19 + R-11 LS R-10 + R-19 FC	R-19 + R-11 LS R-10 + R-19 FC	R-19 + R-11 LS R-10 + R-19 FC	R-19 + R-11 LS R-10 + R-19 FC	R-19 + R-11 LS R-10 + R-19 FC	R-19 + R-11 LS or R-25 + R-8 LS	R-19 + R-11 LS or R-25 + R-8 LS	R-19 + R-11 LS or R-25 + R-8 LS	R-19 + R-11 LS or R-25 + R-8 LS	R-25 + R-11 LS	R-25ei R-30 + R-11 LS	R-30 + R-11 LS	R-30 + R-11 LS	R-30 + R-11 LS ± R-11 LS	R-30 + R-11 LS ± R-11 LS
Attic and other	R-38	R-38	R-38	R-38	R-38	R-38	R-38 R-49	R-38 R-49	R-38 R-49	R-49	R-49	R-49	R-49 R-60	R-49 R-60	R-49 R-60	R-49 R-60
Walls, Above Grade																
Mass	R-5.7ei NR	R-5.7ci ^c	R-5.7ci ^c	R-7.6ci	R-7.6ci	R-9.5ci	R-9.5ci	R-11.4ci	R-11.4ci	R-13.3ci	R-13.3ci	R-15.2ci	R-15.2ci	R-15.2ci	R-25.19ci	R-25.19ci
Metal building	R-13 + R-6.5ei R-0 + R-9.8 c.i.	R-13 + R-6.5ei R-0 + R-9.8 c.i.	R-13 + R-6.5ei R-0 + R-9.8 ci	R-13 + R-6.5ei R-0 + R-9.8 ci	R-13 + R-6.5ei R-0 + R-9.8 ci	R-13 + R-6.5ei R-0 + R-13 ci	R-13 + R-43ei R-0 + R-15.8 ci	R-13 + R-43ei R-0 + R-19 ci	R-13 + R-43ei R-0 + R-19 ci	R-13 + R-43ei R-0 + R-19 ci	R-13 + R-43ei R-0 + R-19 ci	R-13 + R-43ei R-0 + R-19 ci	R-13 + R-43ei R-0 + R-22.1 ci	R-13 + R-43ei R-0 + R-22.1 ci	R-13 + R-43ei R-0 + R-25.19ci	R-13 + R-43ei R-0 + R-25.19ci
Metal framed	R-13 + R-6ei	R-13 + R-6ei	R-13 + R-53.8ci	R-13 + R-7.5ci	R-13 + R-7.5 ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ei R-10ci	R-13 + R-7.5ei R-10ci	R-13 + R-7.5ei R-12.5 ci	R-13 + R-7.5ei R-12.5 ci	R-13 + R-7.5ei R-12.5 ci	R-13 + R-15.6ci	R-13 + R-7.5ei R-18.8ci	R-13 + R-7.5ei R-18.8ci
Wood framed and other	R-13 R-3.8ci or R-20	R-13 R-3.8ci or R-20	R-13 R-3.8ci or R-20	R-13 R-3.8ci or R-20	R-13 R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-7.5ci R-3.8ci or R-20 + R-19 + R-5ci	R-13 + R-7.5ci R-3.8ci or R-20 + R-19 + R-5ci	R-13 + R-7.5ci or R-20 + R-19 + R-5ci	R-13 + R-7.5ci or R-20 + R-19 + R-5ci	R-13 + R-7.5ci or R-20 + R-19 + R-5ci	R-13 + R-7.5ci or R-20 + R-19 + R-5ci	R-13 + R-15.6ci R-18.8ci or R-20 + R-10ci	R-13 + R-15.6ci R-18.8ci or R-20 + R-10ci
Walls, Below Grade																
Below-grade wall	NR	NR	NR	NR	NR	NR	R-7.5ci	R-7.5ei R-10ci	R-7.5ci	R-7.5ei R-10ci	R-7.5ei R-10ci	R-7.5ei R-15ci	R-10ci R-15ci	R-10ci R-15ci	R-10ci R-15ci	R-12.5ci R-15ci
Floors																
Mass	NR	NR	R-6.3ci	R-8.3ci	R-10ci	R-10ci	R-10ei R-14.6ci	R-10ei R-16.7ci	R-10ei R-14.6ci	R-10ei R-16.7ci	R-12.5ei R-16.7ci	R-12.5ei R-16.7ci	R-15ci R-20.9ci	R-16.7ci R-20.9ci	R-15ci R-23ci	R-16.7ci R-23ci
Metal Joist/framing	NR	NR	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30
Wood Framed and Other	NR	NR	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-38	R-38	R-38	R-38	R-38	R-38
Slab-on-Grade Floors																

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Unheated slabs	NR	NR	NR	NR	NR	NR R-10 for 24" below	R-10 for 24" below R-15 for 24" below	R-10 for 24" below R-15 for 24" below	R-10 for 24" below R-15 for 24" below	R-10 for 24" below R-15 for 24" below	R-15 for 24" below R-20 for 48" below	R-15 for 24" below R-20 for 48" below	R-15 for 24" below R-20 for 48" below	R-15 for 24" below R-20 for 48" below	R-15 for 24" below R-20 for 48" below	R-20 for 24" below R-25 for 48" below
Heated slabs	R-7.5 for 12" below	R-7.5 for 12" below	R-7.5 for 12" below R-10 for 24" below	R-7.5 for 12" below R-15 for 24" below	R-10 for 24" below R-15 for 24" below	R-10 for 24" below R-15 for 24" below	R-15 for 24" below R-20 for 24" below	R-15 for 24" below R-20 for 48" below	R-15 for 36" below R-20 for 48" below	R-15 for 36" below R-20 for 48" below	R-15 for 36" below R-20 for 48" below	R-20 for 48" below R-25 for 48" below	R-20 <u>25</u> for 24 <u>48</u> " below	R-20 <u>25</u> for 48" below	R-20 <u>25</u> for 48" below	R-20 for 48" below <u>full slab</u>
Opaque Doors																
Swinging	U-0.61 U-0.70	U-0.61 U-0.50	U-0.61 U-0.70	U-0.61 U-0.50	U-0.61 U-0.70	U-0.61 U-0.50	U-0.61 U-0.50	U-0.61 U-0.50	U-0.37 U-0.50	U-0.37 U-0.50	U-0.37 U-0.50	U-0.37 U-0.50	U-0.37 U-0.50	U-0.37 U-0.50	U-0.37 U-0.50	U-0.37 U-0.50
Roll-up or sliding	R-4.75 U-1.45	R-4.75 U-0.50	R-4.75 U-0.50	R-4.75 U-0.50	R-4.75 U-0.50	R-4.75 U-0.50	R-4.75 U-0.50	R-4.75 U-0.50	R-4.75 U-0.50	R-4.75 U-0.50	R-4.75 U-0.50	R-4.75 U-0.50	R-4.75 U-0.50	R-4.75 U-0.50	R-4.75 U-0.50	R-4.75 U-0.50

For SI: 1 inch = 25.4 mm. ci = Continuous insulation. NR = No requirement.

LS = *Liner System*—*Liner systems* shall have a minimum R-3 thermal spacer block between the purlins and the metal roof panels is required, unless compliance is shown by the overall assembly U-factor. A continuous membrane installed below the purlins and uninterrupted by framing members. Uncompressed, unfaced insulation rests on top of the membrane between the purlins.

FC = *Filled Cavity*—*Filled Cavity* assemblies shall have a minimum R-5 thermal spacer block between the purlins and the metal roof panels is required, unless compliance is shown by the overall assembly U-factor

- Assembly descriptions can be found in ANSI/ASHRAE/IESNA 90.1 Appendix A.
- Where using *R*-value compliance method, a thermal spacer block shall be provided, otherwise use the *U*-factor compliance method in Table C402.1.2
- R-5.7ci is allowed to be substituted with concrete block walls complying with ASTM C 90, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores filled with materials having a maximum thermal conductivity of 0.44 Btu-in/h-f °F.
- Where heated slabs are below grade, below-grade walls shall comply with the exterior insulation requirements for heated slabs.
- Steel floor joist systems shall be insulated to R-38.

Reason: This proposal will make the fenestration requirements consistent with those published in addendum bb to ANSI/ASHRAE/IES Standard 90.1. This addendum was a result of much investigations into the cost effectiveness of various assembly types. There was also additional research done for different types of metal building assemblies. This proposal incorporates corrections to the current IECC for those building types.

Cost Impact: The code change proposal will increase the cost of construction.

CE90-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

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CE91 – 13

Table C402.1.2, Table C402.2

Proponent: Michael D. Fischer, Kellen Company, representing Polyisocyanurate Insulation Manufacturers Association (mfischer@kellencompany.com)

Revise as follows:

**Table C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS**

Climate Zone	1		2		3		4		5		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Roofs																
Insulation entirely above deck	U-0.048	<u>U-0.048</u> <u>U-0.039</u>	<u>U-0.048</u> <u>U-0.039</u>	<u>U-0.048</u> <u>U-0.039</u>	<u>U-0.048</u> <u>U-0.039</u>	<u>U-0.048</u> <u>U-0.039</u>	<u>U-0.039</u> <u>U-0.032</u>	<u>U-0.039</u> <u>U-0.032</u>	<u>U-0.039</u> <u>U-0.032</u>	<u>U-0.039</u> <u>U-0.032</u>	U-0.032	U-0.032	U-0.028	U-0.028	U-0.028	U-0.028

(Portions of Table not shown remain unchanged)

**Table C402.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS**

Climate Zone	1		2		3		4		5		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Roofs																
Insulation entirely above deck	R-20ci	<u>R-20</u> <u>25ci</u>	<u>R-20</u> <u>25ci</u>	<u>R-20</u> <u>25ci</u>	<u>R-20</u> <u>25ci</u>	<u>R-20</u> <u>25ci</u>	<u>R-25</u> <u>30ci</u>	<u>R-25</u> <u>30ci</u>	<u>R-25</u> <u>30ci</u>	<u>R-25</u> <u>30ci</u>	R-30ci	R-30ci	<u>R-30</u> <u>35ci</u>	R-35ci	R-35ci	R-35ci

(Portions of Table not shown remain unchanged)

Reason: This proposal modifies the thermal envelope requirements for above-deck roof insulation to be consistent with the recently revised ASHRAE 90.1 Addendum bb. The change is necessary to ensure that the IECC is at least as efficient as 90.1

Cost Impact: The code change proposal will increase the cost of construction. This proposal will increase the initial cost of construction, but will result in reduced energy costs that will result in a short payback.

CE91-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

C402.1.2T-EC-FISCHER

CE92 – 13

Table C402.1.2

Proponent: Hal Robbins, Lamtec Corporation (halr@lamtec.com)

Revise as follows:

TABLE C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS^a

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Roofs																
Insulation entirely above deck	U-0.048	U-0.048	U-0.048	U-0.048	U-0.048	U-0.048	U-0.039	U-0.039	U-0.039	U-0.039	U-0.032	U-0.032	U-0.028	U-0.028	U-0.028	U-0.028
Metal buildings	U-0.044	U-0.035 U-0.037	U-0.035 U-0.037	U-0.035 U-0.037	U-0.035 U-0.037	U-0.035 U-0.037	U-0.035 U-0.037	U-0.035 U-0.037	U-0.035 U-0.037	U-0.035 U-0.037	U-0.031	U-0.031	U-0.029	U-0.029	U-0.029	U-0.029

(Portions of Table not shown remain unchanged)

Reason: During the development of the ANSI/ASHRAE/IES 90.1-2013, "Energy Standard for Buildings except Low-Rise Residential Buildings", there was significant debate regarding the U-Factor associated with the thermal performance of the R-19 + R-11Ls (Liner System). The debate focused on the proposed 0.035 U-Factor for the Liner System, and related to the accuracy of this value due to the variability of the test methodology and the range of data supplied to the committee for this system. Specifically:

- The initial 0.035 U-factor was adopted for this Liner Systems based upon a single test report generated in 2007.
- In 2010 the R-19+R-11 Liner System was retested by an accredited testing laboratory, and a U-Factor of 0.039 was achieved. (a copy of the test report is attached)
- Based upon the range of values provided to the 90.1 Envelope Committee, and their understanding of the variability for this type of thermal testing, the Committee decided to adjust the U-factor being shown for the R-19+R-11 Ls from 0.035 to 0.037.

Our request to change the Metal Building Roof U-Factor being shown for the R-19+R11 Ls from 0.035 to 0.37 in Table C402.1.2 of the 2015 edition of the IECC is necessary to prevent the confusion that will arise if the U-Value assembly requirements do not agree between IECC and ASHRAE. Please keep in mind the following:

- Footnote "a" in IECC tables C402.1.2 and C402.2 references the assemblies shown in the 90.1, Table A.
- In 90.1-2013, Table A2.3 will show the U-Value for the R-19+R-11Liner Systems as 0.037
- If IECC - 2015 is not changed, it will require a U-Value of 0.035 for Climate Zones, 1 (Group R), 2, 3, 4 and 5, and there will not be a corresponding U-Value in 90.1 -Table A.
- As such, by default, the user will be driven to the next lower U-Value in the table, a far more expensive system and one that far exceeds the needs of the project.
- This request to change the U-Value for the Liner System from 0.035 to 0.037, should essentially be considered "editorial", as the same insulation levels are being specified.

Cost Impact: This code change proposal will not increase the cost of construction. There should be no cost impact, this is strictly an editorial change.

CE92-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.1.2T-EC-ROBBINS.doc

CE93 – 13

Table C402.1.2, Table C402.2

Proponent: Daniel J. Walker, P.E., Thomas Associates, Inc., representing Metal Building Manufacturers Association (dwalker@thomasamc.com)

Revise as follows:

Table C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS^a

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Roofs																
Metal buildings	U-0.044 U-0.041	U-0.035 U-0.041	U-0.035 U-0.041	U-0.035 U-0.041	U-0.035 U-0.041	U-0.035 U-0.041	U-0.035 U-0.037	U-0.035 U-0.037	U-0.035 U-0.037	U-0.035 U-0.037	U-0.031	U-0.034 U-0.029	U-0.029	U-0.029	U-0.029 U-0.026	U-0.029 U-0.026
Walls, Above Grade																
Metal building	U-0.079 U-0.094	U-0.079 U-0.094	U-0.079 U-0.094	U-0.079 U-0.094	U-0.079 U-0.094	U-0.062 U-0.072	U-0.062 U-0.072	U-0.062 U-0.060	U-0.062 U-0.060	U-0.062 U-0.060	U-0.062 U-0.050	U-0.062 U-0.050	U-0.062 U-0.050	U-0.039 U-0.050	U-0.062 U-0.039	U-0.039

(Portions of table not shown remain unchanged)

TABLE C402.2
OPAQUE THERMAL ENVELOPE REQUIREMENTS^a

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Roofs																
Metal buildings (with R-5 thermal spacer blocks) ^{a,b}	R-19 + R- 11 LS R-10 + R- 19 FC	R-19 + R- 11 LS R-10 + R- 19 FC	R-19 + R- 11 LS R-10 + R- 19 FC	R-19 + R- 11 LS R-10 + R- 19 FC	R-19 + R- 11 LS R-10 + R- 19 FC	R-19 + R- 11 LS R-10 + R- 19 FC	R-19 + R- 11 LS or R-25 + R-8 LS	R-19 + R- 11 LS or R-25 + R-8 LS	R-19 + R- 11 LS or R-25 + R-8 LS	R-19 + R- 11 LS or R-25 + R-8 LS	R-25 + R- 11 LS	R-25 R- 30 + R-11 LS	R-30 + R- 11 LS	R-30 + R- 11 LS	R-30 + R- 11 + R-11 LS	R-30 + R- 11 + R-11 LS
Walls, Above Grade																
Metal building	R-13 + R- 6.5ci R-0 + R- 9.8ci	R-13 + R- 6.5ci R-0 + R- 9.8ci	R-13 + R- 6.5ci R-0 + R- 9.8ci	R-13 + R- 6.5ci R-0 + R- 9.8ci	R-13 + R- 6.5ci R-0 + R- 9.8ci	R-13 + R- 13ci R-0 + R- 13ci	R-13 + R- 13ci R-0 + R- 13ci	R-13 + R- 13ci R-0 + R- 15.8ci	R-13 + R- 13ci R-0 + R- 15.8ci	R-13 + R- 13ci R-0 + R- 15.8ci	R-13 + R- 13ci R-0 + R- 19ci	R-13 + R- 13ci R-0 + R- 19ci	R-13 + R- 13ci R-0 + R- 19ci	R-13 + R- 13ci R-0 + R- 19ci	R-13 + R- 49.5ci R-18.8ci	R-13 + R- 49.5ci R-18.8ci

For SI: 1 inch = 25.4 mm. ci = Continuous insulation. NR = No requirement.

LS = Liner System – A continuous membrane installed below the purlins and uninterrupted by framing members. Uncompressed, unfaced insulation rests on top of the membrane between the purlins. Liner systems shall have a minimum R-3 thermal spacer block between the purlins and the metal roof panels as required, unless compliance is shown by the overall assembly U-factor

FC = Filled Cavity – Filled Cavity assemblies shall have a minimum R-5 thermal spacer block between the purlins and the metal roof panels as required, unless compliance is shown by the overall assembly U-factor

a. Assembly descriptions can be found in ANSI/ASHRAE/IESNA 90.1 Appendix A.

b. ~~Where using R-value compliance method, a thermal spacer block shall be provided, otherwise use the U-factor compliance method in Table C402.1.2~~

(Portions of Table not shown remain unchanged)

Reason: We propose to update the roof and wall insulation requirements in the U-factor tables and corresponding R-values for consistency with the majority of the values and options found in ANSI/ASHRAE/IES 90.1-2013, "Energy Standard for Buildings Except Low-Rise Residential Buildings". Additionally, the table footnotes are proposed to be expanded to include the construction descriptions for Liner Systems and Filled Cavity assemblies.

The U-factors and R-values for roofs we propose are exactly the same as ANSI/ASHRAE/IES 90.1-2013. For walls we propose something slightly different than what was approved for 90.1-2013, but only in Climate Zones 4, 5 and 7. The values chosen for our proposal are more reasonable for metal building construction in comparison to the required performance of the other forms of construction in the tables. The values we selected also make for better transitions of the requirements from climate-zone to climate-zone, where the ASHRAE 90.1-2013 values have large jumps in the requirements between climate zones in these areas.

The reason for the large jumps in ASHRAE 90.1 was primarily due to the lack of available assemblies at the time the standard was written. By smoothing the transition for requirements between the three climate zones it provides for reasonable stringency levels and will provide for better design flexibility and alternate or innovative materials to be used.

Finally, we propose to delete the specific reference to "R-5" for the thermal spacer block requirement in Table C402.2 because the Liner System and Filled Cavity roof types utilize different thermal blocks, so a single note no longer applies. The new table footnotes contain the appropriate thermal spacer blocks for each system.

Cost Impact: The proposal will not increase the cost of construction.

CE93-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.1.2T-EC-WALKER.doc

CE94 – 13

Table C402.1.2

Proponent: Martha G. VanGeem, representing Masonry Alliance for Codes and Standards

Revise as follows:

TABLE C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS^a

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Walls, Above Grade																
Mass	<u>U-0.142</u> <u>U-0.151</u>	<u>U-0.142</u> <u>U-0.151</u>	<u>U-0.142</u> <u>U-0.151</u>	U-0.123	<u>U-0.110</u> <u>U-0.123</u>	U-0.104	U-0.104	U-0.090	U-0.078	U-0.078	<u>U-0.078</u> <u>U-0.080</u>	U-0.071	<u>U-0.061</u> <u>U-0.071</u>	U-0.061	U-0.061	U-0.061

(Portions of Table not shown remain unchanged)

Reason: According to Section 402.1 of the IECC, the criteria are the R-values specified in Section 402.1.1. The U-factors in Section 402.1.2 are an alternate compliance path. IECC Section 402.1.1 states that the R-values are in Tables C402.2 and C402.3. Therefore, the values in Table 402.2 are the main requirements and Table C402.1.2 lists alternates that should correspond to values in Table C402.2. Most of the mass wall criteria in both of these tables, C402.2 and C402.1.2, are based on the criteria in *ASHRAE/IES Standard 90.1-2010*.

In the last edition of the IECC, errors were introduced into Table C402.1.2 for Climate Zones 1, 2, 3, 6, and 7 for "Mass Walls, Above Grade." (Corrections to values in Climate Zone 5 are submitted in a separate proposal.)

- For Climate Zone 6, in the governing criteria table C402.2, the requirement is R-13.3ci for the row for "Mass Walls, Above Grade" and the column "Climate Zone 6, All Other."

According to *ASHRAE/IES Standard 90.1-2010*, Table 5.5-6, the U-factor that corresponds to an R-value of R-13.3ci is 0.080, not 0.078.

- For Climate Zone 7, the corresponding U-factor for R-15.2ci is 0.071 not 0.061. This is shown in Table 5.5-7 of *ASHRAE 90.1-2010*. This is also demonstrated by the U-factor for Climate Zone 6 "Group R", which also has a requirement for R-15.2ci in Table 402.2 and a U-factor of 0.071 in Table 402.1.2 as shown above.

- For Climate Zone 3 "All other", the corresponding U-factor for R-7.6ci is 0.123, not 0.110. This is shown in Table 5.5-3 for Climate Zone 3 of *ASHRAE 90.1-2010*. This is also demonstrated by the U-factor for Climate Zone 2 "Group R", which also has a requirement for R-7.6ci in Table 402.2 and a U-factor of 0.123 in Table 402.1.2 as shown above.

- For Climate Zones 1 "All other" and "Group R" as well as Climate Zone 2 "All other," the corresponding U-factor for R-5.7ci is 0.151, not 0.142. This is shown in Tables 5.5-1 and 5.5-2 of *ASHRAE 90.1-2010*.

Correcting these U-factors will make the IECC less confusing and thereby simplify it and increase its use.

Therefore, the U-factors should be changed as shown in Table 402.1.2 for the row for "Mass Walls, Above Grade" for the Climate Zones 1, 2, 3, 6, and 7 to correct these errors.

Cost Impact: This code change proposal will not increase the cost of construction.

CE94-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

C402.1.2T #1-EC-VANGHEEM.doc

CE95 – 13

Table C402.1.2

Proponent: Martha G. VanGeem, representing Masonry Alliance for Codes and Standards

Revise as follows:

TABLE C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS^a

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Walls, Above Grade																
Mass	U-0.142	U-0.142	U-0.142	U-0.123	U-0.110	U-0.104	U-0.104	U-0.090	<u>U-0.078</u> <u>U-0.090</u>	<u>U-0.078</u> <u>U-0.080</u>	U-0.078	U-0.071	U-0.061	U-0.061	U-0.061	U-0.061

(Portions of Table not shown remain unchanged)

Reason: According to Section 402.1 of the IECC, the criteria are the R-values specified in Section 402.1.1. The U-factors in Section 402.1.2 are an alternate compliance path. IECC Section 402.1.1 states that the R-values are in Tables C402.2 and C402.3. Therefore, the values in Table 402.2 are the main requirements and Table C402.1.2 lists alternates that should correspond to values in Table C402.2.

In the last edition of the IECC, errors were introduced into Table C402.1.2 for Climate Zones 5 and Marine 4 for "Mass Walls, Above Grade." In the governing criteria table C402.2, the requirement is R-11.4ci for the row for "Mass Walls, Above Grade" and the column "Climate Zones 5 and Marine 4, All Other." This is the same criteria as for one cell to the left, "Mass Walls, Above Grade" and the column "Climate Zones 4 except Marine, Group R." The U-factor that corresponds to an R-value of R-11.4ci is 0.090, not 0.078, as indicated by the value in "Climate Zones 4 except Marine, Group R."

Most of the mass wall criteria in both of these tables, C402.2 and C402.1.2, are based on the criteria in *ASHRAE/IES Standard 90.1-2010*. For "All other," the corresponding R-value in *90.1-2010* for nonresidential in Table 5.5-5 for Climate Zone 5 on page 30 is R-11.4ci and the corresponding U-factor is 0.90. Therefore the U-factor in C402.1.2 for "All other" should be 0.090 for mass walls in "Climate Zones 5 and Marine 4". In addition, for "Group R," the corresponding R-value in *90.1-2010* in Table 5.5-5 for Climate Zone 5 on page 30 is R-13.3ci and the corresponding U-factor is 0.80. Therefore the U-factor in C402.1.2 for "Group R" should be 0.080. These values will remain the same in *90.1-2013*. Correcting these U-factors will make the IECC less confusing and thereby simplify it and increase its use.

Therefore, in Table 402.1.2 for the row for "Mass Walls, Above Grade" and the column "Climate Zones 5 and Marine 4," the U-factor should be changed to 0.090 for "All other" and the U-factor should be changed to 0.080 for "Group R" to correct these errors.

Cost Impact: This code change proposal will not increase the cost of construction.

CE95-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

C402.1.2T #2-EC-VANGEEM.doc

CE96 – 13

Table C402.1.2, Table C402.2, C402.2.5

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

**TABLE C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS^a**

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Floors																
Mass ^c	U-0.322	U-0.322	U-0.107	U-0.087	U-0.076	U-0.076	U-0.076	U-0.074	U-0.074	U-0.064	U-0.064	U-0.057	U-0.055	U-0.051	U-0.055	U-0.051

(Portions of Table not shown remain unchanged)

- Opaque assembly U-factors, C-factors, and F-factors from ASHRAE 90.1 Appendix A shall be permitted provided the construction complies with the applicable construction details from ASHRAE 90.1 Appendix A.
- Where heated slabs are below grade, below-grade walls shall comply with the F-factor requirements for heated slabs.
- "Mass floors" shall include floors weighing not less than:
 - 35 psf (170 kg/m²) of floor surface area; or
 - 25 psf (120 kg/m²) of floor surface area where the material weight is not more than 12 pounds per cubic foot (pcf) (1900 kg/m³).

**TABLE C402.2
OPAQUE THERMAL ENVELOPE REQUIREMENTS^a**

Climate Zone	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Floors																
Mass ^b	NR	NR	R-6.3ci	R-8.3ci	R-10ci	R-10ci	R-10ci	R-10.4ci	R-10ci	R-12.5ci	R-12.5ci	R-12.5ci	R-15ci	R-16.7ci	R-15ci	R-16.7ci

(Portions of Table not shown remain unchanged)

For SI: 1 inch = 25.4 mm ci = Continuous insulation. NR = No requirement.

LS = Liner System- A continuous membrane installed below the purlins and uninterrupted by framing members. Uncompressed, un-faced insulation rests on top of the membrane between the purlins.

- Assembly descriptions can be found in ASHRAE 90.1 Appendix A.
- Where using R-value compliance method, a thermal spacer block is required, otherwise use the U-factor compliance method in Table C402.1.2.

- c. R-5.7 ci is allowed to be substituted with concrete block walls complying with ASTM C 90, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores filled with materials having a maximum thermal conductivity of 0.44 Btu-in./h-² F.
- d. Where heated slabs are below grade, below-grade walls shall comply with the exterior insulation requirements for heated slabs.
- e. Steel floor joist systems shall be insulated to R-38.
- a. "Mass floors" shall include floors weighing not less than:
 - 1. 35 psf (170 kg/m²) of floor surface area; or
 - 2. 25 psf (120 kg/m²) of floor surface area where the material weight is not more than 12 pounds per cubic foot (pcf) (1900 kg/m³).

C402.2.5 Floors over outdoor air or unconditioned space. The thermal properties (component *R*-values or assembly *U*-, *C*- or *F*-factors) ~~resistance (*R*-value) of the insulating material installed either between the floor framing or continuously on the floor assembly~~ of floor assemblies over outdoor air or unconditioned space shall be as specified in Table C402.1.2 or C402.2, based on the construction materials used in the floor assembly.

~~"Mass floors" shall include floors weighing not less than:~~

- ~~1. 35 psf (170 kg/m²) of floor surface area; or~~
- ~~2. 25 psf (120 kg/m²) of floor surface area if the material weight is not more than 12 pcf (1,900 kg/m³).~~

Reason: This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 2 open meetings and over 15 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

This proposal is intended to clarify the use and application of the codes prescriptive building thermal envelope provisions and does not contain changes to the technical requirements of the code. Detailed reasons for this proposal are as follows:

- a) This proposal moves and clarifies, but does not delete the requirements of Section C402.2.5 of the 2012 IECC.
- b) In the I-Codes, text should not rely on section titles for application. Therefore, the information in the title was added to the code text.
- c) The first sentence in Section C402.2.5 is revised to clarify that the provisions for floors over outdoor air or unconditioned space are also applicable to the assembly *U*-, *C*- and *F*-factors of Table C402.1.2.
- d) The original language of Section C402.2.4 did not clearly indicate what the "mass floor" requirements were relevant or related to. These requirements are more appropriately and clearly applied as footnotes to Tables C402.1.2 and C402.2. By moving the information to the appropriate tables, unintentional non compliance will decrease (compliance will increase).

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: This code change proposal will not increase the cost of construction. This proposal is a clarification and, as such, will not increase the cost of construction.

CE96-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.1.2T #1-EC-THOMPSON-SEHPCAC.doc

CE97 – 13

Table C402.1.2, Table C402.2

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

**TABLE C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS^a**

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Walls, Above Grade																
Mass	U-0.142	U-0.142	U-0.142	U-0.123	U-0.110	U-0.104	U-0.104	U-0.090	U-0.078	U-0.078	U-0.078	U-0.071	U-0.061	U-0.061	U-0.061	U-0.061
Metal building	U-0.079	U-0.079	U-0.079	U-0.079	U-0.079	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.039	U-0.052	U-0.039
Metal framed	U-0.077	U-0.077	U-0.077	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.057	U-0.064 U-0.052	U-0.052	U-0.045	U-0.045
Wood framed and other	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.051 U-0.057	U-0.051 U-0.057	U-0.051 U-0.052	U-0.036 U-0.045	U-0.036 U-0.045

(Portions of Table not shown remain unchanged)

**TABLE C402.2
OPAQUE THERMAL ENVELOPE REQUIREMENTS^a**

Climate Zone	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Walls, Above Grade																
Mass	R-5.7ci	R-5.7ci	R-5.7ci	R-7.6ci	R-7.6ci	R-9.5ci	R-9.5ci	R-11.4ci	R-11.4ci	R-13.3ci	R-13.3ci	R-15.2ci	R-15.2ci	R-15.2ci	R-25ci	R-25ci
Metal building	R-13+ R-6.5ci	R-13 + R-6.5ci	R13 + R6.5ci	R-13 + R13ci	R-13 + R6.5ci	R-13 + R13ci	R-13 + R13ci	R-13 + R13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + +R13ci	R-13+ R19.5ci	R-13 + R13ci	R-13+ R- 19.5ci
Metal Framed	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-15.6ci	R-13 + R-7.5ci	R-13+ R17.5ci
Wood Framed and Other	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-7.5ci 3.8ci or R20 + 3.8ci	R-13 + R-7.5ci or R20 + 3.8ci or R22	R-13 + R-7.5ci or R20 + 3.8ci or R22	R-13 + R-7.5ci or R20 + 3.8ci or R27	R-13 + R-7.5ci or R20 + 3.8ci or R27	R-13 + R-15.6ci or R20 + 10ci or R32	R-13 + R-15.6ci or R20 + 10ci or R32

(Portions of Table not shown remain unchanged.)

Reason: This proposal is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code

content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

This proposal is intended to correct anomalies in these tables and present additional options to increase the usability and effectiveness of the codes prescriptive building envelope requirements. Detailed reasons for this proposal are as follows:

1) Table C402.1.2

- a. In Table C402.1.2, some of the U-factors in CZ7 seem to be disjointed without reason. In the both the "Group R" and the "All Other" cells in CZ7, wood stud walls and steel stud walls have identical values except that the "All Other" cell for steel studs differs significantly. It seems reasonable to simply make all four cells values identical. Preliminary PNNL modeling has shown that merging U-factors to one performance level for all materials for building envelopes is an effective strategy for gaining more efficiency in codes. Certainly, it meets the intent of the cost effectiveness mandate from the Energy Act.
- b. In Table C402.1.2, the U-factors for both wood stud and steel stud walls are disjointed to an even greater extent than those in CZ7 or CZ8. The SEHPCAC believes that bringing these U-factors into closer alignment with each other and with adjacent climate zones makes this code more enforceable, more readily achieved and more understandable. In achieving those objectives, the SEHPCAC believes that the biggest goal, adoptability, is also achieved. Any efficiency improvement is unimportant if the model code in which it is embodied is never adopted.
- c. In the CZ8 columns of Table C402.1.2, U-factors were used that were simply in line with the descending values for the cells in CZ 1-7.

2) Table C402.2

- a. For Table C402.2 this proposal provides "cavity only" insulation options for each climate zone entry in the "Wood Framed and Other" row. This is proposed in order to provide a practical solution for energy efficiency with which builders are familiar and that they can readily execute to a satisfactory level. Buy "cavity only," it is meant that the insulation will be placed only in the cavities between studs and that c.i. (continuous insulation, such as foam insulation sheathing applied on the exterior side of studs) is not required in association with it. These "cavity only" options make compliance with, and effectiveness of, the code more likely by offering choices to designers and builders that are readily implementable.

Please note that the cavity only insulation option is just that: it is an option. As the existing cavity plus continuous insulation (ci) options also remain in place, the cavity only options do not necessarily increase costs, they simply provide added flexibility.

Also note that the cavity only option R-values, as minimum values, do not preclude the use of insulation with higher R-values where insulation materials are not readily available in the exact R-values provided in the Table. This is intentional. R-values differ for various insulation types and this puts all types on a level playing field. The R-values proposed for cavity only insulation Table C402.2 are derived from the U-factors for equivalent building envelope assemblies in Table C402.1.2.

Design professionals and builders have asked ICC, Code Trainers, and other professionals "what is the option in wood framed walls for cavity only insulation." This addition provides that design flexibility and information to builders to understand the cavity only insulation requirements option. The third R-value listed in the row for wood framed wall climate zone 6 – 8, is a calculated value and may not represent thermal insulation products available off the shelf at building supply centers. Achieving the R-value in a cavity only installation may require a mix of insulation materials to achieve these values.

- b. Beginning with Climate Zones 5 and Marine 4, the second option in each cell in the "Wood Framed and Other" row has been restored to "cavity-only". In CZ5-M4, the residential cell R-values were made similar to the "All Other" cell because the U-factor values in Table C402.1.2 are the same for the corresponding table entries.
- c. The R-values in both cells of Climate Zone 6 in the "Wood Framed and Other" row were revised to reflect equivalency calculations, as performed by the American Wood Council, that were based on U-factors for corresponding entries in Table C402.1.2.

Below is the summary page of the Excel spreadsheet used to determine R-value equivalents to U-factor inputs. This is the system by which the R-values in Table C402.2 were determined from the U-factors in Table C402.1.2.

U-factor to R-value equivalency spreadsheet

Material	R	Framing Factor	25%
inside air film	0.68	Stud Path 2x4	6.30
1/2" Gyp.	0.45	Stud Path 2x6	8.80
2x4 @ 16" o.c.	4.375	Cavity - Insulation	1.92
2x6 @ 16" o.c.	6.875		
7/16" OSB	0.62		
outside air film	0.17		

Siding Type	Average Thickness	R _{siding}	Stud Size							
			2 x 4			2 x 6				
			Cavity Insulation							
			R-13	R-15	R-17	R-17	R-19	R-20	R-22	R-24
Wall + Siding U-factor										
			13	15	17	17	19	20	22	24
Baseline (no siding)		-	0.090	0.084	0.079	0.068	0.064	0.063	0.060	0.057
Aluminum, Steel, or Vinyl siding										
uninsulated (hollow-back)	Varies	0.62	0.084	0.079	0.075	0.065	0.061	0.060	0.057	0.055
insulated (R-2)	Varies	2.00	0.074	0.070	0.066	0.059	0.056	0.054	0.052	0.050
insulated (R-3)	Varies	3.00	0.069	0.065	0.061	0.055	0.053	0.051	0.049	0.047
Brick veneer (3/4" air space)	3-5/8"	1.26	0.079	0.074	0.070	0.062	0.059	0.057	0.055	0.052
Hardboard siding	7/16"	0.67	0.084	0.078	0.074	0.065	0.061	0.060	0.057	0.055
Plywood siding (edges lapped)	3/8"	0.59	0.085	0.079	0.075	0.065	0.061	0.060	0.057	0.055
Wood siding										
Drop (8")	1"	0.79	0.083	0.078	0.073	0.064	0.061	0.059	0.056	0.054
Bevel (8", lapped)	1/2"	0.81	0.083	0.077	0.073	0.064	0.061	0.059	0.056	0.054
Bevel (10", lapped)	3/4"	1.05	0.081	0.076	0.072	0.063	0.060	0.058	0.055	0.053

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: Where the U-factors in the table are proposed to be decreased, this proposal may increase the cost of construction. Where cavity only insulation options have been provided, this proposal may decrease the cost of construction in certain applications.

CE97-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

C402.1.2T #4-EC-THOMPSON-SEHPCAC.doc

CE98 – 13

Table C402.1.2, Table C402.2

Proponent: Mark Halverson, APA-The Engineered Wood Association (mark.halverson@apawood.org)
Paul Coats, The American Wood Council

Revise as follows:

TABLE C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS^a

Walls, Above Grade																
CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Mass	U-0.142	U-0.142	U-0.142	U-0.123	U-0.110	U-0.104	U-0.104	U-0.090	U-0.078	U-0.078	U-0.078	U-0.071	U-0.061	U-0.061	U-0.061	U-0.061
Metal buildings	U-0.079	U-0.079	U-0.079	U-0.079	U-0.079	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.039	U-0.052	U-0.039
Metal framed	U-0.077	U-0.077	U-0.077	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.052	U-0.045	U-0.045
Wood framed and other	U-0.064 0.087	U-0.064 0.087	U-0.064 0.087	U-0.064 0.087	U-0.064 0.087	U-0.064 0.087	U-0.064	U-0.064	U-0.064	U-0.064	U-0.051	U-0.051	U-0.051	U-0.051	U-0.036	U-0.036

(Portions of Table not shown remain unchanged)

Table C402.2
OPAQUE THERMAL ENVELOPE REQUIREMENTS^a

Walls, Above Grade																
CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Mass	R-5.7ci ^c	R-5.7ci ^c	R-5.7ci ^c	R-7.6ci	R-7.6ci	R-9.5ci	R-9.5ci	R-11.4ci	R-11.4ci	R-13.3ci	R-13.3ci	R-15.2ci	R-15.2ci	R-15.2ci	R-25ci	R-25ci
Metal buildings	R-13 + R-6.5ci	R-13 + R-6.5ci	R-13 + R-6.5ci	R-13 + R-13ci	R-13 + R-6.5ci	R-13 + R-13ci	R-13 + 13ci	R-13 + 13ci	R-13 + 13ci	R-13 + 13ci	R-13 + 13ci	R-13 + 13ci	R-13 + 13ci	R-13 + 19.5ci	R-13 + 13ci	R-13 + 19.5ci
Metal framed	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-15.6ci	R-13 + R-7.5ci	R-13 + R-17.5ci
Wood framed and other	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-7.5ci or R-20 + R3.8ci	R-13 + R-7.5ci or R-20 + R3.8ci	R-13 + R-7.5ci or R-20 + R3.8ci	R-13 + R-7.5ci or R-20 + R3.8ci	R-13 + R-7.5ci or R-20 + R3.8ci	R-13 + R-15.6ci or R-20 + R10ci	R-13 + R-15.6ci or R-20 + R10ci

For SI: 1 inch = 25.4 mm. ci = Continuous insulation. NR = No requirement.

LS = Liner System—A continuous membrane installed below the purlins and uninterrupted by framing members. Uncompressed, unfaced insulation rests on top of the membrane between the purlins.

a. Assembly descriptions can be found in ANSI/ASHRAE/IESNA Appendix A.

b. Where using *R*-value compliance method, a thermal spacer block shall be provided, otherwise use the *U*-factor compliance method in Table C402.1.2.

c. R-5.7ci is allowed to be substituted with concrete block walls complying with ASTM C 90, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores filled with materials having a maximum thermal conductivity of 0.44 Btu-in/h-² °F.

d. Where heated slabs are below grade, below-grade walls shall comply with the exterior insulation requirements for heated slabs.

e. Steel floor joist systems shall be insulated to R-38.

(Portions of Table not shown remain unchanged)

Reason: The above-grade wall *U*-factors and the insulation requirements in Tables C402.1.2 and C402.2 are much more stringent for wood framed walls than the other framing types in Climate Zones 1-3. This proposal brings wood frame walls to levels that are within the range of the other wall types.

The code must be product neutral and not favor one product over the others. The provision of the 2012 IECC require much lower *U*-factors and greater *R*-values in Climate Zones 1-3 for above grade wood framed walls than for the other three types of walls. Codes should not unfairly provide one framing product with an advantage over another. If the goal of the IECC is to save energy, then the code should be "blind" to material types when setting performance levels.

In addition, the amount of energy saved in requiring commercial and multi-family buildings to meet a *U*-factor of 0.064 as opposed to the proposed *U*-factor of 0.087 is minimal in these warmer climate zones. When the additional cost of construction is compared to the energy savings, the provision to build at the 0.064 *U*-level is not cost effective.

Table 1 shows a *U*-factor calculation using standard *R*-values. A 7/8-inch stucco *R*-value is used instead of single-coat stucco, as is recommended when applied to wood structural panels. The 7/16-inch sheathing is used in this system as it is a typical exterior sheathing thickness for wood frame commercial walls.

This proposal works to correct those discrepancies between framing materials while bringing the Commercial IECC in-line with the Residential IECC.

We ask the support of the committee for this proposal.

Table 1. U-Factor Calculations Climate Zones 1-3, 2x4 Wood Framed Walls

Wall Thermal Resistance by Component	2x4 Wall - R13		
	R-Value Studs	R-Value Cavity	Assembly Value
Outside Air Film	0.17		
Stucco 7/8" (3-Coat)	0.18		
Continuous Insulation	0		
Wood Structural Panel Sheathing (7/16")	0.62		
Stud/Cavity Insulation	4.375	13	
Interior Gypsum	0.56		
Inside Air Film	0.68		
Studs at 16" o.c.	25%	75%	
Total Wall R-Value	6.59	15.21	11.46
Total Wall U-Factor	0.152	0.066	0.0873

Cost Impact: The code change proposal will not increase the cost of construction.

CE98-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

C402.1.2T #2-EC-COATS-HALVERSON.doc

CE99 – 13

Table C402.1.2, Table C402.2

Proponent: Mark Halverson, APA-The Engineered Wood Association and Paul Coats, The American Wood Council (mark.halverson@apawood.org)

Revise as follows:

TABLE C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS^a

Walls, Above Grade																
CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Mass	U-0.142	U-0.142	U-0.142	U-0.123	U-0.110	U-0.104	U-0.104	U-0.090	U-0.078	U-0.078	U-0.078	U-0.071	U-0.061	U-0.061	U-0.061	U-0.061
Metal buildings	U-0.079	U-0.079	U-0.079	U-0.079	U-0.079	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.039	U-0.052	U-0.039
Metal framed	U-0.077	U-0.077	U-0.077	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.052	U-0.045	U-0.045
Wood framed and other	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.054 U-0.056	U-0.054 U-0.056	U-0.054 U-0.047	U-0.054 U-0.047	U-0.036 U-0.047	U-0.036 U-0.047

(Portions of Table not shown remain unchanged)

Table C402.2
OPAQUE THERMAL ENVELOPE REQUIREMENTS^a

Walls, Above Grade																
CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Mass	R-5.7ci ^c	R-5.7ci ^c	R-5.7ci ^c	R-7.6ci	R-7.6ci	R-9.5ci	R-9.5ci	R-11.4ci	R-11.4ci	R-13.3ci	R-13.3ci	R-15.2ci	R-15.2ci	R-15.2ci	R-25ci	R-25ci
Metal buildings	R-13+ R-6.5ci	R-13+ R-6.5ci	R-13+ R-6.5ci	R-13+ R-13ci	R-13+ R-6.5ci	R-13+ R-13ci	R-13+ R-13ci	R-13+ R-13ci	R-13+ R-13ci	R-13+ R-13ci	R-13+ R-13ci	R-13+ R-13ci	R-13+ R-13ci	R-13+ R-19.5ci	R-13+ R-13ci	R-13+ R-19.5ci
Metal framed	R-13+ R-5ci	R-13+ R-5ci	R-13+ R-5ci	R-13+ R-7.5ci	R-13+ R-7.5ci	R-13+ R-7.5ci	R-13+ R-7.5ci	R-13+ R-7.5ci	R-13+ R-7.5ci	R-13+ R-7.5ci	R-13+ R-7.5ci	R-13+ R-7.5ci	R-13+ R-7.5ci	R-13+ R-15.6ci	R-13+ R-7.5ci	R-13+ R-17.5ci
Wood framed and other	R-13+ R-3.8ci or R-20	R-13+ R-3.8ci or R-20	R-13+ R-3.8ci or R-20	R-13+ R-3.8ci or R-20	R-13+ R-3.8ci or R-20	R-13+ R-3.8ci or R-20	R-13+ R-3.8ci or R-20	R-13+ R-3.8ci or R-20	R-13+ R-3.8ci or R-20	R-13+ R-7.5ci or R-20 +R-3.8ci	R-13+ R- <u>6.57.5ci</u> or R- <u>1820</u> +R- <u>33.8ci</u> or <u>R-24</u>	R-13+ R- <u>6.57.5ci</u> or R- <u>1820</u> +R- <u>33.8ci</u> or <u>R-24</u>	R-13+ R- <u>107.5ci</u> or R-20 +R- <u>53.8ci</u> or R-28	R-13+ R- <u>107.5ci</u> or R-20 +R- <u>53.8ci</u> or R-28	R-13+ R- <u>1045.6ci</u> or R-20 +R- <u>540ci</u> or R-28	R-13+ R- <u>1045.6ci</u> or R-20 +R- <u>540ci</u> or R-28

For SI: 1 inch = 25.4 mm. ci = Continuous insulation. NR = No requirement.

LS = Liner System—A continuous membrane installed below the purlins and uninterrupted by framing members. Uncompressed, unfaced insulation rests on top of the membrane between the purlins.

a. Assembly descriptions can be found in ANSI/ASHRAE/IESNA Appendix A.

b. Where using R-value compliance method, a thermal spacer block shall be provided, otherwise use the U-factor compliance method in Table C402.1.2.

c. R-5.7ci is allowed to be substituted with concrete block walls complying with ASTM C 90, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores filled with materials having a maximum thermal conductivity of 0.44 Btu-in/h-°F.

d. Where heated slabs are below grade, below-grade walls shall comply with the exterior insulation requirements for heated slabs.

e. Steel floor joist systems shall be insulated to R-38.

(Portions of Table not shown remain unchanged)

Reason: The above-grade wall *U*-factors and the insulation requirements in Tables C402.1.2 and C402.2 are much more stringent for wood framed walls than the other framing types in Climate Zones 6-8. This proposal brings wood frame walls to levels that are within the range of the other wall types as well as levels that are similar to those found in the residential energy code.

The code must be product neutral and not favor one product over the others. The provision of the 2012 IECC require lower *U*-factors and greater *R*-values in Climate Zones 6-8 for above grade wood framed walls than for the other three types of walls. Codes should not unfairly provide one framing product with an advantage over the other. Since the goal of the IECC is to save energy, it should be "blind" to framing material types when setting performance levels. This proposal works to correct those irregularities between framing materials.

Table 1 shows the *U*-factor calculations for 2x6 and 2x4 walls using a combination of continuous insulation and cavity insulation for Climate Zone 6. The 2x6 wall system uses R18 cavity insulation with R3 continuous insulation and the 2x4 systems incorporates R13 cavity with R6.5 continuous insulation. Both systems result in a *U*-factor of 0.056.

Table 2 shows a calculation for a 2x6 wall system using R24 cavity insulation. The system also incorporates 7/8-inch stucco which is recommended for direct applications to wood structural panels. The 7/16-inch sheathing is used in this system as it is a typical exterior sheathing thickness for wood frame commercial walls. This system results in a *U*-factor of 0.056 and is equivalent to the two systems found in Table 1.

Table 3 shows the *U*-factor calculations for 2x6 and 2x4 walls using a combination of continuous insulation and cavity insulation for Climate Zones 7-8. The 2x6 wall system uses R20 cavity insulation with R5 continuous insulation and the 2x4 systems incorporates R13 cavity with R10 continuous insulation. Both systems result in a *U*-factor of 0.047.

Table 4 shows a calculation for a 2x8 wall system using R28 cavity insulation. A 7/8-inch stucco *R*-value is used as is typical when applied to wood structural panels. The 7/16-inch sheathing is used in this system as it is a typical exterior sheathing thickness for wood frame commercial walls. This system results in a *U*-factor of 0.047 and is equivalent to the two systems found in Table 3.

We ask the support of the committee for this proposal.

Table 1. U-Factor Calculations Climate Zone 6 Wood Framed Walls

Wall Thermal Resistance by Component	2x6 Wall - R18+3			2x4 Wall - R13+6.5		
	R-Value Studs	R-Value Cavity	Assembly Value	R-Value Studs	R-Value Cavity	Assembly Value
Outside Air Film	0.17			0.17		
Stucco (1-Coat)	0.08			0.08		
Continuous Insulation	3			6.5		
Wood Structural Panels Sheathing	0			0		
Stud/Cavity Insulation	6.875	18		4.375	13	
5/8" Drywall	0.56			0.56		
Inside Air Film	0.68			0.68		
Studs at 16" o.c.	25%	75%		25%	75%	
Total Wall R-Values	11.37	22.49	18.07	12.37	20.99	17.87
Total Wall U-Factors	0.088	0.044	0.0553	0.081	0.048	0.0559

Table 2. U-Factor Calculations Climate Zone 6 Wood Framed Walls

Wall Thermal Resistance by Component	2x6 Wall - R24		
	R-Value Studs	R-Value Cavity	Assembly Value
Outside Air Film	0.17		17.81
Stucco - 7/8" (3-Coat)	0.18		
Continuous Insulation	0		
Wood Structural Panels Sheathing (7/16")	0.62		
Stud/Cavity Insulation	6.875	24	
5/8" Drywall	0.56		
Inside Air Film	0.68		
Studs at 16" o.c.	25%	75%	
Total Wall R-Values	9.09	26.21	17.81
Total Wall U-Factors	0.110	0.038	0.0561

Table 3. U-Factor Calculations Climate Zones 7-8 Wood Framed Walls

Wall Thermal Resistance by Component	2x6 Wall - R20+5			2x4 Wall - R13+10		
	R-Value Studs	R-Value Cavity	Assembly Value	R-Value Studs	R-Value Cavity	Assembly Value
Outside Air Film	0.17			0.17		
Stucco (1-Coat)	0.08			0.08		
Continuous Insulation	5			10		
Wood Structural Panels Sheathing	0			0		
Stud/Cavity Insulation	6.875	20		4.375	13	
5/8" Drywall	0.56			0.56		
Inside Air Film	0.68			0.68		
Studs at 16" o.c.	25%	75%		25%	75%	
Total Wall R-Values	13.37	26.49	21.27	15.87	24.49	21.56
Total Wall U-Factors	0.075	0.038	0.0470	0.063	0.041	0.0464

Table 4. U-Factor Calculations - Climate Zones 7-8 Wood Framed Walls

Wall Thermal Resistance by Component	2x8 Wall - R28		
	R-Value Studs	R-Value Cavity	Assembly Value
Outside Air Film	0.17		
Stucco - 7/8" (3-Coat)	0.18		
Continuous Insulation	0		
Wood Structural Panels Sheathing (7/16")	0.62		
Stud/Cavity Insulation	9.063	28	
5/8" Drywall	0.56		
Inside Air Film	0.68		
Studs at 16" o.c.	25%	75%	
Total Wall R-Values	11.27	30.21	21.28
Total Wall U-Factors	0.089	0.033	0.0470

Cost Impact: The code change proposal will not increase the cost of construction.

CE99-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

C402.1.2T #1-EC-COATS-HALVERSON.doc

CE100 – 13

Table C402.1.2

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

**TABLE C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS^a**

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Slab-on-Grade Floors																
Unheated slabs	F-0.73	F-0.73	F-0.73	F-0.73	F-0.73	F-0.73	F-0.54	F-0.54	F-0.54	F-0.54	F-0.54	F-0.52	F-0.40	F-0.40	F-0.40	F-0.40
Heated slabs	F-0.70 F-1.020	F-0.70 F-1.020	F-0.70 F-1.020	F-0.70 F-1.020	F-0.70 F-0.900	F-0.70 F-0.900	F-0.65 F-0.860	F-0.65 F-0.860	F-0.65 F-0.079	F-0.65 F-0.079	F-0.58 F-0.079	F-0.58 F-0.688	F-0.55 F-0.688	F-0.55 F-0.688	F-0.55 F-0.688	F-0.55 F-0.688

- Use of opaque assembly *U*-factors, *C*-factors, and *F*-factors from ASHRAE 90.1 Appendix A shall be permitted provided the construction complies with the applicable construction details from ASHRAE 90.1 Appendix A.
- Where heated slabs are below grade, below-grade walls shall comply with the *F*-factor requirements for heated slabs.

(Portions of Table not shown remain unchanged)

Reason: This proposal is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

The IECC F-factors are outdated and need to be improved. The F-factors for heated slabs in Table C402.1.2 are proposed to be revised to align with those in Tables 5.5-1 through 5.5-8 of ASHRAE 90.1-2010.

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: This code change proposal will not increase the cost of construction. As the maximum F-values are revised higher, which means that less insulation is required, this proposal will decrease the cost of construction.

CE100-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

C402.1.2T #3-EC-THOMPSON-SEHPCAC.doc

CE101 – 13

Table C402.1.2

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

**TABLE C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS^a**

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Walls, Below Grade																
Below-grade wall ^b	C-1.140 ^d	C-1.140 ^d	C-1.140 ^d	C-1.140 ^d	C-1.140 ^d	C-1.140 ^d	C-0.119	C-0.119	C-0.119	C-0.119	C-0.119	C-0.119	C-0.092	C-0.092	C-0.092	C-0.092
Floors																
Mass	U-0.322 ^d	U-0.322 ^d	U-0.107	U-0.087	U-0.076	U-0.076	U-0.076	U-0.074	U-0.074	U-0.064	U-0.064	U-0.057	U-0.055	U-0.051	U-0.055	U-0.051
Joist/Framing	U-0.066 ^d	U-0.066 ^d	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033 ^e	U-0.033	U-0.033 ^e	U-0.033 ^e	U-0.033 ^e
Slab-on-Grade Floors																
Unheated slabs	F-0.73 ^d	F-0.73 ^d	F-0.73 ^d	F-0.73 ^d	F-0.73 ^d	F-0.73 ^d	F-0.54	F-0.54	F-0.54	F-0.54	F-0.54	F-0.52	F-0.40	F-0.40	F-0.40	F-0.40
Heated slabs	F-0.70 ^c	F-0.70 ^c	F-0.70 ^c	F-0.70 ^c	F-0.70 ^c	F-0.70 ^c	F-0.65 ^c	F-0.65 ^c	F-0.58 ^c	F-0.58 ^c	F-0.58 ^c	F-0.58 ^c	F-0.55 ^c	F-0.55 ^c	F-0.55 ^c	F-0.55 ^c

- Use of opaque assembly *U*-factors, *C*-factors, and *F*-factors from ASHRAE 90.1 Appendix A shall be permitted provided the construction complies with the applicable construction details from ASHRAE 90.1 Appendix A.
- Where heated slabs are below grade, below-grade walls shall comply with the *F*-factor requirements for heated slabs.
- Evidence of compliance with the *F*-factors indicated in the table for heated slabs shall be demonstrated by the application of the unheated slab *F*-factors and *R*-values derived from ASHRAE 90.1 Appendix A.
- These *C*-, *F*- and *U*-factors are based on assemblies that are not required to contain insulation.

(Portions of Table not shown remain unchanged)

Reason: This proposal is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

This proposal does not contain technical changes. Its purpose is to clarify the intent and application of the code provisions.

Detailed reasons for this proposal are as follows:

- Reason for footnote c: Footnote c is necessary because the heated slab *F*-factor values in Table C402.1.2 do not match those in ASHRAE 90.1. ASHRAE 90.1 Appendix A values in Table A6.3, Assembly *F*-Factors for Slab on Grade Floors, reflect much higher *F*-factors for heated slabs with a specific *R*-value, as opposed to unheated slabs with the same *R*-value. Heated slabs lose more energy due to the input of heat directly into the slab. Therefore, more insulation is needed in a heated slab to provide the

same resistance to heat loss (and therefore the same heat loss rate). IECC 2012 Table C402.1.2 heated slab F-factor values are closer to the unheated slab values in ASHRAE Appendix A. This proposal corrects Table C402.1.2 heated-slab f-factors to align with 90.1 Appendix A. If using the 2012 Table 402.1.2, correlating the IECC F-factor to an equivalent R-value via ASHRAE Appendix A, would require significantly more insulation than the IECC prescriptive R-value. Example: Heated slab in Climate Zone 3, per C402.1.2 requires an F-factor of F-0.70, or a prescriptive R-10 for 24" below. In the 90.1-2010 Appendix A tables, an equivalent to F-0.70 for heated slabs would require R-20 for 48" below, doubling the prescriptive IECC R-value and depth. The existing C402.12 F-factors for Climate Zones 5 and higher correlate to ASHRAE Appendix A insulation levels that prohibit the use of slab edge insulation; only a fully insulated slab can meet the F-0.58 or lower (derived from Table C402.1.2 and correlated to 90.1). Whereas the most restrictive slab edge R-value via IECC prescriptive tables is R-20 for 48" below. ASHRAE's best slab edge F-factor is for R-30 for 48" below (only F-0.659).

- b. Footnote "d" has been added to clarify that all specific C-, F- and U-factors that are followed by the "d" superscript are factors for assemblies that do not contain insulation. Note that Table C402.2 indicates "NR" (Not Required) for all equivalent applications. This will save time for users by not requiring them to go to ASHRAE 90.1 Appendix A to verify for themselves that the end result is that no insulation is required in these scenarios.

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: This code change proposal will not increase the cost of construction. This proposal is a clarification and, as such, will not increase the cost of construction.

CE101-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

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Table C402.1.2, Table C402.2

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

**TABLE C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS^a**

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Roofs																
Insulation entirely above deck	U-0.048	U-0.048	U-0.048	U-0.048	U-0.048	U-0.048	U-0.039	U-0.039	U-0.039	U-0.039	U-0.032	U-0.032	U-0.028	U-0.028	U-0.028	U-0.028
Metal buildings ^d	U-0.044	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.031	U-0.031	U-0.029	U-0.029	U-0.029	U-0.029
Attic and other ^e	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.021	U-0.021	U-0.021	U-0.021	U-0.021	U-0.021	U-0.021
Walls, Above Grade																
Mass	U-0.142	U-0.142	U-0.142	U-0.123	U-0.110	U-0.104	U-0.104	U-0.090	U-0.078	U-0.078	U-0.078	U-0.071	U-0.061	U-0.061	U-0.061	U-0.061
Metal building ^d	U-0.079	U-0.079	U-0.079	U-0.079	U-0.079	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.039	U-0.052	U-0.039
Metal framed ^d	U-0.077	U-0.077	U-0.077	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.057	U-0.064	U-0.052	U-0.045	U-0.045
Wood framed and other ^e	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.051	U-0.051	U-0.051	U-0.051	U-0.036	U-0.036
Walls, Below Grade																
Below-grade wall ^b	C-1.140	C-1.140	C-1.140	C-1.140	C-1.140	C-1.140	C-0.119	C-0.119	C-0.119	C-0.119	C-0.119	C-0.119	C-0.092	C-0.092	C-0.092	C-0.092
Floors																
Mass	U-0.322	U-0.322	U-0.107	U-0.087	U-0.076	U-0.076	U-0.076	U-0.074	U-0.074	U-0.064	U-0.064	U-0.057	U-0.055	U-0.051	U-0.055	U-0.051
Joist/Framing	U-0.066	U-0.066	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033 ^e	U-0.033	U-0.033 ^e	U-0.033 ^e	U-0.033 ^e
Slab-on-Grade Floor																
Unheated slabs	F-0.73	F-0.73	F-0.73	F-0.73	F-0.73	F-0.73	F-0.54	F-0.54	F-0.54	F-0.54	F-0.54	F-0.52	F-0.40	F-0.40	F-0.40	F-0.40
Heated slabs	F-0.70	F-0.70	F-0.70	F-0.70	F-0.70	F-0.70	F-0.65	F-0.65	F-0.58	F-0.58	F-0.58	F-0.58	F-0.55	F-0.55	F-0.55	F-0.55

- a. Use of Prescriptive opaque assembly *U*-factors, *C*-factors, and *F*-factors from ASHRAE 90.1 Appendix A shall be permitted to be used to show evidence of compliance with this table, provided the construction complies with the applicable construction details, including insulation component thermal requirements, from ASHRAE 90.1 Appendix A.

- b. Where heated slabs are below grade, below-grade walls shall comply with the *F*-factor requirements for heated slabs.
- c. Attic insulation and all other types of roof insulation other than above deck or metal building insulation.
- d. Metal skin and steel-framed structural system wherein the insulation, other than continuous insulation, is often compressed at the areas between the structural members and the metal skin.
- e. Wood light framed walls and all other wall systems except mass walls, metal building walls and metal framed walls.
- f. Light framed walls where the insulation, other than continuous insulation, is installed in the cavity between metal framing members.

**TABLE C402.2 C402.1.1
OPAQUE THERMAL ENVELOPE INSULATION COMPONENT MINIMUM R-VALUE REQUIREMENTS^a**

Climate Zone	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Roofs																
Insulation Entirely Above <u>Roof Deck</u>	R-20ci	R-20ci	R-20ci	R-20ci	R-20ci	R-20ci	R-25ci	R-25ci	R-25ci	R-25ci	R-30ci	R-30ci	R-35ci	R-35ci	R-35ci	R-35ci
Metal Buildings (with R-5 thermal blocks) ^{a,b}	R-19 + R11 LS	R-19 + R11 LS	R-19 + R11 LS	R-19 + R11 LS	R-19 + R11 LS	R-19 + R11 LS	R-19 + R11 LS	R-19 + R11 LS	R-19 + R11 LS	R-19 + R11 LS	R-25 + R11 LS	R-25 + R11 LS	R-30 + R11 LS	R-30 + R11 LS	R-30 + R11 LS	R-30 + R11 LS
Attic and other ^a	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-49	R-49	R-49	R-49	R-49	R-49	R-49
Walls, Above Grade																
Mass	R-5.7ci ^c	R-5.7ci ^c	R-5.7ci ^c	R-7.6ci	R-7.6ci	R-9.5ci	R-9.5ci	R-11.4ci	R-11.4ci	R-13.3ci	R-13.3ci	R-15.2ci	R-15.2ci	R-15.2ci	R-25ci	R-25ci
Metal building ^d	R-13+ R-6.5ci	R-13 + R-6.5ci	R13 + R6.5ci	R-13 + R13ci	R-13 + R6.5ci	R-13 + R13ci	R-13 + R13ci	R-13 + R13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R13ci	R-13+ R19.5ci	R-13 + R13ci	R-13+ R-19.5ci
Metal Framed ^f	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-15.6ci	R-13 + R-7.5ci	R-13+ R17.5ci
Wood Framed and Other ^a	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-7.5ci or R20 + 3.8ci	R-13 + R-7.5ci or R20 + 3.8ci	R-13 + R-7.5ci or R20 + 3.8ci	R-13 + R-7.5ci or R20 + 3.8ci	R-13 + R-7.5ci or R20 + 3.8ci	R-13 + R-15.6ci or R20 + 10ci	R-13 + R-15.6ci or R20 + 10ci
Walls, Below Grade																
Below Grade Wall ^d	NR	NR	NR	NR	NR	NR	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-10ci	R-10ci	R-10ci	R-12.5ci
Floors																
Mass	NR	NR	R-6.3ci	R-8.3ci	R-10ci	R-10ci	R-10ci	R-10.4ci	R-10ci	R-12.5ci	R- 12.5ci	R-12.5ci	R-15ci	R-16.7ci	R-15ci	R-16.7ci
Joist / Framing	NR	NR	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30 ^e	R-30	R-30 ^e	R-30 ^e	R-30 ^e
Slab on Grade Floor																
Unheated Slabs	NR	NR	NR	NR	NR	NR	R-10 for 24 in. below	R-10 for 24 in. below	R-10 for 24 in. below	R-10 for 24 in. below	R-10 for 24 in. below	R-15 for 24 in. below	R-15 for 24 in. below	R-15 for 24 in. below	R-15 for 24 in. below	R-20 for 24 in. below
Heated Slabs	R-7.5 for 12 in. below	R-7.5 for 12 in. below	R-7.5 for 12 in. below	R-7.5 for 12 in. below	R-10 for 24 in. below	R-10 for 24 in. below	R-15 for 24 in. below	R-15 for 24 in. below	R-15 for 36 in. below	R-15 for 36 in. below	R-15 for 36 in. below	R-20 for 48 in. below	R-20 for 24 in. below	R-20 for 48 in. below	R-20 for 48 in. below	R-20 for 48 in. below
Opaque Doors																
Swinging	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37
Roll-up or Sliding	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75

For SI: 1 inch = 25.4 mm ci = Continuous insulation. NR = No requirement.

LS = Liner System- A continuous membrane installed below the purlins and uninterrupted by framing members. Uncompressed, un-faced insulation rests on top of the membrane between the purlins.

- a. Assembly descriptions can be found in ASHRAE 90.1 Appendix A. "Attic and other" is attic insulation and all other types of roof insulation other than above deck or metal building insulation.
- b. Buildings that incorporate a metal skin and steel-framed structural system wherein the insulation is often compressed between the skin and framing members. Where using the R-value compliance method, a thermal spacer block is required between the skin and framing members, otherwise use the assembly U-factor compliance method in Section C402.1.2 and Table C402.1.2.
- c. R-5.7 ci is allowed to be substituted with concrete block walls complying with ASTM C 90, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores filled with materials having a maximum thermal conductivity of 0.44 Btu-in./h-² F.
- d. Where heated slabs are below grade, below-grade walls shall comply with the F-factor requirements for heated slabs.
- e. Wood light framed walls and all other wall systems except mass walls, metal building walls and metal framed walls.
- f. Light framed walls where the insulation, other than continuous insulation, is installed in the cavity between metal framing members.

Reason: This proposal is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

This proposal clarifies the code and increases its usability with regard to Tables C402.1.2 and C402.2 and the code's prescriptive building thermal envelope provisions. It does not contain technical changes. Most of these changes clarify the relationship between the tables and ASHRAE 90.1 Appendix A, eliminate the need to go to ASHRAE Appendix A, or add missing information regarding how ASHRAE 90.1 Appendix A is to be used when it is necessary to use it. An effort was also made to coordinate the footnotes between Tables C402.1.2 and C402.2.

Detailed reasons for this proposal are as follows:

1) Table C402.1.2:

- a. Revised Footnote a: The existing language indicates that ASHRAE 90.1 Appendix A is permitted to be used, but it does not state what it is to be used for. This proposal clarifies that the purpose is to "show evidence of compliance with this table" and that the design must then also comply with Appendix A "insulation component thermal requirements."
- b. Footnote b: unchanged
- c. Proposed new Footnote c: This new footnote indicates what "Attic and other" is intended to apply to as used in the table, which is "insulation other than above deck or metal building insulation." Members of SEHPCAC subgroup working on this proposal verified this information with Steve Ferguson of ASHRAE. This information is necessary as building officials have reported that many users call and ask what "Attic and other" is.
- d. Proposed new Footnote d: This footnote describes what the term "Metal buildings" is intended to mean as used in the table. Previously it was necessary to go to ASHRAE 90.1 for this information, making the use of the table cumbersome and incomplete. This description is based upon the ASHRAE 90.1 description.
- e. New Footnote e: This new footnote clarifies that the term "Wood framed and other," as used in the table, "are wood framed walls and all other wall systems except mass walls, metal building walls and metal framed walls." There is much confusion in the field as to how this term is to be interpreted.
- f. Proposed new Footnote f: This new footnote describes what the term "Metal framed walls" is intended to mean as used in the table. Previously it was necessary to go to ASHRAE 90.1 for this information, making the use of the table cumbersome and incomplete. This description is based upon the ASHRAE 90.1 description.

2) Table C402.2:

- a. Revised Footnote a: Rather than forcing the user to go to ASHRAE 90.1 for a description of assemblies, the footnotes have been revised to include the necessary descriptions. Footnote a in particular now describes the term "Attic and other" as used in the table, which is "insulation other than above deck or metal building insulation." Members of SEHPCAC subgroup working on this proposal verified this information with Steve Ferguson of ASHRAE. This information is needed as building officials have reported that many users call and ask what "Attic and other" is.
- b. Revised Footnote b: In addition to retaining the information related to "spacer blocks," this footnote now also describes what the term "Metal buildings" is intended to mean as used in the table. Previously it was necessary to go to ASHRAE 90.1 for this information, making the use of the table cumbersome and incomplete. This description is based upon the ASHRAE 90.1 description.
- c. Footnote c: unchanged
- d. Footnote d: unchanged

- e. New Footnote e: Identical to proposed Footnote e to Table C402.1.2, this new footnote clarifies that the term “Wood framed and other,” as used in the table, “are wood framed walls and all other wall systems except mass walls, metal building walls and metal framed walls.” There is much confusion in the field as to how this term is to be interpreted.
- f. Proposed new Footnote f: Identical to proposed Footnote f to Table C402.1.2, this new footnote describes what the term “Metal framed walls” is intended to mean as used in the table. Previously it was necessary to go to ASHRAE 90.1 for this information, making the use of the table cumbersome and incomplete. This description is based upon the ASHRAE 90.1 description.
- g. Note that, although some of the new footnotes proposed are definitions, and definitions typically belong in Chapter 2, since these definitions pertain only to the these terms as used in this table (they are not used elsewhere in the code), their proper place is as footnotes to the table.

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: This code change proposal will not increase the cost of construction. This proposal is a clarification and, as such, will not increase the cost of construction.

CE102-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

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C402.1.1, C402.1.2, C402.2.7, Table C402.1.2, Table C402.2

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C402.1.1 Insulation and fenestration criteria. ~~The Building thermal envelope~~ opaque assemblies shall meet the requirements of Tables C402.2 and C402.3 based on the climate zone specified in Chapter 3. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *R*-values from the “Group R” column of Table C402.2. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *R*-values from the “All other” column of Table C402.2. Buildings with a vertical fenestration area or skylight area that exceeds that allowed in Table C402.3 shall comply with the building envelope provisions of ANSI/ASHRAE/IESNA 90.1. Doors having less than 50 percent glass area shall be considered opaque doors. Opaque swinging doors shall comply with Table C402.1.2 and opaque roll-up or sliding doors shall comply with Table C402.1.1.

C402.1.2 U-factor alternative. An opaque assembly with a *U*-factor, *C*-factor, or *F*-factor equal or less than that specified in Table C402.1.2 shall be permitted as an alternative to the *R*-values in Table C402.2. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *U*-factor, *C*-factor, or *F*-factor from the “Group R” column of Table C402.1.2. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *U*-factor, *C*-factor or *F*-factor from the “All other” column of Table C402.1.2. Doors having less than 50 percent glass area shall be considered opaque doors. Opaque swinging doors shall comply with Table C402.1.2 and opaque roll-up or sliding doors shall comply with Table C402.1.1.

~~C402.2.7 Opaque doors.~~ ~~Opaque doors (doors having less than 50 percent glass area) shall meet the applicable requirements for doors as specified in Table C402.2 and be considered as part of the gross area of above-grade walls that are part of the building envelope.~~

**TABLE C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY MAXIMUM REQUIREMENTS, U-FACTOR METHOD^a**

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Heated slabs	F-0.70	F-0.70	F-0.70	F-0.70	F-0.70	F-0.70	F-0.65	F-0.65	F-0.58	F-0.58	F-0.58	F-0.58	F-0.55	F-0.55	F-0.55	F-0.55
<u>Opaque Doors</u>																
Swinging	<u>U-0.61</u>	<u>U-0.61</u>	<u>U-0.61</u>	<u>U-0.61</u>	<u>U-0.61</u>	<u>U-0.61</u>	<u>U-0.61</u>	<u>U-0.61</u>	<u>U-0.37</u>	<u>U-0.37</u>	<u>U-0.37</u>	<u>U-0.37</u>	<u>U-0.37</u>	<u>U-0.37</u>	<u>U-0.37</u>	<u>U-0.37</u>

(Portions of Table not shown remain unchanged)

**TABLE C402.2
OPAQUE THERMAL ENVELOPE INSULATION COMPONENT MINIMUM REQUIREMENTS, R-VALUE METHOD^a**

Climate Zone	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Opaque Doors																
Swinging	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37
Roll-up or Sliding	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75

(Portions of Table not shown remain unchanged)

Reason: This proposal is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

Reasons for this proposal are as follows:

- a) This proposal is intended to clarify the use and application of the codes prescriptive building thermal envelope provisions and does not contain changes to the technical requirements of the code.
- b) The information related to opaque doors in the code is confusing. Doors are only found in Table C402.2 which is supposed to be the table addressing R values. But R-values are only provided for roll-up and sliding doors, but not for swinging doors. For swinging doors it provides a U-factor. U-factors are commonly listed in Table C402.1.2, but this latter table has no provisions for doors.
- c) This proposal moves the U-factor information for swinging doors to the U-factor table, but leaves the R-values for Roll-up or sliding doors in the R-value table (C402.2). It also and adds language to the text of Sections C402.1.1 and C402.1.2 that directs users from one table to the other for the information related to opaque doors that is not contained in each respective table. (i.e., Section C402.1.1 is revised to direct users to Table C402.1.2 for opaque swinging door thermal information and Section C402.1.2 has been revised to direct users to Table C402.2 for opaque roll-up or sliding door thermal requirements.
- d) The opaque door requirements of existing Section C402.2.7 of the 2012 IECC are directly related to the application of Sections C402.1.1 and C402.1.2 and their associated tables. The current scenario, however, is disjointed as there is no direct connection in Sections C402.1.1 or C402.1.2 to Section C402.2.7. Therefore, users are often unaware of the connection. As a result of the current disjointed arrangement of the opaque door provisions, Section C402.7 tends to be overlooked. This proposal clarifies the relationship by moving (not deleting) the information related to opaque doors from Section C402.2.7 directly into the sections they are related to: Sections C402.1.1 and C402.1.2.
- e) With the R-value and U-factor information relegated to the proper tables by this proposal, it clears the way for the titles to be revised to clearly indicate their proper application. The existing text titles do not indicate a) which method they are associated with or b) whether the values in the tables are intended to be applied as maximum or minimum values. Furthermore, while Table 402.1.2 appropriately indicates that it applies to assemblies, Table C402.2 does not indicate whether it is applicable to entire assemblies or to insulation components. Therefore, this proposal:
 - a. Revises the title of Table C402.1.2 to indicate that it contains maximum requirements, while the title of Table C402.2 is revised to indicate that it contains minimum requirements. This information differs for each table, is not intuitive to all users (many users incorrectly assume both tables contain maximum values) and is critical to the proper application of these tables.
 - b. Adds "R-VALUE METHOD" to the title of Table C402.2 and "U-FACTOR METHOD" to the title of Table C402.1.2. This reinforces the proper application of the tables with their respective methods. Note that existing Footnote "b" to Table C402.2 describes these methods in exactly this way.
 - c. Adds the words "insulation component" to the title of Table C402.2 in order to further clarify its application. Once again, unlike Table 401.1.2, Table C402.2 is not applicable to entire assemblies.

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: This code change proposal will not increase the cost of construction. This proposal is a clarification and, as such, will not increase the cost of construction.

CE103-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.1.1 #3-EC-THOMPSON-SEHPCAC.doc

CE104 – 13

Table C402.1.2, Chapter 5

Proponent: Mark Nowak, M. Nowak Consulting LLC, representing Steel Framing Alliance

Revise as follows:

TABLE C402.1.2
OPAGUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS^{a, b}

- a. Use of Opaque assembly U-factors, C-factors, and F-factors from ANSI/ASHRAE/IESNA 90.1 Appendix A shall be permitted, provided the construction, excluding the cladding system on walls, complies with the appropriate construction details from ANSI/ASHRAE/IESNA 90.1 Appendix A.
- b. Opaque assembly U-factors based on designs tested in accordance with ASTM C1363 shall be permitted. Modifications to the test results shall be permitted based on the addition or subtraction of building components on the exterior of the framing of the original tested design.
- b- c. Where heated slabs are below grade, below-grade walls shall comply with the F-factor requirements for heated slabs.

(Portions of Table not shown remain unchanged)

Add new standard to Chapter 5 as follows:

ASTM

ASTM C 1363-11 Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus

Reason: This proposal accomplishes three objectives. First it clarifies that one can use the ASHRAE 90.1 Appendix A U-Factors for compliance even if the siding system differs from the stucco siding system assumed in 90.1. The R-value of stucco is insignificant (approximately R 0.08) and choice of other siding should not disallow use of the 90.1 Appendix tables. For many assemblies, 90.1 is the only source of U-factors. This proposal will broaden their use without any significant impact on energy use.

Second, this proposal recognizes results of hot box laboratory tests conducted in accordance with ASTM C1363 for compliance with the code. Tested assemblies represent the best available data for assemblies and they should be recognized as acceptable for compliance.

Third, the proposal recognizes that hot box tests are costly and time consuming and it is not feasible or necessary to test every possible configuration but only the base assembly. A base assembly consists of the wall framing and cavity insulation with or without interior gypsum board or exterior sheathing. The U-factor of assemblies that differ from the base assembly in terms of different claddings, exterior continuous insulation, and sheathings can be calculated by adding or subtracting component R-values as long as changes are not made to the framing factor or the R-value of the cavity insulation.

The proposed test standard can be viewed by the committee through the ASTM website set up specifically to facilitate review of proposals to the ICC codes.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, ASTM C 1363-2011 Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

CE104-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.1.2T-EC-NOWAK.doc

CE105 – 13

C402.2, C402.2.1 (NEW)

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C402.2 Specific building thermal envelope insulation requirements (Prescriptive). ~~Opaque assemblies shall comply with Table C402.2.~~ Insulation in building thermal envelope opaque assemblies shall comply with Sections C402.2.1 through C402.2.8 and Table C402.2.

C402.2.1. Multiple layers of continuous insulation board. Where two or more layers of continuous insulation board are used in a construction assembly, the continuous insulation boards shall be installed in accordance with Section C303.2. If the continuous insulation board manufacturer's installation instructions do not address installation of two or more layers, the edge joints between each layer of continuous insulation boards shall be staggered.

Reason: This proposal is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

Reasons for this proposal are as follows:

- a) This proposal clarifies the application of these sections and makes no technical changes.
- b) The intent of the code is that the provisions of Section C402.2 and its subsections are to apply to both of the code's prescriptive building thermal envelope methods (the R-value and U-factor methods), not just the R-value method indicated in the existing text by its reference solely to Table C402.2.
- c) In addition, this proposal breaks out the specific requirement for continuous insulation into a separate subsection, which agrees conceptually with the format of the other current subsections of Section C402.2.

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: The code change proposal will not increase the cost of construction. This proposal is a clarification and, as such, will not increase the cost of construction.

CE105-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.2-EC-THOMPSON-SEHPCAC

CE106 – 13

Table C402.2, C402.2.3

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

**TABLE C402.2
OPAQUE THERMAL ENVELOPE REQUIREMENTS^a**

Climate Zone	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Walls, Above Grade																
Mass ^{LS}	R-5.7ci ^c	R-5.7ci ^c	R-5.7ci ^c	R-7.6ci	R-7.6ci	R-9.5ci	R-9.5ci	R-11.4ci	R-11.4ci	R-13.3ci	R-13.3ci	R-15.2ci	R-15.2ci	R-15.2ci	R-25ci	R-25ci
Metal building	R-13+ R-6.5ci	R-13 + R-6.5ci	R13 + R6.5ci	R-13 + R13ci	R-13 + R6.5ci	R-13 + R13ci	R-13 + R13ci	R-13 + R13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + +R13ci	R-13+ R19.5ci	R-13 + R13ci	R-13+ R- 19.5ci
Metal Framed	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-15.6ci	R-13 + R-7.5ci	R-13+ R17.5ci
Wood Framed and Other ^f	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-7.5ci or R20 + 3.8ci	R-13 + R-7.5ci or R20 + 3.8ci	R-13 + R-7.5ci or R20 + 3.8ci	R-13 + R-7.5ci or R20 + 3.8ci	R-13 + R-7.5ci or R20 + 3.8ci	R-13 + R-15.6ci or R20 + 10ci	R-13 + R-15.6ci or R20 + 10ci
Walls, Below Grade																
Below Grade Wall ^{d,f}	NR	NR	NR	NR	NR	NR	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-10ci	R-10ci	R-10ci	R-12.5ci

(Portions of Table not shown remain unchanged)

For SI: 1 inch = 25.4 mm ci = Continuous insulation. NR = No requirement.

LS = Liner System- A continuous membrane installed below the purlins and uninterrupted by framing members. Uncompressed, un-faced insulation rests on top of the membrane between the purlins.

- Assembly descriptions can be found in ASHRAE 90.1 Appendix A.
- Where using R-value compliance method, a thermal spacer block shall be provided, otherwise use the U-factor compliance method in Table C402.1.2.
- R-5.7 ci is allowed to be substituted with concrete block walls complying with ASTM C 90, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores filled with materials having a maximum thermal conductivity of 0.44 Btu-in/h- f^2 °F.
- Where heated slabs are below grade, below-grade walls shall comply with the exterior insulation requirements for heated slabs.
- Steel floor joist systems shall be insulated to R-38.
- The R-value of integral insulation installed in concrete masonry units shall not be used in determining compliance with Table C402.2.
- "Mass walls" shall include walls weighing not less than:
 - 35 psf (170 kg/m²) of wall surface area; or
 - 25 psf (120 kg/m²) of wall surface area where the material weight is not more than 120 pounds per cubic foot (pcf) (1900 kg/m³).

C402.2.3 Thermal resistance of above-grade walls. The minimum thermal resistance (*R*-value) of the insulating materials installed in the wall cavity between the framing members and continuously on the walls shall be as specified in Table C402.2, based on framing type and construction materials used in the wall assembly. The *R*-value of integral insulation installed in concrete masonry units (CMU) shall not be used in determining compliance with Table C402.2.

"Mass walls" shall include walls weighing not less than:

1. 35 psf (170 kg/m²) of wall surface area; or
2. 25 psf (120 kg/m²) of wall surface area if the material weight is not more than 120 pounds per cubic foot (pcf) (1900 kg/m³).

Reason: This proposal is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

This proposal is intended to clarify the use and application of the codes prescriptive building thermal envelope provisions and does not contain changes to the technical requirements of the code. Detailed reasons are as follows:

- a) The first sentence in Section C402.2.3 is unnecessary as it is redundant with the requirements of Section C402.1.1 and Table C402.2. It appears to be there only to tie these provisions to Section C402.1.1. Thus, it is better to simply relocate these provisions in Section C402.1.1. The current scenario also creates a condition wherein these redundant requirements could unintentionally diverge in the future.
- b) The second sentence and the "Mass wall" criteria in Section C402.2.3 are directly related to Table C402.1.1 and, therefore, are more appropriately located as footnotes to the table. While using the table in its current form (without these proposed footnotes), it is difficult to tell that these provisions are relevant to it.
- c) As currently organized, it is not apparent to users as they apply Tables C402.1.1 and C402.2 that Section C402.2.3 is applicable to the tables. This change makes the application more obvious and, therefore, will increase compliance.
- d) Note that the requirements of Section C402.2.3 are being moved, not deleted.
- e) Note that the provisions of C402.2.3 that are being moved are not requirements, they simply indicate how the term "mass walls" is intended to be applied in the tables.

The SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: The code change proposal will not increase the cost of construction. This proposal is a clarification and, as such, will not increase the cost of construction.

CE106-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.2T-EC-THOMPSON-SEHPCAC

CE107 – 13

Table C402.2

Proponent: Mark Nowak, M. Nowak Consulting, LLC, representing Steel Framing Alliance

Revise as follows:

TABLE C402.2
OPAQUE THERMAL ENVELOPE REQUIREMENTS^a

Climate Zone	1		2	
	All other	Group R	All other	Group R
Walls, Above Grade				
Metal Framed	R-13+5ci	R-13+5ci	R-13+5ci	R-13+7.5ci
Wood framed and other	R-13+3.8 or R-20	R-13+3.8 or R-20	R-13+3.8 or R-20	R-13+3.8 or R-20

(Portions of Table not shown remain unchanged)

Reason: The addition of continuous insulation for Climate Zones 1 and 2 in the 2009 and 2012 code resulted in significant construction costs but little energy savings. Further, in these warmer climates, the embodied energy to manufacture and ship the continuous insulation requires years of the annual projected savings before any real energy savings occurs. Energy conservation could be better accomplished in other areas of the building where more energy could be conserved for each dollar invested.

Following is an analysis of Group R construction that was conducted in various cities from Climate Zones 1 and 2. The data shows the costs and benefits associated with specifying a metal framed wall with and without continuous insulation. The selected cities are the representative cities developed by the US Department of Energy's Pacific Northwest National Laboratory (PNNL) for these respective climate zones. Based on this analysis, which shows simple paybacks from 30 to 102 years, there is not sufficient justification to retain the insulation requirements at the current levels.

Climate zone	City	Building energy use with R-13 exterior walls (kWh)	Building energy use with R13+5 exterior walls (kWh)	Building Energy with R13+7.5 (kWh)	Annual energy savings with addition of continuous insulation (kWh)/\$	Cost of continuous insulation per building (\$)	Payback in years
1	Miami	373033	371739	-	1294/\$138	14032	102
2	Houston	389323	-	384992	4331/\$537	16533	31
2	Phoenix	384175	-	380105	4070/\$472	16533	35

Table Notes: Energy use was determined through simulations with Energy Gauge Summit V4.10 for a four story 32 unit multi-family apartment based on minimum prescriptive and equipment requirements in the 2012 IECC. Energy costs are as reported year end 2011 by USEIA for the largest utility providers in each city. Insulation costs are national averages from Craftsman Estimator 2007 adjusted for inflation and contractor overhead and profit.

In addition to the lengthy payback periods in these climate zones, the consideration of embodied energy needs to be addressed. The table below shows the embodied energy impact on the overall payback period. In Phoenix and Houston, it will take approximately 7 years before any overall energy will be saved compared to a wall without continuous insulation. The payback for embodied energy increases to 15 years in Miami. When added to the payback for first costs, this will put the overall payback period between 42 and 117 years for the cities in these climate zones, well outside accepted norms.

Climate zone	City	Embodied energy for R-5 continuous insulation (kWh)	Embodied energy for R-7.5 continuous insulation (kWh)	Annual energy savings with addition of continuous insulation (kWh)	Years to payback embodied energy
1	Miami	19388	-	1294	15
2	Houston	-	29030	4331	6.7
2	Phoenix	-	29030	4070	7.1

Table notes: Embodied energy information based on 1.87 kWh per SF or R-5 insulation. Source of embodied energy data extracted from Environmental Building News (Wilson 2010 downloaded from <http://www2.buildinggreen.com/blogs/avoiding-global-warming-impact-insulation> on December 4, 2012)

Cost Impact: The code change proposal will not increase the cost of construction.

CE107-13

Public Hearing: Committee:
Assembly:

AS
ASF

AM
AMF

D
DF

C402.2T-EC-NOWAK.doc

CE108 – 13

Table C402.2

Proponent: Larry Williams, Steel Framing Industry Association

Revise as follows:

Table C402.2
Opaque thermal Envelope requirements

Climate Zone	3	
	All other	Group R
	Walls, above grade	
Metal Framed	R-13+7.5ci	R-13+7.5ci
Wood framed and other	R-13+3.8 or R-20	R-13+3.8 or R-20

(Portions of Table not shown remain unchanged)

Reason: The addition of continuous insulation for Climate Zone 3 in 2009 and its further increase in the 2012 code resulted in significant construction costs but little energy savings. Further, the embodied energy to manufacture and ship the continuous insulation requires years of the annual projected savings before any real energy savings occurs. Energy conservation could be better accomplished in other areas of the building where more energy could be conserved for each dollar invested.

Following is an analysis of Group R construction that was conducted in various cities from Climate Zone 3. The data shows the costs and benefits associated with specifying a metal framed wall with and without continuous insulation. The selected cities are the representative cities developed by the US Department of Energy's Pacific Northwest National Laboratory (PNNL) for this climate zone. Based on this analysis, which shows simple paybacks from 23 to 25-1/2 years, there is not sufficient justification to retain the insulation requirements at the current levels.

Climate zone	City	Building energy use with R-13 exterior walls (kWh)	Building Energy with R13+7.5 (kWh)	Annual energy savings with addition of continuous insulation (kWh)/\$	Cost of continuous insulation per building (\$)	Payback in years
3	El Paso	399359	393888	5471/\$649	16533	25.5
3	San Francisco	355492	351170	4322/\$662	16533	25
3	Memphis	439907	432413	7494/\$718	16533	23

Table Notes: Energy use was determined through simulations with Energy Gauge Summit V4.10 for a four story 32 unit multi-family apartment based on minimum prescriptive and equipment requirements in the 2012 IECC. Energy costs are as reported year end 2011 by US EIA for the largest utility providers in each city. Insulation costs are national averages from Craftsman Estimator 2007 adjusted for inflation and contractor overhead and profit.

In addition to the lengthy payback period in these climate zones for first costs, the consideration of embodied energy needs to be addressed. The table below shows the embodied energy payback periods. The embodied energy increases payback by approximately 4 to just under 7 additional years. When added to the payback for first costs, this will put the overall payback period between approximately 27 and 32 years, well outside accepted norms.

Climate zone	City	Embodied energy for R-7.5 continuous insulation (kWh)	Annual energy savings with addition of continuous insulation (kWh)	Years to payback embodied energy
--------------	------	---	--	----------------------------------

1	<i>El Paso</i>	29030	5471	5.3
2	<i>San Francisco</i>	29030	4322	6.7
2	<i>Memphis</i>	29030	7494	3.9

Table notes: Embodied energy information based on 1.87 kWh per SF of R-5 insulation. Source of embodied energy data extracted from Environmental Building News (Wilson 2010, downloaded from <http://www2.buildinggreen.com/blogs/avoiding-global-warming-impact-insulation> on December 4, 2012)

Cost Impact: The code change proposal will not increase the cost of construction.

CE108-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

C402.2T-EC-WILLIAMS.doc

CE109 – 13

Table C402.2

Proponent: Robert A. Zabcik, NCI Building Systems, representing self

Revise as follows:

**TABLE C402.2
OPAQUE THERMAL ENVELOPE REQUIREMENTS^a**

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
ROOFS								
Insulation entirely above deck	R-20ci	R-20ci	R-20ci	R-20ci	R-20ci	R-20ci	R-25ci	R-25ci
Metal Buildings (with R-5 thermal blocks) ^{a,b}	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS
Attic and other	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-38

(Portions of Table not shown remain unchanged)

For SI: 1 inch = 25.4 mm. ci = Continuous insulation. NR = No requirement.

LS = Liner System—A continuous membrane installed below the purlins and uninterrupted by framing members. Uncompressed, unfaced insulation rests on top of the membrane between the purlins.

a. Assembly descriptions can be found in ANSI/ASHRAE/IESNA Appendix A.

b. Where using *R*-value compliance method, a thermal spacer block shall be provided, otherwise use the *U*-factor compliance method in Table C402.1.2.

Reason: The purpose of this proposal is to correct an error. The requirement of R-5 thermal blocks for the referenced assemblies is not correct. According to Appendix A of ASHRAE 90.1-2010 (as referenced in footnote a and as qualified in Chapter 5 of the Commercial Provisions of IECC) the reference liner system has a minimum R-3.5 thermal block. Rather than change the table to reflect R-3.5, it is proposed to eliminate the statement completely since the thermal block requirement is very clearly stated in the 90.1 Appendix already. To repeat the requirement in this table further introduces a maintenance issue, especially considering the fact that many state codes incorporate this table verbatim. This has caused a problem in the North Carolina energy code, for instance. For convenience, the pertinent ASHRAE 90.1 Appendix A passage is repeated below and the R factor requirement bolded:

A2.3.2.4 Liner System (Ls). A continuous vapor barrier liner is installed below the purlins and uninterrupted by framing members. Uncompressed, unfaced insulation rests on top of the liner between the purlins. For multilayer installations, the first *rated R-Value of insulation* is for unfaced insulation draped over purlins and then compressed when the metal *roof* panels are attached. A minimum **R-3.5** thermal spacer block between the purlins and the metal *roof* panels is required when specified in Table A2.3.

Cost Impact: The code change proposal will not increase the cost of construction. This to correct an error.

CE109-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

C402.2T-EC-ZABCIK.doc

CE110 – 13

Table C402.2

Proponent: Mark Halverson, APA-The Engineered Wood Association (mark.halverson@apawood.org), Paul Coats, The American Wood Council

Revise as follows:

Table C402.2
OPAQUE THERMAL ENVELOPE REQUIREMENTS^a

Walls, Above Grade																
CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Mass	R-5.7ci ^c	R-5.7ci ^c	R-5.7ci ^c	R-7.6ci	R-7.6ci	R-9.5ci	R-9.5ci	R-11.4ci	R-11.4ci	R-13.3ci	R-13.3ci	R-15.2ci	R-15.2ci	R-15.2ci	R-25ci	R-25ci
Metal buildings	R-13 + R-6.5ci	R-13 + R-6.5ci	R-13 + R-6.5ci	R-13 + R-13ci	R-13 + R-6.5ci	R-13 + R-13ci	R13 + 13ci	R-13 + 13ci	R13 + 13ci	R13 + 13ci	R13 + 13ci	R13 + 13ci	R13 + 13ci	R13 + 19.5ci	R13 + 13ci	R13 + 19.5ci
Metal framed	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-15.6ci	R-13 + R-7.5ci	R-13 + R-17.5ci
Wood framed and other	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R13 + R7.5ci or R20 + R3.8ci	R13 + R7.5ci or R20 + R3.8ci	R13 + R7.5ci or R20 + R3.8ci	R13 + R7.5ci or R20 + R3.8ci	R13 + R15.6ci or R20 + R10ci	R13 + R15.6ci or R20 + R10ci

For SI: 1 inch = 25.4 mm. ci = Continuous insulation. NR = No requirement.

LS = Liner System—A continuous membrane installed below the purlins and uninterrupted by framing members. Uncompressed, unfaced insulation rests on top of the membrane between the purlins.

- Assembly descriptions can be found in ANSI/ASHRAE/IESNA Appendix A.
- Where using *R*-value compliance method, a thermal spacer block shall be provided, otherwise use the *U*-factor compliance method in Table C402.1.2.
- R*-5.7ci is allowed to be substituted with concrete block walls complying with ASTM C 90, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores filled with materials having a maximum thermal conductivity of 0.44 Btu-in/h-^{ft} °F.
- Where heated slabs are below grade, below-grade walls shall comply with the exterior insulation requirements for heated slabs.
- Steel floor joist systems shall be insulated to R-38.

(Portions of Table not shown remain unchanged)

Reason: The above-grade wall *U*-factors and the insulation requirements for Climate Zone 5 and Marine 4 in Tables C402.1.2 and C402.2 are in alignment, except for the *R*-value requirements for Group R buildings. This proposal simply brings those insulation values into alignment with the other *R*-values and *U*-factors for the climate zone. Since each of the

other climate zones have consistent wood frame wall *R*-values and *U*-factors for “Group R” buildings and “All Other” buildings, it only makes sense to correct the inconsistency found in this cell in Table C402.2.

Cost Impact: The code change proposal will not increase the cost of construction.

CE110-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.2T-EC-COATS-HALVERSON.doc

CE111 – 13

Table C402.2

Proponent: Joseph R. Hetzel, P.E., Thomas Associates, Inc., representing the Door & Access Systems Manufacturers Association (DASMA) International (jhetzel@thomasamc.com)

Revise as follows:

**TABLE C402.2
OPAQUE THERMAL ENVELOPE REQUIREMENTS^a**

CLIMATE ZONE	1		2		3		4 except Marine		5 & Marine 4		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Opaque Doors																
Swinging	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37
Roll-up or sliding Non-swinging	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75

(Portions of Table not shown remain unchanged)

Reason: "Non-swinging" is a better term to use since it not only would distinguish these types of doors from "swinging doors", but the term encompasses sectional garage doors as well as rolling ("roll-up") doors and sliding doors. "Non-swinging" is also used in ASHRAE 90.1.

Cost Impact: The code change proposal will not increase the cost of construction.

CE111-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

C402.2T-EC-HETZEL.doc

CE112 – 13

C402.2.1, C402.2.1.1 (NEW), C402.2.1.2 (NEW), C402.2.1.3

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C402.2.1 Roof assembly insulation. Roof insulation shall comply with Sections C402.2.1.1, C402.2.1.2 and C402.2.1.3.

C402.2.1.1 Variations in continuous roof insulation thickness. ~~The minimum thermal resistance (*R*-value) of the insulating material installed either between the roof framing or continuously on the roof assembly shall be as specified in Table C402.2, based on construction materials used in the roof assembly. Where the thickness of continuous above deck roof insulation varies by 1 inch (25 mm) or less:~~

- ~~1. For designs intended to comply with Section C402.1.1, the area-weighted *R*-value shall be not less than the *R*-value specified in Table C402.2, or~~
- ~~2. For designs intended to comply with Section C402.1.2, the area-weighted *U*-factor shall not be greater than the *U*-factor specified in Table C402.1.2.~~

C402.2.1.2 Insulation at skylight curbs. Skylight curbs shall be insulated to not less than the level of required for roofs with insulation entirely above deck or *R*-5, whichever is less.

Exceptions:

- ~~1. Continuously insulated roof assemblies where the thickness of insulation varies 1 inch (25 mm) or less and where the area-weighted *U*-factor is equivalent to the same assembly with the *R*-value specified in Table C402.2.~~
- ~~2. 1. Unit skylight curbs included as a component of an NFRC 100 rated assembly shall not be required to be insulated.~~

C402.2.1.3 Suspended ceiling insulation. Insulation installed on a suspended ceiling with removable ceiling tiles shall not be considered part of the minimum thermal resistance of the roof insulation.

Reason: This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 2 open meetings and over 15 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

This proposal seeks to clarify the code's provisions related to roof insulation by essentially breaking the provisions out into 3 separate subsections. This proposal makes no technical changes. Detailed reasons are as follows:

- a) The first sentence in the original provision was removed as it was redundant with information already contained in Section C402.1.1. This information appeared to be repeated in Section C402.2.1 of the 2012 IECC solely to facilitate the application of Exception 1. However, it is not an exception. It is an alternative requirement. As such, it was reconfigured as Item 2 to proposed new Section C402.2.1.1.
- b) The main/parent section title was revised to include the word "insulation" and delete the word "assembly," which is more indicative of what this section is applicable to.
- c) The area weighting provisions were broken out into their own subsection and the language was revised so that the concept can now be applied to both the *R*-value and *U*-factor methods in Tables C402.1.1 and C402.1.2. Formerly, these provisions only applied to Table C402.2.
- d) The skylight insulation component was broken out to add clarity.
- e) The suspended ceiling insulation component was broken out to add clarity.

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: The code change proposal will not increase the cost of construction. This proposal is a clarification and, as such, will not increase the cost of construction.

CE112-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.2.1-EC-THOMPSON-SEHPCAC

CE113 – 13

C402.2.1

Proponent: Mark S. Graham, National Roofing Contractors Association (mgraham@nrca.net)

Revise as follows:

C402.2.1 Roof assembly. The minimum thermal resistance (*R*-value) of the insulating material installed either between the roof framing or continuously on the roof assembly shall be as specified in Table C402.2, based on construction materials used in the roof assembly. Where continuous insulation boards are used with insulation entirely above deck, the insulation boards shall be installed in two or more layers with the insulation board joints staggered and offset between each layer. Skylight curbs shall be insulated to the level of roofs with insulation entirely above deck or R-5, whichever is less.

Exceptions:

1. Continuously insulated roof assemblies where the thickness of insulation varies 1 inch (25 mm) or less and where the area-weighted *U*-factor is equivalent to the same assembly with the *R*-value specified in Table C402.2.
2. Unit skylight curbs included as a component of an NFRC 100 rated assembly shall not be required to be insulated.

Insulation installed on a suspended ceiling with removable ceiling tiles shall not be considered part of the minimum thermal resistance of the roof insulation.

Reason: This code change proposal is intended to add a requirement for insulation boards used in roof assemblies in insulation above deck configurations to be installed in two or more layers allowing for staggering and offsetting the board joints. This installation method will improve the effective thermal performance of the roof assembly by effectively reducing heat loss through the board joints.

Cost Impact: This code change proposal will not increase the cost of construction.

CE113-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.2.1 #1-EC-GRAHAM.doc

CE114 – 13

C402.2.1

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.2.1 Roof assembly. The minimum thermal resistance (*R*-value) of the insulating material installed either between the roof framing or continuously on the roof assembly shall be as specified in Table C402.2, based on construction materials used in the roof assembly. Skylight curbs shall be insulated to the level of roofs with insulation entirely above deck or R-5, whichever is less.

Exceptions:

1. Continuously insulated roof assemblies where the thickness of insulation varies 1 inch (25 mm) or less and where the area-weighted *U*-factor is equivalent to the same assembly with the *R*-value specified in Table C402.2.
2. Unit skylight curbs included as a component of ~~an NFRC 100 rated assembly~~ a skylight listed and labeled in accordance with NFRC 100 shall not be required to be insulated.

Insulation installed on a suspended ceiling with removable ceiling tiles shall not be considered part of the minimum thermal resistance of the roof insulation.

Reason: The term “rated” is generally understood but the correct presentation of the criterion is that the assembly be listed and labeled in accordance with NFRC 100. This proposal clarifies when a skylight curb can be exempted from meeting the requirements for insulating the curb.

Cost Impact: The code change proposal will not increase the cost of construction.

CE114-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.2.1-EC-WILLIAMS.doc

CE115 – 13

C402.2.1

Proponent: Mark S. Graham, National Roofing Contractors Association (mgraham@nrca.net)

Revise as follows:

C402.2.1 Roof assembly. The minimum thermal resistance (*R*-value) of the insulating material installed either between the roof framing or continuously on the roof assembly shall be as specified in Table C402.2, based on construction materials used in the roof assembly. Skylight curbs shall be insulated to the level of roofs with insulation entirely above deck or R-5, whichever is less.

Exceptions:

1. Continuously insulated roof assemblies where the thickness of insulation varies 1 inch (25 mm) or less and where the area-weighted *U*-factor is equivalent to the same assembly with the *R*-value specified in Table C402.2.
2. Where tapered insulation is used with insulation entirely above deck, the *R*-value where the insulation thickness varies 1 inch (25 mm) or less from the minimum thickness of tapered insulation shall comply with the *R*-value specified in Table C402.2
- ~~2~~ 3. Unit skylight curbs included as a component of an NFRC 100 rated assembly shall not be required to be insulated.

Insulation installed on a suspended ceiling with removable ceiling tiles shall not be considered part of the minimum thermal resistance of the roof insulation.

Reason: This code change proposal is intended to clarify the Code's intent how *R*-value is determined when using slope-to-drain tapered insulation systems in roof assemblies using the insulation entire above deck configuration. The 2012 IECC Code and Commentary indicates Exception 1 is intended to address tapered insulation systems in insulation entire above deck configurations. The Commentary's text on this specific topic is as follows:

"The exception to this section permits a roof that is "continuously insulated" to have areas that do not meet the required *R*-values, provided that the area weighted values are equivalent to the specified insulation values. This type of insulation referred to as a tapered installation is where the roof insulation thickness varies to provide slope for drainage. Therefore, while one section may have less insulation due to this slope, other portions of the roof would be above the values required. Therefore, in this situation the weighted average of the insulation would meet the required values even though some portions may be less than that specified in Table C402.2. When applying the exception, it is important to notice that the variation in insulation thickness is limited to 1 inch (25 mm). This limitation on the thickness variation will help ensure more consistent insulation coverage and also reduce the number of roofs that qualify to use this exception.

This 1-inch (25 mm) limitation does not prevent the provisions from being applied to roofs that have a greater variation; it simply does not allow additional thickness to be factored into the average insulation values. Where the variation exceeds 1 inch (25 mm), it would be permissible to go to the thinnest spot and measure the *R*-value at that point (for the example call this Point "a"). Then go to a point that is 1 inch (25 mm) thicker than Point "a" and measure the *R*-value there (for the example, call this Point "b"). The remaining portions of the roof that are thicker than that additional 1-inch (25 mm) portion (Point "b") would simply be assumed to have the same *R*-value that Point "b" had. All portions of the roof that meet or exceed the Point "b" *R*-value would simply use the Point "b" *R*-value when determining the area weighted *U*-factor for the roof."

Simply put, this is confusing.

The proposed new Exception 2 is an attempt to provide clearer, more concise wording addressing tapered insulation systems in roof assemblies using the insulation entire above deck configuration.

This proposal keeps the existing Exception 1 intact as it may apply to situations other than tapered insulation systems in roof assemblies using the insulation entire above deck configuration.

Cost Impact: The code change proposal will not increase the cost of construction.

CE115-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.2.1 #2-EC-GRAHAM.doc

CE116 – 13

C402.2.1.1

Proponent: Amy Dickie, Global Cool Cities Alliance (amy@globalcoolcities.org)

Revise as follows:

C402.2.1.1 Roof solar reflectance and thermal emittance. Low-sloped roofs, with a slope less than 2 units vertical in 12 horizontal, directly above cooled *conditioned spaces* in Climate Zones 1, 2, ~~and 3~~, 4a and 4b, shall comply with one or more of the options in Table C402.2.1.1.

(Portions of text not shown remains unchanged)

Reason: Cool roofs are cost effective in climate zones 4a and 4b. Currently, the cool roof provision applies only to climate zones 1 through 3. This proposal expands the cool roof provision to climate zones 4a and 4b, where there is overwhelming evidence that cool roofs provide consistent and significant energy savings and energy cost savings.

Roofs that have a high solar reflectance and high thermal emittance (cool roofs) stay cooler in the sun. Cool roofs will have multiple benefits in climate zones 4a and 4b.

- Switching to cool roofs across climate zones 4a and 4b generates energy savings and energy cost savings.
- Cool roofs help reduce peak load in IECC climate zones 4a and 4b.
- The benefits of cool roofs have been proven beneficial in major metropolitan areas within climate zones 4a and 4b. Several major cities in climate zone 4 have adopted the use of cool roofs on commercial, low-sloped roofs into law.
- Cool roofs provide a cooler environment for roof equipment, thus enabling better performance for rooftop equipment.
- In many cases roof construction can have a cool roof option with zero price premium. Some cool roofs have small price premiums.
- Cool roofs have many important co-benefits. For example, a large number of cool roofs will reduce the summer air temperature in cities and therefore improve resiliency of urban populations to heat events.

The following technical analyses and substantiating information supports this proposal.

1) Switching to cool roofs across IECC Climate Zones 4a and 4b generates energy savings and energy cost savings.

- a. Cool roofs have a positive net energy savings in most parts of the country (Figure 1) and net energy cost savings in most parts of the country (Figure 2).¹

Figure 1: Cooling energy savings and heating energy penalty for commercial buildings with low-sloped roofs that have installed cool roofs. Calculations are based on increasing the aged solar reflectance of the roof to 0.55 from 0.20. Data from Levinson and Akbari (2010). Btu conversions added by GCCA. Annual net energy savings = annual cooling energy savings – heating energy penalty. *Values for other climate zones are available in the Levinson and Akbari (2010) paper.*

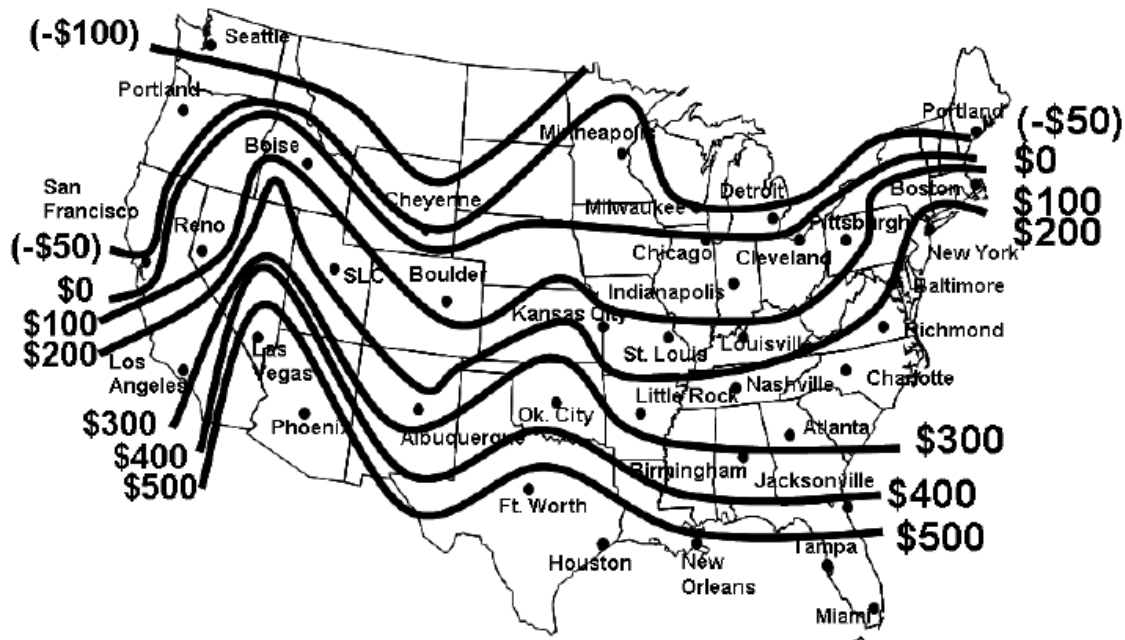
DOE benchmark city	State	Climate Zone	new office annual cooling-energy savings (Btu/m ²)	new office annual heating-energy penalty (Btu/m ²)	new office annual net energy savings (Btu/m ²)
Baltimore	MD	4A	7,034	4,766	2,268
Albuquerque	NM	4B	10,084	4,714	5,370

Figure 2: Net energy cost savings for commercial buildings with low-sloped roofs that have installed cool roofs. Calculations are based on increasing the aged solar reflectance of the roof to 0.55 from 0.20. Data from Levinson and Akbari (2010) with updated energy prices from EIA 2010. *Values for other climate zones are available upon request by e-mail.*

DOE benchmark cities	State	Climate Zone	new office annual energy-cost saving (\$/ft ²)	new retail annual energy-cost saving (\$/ft ²)
Baltimore	MD	4A	\$ 0.01	\$ 0.02
Albuquerque	NM	4B	\$ 0.02	\$ 0.03

- b. The breakeven line for cool roofs is well north of climate zones 4a and 4b.

Figure 3: Net Annual Energy Cost Savings for a reflective roof versus a non-reflective roof (dollars per 20,000 square foot roof area) for low-sloped commercial buildings. Calculations were made using the DOE Cool Roof Calculator.²



- 2) **Cool roofs help reduce peak load in IECC Climate Zones 4a and 4b.**
 - a. According to a recent study, peak energy savings from cool roofs are significant in all climate zones.³
 - b. According to an analysis conducted for the Environmental Protection Agency⁴, adopting cool roofs across 11 metropolitan areas generates peak energy savings for all of them. The three cities included in the study from climate zone 4a had peak annual energy savings from commercial buildings as follows:
New York – 95 MW
Philadelphia – 49 MW
DC/Baltimore – 31 MW
- 3) **The benefits of cool roofs have been proven beneficial in major metropolitan areas within climate zones 4a and 4b. Several major cities in climate zone 4 have adopted the use of cool roofs on commercial, low-sloped roofs into law.**
 - a. A study that analyzed temperature data collected from three different roof surface treatments in Long Island City, Queens, New York found that the white roof surfaces did not show any “winter heating penalty” relative to the black roofs, and found that white roofs generate an energy cost savings of approximately \$200 per year.⁵
 - b. A study which analyzed the building energy impacts of the use of light colored roofs across the US found net energy cost savings for commercial buildings in all eleven of the metropolitan areas it analyzed.⁶ GCCA updated this analysis using EIA electricity and natural gas data from 2010. See Figure 4, below.
Figure 4: Annual energy savings and energy cost savings per 1,000 square feet of roof area of air conditioned commercial buildings resulting from the application of light colored roofs. Building energy data from Konopacki et al. Energy cost data from EIA 2010.

Metropolitan Area	Annual Savings on Commercial Buildings					
	Climate Zone	electricity (kWh)	gas (therms)	electricity savings (\$)	heating energy penalty (\$)	net energy savings (\$)
Atlanta	3A	239	-6	21.65	-6.57	15.08
Chicago	5A	228	-15	20.25	-13.14	7.11
Los Angeles	3B	350	-3	45.85	-2.49	43.36
Dallas / Fort Worth	3A	224	-4	20.59	-3.16	17.43
Houston	2A	261	-2	23.99	-1.58	22.41
Miami/ Ft. Lauderdale	1A	340	0	33.18	0	33.18
New Orleans	2A	287	-2	24.4	-1.97	22.43
New York	4A	211	-9	34.41	-9.79	24.62
Philadelphia	4A	232	-14	23.43	-14.66	8.77
Phoenix	2B	409	-2	38.73	-2.14	36.59
DC/Baltimore	4A	221	-9	29.66	-11.03	18.63

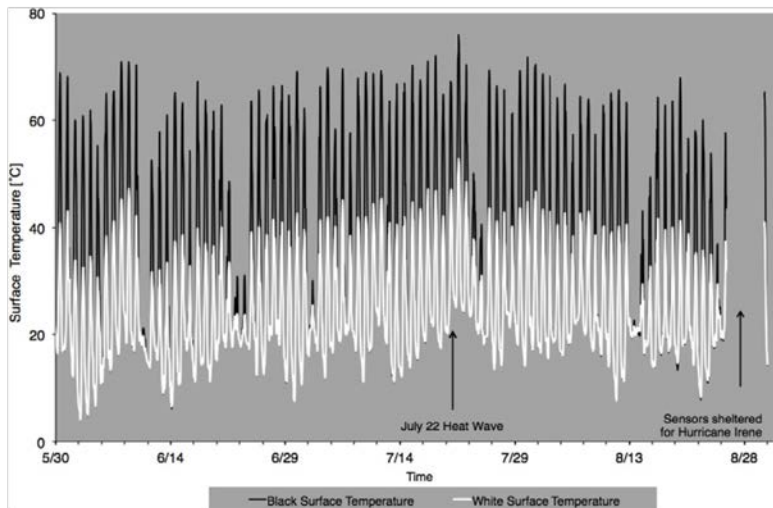
c. New York, Philadelphia, and Washington DC all require cool roofs. All of these cities are in climate zone 4. In all cases, these ordinances were adopted in an effort to generate building energy savings and mitigate the urban heat island.

- As of January 2012, New York City requires cool roofs on new and replacement low-sloped roofs (Local Laws of the City of New York for the Year 2011, #21). Roofs must have a minimum initial reflectance of 0.7 and initial thermal emittance of 0.75 or an SRI of 78.
- Washington DC's Construction Code of 2008 for commercial buildings includes a provision on cool roofs in Chapter 15A. Low-sloped roofs are required to have a minimum initial SRI of 78 or comply with Energy Star. In December 2012, the Washington DC Department of Consumer and Regulatory Affairs and the Construction Codes Coordinating Board published a proposed rulemaking to adopt IECC 2012 section C402.2.1.1 with an amendment to include climate zone 4.
- In April, 2010, the City of Philadelphia issued an ordinance (#090923) that all low-sloped roofs on new buildings and additions to existing buildings be Energy Star rated as highly reflective.

4) Cool roofs provide a cooler environment for roof equipment

a. Cool roofs lead to less thermal expansion due to their cooler temperatures.⁷

Figure 5: White and black roof temperatures on a building in New York City through the summer of 2011.⁷



5) In many cases roof construction can have a cool roof option with zero price premium. Some cool roofs have small price premiums.

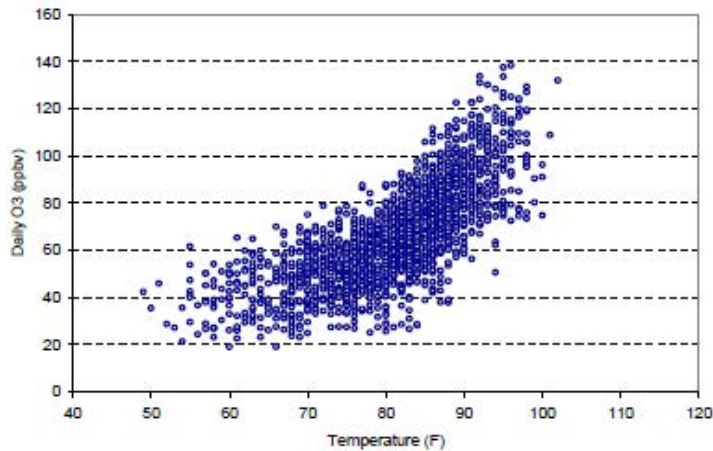
a. As with most construction materials, pricing can vary by market. According to EPA's Cool Roof website states, the cost premium for cool roofs versus conventional roofing materials ranges from zero to 5 or 10 cents per square foot for most products.⁸

6) Cool roofs provide co-benefits beyond building energy efficiency

a. Cool roofs help reduce ambient air temperatures, which in turn lower the incidences of smog formation.⁹

Figure 6 shows that as the surface temperature at Baltimore Washington International Airport (x-axis) rises, peak 8-hour ozone concentrations (y-axis) rise at an accelerated pace. Plots above horizontal red line indicate readings that exceeded the EPA compliance standard.

Figure 6: Maximum surface temperature at BWI versus peak 8-hour ozone concentrations



- b. Cool roofs improve resiliency of urban populations to heat events.

A report for the Environmental Protection Agency studied the estimated mortality attributed to actual extreme heat events in Detroit, Philadelphia, Los Angeles, and New Orleans. Scenarios where the cities had higher albedos (10% improvements and 20% improvements) and greater vegetative cover suggest reductions in mortality during extreme heat events when cool surfaces are used to reduce urban temperatures. The paper models three multi-day heat events in Philadelphia (Climate Zone 4a) and estimated a reduction in mortality of approximately 5.5% as a result of a 10% improvement in urban reflectivity.¹⁰

References:

- 1) Ronnen Levinson and Hashem Akbari, "Potential benefits of cool roofs on commercial buildings," *Energy Efficiency* (2010) 3:53-109.
- 2) Hoff, J. L. (2005). The Economics of Cool Roofing: A local and regional approach. *Proceedings of Cool Roofing: Cutting through the Glare*, Atlanta, Georgia, May 2005.
- 3) Hoff, J. L. (2012) An outcome-based, multi-variate approach to roof surface thermal contribution. *Proceedings of the International Roof Coatings Conference*, Baltimore, MD, July 2012.
- 4) Konopacki et al., "Cooling Energy Savings Potential of Light-Colored Roofs for Residential and Commercial Buildings in 11 U.S. Metropolitan Areas", a report prepared for the Environmental Protection Agency, 1997.
- 5) Gaffin, S.R., Rosenzweig, C., Eichenbaum-Pikser, J., Khanbilvardi, R. and Susca, T., 2010. "A Temperature and Seasonal Energy Analysis of Green, White, and Black Roofs" Columbia University, Center for Climatic Systems Research. New York.
- 6) Konopacki et al., "Cooling Energy Savings Potential of Light-Colored Roofs for Residential and Commercial Buildings in 11 U.S. Metropolitan Areas", a report prepared for the Environmental Protection Agency, 1997.
- 7) Gaffin et al., "Bright is the New Black" *Environmental Research Letters* 7 (2012).
- 8) <http://www.epa.gov/hiri/mitigation/coolroofs.htm>
- 9) Russell Dickerson et al., "Climate Change and Air Quality for Baltimore and Washington," a contribution to ACCENT CCAQ: Group 1 (2007).
- 10) Kalkstein and Sheridan, "The Heat Impact of Heat Island Reduction Strategies on Health-Debilitating Oppressive Air Masses in Urban Areas" a report for the EPA, 2003.

Cost Impact: The code change proposal will not increase the cost of construction.

CE116-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.2.1.1-EC-DICKIE.doc

CE117 – 13

C402.1, C402.1.1, Table C402.2.1.1

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C402.1 General (Prescriptive). The building thermal envelope shall comply with Sections C402.1.1 and C402.3. Section C402.1.2 shall be permitted as an alternative to the *R*-values specified in Section C402.1.1.

~~C402.2.1.1~~ C402.3 Roof solar reflectance and thermal emittance. Low-sloped roofs, with a slope less than 2 units vertical in 12 horizontal, directly above cooled *conditioned spaces* in Climate Zones 1, 2, and 3 shall comply with one or more of the options in Table ~~C402.2.1.1~~ C402.3.

Exceptions: The following roofs and portions of roofs are exempt from the requirements in Table C402.2.1.1:

1. Portions of roofs that include or are covered by:
 - 1.1. Photovoltaic systems or components.
 - 1.2. Solar air or water heating systems or components.
 - 1.3. Roof gardens or landscaped roofs.
 - 1.4. Above-roof decks or walkways.
 - 1.5. Skylights.
 - 1.6. HVAC systems, components, and other opaque objects mounted above the roof.
2. Portions of roofs shaded during the peak sun angle on the summer solstice by permanent features of the building, or by permanent features of adjacent buildings.
3. Portions of roofs that are ballasted with a minimum stone ballast of 17 pounds per square foot (psf) (74kg/m²) or 23 psf (117 kg/m²) pavers.
4. Roofs where a minimum of 75 percent of the roof area meets a minimum

**TABLE ~~C402.2.1.1~~ C402.3
MINIMUM ROOF REFLECTANCE AND EMITTANCE OPTIONS^a**

(Portions of Table not shown remain unchanged)

Reason: This proposal is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

Reasons for this proposal are as follows:

This section is currently located incorrectly under parent section C402.2, which addresses insulation. This section has nothing to do with insulation. Therefore, this proposal renumbers the section, relocating it in a manner that separates it from the insulation requirements. The table referenced in this section is also proposed to be renumbered to coordinate with the revised section number.

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: This code change proposal will not increase the cost of construction. This proposal is a clarification and, as such, will not increase the cost of construction.

CE117-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

CE118 – 13

C202 (NEW), C402.2.1.1

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.2.1.1 Roof solar reflectance and thermal emittance. Low sloped roofs, ~~with a slope less than 2 units vertical in 12 units horizontal~~, directly above cooled conditioned spaces in Climate Zones 1, 2, and 3 shall comply with one or more of the options in Table C402.2.1.1.

Exceptions: The following roofs and portions of roofs are exempt from the requirements in Table C402.2.1.1:

1. Portions of roofs that include or are covered by:
 - 1.1. Photovoltaic systems or components.
 - 1.2. Solar air or water heating systems or components.
 - 1.3. Roof gardens or landscaped roofs.
 - 1.4. Above-roof decks or walkways.
 - 1.5. Skylights.
 - 1.6. HVAC systems, components, and other opaque objects mounted above the roof.
2. Portions of roofs shaded during the peak sun angle on the summer solstice by permanent features of the building, or by permanent features of adjacent buildings.
3. Portions of roofs that are ballasted with a minimum stone ballast of 17 pounds per square foot (psf) (74 kg/m²) or 23 psf (117 kg/m²) pavers.
4. Roofs where a minimum of 75 percent of the roof area meets a minimum of one of the exceptions above.

Add new definition as follows:

LOW SLOPED ROOF. A roof having a slope less than 2 units vertical in 12 units horizontal.

Reason: This proposal simplifies criteria for low sloped roofs by adding a definition for the term “low slope roof.” The current code text includes within it a definition that might be better placed in the definitions section of the code. Alternatively, if this is the only place the term is used, the need for a definition is moot if the text is then revised as “Roofs with a slope less than 2 units vertical in 12 units horizontal directly above....”

Cost Impact: The code change proposal will not increase the cost of construction.

CE118-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.2.1.1-EC-WILLIAMS.doc

CE119 – 13

Table C402.2.1.1, Chapter 5

Proponent: Sherry Hao, Energy Solutions, representing Cool Roof Rating Council
(sherry@coolroofs.org)

Revise as follows:

TABLE C402.2.1.1 MINIMUM ROOF REFLECTANCE AND EMITTANCE OPTIONS^a

- b. Solar reflectance tested in accordance with ASTM C1549, ASTM E903, or ASTM E1918, or the CRRC-1 Standard.
- c. Thermal emittance tested in accordance with ASTM C1371, or ASTM E408, or the CRRC-1 Standard.

(Portions of Table not shown remain unchanged)

Add new standard to Chapter 5 as follows:

CRRC Cool Roof Rating Council
 1610 Harrison Street
 Oakland, CA 94612

CRRC-1-12 CRRC-1 Standard

Reason: The Cool Roof Rating Council is recommending that another choice be integrated into the IECC. In this case the CRRC-1 Standard.

The Cool Roof Rating Council was created in 1998 to develop accurate and credible methods for evaluating and labeling the solar reflectance and thermal emittance (radiative properties) of roofing products and to disseminate the information to all interested parties. The CRRC is incorporated as a non-profit educational organization for the following purposes:

- To implement and communicate fair, accurate, and credible radiative energy performance rating systems for roof surfaces.
- To support research into energy related radiative properties of roofing surfaces, including durability of those properties.
- To provide education and objective support to parties interested in understanding and comparing various roofing options.

The CRRC-1 Standard is a testing standard that has many features which are attractive to roof product manufacturers which are beyond the ASTM standards already cited in this these provisions. This document:

- Defines and covers both initial and aged testing requirements
- Covers variegated, granular coated, and custom colored roof products
- Specifies roof product specimen preparation
- Addresses how to handle specimens which may be uncharacteristically damaged during testing
- Specifies the minimum contents of a testing report

This is not a proprietary document, as it is material neutral. This document is not specifically tied to the Cool Roof Rating Council "Product Rating Program", but is designed to be independent of that program or any others.

This code change proposal does not attempt to remove the existing ASTM standards as industry in past code hearings has indicated that it wishes to retain those options currently available to them.

The standard is available at no charge at <http://www.coolroofs.org> for viewing or downloading.

Cost Impact: The code change proposal will not increase the cost of construction. None know.

Analysis: A review of the standard proposed for inclusion in the code, CRRC-1-2012 – CRRC-1 Standard, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

CE119-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.2.1.1T-EC-HAO

CE120 – 13

Table C402.2.1.1, Chapter 5

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

TABLE C402.2.1.1 MINIMUM ROOF REFLECTANCE AND EMITTANCE OPTIONS^a

Three-year aged solar reflectance ^b of 0.55 and three-year aged thermal emittance ^c of 0.75
Initial solar reflectance^b of 0.70 and initial thermal emittance^c of 0.75
Three-year aged solar reflectance index^d of 64
Initial solar reflectance^d of 82

- a. [delete foot note a and renumber subsequent footnotes as a, b and c]
b. Solar reflectance tested in accordance with ASTM C 1549, ASTM E 903 or ASTM E 1918 CRRC-1 Standard.
c. Thermal emittance tested in accordance with ASTM C 1371 or ASTM E 408 CRRC-1 Standard.
d. Solar reflectance index (SRI) shall be determined in accordance with ASTM C 1980 using a convection coefficient of 2.1 Btu/h x ft² x F. Calculation of aged SRI shall be based on aged testing values of solar reflectance and emittance. Calculation of initial SRI shall be based on initial tested values of solar reflectance and thermal emittance. ~~three-year aged solar reflectance and three-year aged thermal emittance testing in accordance with CRRC-1 Standard.~~

Add new standard to Chapter 5 as follows:

CRRC Cool Roof Rating Council
 1610 Harrison Street
 Oakland, CA 94612

CRRC-1-12 CRRC-1 Standard

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has been revised with respect to certain HVAC equipment efficiency criteria. The change ensures continued consistency between the IECC and standard 90.1-2010.

ASHRAE SSPC 90.1 also chose to adopt the CRRC-1 Standard as the document for testing roofing products. This testing standard has many features which are attractive to roof product manufacturers which are beyond the ASTM standards already cited in this these provisions. This document:

- Defines and covers both initial and aged testing requirements
- Covers variegated, granular coated, and custom colored roof products
- Specifies roof product specimen preparation
- Addresses how to handle specimens which may be uncharacteristically damaged during testing
- Specifies the minimum contents of a testing report

This is not a proprietary document, as it is material neutral. This document is not specifically tied to the Cool Roof Rating Council "Product Rating Program", but is designed to be independent of that program or any others. The standard is available at no charge at <http://www.coolroofs.org> for viewing or downloading.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, CRRC-1-2012 – CRRC-1 Standard, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

CE120-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.2.1.1T-EC-FERGUSON.doc

CE121 – 13

Table C402.2.1.1, C402.1.1.1 (NEW), Chapter 5

Proponent: Robert A. Zabcik, P.E., NCI Building Systems, Inc., representing Cool Metal Roofing Coalition

Revise as follows:

**TABLE C402.2.1.1
MINIMUM ROOF REFLECTANCE AND EMITTANCE OPTIONS^a**

Three-year aged solar reflectance ^b of 0.55 and three-year aged thermal emittance ^c of 0.75
Initial solar reflectance^b of 0.70 and initial thermal emittance^c of 0.75
Three-year-aged solar reflectance index ^d of 64
Initial solar reflectance index^d of 82

- a. The use of area-weighted averages to meet these requirements shall be permitted. ~~Materials lacking initial tested values for either solar reflectance or thermal emittance, shall be assigned both an initial solar reflectance of 0.10 and an initial thermal emittance of 0.90. Materials lacking three-year aged tested values for either solar reflectance or thermal emittance shall be assigned both a three-year aged solar reflectance in accordance with Section C402.2.1.1.1 of 0.10 and a three-year aged thermal emittance of 0.90.~~
- b. ~~Aged~~ Solar reflectance tested in accordance with ~~CRRC-1~~ASTM C 1549, ASTM E 903 or ASTM E 1918.
- c. ~~Aged~~ Thermal emittance tested in accordance with ~~CRRC-1~~ASTM C 1371 or ASTM E 408.
- d. Solar reflectance index (SRI) shall be determined in accordance with ASTM E 1980 using a convection coefficient of 2.1 Btu/h x ft² x °F (12W/m² x K). Calculation of aged SRI shall be based on aged tested values of solar reflectance and thermal emittance. Calculation of initial SRI shall be based on initial tested values of solar reflectance and thermal emittance.

C402.2.1.1.1 Aged roof solar reflectance. Where an aged solar reflectance required by Section C402.2.1.1 is not available, it shall be determined in accordance with Equation 4-X.

$$R_{\text{aged}} = [0.2 + 0.7(R_{\text{initial}} - 0.2)] \quad (\text{Equation 4-X})$$

where:

R_{aged} = The aged solar reflectance

R_{initial} = The initial solar reflectance determined in accordance with CRRC-1

Add new standard to Chapter 5 as follows:

CRRC Cool Roof Rating Council
1610 Harrison St
Oakland, CA 94612

CRRC-1 2012 Cool Roof Rating Council, CRRC-1 Standard

Reason: The use of initial values for compliance with solar reflectance (SR) and thermal emittance (TE) requirements as opposed to three-year aged values is not representative of real-world conditions. Weathering of most roofing materials greatly changes the SR and to a lesser degree, the TE, as documented by Lawrence Berkeley and Oak Ridge National Laboratories. The California Energy Commission (CEC) Title 24 Building Energy Efficiency Standards has addressed this issue very effectively since 2005. By requiring 3-year aged SR and TE values, a more realistic SRI is obtained; one that represents the performance of the roofing material during the life of the material rather than at the time of installation. The Cool Roof Rating Council (CRRC) has simultaneously developed the CRRC-1 standard to rigorously qualify the test procedures used to measure SR and TE, as well as the aging process. Thus, referencing the CRRC-1 standard is much more thorough than simply referencing the ASTM test methods used to measure SR and TE directly. The CRRC has recently been ANSI accredited to develop standards, further adding credibility.

The CRRC-1 standard uses the same test methods as the 2012 IECC, with the exception of ASTM E 408, which measures direct normal TE using a handheld device. (ASTM C 1371 measures the TE averaged over a hemisphere and the two methods can yield greatly different results.) Energy Star has recently dropped ASTM E408 as well. Furthermore, the test procedures are further qualified to ensure consistency across all tested roofing products, including variegated products such as granule coated shingles. The aging process has absolutely no qualification as currently specified in the IECC. The CRRC-1 Standard very effectively addresses this gap as well by specifying multiple test farms sites and accrediting labs to age and test specimens for SR and TE. It also outlines a color family program that allows manufacturers of colored products to group and test their products in representative

lots. The downside is that the aging process takes three years. However, the CEC has included the aging formula presented in proposed new Section C402.2.1.1.1 since 2005 to predict aged values, which is also introduced in this proposal to provide values to use before testing is completed. This formula is based on a curve fit of the CRRC dataset and provides aged values of SR with conservatism and accuracy.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, CRRC-1-2012 – CRRC-1 Standard, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

CE121-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.2.1.1T-EC-ZABEIK.doc

CE122 – 13

C402.2.1.1, C402.2.1.1.1 (NEW), C402.2.1.2 (NEW), Chapter 5

Proponent: Amy Dickie, Global Cool Cities Alliance (amy@globalcoolcities.org), Craig Conner, Building Quality, representing self (craig.conner@mac.com)

Delete and substitute as follows:

~~C402.2.1.1 Roof solar reflectance and thermal emittance.~~ ~~Low-sloped roofs, with a slope less than 2 units vertical in 12 horizontal, directly above cooled conditioned spaces in Climate Zones 1, 2, and 3 shall comply with one or more of the options in Table C402.2.1.1.~~

~~Exceptions:~~ ~~The following roofs and portions of roofs are exempt from the requirements in Table C402.2.1.1:~~

- ~~1. Portions of roofs that include or are covered by:~~
 - ~~1.1. Photovoltaic systems or components.~~
 - ~~1.2. Solar air or water heating systems or components.~~
 - ~~1.3. Roof gardens or landscaped roofs.~~
 - ~~1.4. Above-roof decks or walkways.~~
 - ~~1.5. Skylights.~~
 - ~~1.6. HVAC systems, components, and other opaque objects mounted above the roof.~~
- ~~2. Portions of roofs shaded during the peak sun angle on the summer solstice by permanent features of the building, or by permanent features of adjacent buildings.~~
- ~~3. Portions of roofs that are ballasted with a minimum stone ballast of 17 pounds per square foot (psf) (74 kg/m²) or 23 psf (117 kg/m²) pavers.~~
- ~~4. Roofs where a minimum of 75 percent of the roof area meets a minimum of one of the exceptions above.~~

C402.2.1.1 Roof solar reflectance and thermal emittance. In climate zones 1, 2 and 3, roofs with a slope less than or equal to 2 units vertical in 12 units horizontal that are located directly above cooled conditions spaces shall have an average aged solar reflectance of not less than 0.55 and an average aged thermal emittance of not less than 0.75.

Exceptions: The following roofs and portions of roofs are exempt from the requirements in this Section:

1. Portions of the roof that include or are covered by the following:
 - 1.1. Photovoltaic systems or components
 - 1.2. Solar air or water heating systems or components
 - 1.3. Roof gardens or landscaped roofs
 - 1.4. Above-roof decks or walkways
 - 1.5. Skylights
 - 1.6. HVAC systems, components, and other opaque objects mounted above the roof.
2. Portions of the roof shaded during the peak sun angle on the summer solstice by permanent features of the building, or by permanent features of adjacent buildings.
3. Portions of roofs that are ballasted with a minimum stone ballast of 17 pounds per square foot (lb/ft²) [74 kg/m²] or 23 psf (lb/ft²) [117 kg/m²] pavers.
4. Roofs where a minimum of 75 percent of the roof area meets one or more of the exceptions above.

C402.2.1.1.1 Alternative Compliance Pathways. Roofs or portions of roofs that comply with one or more of the following also shall be in compliance with C402.2.1.1.

1. An aged solar reflectance index of not less than 64.

2. An initial solar reflectance of not less than 0.70 and an initial thermal emittance of not less than 0.75.
3. An initial solar reflectance index of not less than 82.

C402.2.1.2 Roof testing. Roof product solar reflectance and thermal emittance shall be determined as follows:

1. The initial and aged solar reflectances and initial and aged thermal emittances of the roofing product shall be measured in accordance with the ANSI/CRRC-1 Standard.
2. Initial and aged values of solar reflectance index (SRI) shall be determined in accordance with ASTM E 1980 using a medium wind speed convective coefficient of 2.1 BTU/(h · ft² · °F) [12 W/(m² · K)]. Calculation of aged SRI shall be based on aged tested values of solar reflectance and thermal emittance. Calculation of initial SRI shall be based on initial tested values of solar reflectance and thermal emittance.
3. Materials lacking initial tested values for either solar reflectance or thermal emittance shall be assigned both an initial solar reflectance of 0.10 and an initial thermal emittance of 0.90. Materials lacking aged tested values for either solar reflectance or thermal emittance shall be assigned both an aged solar reflectance of 0.10 and an aged thermal emittance of 0.90.

Add new standard to Chapter 5 as follows:

CRRC Cool Roof Rating Council
1610 Harrison Street
Oakland, CA 94612

CRRC-1-12 – CRRC-1 Standard

Reason: The 2012 IECC is the first I-code to contain substantive language for 'cool roofs'. This proposal makes technical corrections, reformat, and adds clarity to the language in Section C402.2.1.1, and adds a reference to the CRRC standard. Descriptions of specific changes and the reasons for each are described below.

- 1) Problem: The definition for low-sloped roofs is inconsistent with other major codes and standards, including ASHRAE and California's Title 24.
 Solution: Change the definition of low-sloped roofs from a rise to run ratio of less than 2:12 to a rise to run ratio of less than or equal to 2:12. This change makes the definition of low-sloped roofs consistent with other codes (e.g. ASHRAE 90.1 and California's Title 24).
- 2) Problem: The code does not make clear which performance metric is preferred.
 Solution: Reformat the code to state primary rating option (aged solar reflectance and aged thermal emittance) in the body of the code and the other rating options as exceptions. Note that although this change alters the format of the code, it has no influence on the stringency of the code.
- 3) Problem: The "three-year" specification is redundant to "aged". Further, future versions of the CRRC-1 Standard may allow a different time period for aged testing.
 Solution: Remove the specification of "three-year" from the notation of aged reflectivity and aged emissivity values because the duration of the aging is explicit in the CRRC Standard, and should be changed as the standard evolves.
- 4) Problem: Important definitions and requirements for roof testing are included in footnotes and are therefore confusing and difficult to follow.
 Solution: Move the footnotes that pertain to the testing requirements into a new section (Section C402.2.1.3), titled "Roof Testing". This change moves important definitions and requirements out of the footnotes, thus providing a cleaner format for the code.
- 5) Problem: The ANSI approval for the CRRC-1 Standard as a consensus standard had not been received at the time of the final action hearing of the last code cycle. Therefore, the code does not reference the most appropriate industry standard for roof testing and aging.
 Solution: The CRRC-1 Standard is now an ANSI approved consensus standard. This code change references what most stakeholders consider to be the most appropriate standard, which now complies with ICC CP-28.

Cost Impact: The codec change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, CRRC-1-2012 – CRRC-1 Standard, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

CE122-13

Public Hearing: Committee: AS AM D

Assembly:

ASF

AMF

DF

C402.2.1.1(NEW)-EC-CONNER-DICKIE.doc

CE123 – 13

C202, C402.2.2, C402.2.2.1, C402.2.2

Proponent: Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; Bill Prindle, Energy Efficient Codes Coalition; and Don Vigneau, Northeast Energy Efficiency Partnerships.

Delete without substitution as follows:

SECTION C202 GENERAL DEFINITIONS

~~**C402.2.2 Classification of walls.** Walls associated with the building envelope shall be classified in accordance with Section C402.2.2.1 or C402.2.2.2.~~

~~**C402.2.2.1 Above-grade walls.** Above-grade walls are those walls covered by Section C402.2.3 on the exterior of the building and completely above grade or walls that are more than 15 percent above grade.~~

~~**C402.2.2.2 Below-grade walls.** Below-grade walls covered by Section C402.2.4 are basement or first-story walls associated with the exterior of the building that are at least 85 percent below grade.~~

Revise definitions as follows:

~~**BASEMENT WALL.** A wall 50 percent or more below grade and enclosing *conditioned space*.~~

ABOVE-GRADE WALL. The walls on the exterior of the building and completely above grade or walls that are more than 15 percent above grade.

BELOW-GRADE WALL. The basement or first-story walls associated with the exterior of the building that are at least 85 percent below grade.

Reason: The purpose of this code change is to clarify the code. First, this proposal moves definitions of “above-grade walls” and “below-grade walls” from chapter four to chapter two, where general definitions, such as these, more appropriately belong. The proposal also eliminates the definition of “basement wall” as unnecessary, inconsistent, and potentially confusing in the commercial energy code.

Cost Impact: The code change proposal will not increase the cost of construction.

CE123-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.2.2-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE-VIGNEAU.doc

CE124 – 13

C202 (New), C402.2.2, C402.2.2.1, C402.2.2.2

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Delete without substitution as follows:

~~**C402.2.2 Classification of walls.** Walls associated with the building envelope shall be classified in accordance with Section C402.2.2.1 or C402.2.2.2.~~

~~**C402.2.2.1 Above-grade walls.** Above-grade walls are those walls covered by Section C402.2.3 on the exterior of the building and completely above grade or walls that are more than 15 percent above grade.~~

~~**C402.2.2.2 Below-grade walls.** Below-grade walls covered by Section C402.2.4 are basement or first-story walls associated with the exterior of the building that are at least 85 percent below grade.~~

Add new definitions as follows:

SECTION C202 GENERAL DEFINITIONS

WALL, ABOVE-GRADE. A wall associated with the *building thermal envelope* that is more than 15 percent above grade and is on the exterior of the building or any wall that is associated with the *building thermal envelope* that is not on the exterior of the building.

WALL, BELOW-GRADE. A wall associated with the basement or first story of the building that is part of the *building thermal envelope* , is at least 85 percent below grade and is on the exterior of the building.

Reason: In order to clarify and simplify the code, this proposal replaces the current text indicating how to determine a wall classification with a formal definition of each wall type

Section C402.2.2 contains only definitions that are more appropriately located in Section C202. Application of the current Sections C402.2.3 (above grade walls) and C402.2.4 (below grade walls) are clear as to requirements and can be readily and more easily applied by locating the definitions of those terms in the definitions section as opposed to another section of the code.

The current code provisions are technically incorrect. They refer to the building envelope (not the defined term building thermal envelope) and the exterior of the building. This omits any wall that is an interior wall that is part of the building thermal envelope, which is where the heat transfer occurs that the code is intending to address. Examples of this are a stairway wall separating an unconditioned basement from a conditioned first floor or a wall separating a conditioned basement from a vented crawl space. A strict application of the current code would eliminate such walls from having to be insulated because they are neither on the building exterior nor associated with the building envelope. The proposed definitions, therefore, cover all possible walls that could be part of the building thermal envelope (those bounded completely or partially by earth, those exposed to the outdoor elements and not bounded by earth, and those separating conditioned from unconditioned or exempt spaces regardless of location in relation to grade) in a clearer manner.

Cost Impact: The code change proposal will not increase the cost of construction.

CE124-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.2.2-EC-WILLIAMS.doc

CE125 – 13

Table C402.2, C402.2.2, C402.2.2.1, C402.2.2.2, C402.2.3, C402.2.4

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

~~C402.2.2 Classification of walls.~~ Walls associated with the building envelope shall be classified in accordance with Section C402.2.2.1 or C402.2.2.2.

~~C402.2.2.1 Above-grade walls.~~ Above-grade walls are those walls covered by Section C402.2.3 on the exterior of the building and completely above grade or walls that are more than 15 percent above grade.

~~C402.2.2.2 Below-grade walls.~~ Below-grade walls covered by Section C402.2.4 are basement or first-story walls associated with the exterior of the building that are at least 85 percent below grade.

C402.2.3 Thermal resistance of above-grade walls more than 15 percent above grade. For exterior walls that are completely above grade or are more than 15 percent above grade, the minimum thermal resistance (*R*-value) of the insulating materials installed in the wall cavity between the framing members and continuously on the walls shall be as specified in Table C402.2, based on framing type and construction materials used in the wall assembly. The *R*-value of integral insulation installed in concrete masonry units (CMU) shall not be used in determining compliance with Table C402.2.

"Mass walls" shall include walls weighing not less than:

1. 35 psf (170 kg/m²) of wall surface area; or
2. 25 psf (120 kg/m²) of wall surface area if the material weight is not more than 120 pounds per cubic foot (pcf) (1900 kg/m³).

C402.2.4 Thermal resistance of below-grade walls at least 85 percent below grade. For exterior walls that are at least 85 percent below grade, the minimum thermal resistance (*R*-value) of the insulating material installed in, or continuously on, the below-grade walls shall be as specified in Table C402.2, and shall extend to a depth of 10 feet (3048 mm) below the outside finished ground level, or to the level of the floor, whichever is less.

**TABLE C402.2
OPAQUE THERMAL ENVELOPE REQUIREMENTS^a**

Climate Zone	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Roofs																
Insulation Entirely Above <u>Roof Deck</u>	R-20ci	R-20ci	R-20ci	R-20ci	R-20ci	R-20ci	R-25ci	R-25ci	R-25ci	R-25ci	R-30ci	R-30ci	R-35ci	R-35ci	R-35ci	R-35ci
Metal Buildings (with R-5 thermal blocks) ^{a,b}	R-19 + R11 LS	R-19 + R11 LS	R-19 + R11 LS	R-19 + R11 LS	R-19 + R11 LS	R-19 + R11 LS	R-19 + R11 LS	R-19 + R11 LS	R-19 + R11 LS	R-19 + R11 LS	R-25 + R11 LS	R-25 + R11 LS	R-30 + R11 LS	R-30 + R11 LS	R-30 + R11 LS	R-30 + R11 LS
Attic and other ^a	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-49	R-49	R-49	R-49	R-49	R-49	R-49
Exterior Walls, completely or more than 15 Percent Above Grade																
Mass	R-5.7ci ^c	R-5.7ci ^c	R-5.7ci ^c	R-7.6ci	R-7.6ci	R-9.5ci	R-9.5ci	R-11.4ci	R-11.4ci	R-13.3ci	R-13.3ci	R-15.2ci	R-15.2ci	R-15.2ci	R-25ci	R-25ci
Metal building	R-13+ R-6.5ci	R-13 + R-6.5ci	R13 + R6.5ci	R-13 + R13ci	R-13 + R6.5ci	R-13 + R13ci	R-13 + R13ci	R-13 + R13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R-13ci	R-13 + R13ci	R-13+ R19.5ci	R-13 + R13ci	R-13+ R-19.5ci
Metal Framed	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-7.5ci	R-13 + R-15.6ci	R-13 + R-7.5ci	R-13+ R17.5ci
Wood Framed and Other ^d	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + 3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-3.8ci or R-20	R-13 + R-7.5ci or R20 + 3.8ci	R-13 + R-7.5ci or R20 + 3.8ci	R-13 + R-7.5ci or R20 + 3.8ci	R-13 + R-7.5ci or R20 + 3.8ci	R-13 + R-15.6ci or R20 + 10ci	R-13 + R-15.6ci or R20 + 10ci
Exterior Walls, At Least 85 Percent Below Grade																
Wall Walls at least 85 percent Below Grade ^d	NR	NR	NR	NR	NR	NR	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-7.5ci	R-10ci	R-10ci	R-10ci	R-12.5ci
Floors																
Mass	NR	NR	R-6.3ci	R-8.3ci	R-10ci	R-10ci	R-10ci	R-10.4ci	R-10ci	R-12.5ci	R- 12.5ci	R-12.5ci	R-15ci	R-16.7ci	R-15ci	R-16.7ci
Joist / Framing	NR	NR	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30	R-30 ^e	R-30	R-30 ^e	R-30 ^e	R-30 ^e
Slab on Grade Floors																
Unheated Slabs	NR	NR	NR	NR	NR	NR	R-10 for 24 in. below	R-10 for 24 in. below	R-10 for 24 in. below	R-10 for 24 in. below	R-10 for 24 in. below	R-15 for 24 in. below	R-15 for 24 in. below	R-15 for 24 in. below	R-15 for 24 in. below	R-20 for 24 in. below
Heated Slabs ^d	R-7.5 for 12 in. below	R-7.5 for 12 in. below	R-7.5 for 12 in. below	R-7.5 for 12 in. below	R-10 for 24 in. below	R-10 for 24 in. below	R-15 for 24 in. below	R-15 for 24 in. below	R-15 for 36 in. below	R-15 for 36 in. below	R-15 for 36 in. below	R-20 for 48 in. below	R-20 for 24 in. below	R-20 for 48 in. below	R-20 for 48 in. below	R-20 for 48 in. below
Opaque Doors																
Swinging	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37
Roll-up or Sliding	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75

For SI: 1 inch = 25.4 mm ci = Continuous insulation. NR = No requirement.

LS = Liner System- A continuous membrane installed below the purlins and uninterrupted by framing members. Uncompressed, un-faced insulation rests on top of the membrane between the purlins.

- Assembly descriptions can be found in ASHRAE 90.1 Appendix A.
- Where using R-value compliance method, a thermal spacer block is required, otherwise use the U-factor compliance method in Table C402.1.2.
- R-5.7 ci is allowed to be substituted with concrete block walls complying with ASTM C 90, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores filled with materials having a maximum thermal conductivity of 0.44 Btu-in/h-^f°F.

- d. Where heated slabs are below grade, below-grade walls shall comply with the exterior insulation requirements for heated slabs.
- e. Steel floor joist systems shall to be insulated to R-38.

Reason: This proposal is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

Reasons for this proposal are as follows:

This proposal moves and clarifies, but does not delete the requirements of existing Sections C402.2.2, C402.2.2.1 and C402.2.2.2 of the 2012 IECC.

The code currently has definitions in Chapter 2 for "above-grade" and "basement walls" which conflict with Sections C402.2.1 and C402.2.1, which are also essentially definitions. Furthermore, as Sections 402.2.1 and C402.2.2 are not referenced in C402.2.3 and C402.2.4, it is not immediately clear which definitions apply to Sections C402.2.3 and C402.2.4. To eliminate this confusion and add clarity, we propose that the technically important content from Sections C402.2.1 and C402.2.2 (i.e., percentages above or below grade) be moved into Sections C402.2.3 and C402.2.4, respectively, and that the terms "above grade" and "basement" or "below grade" walls be eliminated. In this manner, confusion is eliminated with other code sections that rely on the Chapter 2 definitions.

Note that the SEHPCAC also submitted a separate proposal to delete Section C402.2.4. This proposal works whether or not that proposal is successful. The committee's preference is that both proposals be approved, resulting in the deletion of Section C402.2.4 and the approval of all other provisions in this proposal.

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: The code change proposal will not increase the cost of construction. This proposal is a clarification and, as such, will not increase the cost of construction.

CE125-13

Public Hearing: Committee:	AS	AM	D
Assembly:	ASF	AMF	DF

C402.2.2-EC-THOMPSON-SEHPCAC

CE126 – 13

C402.2.3

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.2.3 Thermal resistance of above-grade walls. The minimum thermal resistance (R-value) of the insulating materials installed in the wall cavity between the framing members, where required, and continuously on the walls, where required, shall be as specified in Table C402.2, based on framing type and construction materials used in the wall assembly. The R-value of integral insulation installed in concrete masonry units (CMU) shall not be used in determining compliance with Table 402.2.

“Mass walls” shall include walls weighing not less than:

1. 35 psf (170 kg/m²) of wall surface area; or
2. 25 psf (120 kg/m²) of wall surface area if the material weight is not more than 120 pounds per cubic foot (pcf) (1900 kg/m³).

Reason: This proposal clarifies the provisions in the code related to above-grade walls. The current code indicates that the insulation is to be applied between framing members and continuously on the wall. This is never the case for mass walls where only continuous insulation is to be applied and for wood framed walls in some climate zones continuous insulation may not be required to be applied, depending on the insulation option chosen in Table C402.2. Adding the words “where required” allows for cases where either but not both are required or where both are required.

Cost Impact: The code change proposal will not increase the cost of construction.

CE126-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.2.3-EC-WILLIAMS.doc

CE127 – 13

C402.2.3, R402.2.5 (IRC N1102.2.5)

Proponent: James D. Katsaros, PhD, DuPont Building Innovations (james.d.katsaros@dupont.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C402.2.3 Thermal resistance of above-grade walls. The minimum thermal resistance (*R*-value) of the insulating materials installed in the wall cavity between the framing members and continuously on the walls shall be as specified in Table C402.2, based on framing type and construction materials used in the wall assembly. The *R*-value of integral insulation installed in concrete masonry units (CMU) shall not be used in determining compliance with Table C402.2.

“Mass Walls” shall include walls weighing not less than:

1. 35 psf (170 kg/m²) of wall surface areas; ~~or~~
2. 25 psf (120 kg/m²) of wall surface area if the material weight is not more than 120 pound per cubic foot (pcf) (1900 kg/m³), or
3. Having a heat capacity greater than or equal to 6 BTU/ft²×°F [123 kJ/m²× K].

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R402.2.5 (N1102.2.5) Mass Walls. Mass walls for the purpose of this chapter shall be considered above-grade walls of concrete block, concrete, insulated concrete form (ICF), masonry cavity, brick (other than brick veneer), earth (adobe, compressed earth block, rammed earth) and solid timber/logs, or any other walls having a heat capacity greater than or equal to 6 BTU/ft²×°F [123 kJ/m²× K].

Reason: This proposal adds a heat capacity provision to mass wall definition to be consistent with IRC definition

Cost Impact: This code change proposal will not increase the cost of construction.

CE127-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.2.3-EC-KATSARAS.doc

CE128 – 13

C402.2.4

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.2.4 Thermal resistance of below-grade walls. The minimum thermal resistance (R-value) of the insulating materials installed ~~in, or~~ continuously within or on the below-grade walls shall be as specified in Table C402.2 and shall extend to a depth of not less than 10 feet (3048 mm) below the outside finish ground level, or to the level of the floor of the conditioned space enclosed by the below-grade wall, whichever is less.

Reason: This proposal clarifies where and how insulation is to be installed on below-grade walls. The term “installed in or continuously on” is potentially confusing in that it infers that the insulation could be inside the wall but not necessarily continuous. The proposal also clarifies where the ‘depth of burial’ measurements are to be made.

Where insulation is required, the current code requires it to be continuous insulation. The term “installed in, or” is potentially confusing in that it infers that the insulation could be inside the wall but not necessarily continuous. The proposed change ensures that regardless of the location of the insulation, the insulation that is applied must be continuous as provided in Table C402.2. As a minimum code, it is more appropriate to state measurements such as depth of burial as minimums that can be exceeded rather than a single “one length only” criterion. The term “floor” can be clarified further to indicate what floor is being considered. For instance, a wall separating an unconditioned crawl space from a conditioned basement or below-grade room could be a below-grade wall bounded by two floors (one in the conditioned space and the grade in the crawl space). The proposed text ensures there is no confusion as to what floor the insulation depth is to be measured.

Cost Impact: The code change proposal will not increase the cost of construction.

CE128-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.2.4-EC-WILLIAMS.doc

CE129 – 13

C402.2.5

Proponent: Joseph Lstiburek, Building Science Corporation, representing self

Delete and substitute as follows:

~~**C402.2.5 Floors over outdoor air or unconditioned space.** The minimum thermal resistance (*R*-value) of the insulating material installed either between the floor framing or continuously on the floor assembly shall be as specified in Table C402.2, based on construction materials used in the floor assembly.~~

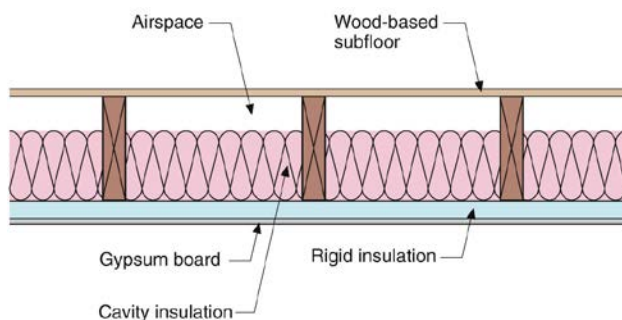
~~“Mass floors” shall include floors weighing not less than:~~

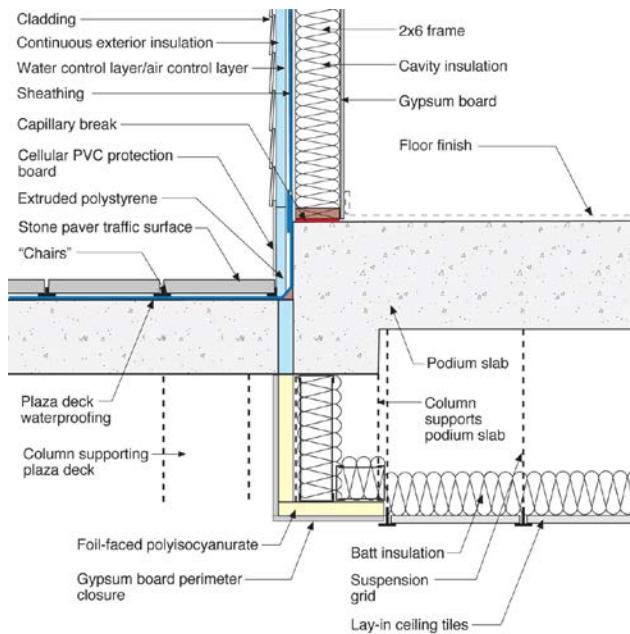
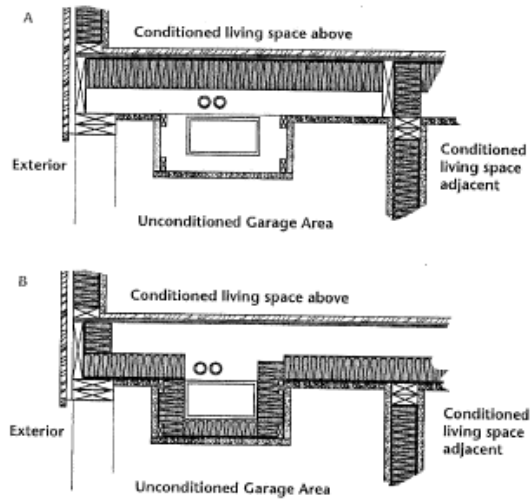
- ~~1. 35 psf (170 kg/m²) of floor surface area; or~~
- ~~2. 25 psf (120 kg/m²) of floor surface area if the material weight is not more than 12 pcf (1,900 kg/m³).~~

C402.2.5 Floors. Floor framing cavity insulation or structural slab insulation shall be installed to maintain permanent contact with the underside of the subfloor decking or structural slabs.

Exception: The floor framing cavity insulation or structural slab insulation shall be permitted to be in contact with the topside of sheathing or continuous insulation installed on the bottom side of floor framing when combined with insulation that meets or exceeds the minimum Metal framed or Wood framed and other Walls, Above Grade, R-value in Table C402.1.2 and extends from the bottom to the top of all perimeter floor framing or floor assembly members.

Reason: Requiring insulation in floors to be in direct contact with the underside of subfloor decking or structural slabs is one insulating option. Another option is to have an airspace between the floor sheathing and structural slabs and the top of the cavity insulation where this cavity insulation is in direct contact with the topside of sheathing or continuous insulation installed on the underside of the floor framing and is combined with perimeter insulation that meets or exceeds the R-value requirements for walls. This second option leads to fewer cold spots yet does not change the heat loss as long as the cavity insulation is in direct contact with a sheathing below it or continuous insulation below it. It also facilitates services to be enclosed within the thermal envelope. Examples of these configurations are illustrated below:





Cost Impact: This code change proposal will not increase the cost of construction. This proposal will not raise the cost of construction.

CE129-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

C402.2.5-EC-LSTIBUREK.doc

CE130 – 13

C402.2.5

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.2.5 Floors ~~over outdoor air or unconditioned space~~. The minimum thermal resistance (R-value) of the insulating materials installed either between the floor framing or continuously on the floor assembly shall be as specified in Table C402.2, based on construction materials used in the floor assembly. Insulation applied on the underside of the floor assembly facing outdoor air or unconditioned space shall be installed to maintain permanent contact with the underside of the floor assembly.

Exception: Insulation applied to the underside of concrete floor slabs shall be permitted an air space of not more than 1 inch where it turns up and is in contact with the underside of the floor under walls associated with the *building thermal envelope*.

Reason: There is no need to indicate in the title anything other than floors because the overall focus of Section 402 is the building thermal envelope, which as defined eliminates the need to further specify any particular conditions associated with the floor. In addition Table C402.2 to which this section refers for insulation provisions refers simply to “floors”. The provisions in R402.2.5 are equally applicable to floor assemblies in commercial buildings where insulation batts for instance may be installed in a floor framing assembly. The need to eliminate a space between the insulation and the underside of the floor is equally applicable in commercial buildings, many of which use the same construction practices as residential buildings. The situation where concrete floor decks may need an air space to address moisture control is covered through an exception that is intended to permit such space but also ensure the insulation is in contact with the floor deck under walls associated with the building thermal envelope so as to cut off any “short circuit” around the floor insulation at the perimeter of the floor deck. This proposal ensures that insulation applied in floors over outside air or unconditioned spaces is in contact with the underside of the floor deck above.

Cost Impact: The code change proposal will not increase the cost of construction.

CE130-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.2.5-EC-WILLIAMS.doc

CE131 – 13

C402.2.6

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C402.2.6 Slabs-on-grade perimeter insulation. Where the slab-on-grade is in contact with the ground, the minimum thermal resistance (*R*-value) of the insulation around the perimeter of unheated or heated slab-on-grade floors designed in accordance with the *R*-value method of Section C402.1.2 shall be as specified in Table C402.2. The insulation shall be placed on the outside of the foundation or on the inside of the foundation wall. The insulation shall extend downward from the top of the slab for a minimum distance as shown in the table or to the top of the footing, whichever is less, or downward to at least the bottom of the slab and then horizontally to the interior or exterior for the total distance shown in the table. Insulation extending away from the building shall be protected by pavement or by a minimum of 10 inches (254 mm) of soil.

Exception: Where the slab-on-grade floor is greater than 24 inches (61 mm) below the finished exterior grade, perimeter insulation is not required.

Reason: This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 2 open meetings and over 15 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

The title of this section is proposed to be revised to clarify that:

- a) Section C402.2.6 applies only to the perimeter insulation associated with slab-on-grade construction. This section does not apply to the insulation installed within or immediately above or below and in contact with the slab-on-grade construction.
- b) Section C402.2.6 applies only to the *R*-value method in Section C402.1.1. It does not apply to the *U*-, *C*- and *F*-factor method in Section C402.1.2. (Note the ASHRAE 90.1 prescriptive tables referenced by Table C402.1.2 contain their own perimeter insulation requirements and are not reliant on Table C402.2.)

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals

Cost Impact: The code change proposal will not increase the cost of construction. This proposal is a clarification and, as such, will not increase the cost of construction.

CE131-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.2.6-EC-THOMPSON-SEHPCAC

CE132 – 13

C402.2.7, C402.3

Proponent: Joseph R. Hetzel, P.E., Thomas Associates, Inc., representing the Door & Access Systems Manufacturers Association (DASMA) International (jhetzel@thomasamc.com)

Revise as follows:

C402.2.7 Opaque doors. Opaque doors (doors having less than 50 percent glass area) shall meet the applicable requirements for doors as specified in Table C402.2 and be considered as part of the gross area of above-grade walls that are part of the building envelope.

Exception: Non-swinging doors intended for vehicular access and material transportation, with a minimum opening rate of 32 inches per second, shall have a U-factor not greater than 1.2.

C402.3 Fenestration (Prescriptive). Fenestration shall comply with Table C402.3. Automatic daylighting controls specified by this section shall comply with Section C405.2.2.3.2.

Exception: Non-swinging doors intended for vehicular access and material transportation, with a minimum opening rate of 32 inches per second, shall have a U-factor not greater than 1.2.

Reason: The Exceptions refer to door products known as "high speed doors". They are typically automatically controlled, non-swinging doors, and are commonly used in conjunction with vehicular traffic or transportation of materials and are not generally intended for pedestrian traffic. Sizes typically range from 8x8 to 12x12. When high speed doors are used in a building exterior envelope, the primary purposes are for environmental control and/or building security.

High speed door panels or curtains are usually made of a thin layer of vinyl, fabric, rubber or composite material. Materials can be opaque, translucent or a combination thereof.

The assemblies are constructed of flexible materials at the perimeter to provide sealing against air leakage but yet to allow variations in contact between door panels/curtains and jamb construction to maximize the effectiveness of continual high speed operation. Thus, high speed doors cannot comply with prescriptive U-factor requirements. The high speed nature of these doors provides for minimizing of "air exchange", a valuable and predominant characteristic of minimizing overall energy losses through a door opening.

A maximum U-factor value of 1.2 was validated by a 1.17 value obtained via a March 2012 DASMA-sponsored test on a representative 8'x8' high speed door product.

Cost Impact: The code change proposal will not increase the cost of construction.

CE132-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.2.7-EC-HETZEL.doc

CE133 – 13

C202 (NEW), C402.2.7

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

~~C402.2.7~~ C402.3.5 Opaque dDoors. *Opaque doors (having less than 50% glass area)* shall meet the applicable requirements for doors as specified in Table C402.2 and be considered part of the gross area of above-grade walls that are part of the building *thermal* envelope. All other doors shall meet the provisions of Section C402.3.3 for vertical fenestration.

Add a definition as follows:

OPAQUE DOORS. Doors that are at least 50 percent opaque in surface area.

Reason: As currently defined, doors are considered fenestration regardless of the percentage of glazing they contain. As such, users of the code would logically begin to look for and address the requirements for doors in the fenestration section of the code. Instead the provisions for opaque doors (those with less than 50% glass area) are located in Section C402.2.7 covering opaque assemblies. One could conclude from a review of this provision in the opaque section of the code that any door with at least 50-percent glass area must be fenestration. This proposal **clarifies** when doors are considered part of the opaque wall and subject to thermal requirements for the wall, and when doors are fenestration and subject to those requirements.

Relocation of the door provisions to the fenestration section of the code is appropriate, and from there doors that are opaque can be correctly referred back to the sections of the code addressing opaque assemblies and components. Note also the term glass area technically precludes consideration of other non-opaque materials. The proposed code change addresses this by using opaque area as the metric.

Cost Impact: The code change proposal does not increase the cost of construction.

CE133-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.2.7-EC-WILLIAMS.doc

CE134 – 13

C202 (NEW), C402.2.8

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.2.8 Insulation of radiant heating systems. Radiant heating system panels, and their associated components U-bends and headers, designed for sensible heating of an indoor space through heat transfer from the thermally effective panel surfaces to the occupants or indoor space or thermal radiation and natural convection and the bottom surfaces of floor structures incorporating radiant heating that are installed in interior or exterior assemblies shall be insulated with a minimum of R-3.5 (0.62 m²/K × W) on all surfaces not facing the space being heated. Radiant heating system panels that are installed in the building thermal envelope shall be separated from the exterior of the building or unconditioned or exempt spaces by not less than the R-value of insulation installed in the opaque assembly in which they are installed or the assembly shall comply with Section C402.1.2.

Exception: Heated slabs on grade insulated in accordance with Section C402.2.6.

Add new definition as follows:

SECTION C202 GENERAL DEFINITIONS

RADIANT HEATING SYSTEM. A heating system that transfers heat to objects and surfaces within a conditioned space primarily by infrared radiation.

Reason: This proposal clarifies that panels installed in building thermal envelope assemblies must be insulated in accordance with the requirements of the assembly in which they are installed. It also requires insulation of R-3.5 on the non-radiant surface when installed in interior assemblies and refer to the other applicable sections of the code for heated slab insulation. The objective of this proposal is to clarify language as radiant systems can be embedded in floor slabs or can be separate panels applied within wall or roof/ceiling assemblies.

In training sessions on the IECC conducted by the DOE Building Energy Codes Program it regularly comes up that the current provision in Section C402.2.8 conflicts with an R-5 requirement in the International Mechanical Code and the insulation requirements in the IECC for heated slabs. As heated slabs are different than radiant heating system panels and are already addressed in Section C402.2.8 the new exception is intended to address any confusion. Beyond heated slabs on grade, what remains are such systems and panels located within the building thermal envelope or within assemblies that are associated with the building interior but not the building thermal envelope. The proposed change clarifies that Section C402.2.7 applies to those conditions. It also clears up an interpretation issue. On the one hand, the current language can be interpreted to allow only R-3.5 on the back of a radiant panel installed within an exterior wall. On the other hand, the section could be interpreted to mean the radiant panel requires a minimum of R-3.5 no matter where installed, but does not relieve the requirement to provide the required insulation in an opaque wall assembly pursuant to the applicable provisions in Section C402.2. The proposed language makes it clear that the full insulation is required in the opaque wall where associated with the building thermal envelope. The intent of the building thermal envelope provisions is to minimize the heating loads on the building. It is not appropriate to reduce the required amount of insulation in an envelope assembly at the very location of such a heating system where a higher temperature difference occurs. In interior assemblies, the effectiveness of the radiant heating system is improved if heat loss to interior plenums or wall cavities is reduced. If the radiant system/panels cannot be located on an interior assembly and the satisfaction of the insulation level in an assembly associated with the building thermal envelope is challenging, then the option remains to use Section C402.1.2. The lengthy definitions of radiant heat embedded in the section are removed and a definition consistent with that in ANSI/ASHRAE/IES Standard 90.1-2010 for radiant heating systems is added to the IECC definitions.

If the current section is interpreted to require minimum insulation on radiant panels but not reduce any requirement for exterior wall insulation there will be no cost impact. Based on the interpretation that only R-3.5 is required for a radiant panel in an exterior wall, there may be a cost impact if the designer chooses to install such systems in building thermal envelope assemblies as opposed to other available interior assemblies. Additional cost could be incurred if providing the required insulation in a wall assembly where above the level of the currently required R-3.5. Where heaters are installed in exterior ceilings under an attic, there is very minimal additional cost to maintain the full attic insulation depth over the radiant panel. In actual practice, exterior wall installation is rare, as radiant heaters on the perimeter are typically installed inside the interior wall finish material. When installed in building thermal envelope assemblies, there is no reason why insulation equal to the same level as the remainder of the envelope assembly should not be required as the required level of insulation has been previously shown to be cost effective. Insulation adjacent to radiant panels will have a shorter payback due to the high temperature of the radiant panel compared to the space temperature that in turn increases the heat loss through the insulation.

Cost Impact: The code change proposal will increase the cost of construction in some buildings.

Note: The term 'radiant heating system' is not defined in other International Codes. However the term 'radiant heater' is defined in the IMC as follows:

RADIANT HEATER. A Heater designed to transfer heat primarily by direct radiation.

CE134-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.2.8-EC-WILLIAMS.doc

CE135 – 13

C202 (NEW), C402.2.9 (NEW), Table C402.2.9 (NEW)

Proponent: Tim Nogler, Washington State Building Code Council (tim.nogler@des.wa.gov)

Add new text as follows:

C402.2.9 Continuous insulation equivalent. Roof, wall and floor assemblies required by Table C402.2 to include continuous insulation are permitted to utilize the alternate nominal R-values listed in Table C402.2.9, in compliance with the following:

1. The cross-sectional area of metal penetrations of otherwise continuous insulation, as measured in the plane of the surface, is equal to or greater than 0.04 percent, but less than 0.08 percent, of the opaque surface area of the assembly.
2. The metal penetrations of otherwise continuous insulation are isolated or discontinuous. No continuous metal elements penetrate the otherwise continuous portion of the insulation.
3. Construction drawings shall contain details showing the locations and dimensions of all the metal penetrations of otherwise continuous insulation. In addition, calculations shall be provided showing the ratio of the cross-sectional area of metal penetrations of otherwise continuous insulation to the overall opaque wall area.

TABLE C402.2.9
CONTINUOUS INSULATION REQUIREMENTS

<u>Assemblies with continuous insulation</u>	<u>Alternate option for assemblies with metal penetrations greater than 0.04% but less than 0.08% of assembly surface</u>
<u>R-11.4ci</u>	<u>R-14.3</u>
<u>R-13.3ci</u>	<u>R-16.6</u>
<u>R-15.2ci</u>	<u>R-19.0</u>
<u>R-30ci</u>	<u>R-38</u>
<u>R-38ci</u>	<u>R-48</u>
<u>R-13 + R7.5ci</u>	<u>R-13 + R9.4</u>
<u>R-13 + R10ci</u>	<u>R-13 + R12.5</u>
<u>R-13 + R12.5ci</u>	<u>R-13 + R15.6</u>
<u>R-13 + R13ci</u>	<u>R-13 + R16.3</u>
<u>R-19 + R8.5ci</u>	<u>R-19 + R10.6</u>
<u>R-19 + R14ci</u>	<u>R-19 + R17.5</u>
<u>R-19 + R16ci</u>	<u>R-19 + R20</u>
<u>R-20 + R3.8ci</u>	<u>R-20 + R4.8</u>
<u>R-21 + R5ci</u>	<u>R-21 + R6.3</u>

Add new definition as follows:

CONTINUOUS INSULATION (ci): Insulation that is continuous across all structural members without thermal bridges, other than service openings and penetrations by metal fasteners with a cross-sectional area, as measured in the plane of the surface, of less than 0.04 percent of the opaque surface area of the assembly. The insulation is installed on the interior or exterior or is integral to any opaque surface of the building envelope.

Reason: This code change confronts the problem of thermal bridging, and ensures that the full intended insulating value of continuous insulation is achieved.

The proposed new Section 402.2.9 and Table C402.2.9 clarify the definition of "continuous insulation" by setting a maximum allowable ratio of metal penetrations, and provide an alternate path for insulation that is penetrated by heavier fasteners. It is based on a 2011 ASHRAE research project by Morrison Hershfield (RP-1365) providing measured values for thermal performance of penetrations through continuous insulation. A similar modifying factor has been in use in Seattle and Washington State for several years.

Cost Impact: The code change proposal will not increase the cost of construction.

CE135-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.2T-EC-NOGLER.doc

CE136 – 13

C402.3, C402.3.4 (NEW), Table C402.3.4 (NEW), Table C407.5.1(1)

Proponent: Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; Bill Prindle, Energy Efficient Codes Coalition; and Don Vigneau, Northeast Energy Efficiency Partnerships.

Revise as follows:

C402.3 Fenestration (Prescriptive). Fenestration shall comply with this section, including the prescriptive values in Table C402.3 and Table C402.3.4. Automatic daylighting controls specified by this section shall comply with Section C405.2.2.3.2.

C402.3.4 Minimum VT. The minimum visible transmittance (VT) for vertical fenestration and skylights in all climate zones shall be as specified in Table C402.3.4.

Exception: Buildings where the vertical fenestration products collectively have an area-weighted average VT equal to or greater than the alternative minimum VT (VT_{alt}) calculated in accordance with Equation C4-3.

$$VT_{alt} = 0.11/FWR \quad \text{(Equation C4-3)}$$

where:

FWR = Fenestration to Wall Ratio which shall be equal to the actual fenestration area of the proposed building divided by the gross above-grade wall area (expressed as a decimal), but shall not exceed the maximum fenestration area as a percent of gross above-grade wall area allowed in Section C402.3.1.

**TABLE C402.3.4
FENESTRATION MINIMUM VT**

FENESTRATION TYPE	MINIMUM VT
All Climate Zones	
Vertical Fenestration:	
Fixed	0.42
Operable	0.32
Curtain wall/storefront	0.46
Glazed entrance doors	0.17
Skylights	0.49

C402.3.4 C402.3.5 Area-weighted average U-factor and VT. An area-weighted average shall be permitted to satisfy the U-factor requirements for each fenestration product category listed in Table C402.3 and the VT requirements for each fenestration product category listed in Table C402.3.4. Individual fenestration products from different fenestration product categories listed in Table C402.3 or Table C402.3.4 shall not be combined in calculating area-weighted average U-factor or VT, respectively.

TABLE C407.5.1(1)

SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT CHARACTERISTICS	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Glazing	Area 1. The proposed glazing area; where the proposed glazing area is less	As proposed

BUILDING COMPONENT CHARACTERISTICS	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
	<p>than 40 percent of above-grade wall area.</p> <p>2. 40 percent of above-grade wall area; where the proposed glazing area is 40 percent or more of the above-grade wall area.</p> <p><i>U</i>-factor: from Table C402.3</p> <p>SHGC: from Table C402.3 except that for climates with no requirement (NR) SHGC = 0.40 shall be used</p> <p><u>VT: from Table C402.3.4</u></p> <p>External shading and PF: None</p>	<p>As proposed</p> <p>As proposed</p> <p><u>As proposed</u></p> <p>As proposed</p>
Skylights	<p>Area</p> <p>1. The proposed skylight area; where the proposed skylight area is less than 3 percent of gross area of roof assembly.</p> <p>2. 3 percent of gross area of roof assembly; where the proposed skylight area is 3 percent or more of gross area of roof assembly.</p> <p><i>U</i>-factor: from Table C402.3</p> <p>SHGC: from Table C402.3 except that for climates with no requirement (NR) SHGC = 0.40 shall be used</p> <p><u>VT: from Table C402.3.4</u></p>	<p>As proposed</p> <p>As proposed</p> <p>As proposed</p> <p><u>As proposed</u></p>

Reason: The purpose of this proposal is to establish minimum visible transmittance (VT) requirements for commercial fenestration in the *IECC*. This proposal will establish in the *IECC* the same level of minimum VT performance criteria that have been approved and will take effect under California's most recently-revised building energy code, Title 24 *Building Energy Efficiency Standards*, starting in January 2014. The proposal also contains certain provisions, such as weighted averaging and an alternative compliance option based on an equation reflecting fenestration to wall ratio, that were adopted by California to provide flexibility in compliance approaches.

It is well understood that windows are the source of significant solar heat gain, particularly in commercial structures, which have significant internal and external heat gains. Even in colder climates, cooling energy use is typically the most significant load for commercial structures. Due to this fact, most commercial energy codes, including the *IECC*, have appropriately focused on establishing low SHGCs to reduce air conditioning loads, resulting in lower peak energy use and lower electrical peak demand (note that we have another proposal to lower SHGCs in climate zones 4 – 6). Traditional solutions to blocking solar gain sacrificed visible light by allowing the use of dark glazing because of limited glazing options that were available at the time; however, because of technological improvements over the last decade, windows with low SHGC and high VT are now widely available. Thus, this proposal is intended to ensure that reasonable levels of natural light are also available inside the building (or at least that the building capture energy savings associated with such levels) by establishing a minimum VT performance requirement.

Historically, model building codes have required minimum glazing area for these and other reasons. The International Building Code, for example, in Section 1205.2, requires a minimum net glazed area of at least 8% of the floor area of the room served. This is to ensure, among other things, that natural light is provided to spaces intended for human occupancy. However, these values

were set based primarily on clear glass, with much higher VTs. In fact, given much lower VTs for fenestration in many commercial buildings, there was a significant debate in the 2012 IECC code cycle over perceived problems to reducing maximum glazing area to 30% in the prescriptive path based on the perceived need for more glazing for daylighting. As our nation's energy codes continue to move to implement criteria for reducing unwanted solar heat gain, setting reasonable VT minimums is a simple measure that will ensure that windows perform as intended to provide natural light, while at the same time reduce solar gain. Ideally, energy codes should establish balanced criteria to address SHGC and VT that are designed to ensure that only the part of the sun's energy useful for daylighting enters the building. This proposal is an effort in that direction.

Achieving this balanced glazing performance (between low SHGC and high VT) was a driving force behind California's implementation of minimum VT requirements (at the same time, California set low SHGC requirements statewide). In 2009, California commissioned a series of Codes and Standards Enhancement Initiative ("CASE") studies to identify opportunities for improvements and efficiency in its Title 24 Building Energy Efficiency Standards. One such CASE Study, entitled "Nonresidential and High-Rise Residential Fenestration Requirements," evaluated and substantiated the establishment of a minimum VT requirement, along with a related CASE Study on daylighting. The California CASE Studies concluded that setting a prescriptive minimum VT ensures maximum natural lighting and minimum artificial lighting for the energy baseline, and it is the simplest and most effective metric in the context of a prescriptive compliance approach.

The CASE Studies found that the more visible light that is provided through fenestration, the more likely internal electric lighting and resulting electric loads are reduced at peak times during the day, which provides a series of benefits beyond the obvious lighting electricity reductions, such as reduced cooling loads due to lower internal heat generated from lighting and, therefore, reduced cooling energy use to offset the lighting heat load and associated lower peak demand. The CASE study authors also found that "the VT requirement is predicted to give occupants a better connection to the outdoors, which has been shown to improve occupant comfort and productivity" (CASE Study, Nonresidential and High-Rise Residential Fenestration Requirements, page 10, note e). The California Energy Commission used the results of these CASE Studies and several months of stakeholder review and comments and staff workshops that followed to further develop, refine and adopt new Title 24 Building Energy Efficiency Standards with minimum prescriptive VT requirements. Starting January 2014, all new nonresidential and high-rise residential buildings and hotels/motels in California must meet or exceed the minimum VT requirements in this proposal.

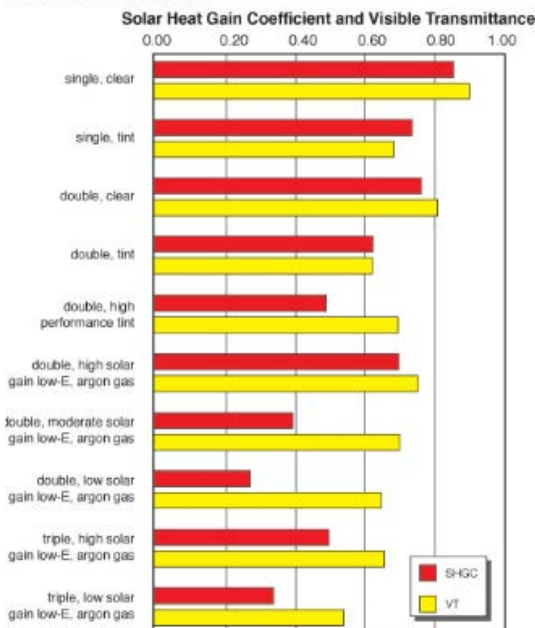
The ideal type of glazing technology capable of meeting the VT requirements in this proposal is referred to by some in the industry as "triple-silver" low SHGC low-e glazing. Triple-silver coatings in a double-pane insulating glass unit provide excellent solar heat gain reduction without losing nearly as much visible light as other glazing types or shading approaches. A triple-silver coating is produced by multiple glazing manufacturers for both residential and nonresidential applications, and is widely available from commercial and residential fenestration manufacturers and contractors across the country. The benefit of a product like triple-silver low-e glazing is that it represents the best available combination of low SHGC, low U-factor and high VT at roughly the same cost to the user as glazing with a low SHGC and low VT. In other words, the visible light benefits can be obtained at little or no additional cost. The minimum VT requirements in this proposal will ensure that the IECC calls for the right glazing choice at the time the windows are installed. Even if controls and other techniques are not implemented at initial construction to maximize daylighting benefit, the minimum VT will still provide benefits. A minimum reasonable VT presents a greater opportunity for effective future retrofits of controls and other techniques, as well as increasing the likelihood of voluntary non-automatic lighting reduction by occupants.

The life-cycle costing analysis used by California in its CASE Studies substantiated that "double-pane triple-silver low-e coated glazing was the most cost-effective choice for a statewide fenestration standard" (CASE Study, Nonresidential and High-Rise Residential Fenestration Requirements, page 33).

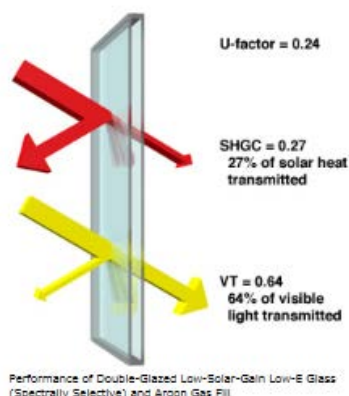
The following graphic from the Efficient Window Collaborative's website compares and contrasts the solar heat gain reduction and visible light transmitting characteristics of various glazing types. As you can see from this graphic, double-pane, low solar gain (triple-silver) low-e glazing (the eighth option on the list) provides the best combination of low SHGC and high VT of standard glazing types. Note that the values in the graphic are for glass only without the frame – actual SHGCs and VTs for code compliance include the effects of frames, which will typically reduce both the SHGC and VT by at least 10%.

Benefits: Increased Light & View

Daylight and view are two of the fundamental attributes of a window. Unfortunately, windows can also be the source of significant solar heat gain during times when it is unwanted. Traditional solutions to reducing solar heat gain such as tinted glazing or shades mean that the amount of light is reduced as well. New glazings with low-solar-gain Low-E (spectrally selective) coatings can provide better solar heat gain reduction than tinted glass, with a minimal loss of visible light. This also means that views can be clearer and unobstructed.



Note: All values are for glass only without frame. Source: Residential Windows by Carmody, Sekowitz, Arasteh and Hesong.



Verifying fenestration VT for code compliance will not add to cost or complexity. VT is simply another number to check that is already listed on the NFRC label, along with U-factor and SHGC. Also, *IECC* Table C303.1.3(3) already includes default VT values for products without NFRC ratings.

During California's most recent code adoption process, some commenters were concerned about glare being a problem associated with a minimum VT requirement. There was much evidence presented (by the California CASE Study authors and others) that refuted any suggestion that higher VTs lead to increased glare. Instead, it was shown that glare could be present regardless of a fenestration product's VT rating, and it is something best addressed through design, not VT.

Other options California considered for establishing minimum visible light criteria included effective aperture (EA) and light-to-solar gain ratio (referred to as LSG or VT/SHGC). California dismissed those as less effective alternatives, and we agree. Focusing first on EA, most daylighting experts agree that EA is overly complicated and unnecessary. The EA approach analyzed in California uncovered a technical loophole and energy penalty that made EA inferior to VT or VT/SHGC. The CASE Study noted "the reason that the EA approach is an energy penalty is that it results in low VTs at crucial WWRs" (CASE Study, Nonresidential and High-Rise Residential Fenestration Requirements, page 37). (Crucial WWRs, or window-to-wall ratios, are ones at or near 30%.) The CASE Study found that the EA penalty could be minimized by adding the complexity of more rules to the code, but such complexity would have been contrary to California's stated goal of simplification. An EA approach also would be contrary to the simplification improvements that the *IECC* has achieved over past cycles.

The second analyzed option of an LSG or VT/SHGC ratio would satisfy a simplification goal, because it relies on two readily available window performance metrics (VT and SHGC), but the same benefits with less complexity can be accomplished by simply setting a minimum VT. Those who supported the VT/SHGC approach in California seemed more interested in adopting the extremely weak 1.1 ratio that is presently required in limited applications in the *IECC* (Section C402.3.1.1(3)), as opposed to any particular reason why the LSG ratio approach would be better than simply setting a minimum VT. The problem with 1.1 VT/SHGC ratio is that it is not a particularly robust or effective target. If a VT/SHGC or LSG ratio approach were implemented in the *IECC*, the ratio would need to be much higher than 1.1 to achieve the same level of performance that California adopted. As an example, using a triple-silver low SHGC low-e glass that is available in today's market as a reference point, the VT/SHGC ratio would exceed 2.0.

To allow flexibility and a greater array of products to qualify, while preserving the core of the VT requirement and associated daylighting savings, several allowances are included in this proposal to match what was adopted in California. First and foremost, in California and in this proposal, the minimum VT is established as the prescriptive path energy baseline for the performance path. The prescriptive VT can be traded away in the performance path, so long as comparable energy savings are provided. Any glazing or combination of measures that deliver equivalent savings would be allowed, which provides the greatest flexibility. Also, as in California, this proposal allows the minimum VT requirements to be met on an area-weighted average basis, which permits some glass not to meet the minimum, so long as the glass meets the minimum on average. Lastly, this proposal includes as an exception, California's equation approach, as an alternative to the prescriptive VT values as a way to provide additional flexibility for buildings

with higher glazing areas (Alternative Minimum VT = 0.11/FWR). California viewed this equation as a temporary option that likely will be removed in the next Title 24 rulemaking cycle.

It is also worth noting that the minimum prescriptive VT values that California's CASE Study initially substantiated and recommended were considerably more stringent than the values that were ultimately adopted and are being proposed here. The California Energy Commission Staff took into consideration several factors and comments throughout its rulemaking process, and the minimum prescriptive values and approaches ultimately settled upon in California were found to be sufficient for a reasonable group of products to qualify while still providing the daylighting benefits and savings that California set out to achieve.

While we too would have constructed a more stringent set of requirements if we were starting from scratch, we believe that adopting this fully-developed and soon-to-be-implemented approach from California, with its already built-in compromises, would be the best course to make real progress at this point on a national basis and hopefully garner additional support and avoid controversy. On balance, we think that additional refinements would best be considered in future code cycles.

In summary, adoption of the minimum VT requirements in this proposal will ensure that fenestration capable of meeting the IECC's insulating and solar gain performance requirements will not needlessly sacrifice visible light. The level of performance in this proposal can be met cost-effectively by existing readily available glazing technology. These proposed performance values will establish in the IECC the appropriate technology targets for high performance glazing that will generate significant cooling, heating and lighting energy savings.

Bibliography: Codes and Standards Enhancement Initiative (CASE), Nonresidential & High-Rise Residential Fenestration Requirements, 2013 California Building Energy Efficiency Standards, California Utilities Statewide Codes and Standards Team, September 2011.

http://www.energy.ca.gov/title24/2013standards/prerulemaking/documents/current/Reports/Nonresidential/Envelope/2013_CA_SE_NR_Fenestration_Reqs_Sept_2011.pdf

Cost Impact: The code change proposal will increase the cost of construction.

CE136-13

Public Hearing: Committee:
Assembly:

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ASF

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C402.3-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE-VIGNEAU.doc

CE137 – 13

C202 (NEW), C402.3, C402.3.1.1, C402.3.1.2, C402.3.2.1, C402.3.3.3, C402.3.3.4, Table C406.3, C408.3.1

Proponent: Jack Bailey, One Lux Studio, representing International Association of Lighting Designers (jbailey@oneluxstudio.com)

Revise as follows:

C402.3 Fenestration (Prescriptive). Fenestration shall comply with Table C402.3. ~~Automatic daylighting controls specified by this section shall comply with Section C405.2.2.3.2.~~ Daylight responsive controls shall comply this section and Section C405.2.2.3.2.

C402.3.1.1 Increased vertical fenestration area with ~~daylighting controls~~ daylight responsive controls. In Climate Zones I through 6, a maximum of 40 percent of the gross above-grade wall area shall be permitted to be vertical fenestration, provided:

1. No less than 50 percent of the conditioned floor area is within a daylight zone;
2. ~~Automatic daylighting controls~~ Daylight responsive controls are installed in daylight zones; and
3. Visible transmittance (VT) of vertical fenestration is greater than or equal to 1.1 times solar heat gain coefficient (SHGC).

Exception: Fenestration that is outside the scope of NFRC 200 is not required to comply with Item 3.

C402.3.1.2 Increased skylight area with ~~daylighting controls~~ daylight responsive controls. The skylight area shall be permitted to be a maximum of 5 percent of the roof area provided ~~automatic daylighting controls~~ daylight responsive controls are installed in daylight zones under skylights.

C402.3.2.1 Lighting controls in daylight zones under skylights. ~~All lighting in the daylight zone shall be controlled by multilevel lighting controls that comply with Section C405.2.2.3.3.~~ Daylight responsive controls shall be provided to control the electric lights within daylight zones under skylights.

Exception: Skylights above daylight zones of enclosed spaces are not required in:

1. ~~Buildings in Climate Zones 6 through 8.~~
2. ~~Spaces where the designed general lighting power densities are less than 0.5 W/ft² (5.4 W/m²).~~
3. ~~Areas where it is documented that existing structures or natural objects block direct beam sunlight on at least half of the roof over the enclosed area for more than 1,500 daytime hours per year between 8 am and 4 pm.~~
4. ~~Spaces where the daylight zone under rooftop monitors is greater than 50 percent of the enclosed space floor area.~~

C402.3.3.3 Increased skylight SHGC. In Climate Zones 1 through 6, skylights shall be permitted a maximum SHGC of 0.60 where located above daylight zones provided with ~~automated daylighting controls~~ daylight responsive controls.

C402.3.3.4 Increased skylight U-factor. Where skylights are installed above daylight zones provided with ~~automated daylighting controls~~ daylight responsive controls, a maximum U-factor of 0.9 shall be permitted in Climate Zones 1 through 3; and a maximum U-factor of 0.75 shall be permitted in Climate Zones 4 through 8.

TABLE C406.3
REDUCED INTERIOR LIGHTING POWER

(Portions of Table not shown remain unchanged)

- a. In cases where both a general building area type and a more specific building area type are listed, the more specific building area type shall apply.
- b. First LPD value applies if no less than 30 percent of conditioned floor area is in daylight zones. ~~Automatic daylighting controls~~ Daylight responsive controls shall be installed in daylight zones and shall meet the requirements of Section C405.2.2.3. In all other cases, second LPD value applies.
- c. No less than 70 percent of the floor area shall be in the daylight zone. Automatic daylighting controls shall be installed in daylight zones and shall meet the requirements of Section 405.2.2.3.

C408.3.1 Functional testing. Testing shall ensure that control hardware and software are calibrated, adjusted, programmed and in proper working condition in accordance with the construction documents and manufacturer's installation instructions. The construction documents shall state the party who will conduct the required functional testing. Where required by the code official, an approved party independent from the design or construction of the project shall be responsible for the functional testing and shall provide documentation to the code official certifying that the installed lighting controls meet the provisions of Section C405.

Where occupant sensors, time switches, programmable schedule controls, photosensors or ~~daylighting controls~~ daylight responsive controls are installed, the following procedures shall be performed:

1. Confirm that the placement, sensitivity and time-out adjustments for occupant sensors yield acceptable performance.
2. Confirm that the time switches and programmable schedule controls are programmed to turn the lights off.
3. Confirm that the placement and sensitivity adjustments of ~~photosensor~~ daylight responsive controls reduce electric light based on the amount of usable daylight in the space as specified.

Add new definition as follows:

SECTION C202 GENERAL DEFINITIONS

DAYLIGHT RESPONSIVE CONTROL. A device or system that provides automatic control of electric light levels based on the amount of daylight in a space.

Reason: The terms "daylighting controls", "automatic daylighting controls", "automated daylighting controls" and "photosensor controls" are used interchangeably throughout the code but not defined. These terms are misleading because the controls they are describing do not control daylight, but rather they control electric lights in response to daylight. "Daylight responsive controls" is proposed to replace all of these terms.

The exceptions to C402.3.2.1 do not make any sense, as they are exceptions to the skylight requirement in the code, but Section C402.3.2.1 refers to daylighting controls, not skylights. The exact same list of exceptions appears under C402.3.2. We believe that including these exceptions under C402.3.2.1 was an unintentional oversight.

Cost Impact: The code change proposal will not increase the cost of construction.

CE137-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.3-EC-BAILEY

CE138 – 13

C402.3.1.1, C402.3.2

Proponent: Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; Bill Prindle, Energy Efficient Codes Coalition; and Don Vigneau, Northeast Energy Efficiency Partnerships.

Revise as follows:

C402.3.1.1 Increased vertical fenestration area with daylighting controls. In Climate Zones 1 through 6, a maximum of 40 percent of the gross above-grade wall area shall be permitted to be vertical fenestration, provided:

1. No less than 50 percent of the conditioned floor area is within a daylight zone; and
2. Automatic daylighting controls are installed in daylight zones; and
3. ~~Visible transmittance (VT) of vertical fenestration is greater than or equal to 1.1 times solar heat gain coefficient (SHGC).~~

Exception: ~~Fenestration that is outside the scope of NFRC 200 is not required to comply with Item 3.~~

C402.3.2 Minimum skylight fenestration area. In an enclosed space greater than 10,000 square feet (929 m²), directly under a roof with ceiling heights greater than 15 feet (4572 mm), and used as an office, lobby, atrium, concourse, corridor, storage, gymnasium/exercise center, convention center, automotive service, manufacturing, non-refrigerated warehouse, retail store, distribution/sorting area, transportation, or workshop, the total daylight zone under skylights shall be not less than half the floor area and shall provide a minimum skylight area to daylight zone under skylights of either:

1. Not less than 3 percent ~~with a skylight VT of at least 0.40;~~ or
2. Provide a minimum skylight effective aperture of at least 1 percent determined in accordance with Equation C4-1.

Reason: The purpose of the proposed code change is to eliminate potentially unnecessary and inconsistent code provisions. The proposal is intended as a clean-up companion proposal to a separate proposal that would establish minimum VT performance requirements for fenestration under the IECC commercial energy efficiency chapter. If the companion proposal is adopted, this proposal would be useful to delete the VT references in these code sections because they would no longer be necessary and could be confusing. For example, the minimum VT for skylights in the companion minimum VT proposal is higher than the VT specified in section C402.3.2. Similarly, the VT/SHGC ratio referenced in section C402.3.1.1 will be unnecessary if the minimum VTs are adopted as proposed in the companion proposal, since the resulting VT/SHGC ratios from the VT minimums can be expected to be substantially higher.

Cost Impact: The code change proposal will not increase the cost of construction.

CE138-13

Public Hearing: Committee:
Assembly:

AS
ASF

AM
AMF

D
DF

C402.3.1.1-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE-VIGNEAU.doc

CE139 – 13

C402.3, C402.3.1.1, C402.3.1.2

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.3 Fenestration (Prescriptive). Fenestration shall comply with Table C402.3. ~~Automatic daylighting controls specified by this section shall comply with Section C405.2.2.3.2.~~

C402.3.1.1 Increased vertical fenestration area with daylighting controls. In Climate Zones 1 through 6, a maximum of 40 percent of the gross above-grade wall area shall be permitted to be vertical fenestration, provided:

1. No less than 50 percent of the conditioned floor area is within a daylight zone;
2. Automatic daylighting controls complying with Section C405.2.2.3.2 are installed in daylight zones; and
3. Visible transmittance (VT) of vertical fenestration is greater than or equal to 1.1 times solar heat gain coefficient (SHGC).

Exception: Fenestration that is outside the scope of NFRC 200 is not required to comply with Item 3.

C402.3.1.2 Increased skylight area with daylighting controls. The skylight area shall be permitted to be a maximum of 5 percent of the roof area provided automatic daylighting controls complying with Section C405.2.2.3.2 are installed in daylight zones under the skylights.

Reason: This proposal clarifies daylighting control provisions associated with fenestration and increased skylight area and locate in a more appropriate subsection. The objective of this proposal is to clarify the code to foster implementation and compliance verification.

The primary purpose of the parent Section C402.3 is to introduce the provisions of the code related to fenestration. It is later on in the section that the issue of skylights and an increased skylight area allowance are addressed and the controls provisions then become relevant. The proposal simply locates the relevant daylighting control provisions in the code where they are specifically relevant.

Cost Impact: The code change proposal will not increase the cost of construction.

CE139-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.3-EC-WILLIAMS.doc

CE140 – 13

C402.3, Table C402.3

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C402.3 Fenestration (Prescriptive). Fenestration shall comply with Sections C402.3 through C402.3.4 and Table C402.3. Automatic daylighting controls specified by this section shall comply with Section C405.2.2.3.2.

TABLE C402.3 BUILDING ENVELOPE FENESTRATION MAXIMUM U-FACTOR AND SHGC REQUIREMENTS: FENESTRATION

(Portions of Table not shown remain unchanged)

Reason: This proposal is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

The following revisions are proposed to clarify the application of Table C402.3::

- a) The word "maximum" is proposed to be added to the title of Table C402.3. Previously, many users incorrectly assumed that these were minimum values.
- b) References to "Sections C402.3 through C402.3.4" were added to the text of Section C402.3 to clarify that these sections must be complied with in addition to the currently referenced Table C402.3 in order to satisfy the codes prescriptive fenestration requirements.

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: This proposal is a clarification and, as such, will not increase the cost of construction. This code change proposal will not increase the cost of construction.

CE140-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.3T #1-EC-THOMPSON-SEHPCAC.doc

CE141 – 13

Table C402.3

Proponent: Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; Bill Prindle, Energy Efficient Codes Coalition; and Don Vigneau, Northeast Energy Efficiency Partnerships.

Revise as follows:

**TABLE C402.3
BUILDING ENVELOPE REQUIREMENTS: FENESTRATION**

CLIMATE ZONE	1	2	3	4 EXCEPT MARINE	5 AND MARINE 4	6	7	8
Vertical fenestration								
U-factor								
Fixed fenestration	0.50	0.50	0.46 0.38	0.38	0.38 0.36	0.36	0.29	0.29
Operable fenestration	0.65	0.65	0.60 0.45	0.45	0.45 0.43	0.43	0.37	0.37
Entrance doors	1.10	0.83	0.77	0.77	0.77	0.77	0.77	0.77

(Portions of Table not shown remain unchanged)

Reason: The purpose of the proposed code change is to improve the efficiency of commercial vertical windows in climate zones 3 and 5 by lowering U-factors to the same level as the U-factors in climate zones 4 and 6 respectively. The proposal also simplifies the code requirements for design professionals, manufacturers, and suppliers.

- The changes in U-factors are based on existing U-factor values in the 2012 IECC. These U-factors are reasonable and currently applicable to commercial buildings in climate zones 4 and 6. The proposal simply spreads the values from one climate zone to the next, applying the same U-factor across 2 climate zones.
- This proposal essentially combines climate zones 3-4 and 5-6 for purposes of U-factor requirements. This will produce economies of scale and lower costs for manufacturers, suppliers, and ultimately consumers.
- The lower U-factors in climate zones 3 and 5 will provide greater insulating value resulting in energy savings and comfort. For example, our initial estimate of savings based on US DOE's EnergyPlus office reference buildings and an assumption of 30% fenestration area is in the neighborhood of 1% heating, cooling and hot water energy costs for each zone.
- Improvement in window performance, even incrementally, is particularly important in commercial buildings because of the large amounts of glass used in such buildings.

Cost Impact: The code change proposal will increase the cost of construction.

CE141-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

C402.3T #2-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE-VIGNEAU.doc

CE142 – 13

Table C402.3, C402.3.3, C402.3.3.1, Table C402.3.3.1

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov); Dr. Thomas D. Culp, Birch Point Consulting LLC, representing the Glazing Industry Code Committee and Aluminum Extruders Council (culp@birchpointconsulting.com)

Revise as follows:

**TABLE C402.3
BUILDING ENVELOPE REQUIREMENTS: FENESTRATION**

CLIMATE ZONE	1	2	3	4 EXCEPT MARINE	5 AND MARINE 4	6	7	8
Vertical fenestration								
U-factor								
Fixed fenestration	0.50	0.50	0.46	0.38	0.38	0.36	0.29	0.29
Operable fenestration	0.65	0.65	0.60	0.45	0.45	0.43	0.37	0.37
Entrance doors	1.10	0.83	0.77	0.77	0.77	0.77	0.77	0.77
SHGC								
Orientation ^a	<u>SEW</u>	<u>N</u>	<u>SEW</u>	<u>N</u>	<u>SEW</u>	<u>N</u>	<u>SEW</u>	<u>N</u>
SHGC PF < 0.2	0.25	<u>0.33</u>	0.25	<u>0.33</u>	0.25	<u>0.33</u>	0.40	<u>0.53</u>
0.2 ≤ PF < 0.5	<u>0.30</u>	<u>0.37</u>	<u>0.30</u>	<u>0.37</u>	<u>0.30</u>	<u>0.37</u>	<u>0.48</u>	<u>0.58</u>
PF ≥ 0.5	<u>0.40</u>	<u>0.40</u>	<u>0.40</u>	<u>0.40</u>	<u>0.40</u>	<u>0.40</u>	<u>0.64</u>	<u>0.64</u>
Skylights								
U-factor	0.75	0.65	0.55	0.50	0.50	0.50	0.50	0.50
SHGC	0.35	0.35	0.35	0.40	0.40	0.40	NR	NR

NR = No requirement.

a. "N" indicates vertical fenestration oriented within 45 degrees of true north. "SEW" indicates orientations other than "N." For buildings in the southern hemisphere, reverse south and north. Buildings located at less than 23.5 degrees latitude shall use SEW for all orientations.

C402.3.3 Maximum U-factor and SHGC. For vertical fenestration, the maximum *U*-factor and solar heat gain coefficient (SHGC) shall be as specified in Table C402.3, based on the window projection factor and orientation. For skylights, the maximum *U*-factor and solar heat gain coefficient (SHGC) shall be as specified in Table C402.3.

The window projection factor shall be determined in accordance with Equation 4-2.

$$PF = A/B$$

(Equation 4-2)

where:

PF = Projection factor (decimal).

A = Distance measured horizontally from the furthest continuous extremity of any overhang, eave, or permanently attached shading device to the vertical surface of the glazing.

B = Distance measured vertically from the bottom of the glazing to the underside of the overhang, eave, or permanently attached shading device.

Where different windows or glass doors have different *PF* values, they shall each be evaluated separately.

C402.3.3.1 SHGC adjustment. Where the fenestration projection factor for a specific vertical fenestration product is greater than or equal to 0.2, the required maximum SHGC from Table C402.3 shall be adjusted by multiplying the required maximum SHGC by the multiplier specified in Table C402.3.3.1 corresponding with the orientation of the fenestration product and the projection factor.

**TABLE C402.3.3.1
SHGC ADJUSTMENT MULTIPLIERS**

PROJECTION FACTOR	ORIENTED WITHIN 45 DEGREES OF TRUE NORTH	ALL OTHER ORIENTATION
$0.2 \leq PF < 0.5$	1.1	1.2
$PF \leq 0.5$	1.2	1.6

Reason:

(Thompson): This proposal is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

This proposal moves and clarifies, but does not delete requirements that are currently contained in Section C402.3.3.1 and Table C402.3.3.1 of the 2012 IECC.

The purpose of this proposal is twofold: correct a technical error in the SHGC shading adjustment, and increase the enforceability and usability of the vertical fenestration requirements.

Technical Correction

During review of the 2012 IECC, a technical error was identified in the way the multipliers of the new Table C402.3.3.1 are applied to adjust the SHGC based on shading projections and orientation. When used, Table C402.3.3.1 illogically allows a higher SHGC on the west side of a building than on the north side. For example, with a 3 ft overhang above 6 ft tall glazing on a building in zone 3, this would require a max SHGC of 0.30 on the north where solar loads are low, yet would allow 0.40 SHGC on the west where solar impact on energy efficiency is more critical. The source of the problem is as follows. The multipliers are indirectly based on a similar SHGC adjustment in ASHRAE 90.1, which in turn was based on a technical paper using DOE2 simulations in 12 cities across various climate zones and latitudes (E.P. Kolderup and C.N. Eley Jr, "Evaluating the Impact of Overhangs and Sides", ACEEE Summer Study on Energy Efficiency in Buildings, 1992). ASHRAE 90.1 determined that the multipliers could be grouped into two sets of multipliers: one for the south, east, and west (SEW) orientations, and one for the north (N) orientation. At the same time, this was meant to be used together with two sets of SHGC base criteria: one number for the overall building, and a separate number for the north side. This recognized the difference in the solar performance of the north side, and also avoided the technical problem now identified in the 2012 IECC with how the shading adjustments are used.

This was the case in ASHRAE 90.1-2004, but unfortunately, this technical rationale may have been forgotten and both ASHRAE 90.1 and IECC have deviated from this since then. The 2009 IECC avoided the multiplication problem by simply listing the required SHGC for different shading levels (projection factor PF), but did not address the difference between north and the other sides. On the other hand, ASHRAE 90.1-2007 and 2010 kept the different shading factors for SEW and N, but dropped the different baseline SHGC for the north in an effort to simplify – and as a result, they now contain the same technical error as 2012 IECC. This proposal aims to correct the error for the IECC, and the issue will also be raised at ASHRAE 90.1.

This proposal restores the basic format of the 2009 IECC where the required SHGC is directly listed for the appropriate climate zone and projection factor, but also reinstates the different SHGC criteria for the north side. While adding some rows, this table format improves usability and enforcement by allowing the required SHGC to be simply read from the main fenestration table instead of involving a separate table and calculation. There is no change in the 2012 baseline SHGC criteria, but the SEW multipliers are applied to directly show the adjusted SHGC for different shading levels ($0.2 \leq PF < 0.5$ and $PF \geq 0.5$) for the SEW orientations. Then, matching the adjusted SHGC requirement for N and SEW orientations for this high PF well shaded window, the SHGC requirements for the north side are then calculated at $0.2 \leq PF < 0.5$ and $PF < 0.2$ using the same multipliers. This ensures consistency, corrects the technical error of requiring higher SHGC on the west than on the north, and also accounts for the different solar performance of northern orientations.

Additionally, the footnote is added to clarify what to do if located in the southern hemisphere or near the equator. The northern multipliers do not apply well between the Tropics of Cancer and Capricorn (23.5 degrees latitude), and the SEW multipliers are more appropriate for all orientations. (Think of it this way: there is no difference between north and south in terms of the sun when standing at the equator.)

Improved Usability and Enforcement

In addition to correcting the technical error, a very important aspect of this proposal is to improve usability and enforcement of the code. Concerns have been expressed about the increased complexity for enforcement with the format of the 2012 IECC, as compared to the 2009 and 2006 IECC. Rather than simply looking up the maximum SHGC for a given projection factor on the main prescriptive table, the 2012IECC forces extra unnecessary steps on the user, referring to a separate table and requiring additional calculations. This increases both the workload and potential for error in code compliance checks. This proposal simplifies the process by allowing the code official to simply look up the required SHGC on the main fenestration table, similar to the 2006 and 2009 IECC. This simplifies enforcement and compliance, makes it easy to determine the baseline value in performance path calculations, and improves overall usability of the code. Also, while SHGC requirements for the northern orientation have been added to make this section technically correct, this does not necessarily add complexity – users can still simply comply with one glass type and SHGC by meeting the main SHGC requirement for the SEW orientation (which is lower or equal to the N requirement in all cases).

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

(Culp): The purpose of this proposal is twofold: correct a technical error in the SHGC shading adjustment, and increase the enforceability and usability of the vertical fenestration requirements.

Technical Correction

During review of the 2012 IECC, a technical error was identified in the way the multipliers of the new Table C402.3.3.1 are applied to adjust the SHGC based on shading projections and orientation. When used, Table C402.3.3.1 illogically allows a higher SHGC on the west side of a building than on the north side. For example, with a 3 ft overhang above 6 ft tall glazing on a building in zone 3, this would require a max SHGC of 0.30 on the north where solar loads are low, yet would allow 0.40 SHGC on the west where solar impact on energy efficiency is more critical. The source of the problem is as follows. The multipliers are indirectly based on a similar SHGC adjustment in ASHRAE 90.1, which in turn was based on a technical paper using DOE2 simulations in 12 cities across various climate zones and latitudes (E.P. Kolderup and C.N. Eley Jr, "Evaluating the Impact of Overhangs and Sides", ACEEE Summer Study on Energy Efficiency in Buildings, 1992). ASHRAE 90.1 determined that the multipliers could be grouped into two sets of multipliers: one for the south, east, and west (SEW) orientations, and one for the north (N) orientation. At the same time, this was meant to be used together with two sets of SHGC base criteria: one number for the overall building, and a separate number for the north side. This recognized the difference in the solar performance of the north side, and also avoided the technical problem now identified in the 2012 IECC with how the shading adjustments are used.

This was the case in ASHRAE 90.1-2004, but unfortunately, this technical rationale may have been forgotten and both ASHRAE 90.1 and IECC have deviated from this since then. The 2009 IECC avoided the multiplication problem by simply listing the required SHGC for different shading levels (projection factor PF), but did not address the difference between north and the other sides. On the other hand, ASHRAE 90.1-2007 and 2010 kept the different shading factors for SEW and N, but dropped the different baseline SHGC for

the north in an effort to simplify – and as a result, they now contain the same technical error as 2012 IECC. This proposal aims to correct the error for the IECC, and the issue will also be raised at ASHRAE 90.1.

This proposal restores the basic format of the 2009 IECC where the required SHGC is directly listed for the appropriate climate zone and projection factor, but also reinstates the different SHGC criteria for the north side. While adding some rows, this table format improves usability and enforcement by allowing the required SHGC to be simply read from the main fenestration table instead of involving a separate table and calculation. There is no change in the 2012 baseline SHGC criteria, but the SEW multipliers are applied to directly show the adjusted SHGC for different shading levels ($0.2 \leq PF < 0.5$ and $PF \geq 0.5$) for the SEW orientations. Then, matching the adjusted SHGC requirement for N and SEW orientations for this high PF well shaded window, the SHGC requirements for the north side are then calculated at $0.2 \leq PF < 0.5$ and $PF < 0.2$ using the same multipliers. This ensures consistency, corrects the technical error of requiring higher SHGC on the west than on the north, and also accounts for the different solar performance of north orientations.

Additionally, the footnote is added to clarify what to do if located in the southern hemisphere or near the equator. The northern multipliers do not apply well between the Tropics of Cancer and Capricorn (23.5 degrees latitude), and the SEW multipliers are more appropriate for all orientations. (Think of it this way: there is no difference between north and south in terms of the sun when standing at the equator.)

Improved Usability and Enforcement

In addition to correcting the technical error, a very important aspect of this proposal is to improve usability and enforcement of the code. Concerns have been expressed about the increased complexity for enforcement with the format of the 2012 IECC, as compared to the 2009 and 2006 IECC. Rather than simply looking up the maximum SHGC for a given projection factor on the main prescriptive table, the 2012 IECC forces extra unnecessary steps on the user, referring to a separate table and requiring additional calculations. This increases both the workload and potential for error in code compliance checks. This proposal simplifies the process by allowing the code official to simply look up the required SHGC on the main fenestration table, similar to the 2006 and 2009 IECC. This simplifies enforcement and compliance, makes it easy to determine the baseline value in performance path calculations, and improves overall usability of the code. Also, while SHGC requirements for the north orientation have been added to make this section technically correct, this does not necessarily add complexity – users can still simply comply with one glass type and SHGC by meeting the main SHGC requirement for the SEW orientation (which is lower or equal to the N requirement in all cases).

Cost Impact: The code change proposal will not increase the cost of construction. This proposal is cost neutral as it is an optional trade-off only.

CE142-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.3T-EC-THOMPSON-SEHPCAC-CULP

CE143 – 13

C202 (NEW), Table C402.3

Proponent: Shaunna Mozingo, City of Cherry Hills Village, Colorado Code Consulting, representing self. (smozingo@coloradocode.net)

Revise as follows:

TABLE C402.3 BUILDING ENVELOPE REQUIREMENTS: FENESTRATION								
Climate Zone	1	2	3	4 except Marine	5 and Marine 4	6	7	8
Vertical Fenestration								
U-factor								
<u>Nonmetal framing (all)</u>	0.50	0.40	0.35	0.35	0.32	0.32	0.29	0.29
<u>Fixed fenestration Metal framing, fixed</u>	0.50	0.50	0.46	0.38	0.38	0.36	0.29	0.29
<u>Operable fenestration Metal framing, operable</u>	0.65	0.65	0.60	0.45	0.45	0.43	0.37	0.37
<u>Metal framing, entrance doors</u>	1.10	0.83	0.77	0.77	0.77	0.77	0.77	0.77
SHGC (all frame types)								

(Portions of Table not shown remain unchanged)

Add new definitions as follows:

SECTION C202 GENERAL DEFINITIONS

FENESTRATION, METAL FRAMING. Fenestration products using metal framing with or without thermal breaks.

FENESTRATION, NONMETAL FRAMING. Fenestration products using framing materials other than metal, with or without metal reinforcement or cladding.

FENESTRATION, FIXED. Vertical fenestration other than *operable fenestration* and *entrance doors* including, but not limited to, curtain wall, storefront, window walls, fixed windows, and picture windows.

FENESTRATION, OPERABLE. Vertical fenestration that opens, except *entrance doors*.

Reason: While I understand the reason the proponent of the table change submitted it for the 2012 IECC to go from windows classified by framing type to windows classified by whether they are fixed or operable, I definitely disagreed with it then and do so even more now that I have had to work with it as a code requirement. Code users are not looking for something as simple as fixed/operable as much as they are the types of framing because that is what we use everywhere else in this code. We have been taught that there is a real difference in metal framing verses all other types of window frames, and that we need to pay attention to the U-factors we are seeing. Now when we take away that framing issue and just say fixed/operable, it looks like framing type no longer matters, so we will go back to not verifying, going backwards in compliance as well as efficiency.

In reality, what is on paper and what happens in the field are two very different things. I am very much for energy efficiency. I have been saying for years that commercial windows are the least complied with requirement of the energy code because they don't usually have the handy labels on the windows and so few take the time to verify NFRC compliant certification. Very few will hold up a Certificate of Occupancy based on a U-Factor not being verified. I know what is being enforced in a lot of jurisdictions, and I know that if we make it sound like all windows are created equal then the code officials will go back to their way of not worrying about it, and all of our hard work on educating them will have gone out the "metal framed window". A very large number of

jurisdictions across the U.S. do absolutely nothing for verifying commercial windows other than seeing that something is listed on ComCheck, and then only half of those make sure that the U-Factor on ComCheck is within in the correct range for the type of framing. Many designers put the U-Factor in as the last item on a ComCheck and put whatever value will get it to pass, knowing full well that the jurisdiction will not verify it at plan review, and if they do, it won't get verified in the field. Ask NFRC how many certificates actually get requested.

The definition of U-Factor doesn't do enough to let the user know that we are not dealing with just center of glass here. It's the entire assembly that gets calculated together to create the U-Factor for this code. The code language in Chapter 3 states that U-Factor is calculated in accordance with NFRC 100. But there are hundreds of referenced standards and testing items in the codes, and I can absolutely tell you that the code official doesn't own them all or read them all, and many will not know or understand that NFRC 100 is for the whole assembly, glass and framing. They need something simple that lets them know that the framing materials matter when it comes to U-Factor, and by taking the table and converting it from framing materials to just fixed/operable, that one piece of information went away.

The default tables in Chapter 3 are based on framing materials and we are taught to figure out what the framing material is so that we can determine a conservative U-Factor and SHGC in the absence of a label or certification. We would need to change the default tables to match the table in Chapters C and R 4 if we are going to keep this new way of determining these values. But you can see by looking in these default tables that framing does matter, and not all windows should be treated as equal.

You can absolutely get a metal framed window to meet the same U-Factor of a window of different framing; it will just cost a lot more. There are structural reasons where metal framed windows are required and in these instances we will be forcing higher costs on the owner because these metal windows will cost a lot more in order to get these lower U-Factors out of them.

What has been proposed here is not exactly the same format as 2009 IECC but is consistent with the format of ASHRAE 90.1-2013. It makes the table a little cleaner than 2009 IECC, putting some of the language in the definitions. But it also uses metal fixed and metal operable, as opposed to metal curtain wall / storefront and metal all other. The main reason ASHRAE did this was because fixed punched opening windows (e.g. strip windows and picture windows) now fall under the more stringent fixed category, as opposed to the less stringent "all other" category, which was really intended to cover operable windows.

For nonmetal U-factors, I used the 2012 residential U-factors, except there is a question about zone 7-8. The residential chapter has 0.32, but the commercial chapter has 0.29 for metal framed fixed products. I chose not to take the nonmetal values from the residential values because it would have made the nonmetal values less stringent than the metal values, which currently requires triple glazing. So I adjusted them to 0.29 on the rationale of staying at least as stringent.

Cost Impact: These glazing values are already realized in the residential portion of the code but if just dealing with commercial buildings, there will be an increase in cost for the more efficient non-metal framed windows because the values were brought up to match those in the residential section.

CE143-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.3T-EC-MOZINGO.doc

CE144 – 13

C202 (NEW), Table C402.3

Proponent: Dr. Thomas D. Culp, Birch Point Consulting LLC, representing the Aluminum Extruders Council (culp@birchpointconsulting.com)

Revise as follows:

**TABLE C402.3
BUILDING ENVELOPE REQUIREMENTS: FENESTRATION**

CLIMATE ZONE	1	2	3	4 EXCEPT MARINE	5 AND MARINE 4	6	7	8
Vertical fenestration								
U-factor								
Performance Class R ^a	0.50	0.40	0.35	0.35	0.32	0.32	0.29	0.29
Performance Class LC, CW, AW and fenestration outside scope of AAMA/WDMA/CSA 101/I.S.2/A440 ^a :								
Fixed fenestration	0.50	0.50	0.46	0.38	0.38	0.36	0.29	0.29
Operable fenestration	0.65	0.65	0.60	0.45	0.45	0.43	0.37	0.37
Entrance doors	1.10	0.83	0.77	0.77	0.77	0.77	0.77	0.77
SHGC								
SHGC	0.25	0.25	0.25	0.40	0.40	0.40	0.45	0.45
Skylights								
U-factor	0.75	0.65	0.55	0.50	0.50	0.50	0.50	0.50
SHGC	0.35	0.35	0.35	0.40	0.40	0.40	NR	NR

NR = No requirement.

a. Performance class determined in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.

Add new definitions as follows:

SECTION C202 GENERAL DEFINITIONS

FENESTRATION, FIXED. Vertical fenestration other than *operable fenestration* and *entrance doors* including, but not limited to, curtain wall, storefront, window walls, fixed windows, and picture windows.

FENESTRATION, OPERABLE. Vertical fenestration that opens, except *entrance doors*.

Reason: The purpose of this proposal is twofold: (1) correct a *decrease* in energy efficiency that inadvertently occurred when the table format was changed in the last cycle, and (2) restore the distinction for different product types used in the diverse range of commercial buildings. First, when the table format was changed at the final action hearings last cycle, it was to establish much more stringent U-factors that could still be achieved by structural metal framed windows, albeit at significantly higher cost, while simplifying the window types down to just fixed vs. operable windows. However, while this was focused on metal framed products that make up 91% of commercial fenestration because of structural and durability performance, this neglected to account for nonmetal residential-style windows that are used in multifamily and light commercial buildings that also fall under the commercial code. For those buildings that would have used these products anyway, the U-factor actually *increased* by 9 - 41% compared to the 2012 residential values (e.g. in zone 5, the U-factor was increased from 0.32 up to 0.38 for fixed windows and 0.45 for operable windows). This resulted in free trade-off credit for something that was going to be done anyway, increasing the overall energy use in these types of buildings.

Second, since first introduced by the New Buildings Institute in 2004, the commercial fenestration requirements have made a distinction between residential-style windows going into multifamily and light commercial buildings, and heavier commercial windows used for structural and durability purposes. This established a fair playing field in that the architect will select the window and framing type based on many building performance considerations, and then each category set an overall U-factor (whole assembly, glazing plus framing) appropriate for that product type that ensures each product uses a comparable energy efficient glazing

package. In other words, make each product type have to use similar energy efficiency measures (low-e, argon, better spacers, etc) to meet the requirement. However, as it stands without that distinction, the current table not only favors less structural products, but also, lighter residential-style windows can get away with a less efficient glazing package.

The 2006 and 2009 IECC used the simplest distinction – metal and nonmetal framed products. This was simple to understand and simple for code enforcement. However, some groups have voiced concerns that using metal vs. nonmetal fenestration frame categories is not “material neutral”. We do not agree with those statements, in that there are specific technical reasons for having separate frame categories, and there is nothing inherently wrong with having separate requirements based on material. Material-based requirements are common throughout the I-codes (e.g. wood, metal, and mass wall requirements).

Nonetheless, in a positive effort to address these concerns, we offer this option that does not use metal vs. nonmetal frame categories, yet preserves the original reason for having separate metal vs. nonmetal categories – structural performance. This proposal uses the “R” performance class from the North American Fenestration Standard (AAMA/WDMA/CSA 101/I.S.2/A440) to set U-factors for the residential-style windows, and then uses the existing U-factors for all other products (performance classes LC, CW, and AW, as well as products outside the scope of AAMA/WDMA/CSA 101/I.S.2/A440 such as curtain wall and storefront). R stands for residential, LC for light commercial, CW for commercial window, and AW for architectural window, with increasing test requirements for each class. This performance class data is already available to the code official in that AAMA/WDMA/CSA 101/I.S.2/A440 testing is already required by the IBC, and for air leakage in the IECC. AAMA/WDMA/CSA 101/I.S.2/A440 testing, which is for the whole product including both framing and glazing, will also help reinforce that the U-factors are not just center-of-glass but must account for the whole product.

The U-factors in the Performance Class R category were taken from the 2012 IECC residential code, except modified to 0.29 in zones 7-8 where the commercial code is already more stringent. This restores the distinction and level playing field for different products while also correcting the decrease in the stringency that occurred last cycle for residential-style products.

Cost Impact: This proposal will increase the cost of construction relative to the current commercial code, but not relative to residential-style windows already established by the residential code for zones 1-6.

CE144-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.3T #2-EC-CULP.doc

CE145 – 13

Table C402.3

Proponent: Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; Bill Prindle, Energy Efficient Codes Coalition; and Don Vigneau, Northeast Energy Efficiency Partnerships.

Revise as follows:

**TABLE C402.3
BUILDING ENVELOPE REQUIREMENTS: FENESTRATION**

CLIMATE ZONE	1	2	3	4 EXCEPT MARINE	5 AND MARINE 4	6	7	8
Vertical fenestration								
SHGC								
SHGC	0.25	0.25	0.25	0.40 <u>0.25</u>	0.40 <u>0.25</u>	0.40 <u>0.25</u>	0.45	0.45

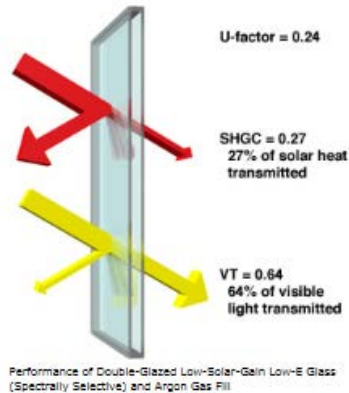
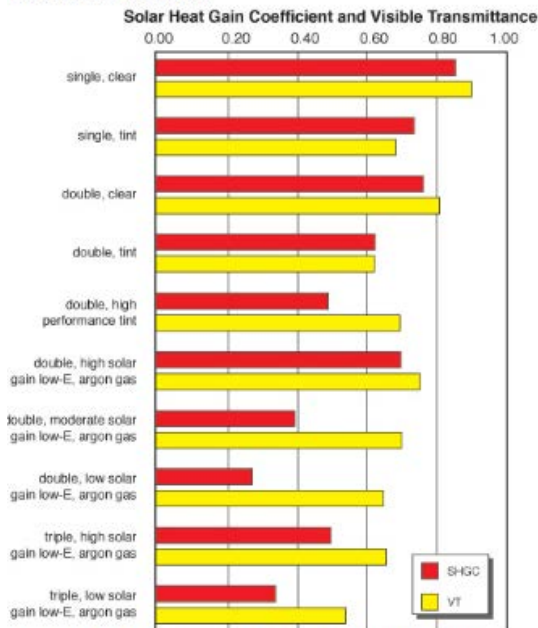
(Portions of Table not shown remain unchanged)

Reason: The purpose of the proposed code change is to strengthen the SHGC requirement for vertical fenestration in climate zones 4 - 6 from 0.40 to 0.25, thereby increasing the energy efficiency of vertical fenestration in these climates.

Low solar heat gain fenestration is even more critical for commercial buildings than residential buildings in all climate zones because commercial buildings tend to be internal heat load dominated, and require cooling during far more hours. Recognizing this fact, the code currently requires some degree of solar control in commercial buildings in all climate zones, by requiring an SHGC of 0.45 or less even in climate zones 7 - 8, 0.40 or less in climate zones 4 – 6; and 0.25 or less in climate zones 1 - 3. When the 0.40 maximum was established for climate zones 4 - 6, a consideration that may have justified the higher SHGC was the reduction in visible light that came with lower SHGC glazing at that time. However, this issue has since been addressed with the introduction of low SHGC glass with much higher visible light transmission resulting from optimizing control of solar gain outside of the visible light spectrum. As a result, lower SHGCs have already been established for homes in climate zones 1 -3 (dropping from 0.40 SHGC in the 2006 IECC to 0.25 in the 2012 IECC). A similar benefit can be captured for commercial buildings in climate zones 4 – 6 by setting the maximum SHGC at 0.25 for these climate zones. The level of solar heat gain, whether 0.40 or 0.25, is simply a choice of low-e coatings and does not involve significant increases in cost; there is no good reason not to capture the benefit of reducing the requirement to 0.25. The Efficient Windows Collaborative (“EWC”) shows how low solar gain, low U-factor and high visible light can now be achieved with improved glazings (see the graphic from their website below; note that these are glass-only values; since NFRC ratings also factor in frames, the reported SHGC and VT can be expected to be at least 10% lower):

Benefits: Increased Light & View

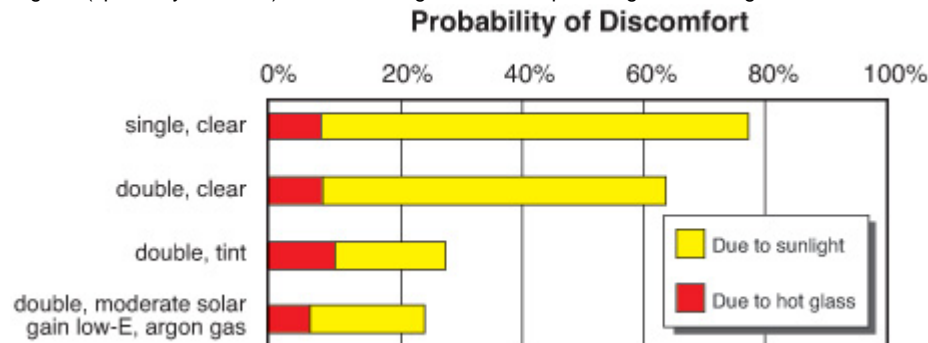
Daylight and view are two of the fundamental attributes of a window. Unfortunately, windows can also be the source of significant solar heat gain during times when it is unwanted. Traditional solutions to reducing solar heat gain such as tinted glazing or shades mean that the amount of light is reduced as well. New glazings with low-solar-gain Low-E ([spectrally selective](#)) coatings can provide better solar heat gain reduction than tinted glass, with a minimal loss of [visible light](#). This also means that views can be clearer and unobstructed.



It is well documented that buildings (which account for over 70% of the electricity used in the United States) have the greatest potential for reducing both energy use and particularly peak electricity use. Peak electricity use is driven by air conditioning load, which is, in large part, driven by summer solar gain. Lower SHGC windows will translate into substantial energy cost savings for building owners and a reduced need for utilities to build additional peak generating plants. For example, based on US DOE's EnergyPlus office reference buildings and an assumption of 30% fenestration area, we estimate a net energy savings (heating, cooling and hot water) for this proposed reduction in maximum SHGC to 0.25 ranging between 2% and 5% depending on the climate zone.

In addition, lower SHGCs will result in smaller cooling equipment for such buildings, easily offsetting any cost increase, thereby reducing first cost as well. Reducing SHGC will provide savings to all consumers, and not just the owners or operators of buildings. Lower SHGCs also produce increased summer comfort, as also illustrated by the EWC on its website. According to EWC:

In summer, strong direct sunlight strikes people and interior surfaces, creating overheating and discomfort. Windows with low [solar heat gain coefficients](#) will reduce the solar radiation coming through the glass and associated discomfort. Low solar heat gain low-E glass (spectrally selective) reduces heat gain while still providing sufficient light and view.



Source: Lawrence Berkeley National Laboratory (Lyons and Arasteh).

For all of these reasons, reducing the SHGC prescriptive requirement to 0.25 in climate zones 4 – 6 is justified in order to reduce energy use and electrical peak demand in commercial buildings.

Cost Impact: The code change proposal will not increase the cost of construction.

CE145-13

Public Hearing: Committee:
Assembly:

AS
ASF

AM
AMF

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C402.3T #1-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE-VIGNEAU.doc

CE146 – 13

C402.3.2

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.3.2 Minimum skylight fenestration area. In an enclosed space greater than ~~40,000~~ 2,000 square feet (~~929~~ 185 m²), directly under a roof with ceiling heights greater than 15 feet (4572 mm), and used as an office, lobby, atrium, concourse, corridor, storage, gymnasium/exercise center, convention center, automotive service, manufacturing, non-refrigerated warehouse, retail store, distribution/sorting area, transportation, or workshop, the total daylight zone under skylights shall be not less than half the floor area and shall provide a minimum skylight area to daylight zone under skylights of either:

1. Not less than 3 percent with a skylight VT of at least 0.40; or
2. Provide a minimum skylight effective aperture of at least 1 percent determined in accordance with Equation 4-1.

$$\text{Skylight Effective Aperature} = \frac{0.85 \times \text{Skylight Area} \times \text{Skylight VT} \times \text{WF}}{\text{Daylight zone under skylight}} \quad \text{(Equation 4-1)}$$

where:

- Skylight area = Total fenestration area of skylights.
Skylight VT = Area weighted average visible transmittance of skylights.
WF = Area weighted average well factor, where well factor is 0.9 if light well depth is less than 2 feet (610 mm), or 0.7 if light well depth is 2 feet (610 mm) or greater.
Light well depth = Measure vertically from the underside of the lowest point of the skylight glazing to the ceiling plane under the skylight.

Exception: Skylights above daylight zones of enclosed spaces are not required in:

1. Buildings in climate zones 6 through 8
2. Spaces where the designed *general lighting* power densities are less than 0.5 W/ft² (5.4 W/m²)
3. Areas where it is documented that existing structures or natural objects block direct beam sunlight on at least half of the roof over the enclosed area for more than 1,500 daytime hours per year between 8 am and 4 pm.
4. Spaces where the daylight zone under rooftop monitors is greater than 50 percent of the enclosed space floor area.

Reason: The use of skylights for daylighting has been shown to be cost effective, and the major portion of the cost is the skylights. This proposal reduces the area threshold for daylighting control requirements in skylit areas to 2,000 square feet. Because the skylight cost is proportional to area, having a high threshold for the skylight daylighting requirement only makes sense if the individual zone control cost is high. The code change proposal reflects the fact that in new construction, the zone control cost is relatively low and a smaller threshold is justified.

A single skylight in a space at the limiting ceiling height of 15 feet creates a daylight area slightly larger than 1,000 ft². Since the requirement is that half the qualifying area receiving skylights and daylight control, then a threshold of 2000 square feet for this requirement is logical if the cost of the skylights can be shown to be cost effective.

An analysis conducted in conjunction with this proposal shows that installing this skylight and the associated daylighting controls within such a space is cost effective. This reduced threshold is mainly due to the reduction in cost of daylighting controls and the reduction of thermal losses and gains through skylights due to improved envelope requirements. The code change proposal reflects the fact that in new construction, the zone control cost is relatively low and a smaller threshold is justified. The lower threshold will add daylighting in smaller, high ceiling spaces that were previously not required to have skylights.

There is a cost increase associated with this proposed change because skylights and controls would be required in areas they are not required under the current code. A cost-effectiveness analysis of the savings resulting from skylight daylighting control shows that such control and skylights are cost effective for a daylit space of 1,000 ft². In the cost effectiveness analysis the

additional skylights and controls had a simple payback ranging from 12.0 to 17.1 years. Based on a skylight life of 40 years, a discounted cost effective payback threshold is 21.8 years. The simple paybacks for all of the additional skylights and controls required under this proposal are well below this cost effective threshold.

Cost Impact: The code change proposal will increase the cost of construction.

CE146-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.3.2 #1-EC-WILLIAMS rev.doc

CE147 – 13

C402.3.2

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C402.3.2 Minimum skylight fenestration area. In an enclosed space greater than 40,000 ~~2,500~~ square feet (~~929 m²~~), directly under a roof with ceiling heights greater than 15 feet (4572 mm), and used as an office, lobby, atrium, concourse, corridor, storage, gymnasium/exercise center, playing area, gymnasium seating, convention center, automotive service, manufacturing, non-refrigerated warehouse, retail store, library reading and stack areas, distribution/sorting area, transportation, or workshop, the total daylight zone under skylights shall be not less than half the floor area and shall provide a minimum skylight area to daylight zone under skylights of either:

1. Not less than 3 percent with a skylight VT of at least 0.40; or
2. Provide a minimum skylight effective aperture of at least 1 percent determined in accordance with Equation 4-1.

$$\text{Skylight Effective Aperture} = \frac{0.85 \times \text{Skylight Area} \times \text{Skylight VT} \times \text{WF}}{\text{Daylight zone under skylight}} \quad (\text{Equation 4-1})$$

where:

- Skylight area = Total fenestration area of skylights.
Skylight VT = Area weighted average visible transmittance of skylights.
WF = Area weighted average well factor, where well factor is 0.9 if light well depth is less than 2 feet (610 mm), or 0.7 if light well depth is 2 feet (610 mm) or greater.
Light well depth = Measure vertically from the underside of the lowest point of the skylight glazing to the ceiling plane under the skylight.

Exception: Skylights above daylight zones of enclosed spaces are not required in:

1. Buildings in climate zones 6 through 8
2. ~~Spaces where the designed general lighting power densities are less than 0.5 W/ft² (5.4 W/m²)~~
3. Areas where it is documented that existing structures or natural objects block direct beam sunlight on at least half of the roof over the enclosed area for more than 1,500 daytime hours per year between 8 am and 4 pm.
4. Spaces where the daylight zone under rooftop monitors is greater than 50 percent of the enclosed space floor area.
5. Spaces where 90 percent of the skylight area is shaded on June 21 in the Northern Hemisphere (December 21 in the Southern Hemisphere) at noon by permanent architectural features of the building.
6. Spaces where the total area minus the daylight zones area adjacent to vertical fenestration is less than 2,500 square feet, and where the lighting is automatically controlled in accordance with Section C405.2.2.3.2.

Reason: The current toplighting requirements in the IECC are based on ANSI/ASHRAE/IES Standard 90.1-2010. Additional revisions are being made to 90.1 in addendum bv. This proposal will make the next version of the IECC consistent with 90.1-2013 for toplighting requirements.

Cost Impact: The code change proposal will increase the cost of construction for spaces between 2,500 ft² and 10,000 ft.

CE147-13

Public Hearing: Committee: AS AM D

Assembly:

ASF

AMF

DF

C402.3.2 #1-EC-FERGUSON.doc

CE148 – 13

C402.3.2

Proponent: Dr. Thomas D. Culp, Birch Point Consulting LLC, representing the Glazing Industry Code Committee (culp@birchpointconsulting.com)

Revise as follows:

C402.3.2 Minimum skylight fenestration area. In an enclosed space greater than ~~40,000~~ 2,500 square feet (~~929~~ 232 m²), directly under a roof with ceiling heights greater than 15 feet (4572 mm), and used as an office, lobby, atrium, concourse, corridor, storage, gymnasium/exercise center, convention center, automotive service, manufacturing, nonrefrigerated warehouse, retail store, distribution/sorting area, transportation, or workshop, the total daylight zone under skylights shall be not less than half the floor area and shall provide a minimum skylight area to daylight zone under skylights of either:

1. Not less than 3 percent with a skylight VT of at least 0.40; or
2. Provide a minimum skylight effective aperture of at least 1 percent determined in accordance with Equation 4-1.

$$\text{Skylight Effective Aperture} = \frac{0.85 \times \text{Skylight Area} \times \text{Skylight VT} \times \text{WF}}{\text{Daylight zone under skylight}} \quad \text{(Equation 4-1)}$$

where:

- Skylight area = Total fenestration area of skylights.
Skylight VT = Area weighted average visible transmittance of skylights.
WF = Area weighted average well factor, where well factor is 0.9 if light well depth is less than 2 feet (610 mm), or 0.7 if light well depth is 2 feet (610 mm) or greater.
Light well depth = Measure vertically from the underside of the lowest point of the skylight glazing to the ceiling plane under the skylight.

Exception: Skylights above daylight zones of enclosed spaces are not required in:

1. Buildings in climate zones 6 through 8.
2. Spaces where the designed *general lighting* power densities are less than 0.5 W/ft² (5.4 W/m²).
3. Areas where it is documented that existing structures or natural objects block direct beam sunlight on at least half of the roof over the enclosed area for more than 1,500 daytime hours per year between 8 am and 4 pm.
4. Spaces where the daylight zone under the rooftop monitors is greater than 50 percent of the enclosed space floor area.
5. Spaces where the total area minus the area of daylight zones adjacent to vertical fenestration is less than 2,500 square feet (929 232 m²), and where the lighting is controlled according to Section C405.2.2.3.2.

Reason: Separate analyses for ASHRAE 90.1 and California Title 24 have shown toplighting of larger open spaces to provide very cost effective energy savings, and that the size threshold may be significantly reduced from the current 10,000 ft². 2008 Title 24 uses an 8,000 ft² threshold, and will use 5,000 ft² in the 2013 standard. ASHRAE 90.1-2010 has already been at 5,000 ft², and following a new cost effectiveness analysis by Pacific Northwest National Laboratory, is now lowering it further to 2,500 ft². At the time this proposal was submitted in Dec 2012, addendum "bv" received no negative comments on the threshold, and was moving forward to the ASHRAE and IES boards for final publication. Some had expressed concern about smaller retail spaces that might be triggered by the 2,500 ft² threshold, but it was noted that these types of retail spaces rarely have ceiling heights over 15 ft, and would therefore be exempt. (Also, toplighting is ideal for the retail spaces that do have taller ceiling heights over 15 ft, such as grocery stores and larger retail.) As such, this proposal lowers the threshold and also adds an exception to be consistent with ASHRAE 90.1 addendum "bv".

Cost Impact: The code change proposal will increase the cost of construction.

CE148-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.3.2-EC-CULP.doc

CE149 – 13

C402.3.2

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.3.2 Minimum skylight fenestration area. In an enclosed space greater than 10,000 square feet (929 m²) in floor area directly under a roof with a not less than 75 percent of ceiling area with heights greater than 15 feet (4572 mm), and used as an office, lobby, atrium, concourse, corridor, storage space, gymnasium/exercise center, convention center, automotive service area, space where manufacturing occurs, non-refrigerated warehouse, retail store, distribution/sorting area, transportation depot, or workshop, the total daylight zone under skylights shall be not less than half the floor area and shall provide a minimum skylight area to daylight zone under skylights of either

1. A minimum skylight area to daylight zone under skylights of not less than 3 percent with a skylight where all skylights have a VT of at least 0.40 when tested in accordance with NFRC 202, or
2. A provide minimum skylight effective aperture of at least 1 percent as determined in accordance with Equation 4-1.

$$\text{Skylight Effective Aperture} = \frac{0.85 \times \text{Skylight Area} \times \text{Skylight VT} \times \text{WF}}{\text{Daylight zone under skylight}}$$

(Equation 4-1)

where:

Skylight area = Total fenestration area of skylights.

Skylight VT = Area weighted average visible transmittance of skylights.

WF = Area weighted average well factor, where well factor is 0.9 if light well depth is less than 2 feet (610 mm), or 0.7 if light well depth is 2 feet (610 mm) or greater.

Light well depth = Measure vertically from the underside of the lowest point of the skylight glazing to the ceiling plane under the skylight.

Exception: Skylights above daylight zones of enclosed spaces are not required in:

1. Buildings in climate zones 6 through 8.
2. Spaces where the designed *general lighting* power densities are less than 0.5 W/ft² (5.4 W/m²).
3. Areas where it is documented that existing structures or natural objects block direct beam sunlight on at least half of the roof over the enclosed area for more than 1,500 daytime hours per year between 8 am and 4 pm.
4. Spaces where the daylight zone under rooftop monitors is greater than 50 percent of the enclosed space floor area.

Reason: This proposal clarifies the language pertaining to requiring skylights in roofs covering areas greater than 10,000 ft². The objective of this proposal is to clarify the code to foster implementation and compliance verification.

By definition skylights are fenestration such that the use of the term fenestration with skylights is redundant. The intent is to address ceilings with variable heights and the proposed revision does that by indicating the requirement applies when more than 75% of ceiling area is above 15 feet. Some of the subject spaces referenced are not technically spaces or areas so the language has been enhanced to convey the intent. Simplification is achieved by making items 1 and 2 parallel construction with reference to the charging section. While VT is defined, there is no referenced test method. NFRC 202 provides a uniform test method by which VT can be objectively determined and should be referenced to enhance uniformity of application and implementation of and compliance verification with the code.

Cost Impact: The code change proposal will not increase the cost of construction. There is no cost impact associated with this proposed change because the current code requires daylighting control.

CE149-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.3.2 #2-EC-WILLIAMS.doc

CE150 – 13

C402.3.2

Proponent: Jack Bailey, One Lux Studio, representing International Association of Lighting Designers (jbailey@oneluxstudio.com)

Revise as follows:

C402.3.2 Minimum skylight fenestration area. In an enclosed space greater than 10,000 square feet (929 m²) directly under a roof with ceiling heights greater than 15 feet (4572 mm), and used as an office, lobby, atrium, concourse, corridor, storage, gymnasium/exercise center, convention center, automotive service, manufacturing, nonrefrigerated warehouse, retail store, distribution/sorting area, transportation, or workshop, the total daylight zone under skylights shall be not less than half the floor area and fenestration shall be configured so that either: ~~and shall provide a minimum skylight area to daylight zone under skylights of either:~~

1. The skylight area divided by the daylight zone area is not less than 3 percent with a skylight VT of at least 0.40; or
2. Provide a minimum skylight effective aperture of at least 4 1.2 percent determined in accordance with Equation 4-1.

$$\text{Skylight Effective Aperture} = \frac{0.85 \times \text{Skylight Area} \times \text{Skylight VT} \times \text{WF}}{\text{Daylight zone under skylight}} \quad (\text{Equation 4-1})$$

where:

Skylight area = Total fenestration area of skylights.
Skylight VT = Area weighted average visible transmittance of skylights.
~~WF = Area weighted average well factor, where well factor is 0.9 if light well depth is less than 2 feet (610 mm), or 0.7 if light well depth is 2 feet (610 mm) or greater.~~
~~Light well depth = Measure vertically from the underside of the lowest point of the skylight glazing to the ceiling plane under the skylight.~~

Exception: ~~Skylights above daylight zones of enclosed spaces~~ are not required in:

1. Buildings in climate zones 6 through 8.
2. Spaces where the designed *general lighting* power densities are less than 0.5 W/ft² (5.4 W/m²).
3. Areas where it is documented that existing structures or natural objects block direct beam sunlight on at least half of the roof over the enclosed area for more than 1,500 daytime hours per year between 8 am and 4 pm.
4. Spaces where the daylight zone under rooftop monitors is greater than 50 percent of the enclosed space floor area.

Reason: The well factor calculation adds complexity without significantly improving the accuracy of the analysis. The minimum skylight effective aperture is increased from 1.0 percent to 1.2 percent so that similar results are obtained regardless of whether option 1 or option 2 is followed.

The language in the exception is confusing, and the proposed change is editorial.

Cost Impact: The code change proposal will not increase the cost of construction.

CE150-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

CE151 – 13

C202 (NEW), C402.3.2.1

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C402.3.2.1 Lighting controls in daylight zones under skylights. All lighting in the daylight zone shall be controlled by multilevel lighting controls that comply with Section C405.2.2.3.3.

Exception: Skylights above daylight zones of enclosed spaces are not required in:

1. Buildings in Climate Zones 6 through 8
2. Spaces where the designed *general lighting* power densities are less than 0.5 W/ft² (5.4 W/m²).
3. Areas where it is documented that existing structures or natural objects block direct beam sunlight on at least half of the roof over the enclosed area for more than 1,500 daytime hours per year between 8 am and 4 pm.
4. Spaces where the daylight zone under *rooftop monitors* is greater than 50 percent of the enclosed space floor area.

Revise definitions as follows:

SECTION C202 GENERAL DEFINITIONS

ROOF MONITOR. That part of a *building* that projects above the plane of the *roof* and whose walls contain *vertical fenestration* for lighting the interior.

DAYLIGHT ZONE.

1. **Under skylights.** The area under skylights whose horizontal dimension, in each direction, is equal to the skylight dimension in that direction plus either the floor-to-ceiling height or the dimension to a ceiling height opaque partition, or one-half the distance to adjacent skylights or vertical fenestration, whichever is least.
2. **Adjacent to vertical fenestration.** The area adjacent to vertical fenestration which receives daylight through the fenestration. For purposes of this definition and unless more detailed analysis is provided, the daylight zone depth is assumed to extend into the space a distance of 15 feet (4572 mm) or to the nearest ceiling height opaque partition, whichever is less. The daylight zone width is assumed to be the width of the window plus 2 feet (610 mm) on each side, or the window width plus the distance to an opaque partition, or the window width plus one-half the distance to adjacent skylight or vertical fenestration, whichever is least.
3. **Under roof monitors.** The combined area under each *roof monitor* without double counting overlapping areas from multiple roof monitors. It is the product of the daylight area width under *roof monitors* and the daylight area depth under *roof monitors*. The daylight area width under *roof monitors* is the width of the *vertical fenestration* above the ceiling level plus on each side, the smallest of: 2 feet (0.6m), or the distance to any 60 inch (1525 mm) or higher vertical obstruction or the distance to the edge of any primary sidelighted area. The daylight area depth under *roof monitors* is the smallest of the following horizontal distances inward from the bottom edge of the *vertical fenestration*, the monitor sill height, (the vertical distance from the floor to the bottom edge of the monitor glazing), or the distance to the edge of any primary sidelighted area or, the distance to the front face of any vertical obstruction where any part of the obstruction is farther away than the difference between the height of the obstruction and the monitor sill height.

Reason: The term "rooftop monitor" is currently used in the IECC, but it's not defined. There is some ambiguity about the term and the definition. This proposal makes the terminology and definition consistent with ANSI/ASHRAE/IES Standard 90.1 by using the

term roof monitor, and adding a definition for the term. It also adds a definition for the daylight zone under a roof monitor which is used in daylighting proposals.

Cost Impact: The code change proposal will not increase the cost of construction.

CE151-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.3.2 #2-EC-FERGUSON.doc

CE152 – 13

C402.3.3 (NEW)

Proponent: Dr. Thomas D. Culp, Birch Point Consulting LLC, representing the Glazing Industry Code Committee (culp@birchpointconsulting.com)

Add new text as follows:

C402.3.3 Daylight zones. In *buildings* not greater than two stories above grade plane, not less than 10 percent of the net floor area shall be located within a *daylight zone*. In *buildings* three or more stories above grade plane, not less than 5 percent of the net floor area shall be located within a *daylight zone*.

Exception: Daylighting in accordance with this section is not required in the following spaces:

1. Auditoriums, places of religious worship, theaters, museums, mercantile occupancies with less than 10,000 square feet of net floor area, and refrigerated warehouses.
2. Existing buildings undergoing *alteration*, *repair*, relocation, or a change of occupancy.
3. *Buildings* where the total daylight potential (TDP) calculated in accordance with Section 808.3 of the *International Green Construction Code* is less than 0.5.

Reason: This proposal would require a minimum daylight area similar in concept to the 2012 International Green Construction Code, but at much less aggressive level (only 1/5 of the IgCC) and with a simplified approach. For comparison, the IgCC requires 50% of the net floor area to be in daylight zones for 1-2 story buildings, and 25% for 3+ story buildings. On the other hand, this proposal is meant to only be a simple base level requirement to ensure that building designers address daylighting and glazing layout, while being easy enough to provide flexibility for different space and building types, and not require any gross changes in building geometry. Exceptions are included for spaces where daylighting would interfere with the function of the space, provide little benefit, or not be feasible.

Cost Impact: This proposal will not increase the cost of construction for most buildings and will help improve layout and use of glazing that would have been installed anyway, but this will increase the cost of construction in some buildings where there would have been insufficient fenestration and daylighting.

CE152-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.3.3 (NEW)-EC-CULP.doc

CE153 – 13

C402.3.2.2

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.3.2.2 Haze factor. Skylights in office, storage, automotive, service, manufacturing, non-refrigerated warehouse, retail store and distribution/sorting area spaces shall have a glazing materials or diffuser with a ~~measured~~ haze factor greater than 90 percent when tested in accordance with Procedure A of ASTM D 1003.

Exception: Skylights ~~designed~~ installed to exclude direct sunlight entering the occupied space by use of fixed or automated baffles, or the geometry of skylight and light well ~~need not comply with Section C402.3.2.2.~~

Reason: This proposal clarifies the testing requirements for fenestration haze factor to reference Procedure A of ASTM D 1003 or other ASTM standards as applicable.

The requirement for testing in the code eliminates the need to use the term “measured,” and could provide additional confusion should a user of the code interpret that as allowing post-installation measurement of haze factor in accordance with the standard. ASTM D 1003 has multiple procedures. Procedure A (hazemeter) test values are normally slightly higher and less variable than Procedure B (spectrophotometer) test values. Where the code indicates a singular criterion (90%) a singular test procedure should be specifically referenced. If there are two test procedures that yield different results for the same metric then the code should provide a separate criterion for each procedure (e.g. 90% when tested per procedure A and a TBD equivalent percentage when tested per procedure B). Also replacing “designed” with “installed” provides clarification as a skylight can be “designed” in the factory where the installation conditions in the exception may not be known. Those conditions are related to the installation of the skylight within the building and are more appropriately referenced in the code.

Cost Impact: The code change proposal will not increase the cost of construction.

CE153-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.3.2.2-EC-WILLIAMS.doc

CE154 – 13

C402.3.2.2

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C402.3.2.2 Haze factor. Skylights in office, storage, automotive service, manufacturing, nonrefrigerated warehouse, retail store, and distribution/sorting area spaces shall have a glazing material or diffuser with a measured haze factor greater than 90 percent when tested in accordance with the procedures contained in ASTM D 1003.

Exception: Skylights designed to exclude direct sunlight entering the occupied space by the use of fixed or automated baffles, or the geometry of skylight and light well need not comply with Section C402.3.2.2.

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

ASTM D 1003 has the title of "Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics." However the standard actually contains test methods and procedures for all transparent materials and isn't limited in application to plastics. As it is up to ASTM to name their standard and it can't be changed in the ICC process, this proposal is intended to try to clarify that the standard is used for the procedures, and not limited to the material contained in the title.

Cost Impact: This code change proposal will not increase the cost of construction. The proposal is editorial in nature and will not affect the cost of construction.

CE154-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.3.2.2-EC-THOMPSON-SEHPCAC.doc

CE155 – 13

C402.3.3

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.3.3 Maximum U-factor and SHGC. ~~For vertical fenestration, the~~ The maximum U-factor and solar heat gain coefficient (SHGC) for fenestration shall be as specified in Table C402.3, ~~based on the window projection factor. For skylights, the maximum U-factor and solar heat gain coefficient (SHGC) shall be as specified in Table C402.3.~~

The window projection factor shall be determined in accordance with Equation 4-2.

$$PF = A/B \quad \text{(Equation 4-2)}$$

where:

PF = Projection factor (decimal).

A = Distance measured horizontally from the furthest continuous extremity of any overhang, eave, or permanently attached shading device to the vertical surface of the glazing.

B = Distance measured vertically from the bottom of the glazing to the underside of the overhang, eave, or permanently attached shading device.

Where different windows or glass doors have different *PF* values, they shall each be evaluated separately.

Reason: This proposal clarifies the provisions in the code related to maximum U-factor and SHGC, to increase simplicity of the code.

The opening section (parent) need only state the scope and criteria and then when consulting Table C402.3 as required the application of the provisions as to which type of fenestration (vertical or skylight) become obvious. The relevance of text beyond the first paragraph of Section C402.3.3 does not become apparent until after Table C402.3.3.1 and should be relocated after that table where it relates to the *PF* term used in that table.

Cost Impact: The code change proposal will not increase the cost of construction.

CE155-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.3.3-EC-WILLIAMS.doc

CE156 – 13

C402.3.3, C402.3.3.1

Proponent: Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; Bill Prindle, Energy Efficient Codes Coalition; and Don Vigneau, Northeast Energy Efficiency Partnerships.

Revise as follows:

C402.3.3 Maximum U-factor and SHGC. For vertical fenestration, the maximum U-factor and solar heat gain coefficient (SHGC) shall be as specified in Table C402.3, based on the climate zone, type of vertical fenestration and, for SHGC, adjusted where necessary for window projection factor. For skylights, the maximum U-factor and solar heat gain coefficient (SHGC) shall be as specified in Table C402.3 by climate zone.

~~The window projection factor shall be determined in accordance with Equation C4-2.~~

~~$PF = A/B$ (Equation C4-2)~~

~~where:~~

~~PF = Projection factor (decimal).~~

~~A = Distance measured horizontally from the furthest continuous extremity of any overhang, eave, or permanently attached shading device to the vertical surface of the glazing.~~

~~B = Distance measured vertically from the bottom of the glazing to the underside of the overhang, eave, or permanently attached shading device.~~

~~Where different windows or glass doors have different PF values, they shall each be evaluated separately.~~

C402.3.3.1 SHGC adjustment. Where the fenestration projection factor for a specific vertical fenestration product is greater than or equal to 0.2, the ~~required~~ maximum SHGC from Table C402.3 shall be adjusted by multiplying the required maximum SHGC by the adjustment multiplier specified in Table C402.3.3.1 corresponding with the orientation of the fenestration product and the projection factor for each fenestration product.

TABLE C402.3.3.1
SHGC ADJUSTMENT FOR PROJECTION FACTOR MULTIPLIERS

PROJECTION FACTOR	ORIENTED WITHIN 45 DEGREES OF TRUE NORTH SHGC ADJUSTMENT MULTIPLIER	ALL OTHER ORIENTATION
$0.2 \leq PF < 0.5$	1.1 1.2	1.2
$PF \geq 0.5$	1.2 1.6	1.6

The projection factor for each vertical fenestration product shall be determined in accordance with Equation C4-2.

$PF = A/B$ (Equation C4-2)

where:

PF = Projection factor (decimal).

A = Distance measured horizontally from the furthest continuous extremity of any overhang, eave, or permanently attached shading device to the vertical surface of the glazing.

B = Distance measured vertically from the bottom of the glazing to the underside of the overhang, eave, or permanently attached shading device.

Where different windows or glass doors have different PF values, they shall each be evaluated separately.

Reason: The purpose of this proposal is to simplify and improve the code in how it addresses the prescriptive U-factor and SHGC requirements for fenestration and the effects of projection factor by:

- cleaning up, clarifying and making the language more specific;
- moving the projection factor methodology and equation to a more appropriate place in the IECC (in the section that establishes an adjustment for projection factor);
- eliminating the need to calculate the projection factor for each window for buildings with little (<0.20) or no projection factor and which do not qualify for an SHGC adjustment; and
- applying a uniform projection factor multiplier to SHGC requirements, regardless of the orientation of the fenestration.

The current IECC applies a different SHGC multiplier to fenestration oriented within 45 degrees of true north as opposed to all other fenestration. While the multipliers yield mathematically correct results based on the current approach in *ASHRAE 90.1*, some code users have expressed concern that windows facing north should not be required to meet a lower SHGC number than windows facing other directions. This proposal eliminates this concern, while simplifying the code, by moving to a single multiplier for all orientations. At the same time, by retaining the multiplier approach, this proposal allows for an automatic adjustment in the event the underlying SHGC values are modified in the future.

Cost Impact: The code change proposal will not increase the cost of construction.

CE156-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.3.3-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE-VIGNEAU.doc

CE157 – 13

C402.3.3.1, Table C402.3.3.1, C402.3.3.2 (NEW)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C402.3.3.1 SHGC adjustment. Where the fenestration projection factor for a specific vertical fenestration product is greater than or equal to 0.2, the required maximum SHGC from Table C402.3 shall be adjusted by multiplying the required maximum SHGC by the multiplier specified in Table C402.3.3.1 corresponding with the orientation of the fenestration product and the projection factor

C402.3.3.1 SHGC of vertical fenestration. Vertical *fenestration* shall have an *SHGC* not greater than that specified in Table C402.3. *Dynamic glazing* shall be considered separately from other vertical *fenestration*, and area weighted averaging with other vertical *fenestration* that is not *dynamic glazing* shall not be permitted.

Exceptions. Vertical *fenestration* that complies with all of the following:

1. The *fenestration* located on the first floor above grade. The first floor is no greater than 20 feet in height above grade.
2. The *fenestration* has a permanent projection factor with a PF greater than 0.5, and
3. The *fenestration* is no greater than 75 percent of the gross wall area.

C402.3.3.1.1 SHGC reduction for permanent shading. The required SHGC shall be reduced by using the multipliers in Table 402.3.3.1 if the vertical *fenestration* is shaded by opaque permanent projections in accordance with one of the following methods:

1. Open louvers provided that no sun penetrates the louvers during the peak sun angle on June 21 in the Northern Hemisphere (December 21 in the Southern Hemisphere).
2. The PF used in the SHGC calculation shall be reduced by multiplying it by a O_s , determined by Equation 4-x, if permanent projections shade vertical *fenestration*.

$$O_s = (A_i \times O_i) + (A_f \times O_f) \quad \text{Equation 4-x}$$

Where

O_s = percent opacity of the shading device

A_i = percent of the area of the shading device that is a partially opaque infill

O_i = percent opacity of the infill—for glass $O_i = (100\% - T_s)$, where T_s is the solar transmittance as determined in accordance with NFRC 300; for perforated or decorative metal panels

O_f = percentage of solid material

A_f = percent of the area of the shading device that represents the framing members

O_f = percent opacity of the framing members; Where solid, $O_f = 100\%$

TABLE C402.3.3.1
SHGC ADJUSTMENT MULTIPLIERS

PROJECTION FACTOR	ORIENTED WITHIN 45 DEGREES OF TRUE NORTH	ALL OTHER ORIENTATION
$0.2 \leq PF < 0.5$	1.1	1.2

PF ≥ 0.5	1.2	1.6
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TABLE 402.3.3.1
SHGC Multipliers for Permanent Projections

Projection Factor	SHGC Multiplier (All Other Orientations)	SHGC Multiplier (North-Oriented)
0–0.10	1.00	1.00
>0.10–0.20	0.91	0.95
>0.20–0.30	0.82	0.91
>0.30–0.40	0.74	0.87
>0.40–0.50	0.67	0.84
>0.50–0.60	0.61	0.81
>0.60–0.70	0.56	0.78
>0.70–0.80	0.51	0.76
>0.80–0.90	0.47	0.75
>0.90–1.00	0.44	0.73

C402.3.3.2 Fenestration orientation. The vertical fenestration shall comply with either Equation 4-y or 4-z

$$A_W \leq (A_T)/4 \text{ and } A_E \leq (A_T)/4 \quad \text{Equation 4-y}$$

$$A_W \times SHGC_W \leq (A_T \times SHGC_C)/4 \text{ and } A_E \times SHGC_E \leq (A_T \times SHGC_C)/4 \quad \text{Equation 4-z}$$

Where

A_W = west oriented vertical *fenestration area* (oriented within 45 degrees of true west to the south and within 22.5 degrees of true west to the north in the northern hemisphere; oriented within 45 degrees of true west to the north and within 22.5 degrees of true west to the south in the southern hemisphere)

A_E = east oriented vertical *fenestration area* (oriented within 45 degrees of true east to the south and within 22.5 degrees of true east to the north in the northern hemisphere; oriented within 45 degrees of true east to the north and within 22.5 degrees of true east to the south in the southern hemisphere)

A_T = total vertical *fenestration area*

$SHGC_C$ = the *SHGC* criteria in Table C402.3 for each climate zone

$SHGC_E$ = the *SHGC* for east-oriented *fenestration* that complies with Section C402.3.3.1

$SHGC_W$ = the *SHGC* for west-oriented *fenestration* that complies with Section C402.3.3.1

Reason: This revision to the building/fenestration orientation requirements provides more specific requirements for east and west facing fenestration while also providing more flexibility for complying. Analyses indicate that east and west facing fenestration increases building energy consumption compared to north and south facing glazing in all climates. The criteria can be met by limiting fenestration area, changing the fenestration SHGC, or orienting the building so that the long axis is in the east-west direction. A number of exceptions are provided. New exceptions include one for buildings with less than 20% fenestration on the east and west facades and one for buildings in Climate Zone 8. The definitions for the areas east and west oriented fenestration have also been further refined. This is consistent with addendum bw to ANSI/ASHRAE/IES Standard 90.1

Cost Impact: The code change proposal will increase the cost of construction.

CE157-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.3.3.1-EC-FERGUSON.doc

CE158 – 13

C402.3.3.2

Proponent: Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; Bill Prindle, Energy Efficient Codes Coalition; and Don Vigneau, Northeast Energy Efficiency Partnerships.

Delete without substitution as follows:

~~**C402.3.3.2 Increased vertical fenestration SHGC.** In Climate Zones 1, 2 and 3, vertical fenestration entirely located not less than 6 feet (1729 mm) above the finished floor shall be permitted a maximum SHGC of 0.40.~~

Reason: The purpose of the proposed code change is to eliminate an exception to the fenestration SHGC requirement because it does not produce equivalent energy savings. In climate zones 1-3, low-SHGC fenestration is crucial for lowering energy use and peak electric demand. If there are to be any exceptions from this requirement, the exceptions should result in energy savings that will meet or exceed the savings that would have resulted from using 0.25 SHGC windows.

The current language does not meet this hurdle. It carves out an exception for fenestration located more than 6 feet above the finished floor. However, the exception does not require higher-VT fenestration, or clarify whether the windows must be part of a daylight area, or require the installation of automatic daylighting controls that possibly could offset at least some of the resulting increase in energy use. The language simply increases the maximum SHGC allowed by 60% with no requirement for any offset. Solar heat gain and the associated peak electricity use of commercial buildings are too important to carve out unnecessary exemptions like C402.3.3.2.

Presumably this exception was created to help with daylighting on the theory that a higher SHGC was necessary for more daylighting. We too are in favor of improving daylighting. However, we do not believe it is necessary to sacrifice solar heat gain reduction to obtain adequate visible light. Substantial VT can be achieved while still meeting the SHGC requirements. We have submitted a companion proposal for a minimum VT, which will do just that.

Moreover, eliminating this exception will also improve the clarity and usability of the code because it is an extremely specific exception that only adds unnecessary complexity to the code.

Cost Impact: The code change proposal will not increase the cost of construction.

CE158-13

Public Hearing: Committee:
Assembly:

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ASF

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C402.3.3.2-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE-VIGNEAU.doc

CE159 – 13

C402.3.3.5

Proponent: Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Bill Prindle, Energy Efficient Codes Coalition; ; Harry Misuriello, American Council for an Energy-Efficient Economy; and Don Vigneau, Northeast Energy Efficiency Partnerships.

Revise as follows:

C402.3.3.5 Dynamic Glazing. For compliance with Section C402.3.3, the SHGC for dynamic glazing products shall be determined using the manufacturer's average of the product's lowest-rated and highest SHGC value from the product's label, and the VT/SHGC ratio shall be determined using the maximum VT and maximum SHGC using the average of the product's lowest and highest VT value from the product's label. Dynamic glazing shall be considered separately from other fenestration, and area-weighted averaging with other fenestration that is not dynamic glazing shall not be permitted.

Reason: The purpose of the proposed code change is to correct how the SHGC and VT are determined for dynamic glazing to reflect that there is no guarantee that dynamic glazing will be operated to minimize either SHGC or VT. Current dynamic glazing assumptions in the IECC are physically impossible and are inconsistent with fenestration product labels. Dynamic glazing products are labeled based on both the "on/open" setting and the "off/closed" setting (there are also variable products with ranges of performance). In one of these settings the product blocks solar heat gain, thereby also reducing visible light. In the other setting, the product blocks less solar heat gain and allows more visible light to pass through the glass. These two conditions do not overlap – either the product is "on" or "off" at any given time during the day. The current definition would suggest that windows are optimally operated to block the maximum solar heat gain throughout the day, which would clearly not allow for visible light to be at the maximum during the day. However, the current language in Section C402.3.3.5 awards the code user the best-case efficiency for SHGC, as well as the best-case VT level, even though the two conditions cannot take place at the same time.

This proposal corrects the inconsistency in the code by averaging the lowest and highest rated values for SHGC and VT, reflecting the fact that there is no guarantee whether the product will be maximizing SHGC or maximizing VT. It does not make sense to assume that the product would be "on" for 24 hours for purposes of calculating SHGC, but "off" for 24 hours for purposes of calculating the VT. This proposal takes the average of the two sets of "best case" assumptions.

Cost Impact: The code change proposal will not increase the cost of construction.

CE159-13

Public Hearing: Committee:
Assembly:

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C402.3.3.5-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE-VIGNEAU.doc

CE160 – 13

C402.3.3.5, R402.3.3 (NEW) (IRC N1102.3.3 (NEW))

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C402.3.3.5 Dynamic glazing. For compliance with Section C402.3.3, the SHGC for dynamic glazing shall be determined using the manufacturer's lowest-rated SHGC, and the VT/SHGC ratio shall be determined using the maximum VT and maximum SHGC. Where the range of values that dynamic glazing can achieve includes the required value for SHGC, U-factor, VT, or VT/SHGC for the glazing and the dynamic glazing is automatically controlled, the dynamic glazing shall be deemed to meet that requirement. Dynamic glazing shall be considered separately from other fenestration, and area-weighted averaging with other fenestration that is not dynamic glazing shall not be permitted.

PART II – IECC-RESIDENTIAL PROVISIONS

Add new text as follows:

R402.3.3 (N1102.3.3) Dynamic glazing. Where the range of values that dynamic glazing can achieve includes the required value for SHGC or U-factor for the glazing and the dynamic glazing is automatically controlled, the dynamic glazing shall be deemed to meet that requirement.

Reason: Dynamic glazing has the potential to become a variable opening that changes quickly, as if we could switch out the glazing in a very short time. Dynamic glazing which can switch its characteristics to respond to the situation could be valuable, a variable characteristic is likely to be much more valuable than any particular single value. The biggest concern in the code world should be to get out of its way and let it behave intelligently.

Dynamic glazing costs significantly more than regular glazing. It will not be purchased simply to get around the energy code. Another option, not presented above, would be simply to not regulate the characteristics that can be automatically controlled. The code could presume that the buyer of such a product is very motivated to make it work well and not over regulate the product.

In any case the code should not get in the way of a product that can change literally as fast as the weather.

Cost Impact: The code change proposal will not increase the cost of construction.

CE160-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.3.3.5-EC-CONNER.doc

CE161 – 13

C402.3.3.5, R402.3.2 (IRC N1102.3.2)

Proponent: Dr. Helen Sanders, SAGE Electrochromics Inc. (helen.sanders@sageglass.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C402.3.3.5 Dynamic glazing. ~~For compliance with Section C402.3.3, the SHGC for *dynamic glazing* shall be determined using the manufacturer's lowest-rated SHGC, and the VT/SHGC ratio shall be determined using the maximum VT and maximum SHGC. *Dynamic glazing* shall be permitted to satisfy the SHGC and VT requirements of Table C402.3 and Section C402.3.1.1 provided the ratio of the higher to lower labeled SHGC is greater than or equal to 3, and the *dynamic glazing* is automatically controlled to modulate the amount of solar gain into the space in multiple steps. *Dynamic glazing* shall be considered separately from other fenestration, and area-weighted averaging with other fenestration that is not *dynamic glazing* shall not be permitted.~~

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R402.3.2 (N1102.3.2) Glazed fenestration SHGC. An area-weighted average of fenestration products more than 50-percent glazed shall be permitted to satisfy the SHGC requirements.

Dynamic glazing shall be permitted to satisfy the SHGC requirements of Table R402.3.3 provided the ratio of the higher to lower labeled SHGC is greater than or equal to 3, and the *dynamic glazing* is automatically controlled to modulate the amount of solar gain into the space in multiple steps. *Dynamic glazing* shall be considered separately from other fenestration, and area-weighted averaging with other fenestration that is not *dynamic glazing* shall not be permitted.

Reason: (Part I) Last cycle, the commercial IECC clarified how to deal with code compliance for dynamic glazing, and dynamic glazing is also now addressed in the IgCC, ASHRAE 90.1, ASHRAE 189.1, and the new 2013 California Title 24 standards. This was important in that dynamic glazing offers the unique ability to reversibly change properties such as SHGC and VT to optimize energy performance, daylighting, and glare based on changing situations during the day, and over different seasons. As such, dynamic glazing represents a key technology on the route to zero energy buildings, and has been strongly supported by the U.S. Department of Energy, Lawrence Berkeley National Laboratory, and the National Renewable Energy Laboratory.

However, to provide additional assurances that the dynamic glazing delivers the maximum energy savings, this proposal strengthens the requirement by only allowing compliance if the dynamic glazing has a certain dynamic range (ratio of the high to low SHGC greater than 3) and is automatically controlled in multiple steps. The minimum dynamic range prevents a loophole for products claiming dynamic properties that do not really have a significant energy impact. Also, with a minimum SHGC dynamic ratio of 3, the current language about using the lowest rated SHGC for compliance is no longer needed ... the highest SHGC in any double glazing is perhaps 0.60, so the lowest SHGC would have to be < 0.20, which is already lower than the lowest 0.25 SHGC requirement. Furthermore, although the dynamic range is specified as a SHGC ratio, this also ensures a good dynamic range for VT, which will be higher than the SHGC ratio. (Typical products commonly have SHGC range from <0.10 to >0.40, and VT range from <0.04 to >0.50.)

Finally, the dynamic glazing must be properly controlled in order to optimize energy performance. Dynamic glazing is almost always already sold as a system integrated with automatic controls, but this proposal clarifies that the dynamic glazing must be automatically controlled in multiple steps, and not rely on manual adjustment by occupants.

(Part II) Dynamic glazing is currently defined and addressed in the commercial IECC, as well as the IgCC, ASHRAE 90.1, ASHRAE 189.1, and the new 2013 California Title 24 standards. However, the residential IECC does not currently address how to deal with compliance of dynamic glazing. Dynamic glazing is unique in that it has the ability to reversibly change properties such as SHGC and VT. This allows the glazing to be controlled optimize energy performance, daylighting, and glare based on changing situations during the day, and over different seasons. For example, unlike traditional glazing with fixed properties, dynamic glazing can be operated in a lower SHGC state during summer to reduce cooling loads, and a higher SHGC state during winter to reduce heating loads.

As such, dynamic glazing represents a key technology on the route to zero energy buildings, and has been strongly supported by the U.S. Department of Energy, Lawrence Berkeley National Laboratory, and the National Renewable Energy Laboratory. Dynamic glazing has been available on the market for 10 years now, and manufacturing expansions have come on line in 2012 to provide larger pane sizes at higher volumes and lower prices to allow broader application. Not only should its use be encouraged, but barriers to its use must be removed. Specifically, the NFRC label for dynamic glazing which has been in place for a number of years, lists two values for SHGC, representing the range over which the SHGC varies. It is not clear how this label should be used to determine compliance with maximum or minimum SHGC requirements, and direction must be given to aid enforcement by the building code official.

Because of the ability of dynamic glazing to optimize solar gain and energy efficiency, the commercial IECC already allows compliance with SHGC requirements by simply saying to use the lower labeled SHGC value, and to treat dynamic glazing separately from other fenestration in the building (no mixing in area-weighted averages). To provide additional assurances of proper performance, this proposal provides a stronger requirement by only allowing compliance if the dynamic glazing has a certain dynamic range (ratio of the high to low SHGC greater than 3) and is automatically controlled in multiple steps. First, the minimum dynamic range prevents a loophole for products claiming dynamic properties that do not really have a significant energy impact. The minimum SHGC dynamic ratio of 3 will also more than ensure compliance with the lowest rated SHGC ... the highest SHGC in any double glazing is perhaps 0.60, so the lowest SHGC would have to be < 0.20, which is already lower than the lowest 0.25 SHGC requirement. (In practice, typical products commonly have SHGC range from <0.10 to 0.40.) Second, the dynamic glazing must be properly controlled in order to optimize energy performance. Automatic controls are especially important in a residential home or apartment, where the occupant may not be home to manually adjust the glazing. A separate proposal is also being submitted to the commercial IECC to strengthen those requirements in a similar manner.

References:

1. "Window Systems for High-Performance Buildings" by Carmody, Selkowitz, Lee, Arasteh, Willmert, 2004, pages 94-100.
2. Lawrence Berkeley National Laboratory – Paper 50502
"High Performance Commercial Building Facades" by Lee, Selkowitz, Bazjanac, Inkarojrit, and Kohler, 2002. See especially p. 28. http://windows.lbl.gov/comm_perf/Electrochromic/refs/LBNL-50502.pdf
3. Lawrence Berkeley National Laboratory – Paper 54924
"Daylighting control performance of a thin-film ceramic electrochromic window: field study results" by Lee, DiBartolomeo, Selkowitz, 2005. http://windows.lbl.gov/comm_perf/Electrochromic/refs/LBNL-54924.pdf

Cost Impact: The code change proposal will not increase the cost of construction. The large majority of dynamic glazing is already sold with automatic control systems.

CE161-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART I AND II TEMPLATE.doc

CE162 – 13

C402.3.3.5

Proponent: Garrett Stone, Brickfield, Burchette, Ritts & Stone, P.C

Revise as follows:

C402.3.3.5 Dynamic Glazing. For compliance with Section C402.3.3, the SHGC for dynamic glazing products shall be determined using the ~~manufacturer's lowest-rated SHGC value on the product label,~~ and the VT/~~SHGC ratio~~ shall be determined using the ~~maximum VT and maximum value on the product label that corresponds with the product's lowest SHGC.~~ Dynamic glazing shall be considered separately from other fenestration, and area-weighted averaging with other fenestration that is not dynamic glazing shall not be permitted.

Reason: The purpose of the proposed code change is to modify how VT is determined for dynamic glazing. The current dynamic glazing assumptions in the IECC are physically impossible and are inconsistent with fenestration product values. Dynamic glazing products are typically labeled at NFRC based on both the "on/open" setting and the "off/closed" setting (there are also variable products with ranges of performance). In one of these settings the product blocks solar heat gain, thereby also reducing visible light. In the other setting, the product blocks less solar heat gain and allows more visible light to pass through the glass. These two conditions do not overlap – either the product is "on" or "off" at any given time during the day. The current definition would suggest that windows are optimally operated to block the maximum solar heat gain throughout the day, which would clearly not allow for visible light to be at the maximum during the day. However, the current language in Section C402.3.3.5 awards the dynamic glazing user the best-case efficiency for SHGC, as well as the best-case VT level, even though the two conditions cannot take place at the same time.

This proposal clarifies that the efficiency rating for dynamic glazing will be based on the lowest SHGC on the label as per the current code language, and then requires using the VT rating that corresponds with that same setting. In other words, the above amendment gives the product the best possible rating (from an SHGC perspective) that is also consistent with its label.

Cost Impact: The code change proposal will not increase the cost of construction.

CE162-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.3.3.5-EC-STONE.doc

CE163 – 13

C402.3.4

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.3.4 Area weighted U-factor. An area-weighted average U-factor shall be permitted to satisfy the U-factor requirements ~~for each fenestration product category listed in Table C402.3~~ separately for fixed fenestration, operable fenestration and entrance doors. Individual fenestration products from different fenestration product categories listed in Table C402.3 shall not be combined in calculating area-weighted U-factor.

Reason: This proposal clarifies the provisions in the code related to area weighted U-factor, to simplify the code.

Cost Impact: The code change proposal will not increase the cost of construction.

CE163-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.3.4-EC-WILLIAMS.doc

CE164 – 13

C402.4, C402.4.1.2, C402.4.1.2.3

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.4 Air leakage (Mandatory). The thermal envelope of buildings shall comply with Sections C402.4.1 through C402.4.8. Alternatively the building thermal envelope shall be permitted to be tested in accordance with ASTM E779 at a pressure differential of 0.3 inches water gauge, or an equivalent method approved by the code official, and deemed to comply with the provisions of this section when the tested air leakage rate of the building thermal envelope does not exceed 0.40 cfm/ft². Where compliance is based on such testing the building shall also comply with Sections C402.4.5, 402.4.6 and 402.4.7.

C402.4.1.2 Air barrier compliance options. A continuous air barrier for the opaque portions of the building thermal envelope shall comply with Section C402.4.1.2.1, or C402.4.1.2.2. ~~or C402.4.1.2.3.~~

~~**C402.4.1.2.3 Building test.** The completed building shall be tested and the air leakage rate of the building envelope shall not exceed 0.40 cfm/ft² at a pressure differential of 0.3 inches water gauge (2.0 L/s · m² at 75 Pa) in accordance with ASTM E 779 or an equivalent method approved by the code official.~~

Reason: This proposal clarifies the language pertaining to the sealing of penetrations in the building thermal envelope associated with continuous air barriers so that all three compliance options associated with air barriers are equivalent. The current code lists three options for meeting the provisions of the opaque building envelope. The first two that deal with the opaque components are valid and allow compliance based on either the materials used or the assemblies of the envelope. The test is also a valid way of addressing air leakage on a performance basis. Unfortunately, a whole building test includes fenestration such that the test cannot address only opaque sections of the envelope as is the case with the other two options. All three options should be comparable and have the same scope. For this reason the text has been more appropriately rearranged. One approach prescriptively addresses the particular components of the building thermal envelope and their construction and installation as well as individual air leakage properties. The other provides a performance oriented approach that is based on the testing currently allowed, since all possible means of air leakage through the envelope are measured

Cost Impact: The code change proposal will not increase the cost of construction.

CE164-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.4-EC-WILLIAMS.doc

CE165 – 13

C402.4

Proponent: Mark S. Graham, National Roofing Contractors Association (mgramham@nrca.net)

Revise as follows:

C402.4 Air leakage (Mandatory). The thermal envelope of buildings shall comply with Sections C402.4.1 through C402.4.8.

Exception: The provisions of this section shall not be required for roof repairs, roof recovering and roof replacement where the alterations, renovations or repairs to the building do not also include alterations, renovations or repairs to the remainder of the building envelope.

Reason: This code change proposal is intended to clarify the Code's intent regarding when air barriers are and are not required as components of buildings' thermal envelopes.

In existing buildings that do not currently include an air barrier in the building's thermal envelope, it can be interpreted the addition of an air retarder is required in roof repair, roof recover or roof replacement projects where the project's scope does not otherwise require alterations, renovations or repairs to the remainder of the building's thermal envelope. In these situations, the addition of an air retarder to the roof assembly only will do little to and be ineffective in improving the building envelope's overall air leakage performance.

This Exception provides clarity by specifically indicating an air retarder is not required for roof repairs, roof recovering or roof replacement where the scope of the project does not also include alterations, renovations or repairs to the remainder of the building envelope.

Cost Impact: The code change proposal will not increase the cost of construction.

CE165-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.4-EC-GRAHAM.doc

CE166 – 13

C402.4.1

Proponent: Theresa A. Weston, PhD., DuPont Building Innovations
(theresa.a.weston@usa.dupont.com)

Revise as follows:

C402.4.1 Air barriers. A continuous air barrier shall be provided throughout the building thermal envelope. The air barriers shall be permitted to be located on the inside or outside of the building envelope, located within the assemblies composing the envelope, or any combination thereof. The air barrier shall comply with Sections C402.4.1.1 and C402.4.1.2.

~~**Exception:** Air barriers are not required in buildings located in Climate Zones 1, 2 and 3.~~

Reason: This proposal deletes the exception for air barriers in Climate Zones 1, 2 and 3. Air barrier use is important to the energy efficiency, moisture performance and comfort in all climate zones and therefore should be included for all climate zones. This change would also make the provisions within the IECC more consistent with both ASHRAE 90.1 and the IgCC.

Cost Impact: The code change proposal will increase the cost of construction in zones 1, 2 and 3.

CE166-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.4.1-EC-WESTON.doc

CE167 – 13

C402.4.1.1, C402.4.2

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.4.1.1 Air barrier construction. The *continuous air barrier* shall be constructed to comply with the following:

1. The air barrier shall be continuous for all assemblies that are the thermal envelope of the building and across the joints and assemblies.
2. Air barrier joints and seams shall be sealed, including sealing transitions in places and changes in materials. Air barrier penetrations shall be sealed in accordance with Section C402.4.2. The joints and seals shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation.
3. Penetrations of the air barrier shall be caulked, gasketed or otherwise sealed in a manner compatible with the construction materials and location. Joints and seals associated with penetrations shall be sealed in the same manner or taped or covered with moisture vapor-permeable wrapping material. Sealing materials shall be appropriate to the construction materials being sealed and shall be securely installed around the penetration so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation
3. 4. Recessed lighting fixtures shall comply with Section C404.2.8. Where similar objects are installed which penetrate the air barrier, provisions shall be made to maintain the integrity of the air barrier.

Exception: Buildings that comply with Section C402.4.1.2.3 are not required to comply with Items 1 and 43.

~~C402.4.2 Air barrier penetrations.~~ ~~Penetrations of the air barrier and paths of air leakage shall be caulked, gasketed or otherwise sealed in a manner compatible with the construction materials and location. Joints and seals shall be sealed in the same manner or taped or covered with moisture vapor-permeable wrapping material. Sealing materials shall be appropriate to the construction materials being sealed. The joints and seals shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation.~~

Reason: This proposal clarifies the language pertaining to the sealing of penetrations in the building envelope. The objective of the proposal is to increase the simplicity of the code.

The provisions of C402.4.2 are currently out of place. They have the same standing in the order of the code as C402.4.1 yet are actually a component of the air barrier provisions. They are more appropriately located as a part of the code text addressing air barrier construction. In addition, the present item 2 is duplicated by C402.4.2 to a large degree so the text has been revised to focus on penetrations.

Cost Impact: The code change proposal will not increase the cost of construction.

CE167-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.4.2-EC-WILLIAMS.doc

CE168 – 13

C402.4.1.2, C402.4.1.2.1, C402.4.1.2.2, C402.4.1.2.3

Proponent: Lee Kranz, City of Bellevue, WA, representing Washington Association of Building Officials Technical Code Development (WABO TCD) (lkranz@bellevuewa.gov)

Revise as follows:

C402.4.1.2 Air barrier testing compliance options. A continuous air barrier for the building envelope shall comply with Section C402.4.1.2.1, C402.4.1.2.2, or C402.4.1.2.3.

C402.4.1.2.1 Materials. Materials with an air permeability no greater than 0.004 cfm/ft^2 ($0.02 \text{ L/s} \cdot \text{m}^2$) under a pressure differential of 0.3 inches water gauge (w.g.) (75 Pa) when tested in accordance with ASTM E 2178 shall comply with this section. Materials in Items 1 through 15 shall be deemed to comply with this section provided joints are sealed and materials are installed as air barriers in accordance with the manufacturer's instructions.

1. Plywood with a thickness of not less than 3/8 inch (10 mm).
2. Oriented strand board having a thickness of not less than 3/8 inch (10 mm).
3. Extruded polystyrene insulation board having a thickness of not less than 1/2 inch (12 mm).
4. Foil-back polyisocyanurate insulation board having a thickness of not less than 1/2 inch (12 mm).
5. Closed cell spray foam a minimum density of 1.5 pcf (2.4 kg/m^3) having a thickness of not less than 1 1/2 inches (38 mm).
6. Open cell spray foam with a density between 0.4 and 1.5 pcf (0.6 and 2.4 kg/m^3) and having a thickness of not less than 4.5 inches (113 mm).
7. Exterior or interior gypsum board having a thickness of not less than 1/2 inch (12 mm).
8. Cement board having a thickness of not less than 1/2 inch (12 mm).
9. Built up roofing membrane.
10. Modified bituminous roof membrane.
11. Fully adhered single-ply roof membrane.
12. A Portland cement/sand parge, or gypsum plaster having a thickness of not less than 5/8 inch (16 mm).
13. Cast-in-place and precast concrete.
14. Fully grouted concrete block masonry.
15. Sheet steel or aluminum.

C402.4.1.2.2 Assemblies. Assemblies of materials and components with an average air leakage not to exceed 0.04 cfm/ft^2 ($0.2 \text{ L/s} \cdot \text{m}^2$) under a pressure differential of 0.3 inches of water gauge (w.g.) (75 Pa) when tested in accordance with ASTM E 2357, ASTM E 1677 or ASTM E 283 shall comply with this section. Assemblies listed in Items 1 and 2 shall be deemed to comply provided joints are sealed and requirements of Section C402.4.1.1 are met.

1. Concrete masonry walls coated with one application either of block filler and two applications of a paint or sealer coating;
2. A Portland cement/sand parge, stucco or plaster minimum 1/2 inch (12 mm) in thickness.

C402.4.1.2.3 Building test. The completed building shall be tested and the air leakage rate of the building envelope shall not exceed 0.40 cfm/ft^2 at a pressure differential of 0.3 inches water gauge ($2.0 \text{ L/s} \cdot \text{m}^2$ at 75 Pa) in accordance with ASTM E 779 or an equivalent method approved by the code official. A report that includes the tested surface area, floor area, air by volume, stories above grade, and leakage rates shall be submitted to code official and the building owner. Where the tested rate exceeds 0.40 cfm/ft^2 , a visual inspection of the air barrier shall be conducted and any leaks noted shall be sealed to the extent practicable. An additional report identifying the corrective actions taken to seal air leaks shall be submitted to the code official and the building owner, and shall be deemed to satisfy the requirements of this section.

Reason: This proposed amendment requires air barrier testing for building envelopes.

Air leakage through building envelopes wastes significant HVAC energy, and provides a pathway for moisture intrusion into building envelope assemblies. Losses of 30% of conditioned air through uncontrolled air leakage are frequently reported, and mechanical systems must be oversized to accommodate this risk. Air barrier testing greatly reduces loss of conditioned air, providing the best energy savings returns per dollar invested of any technology.

The lists of air barrier materials and assemblies in the 2009 code include common materials such as gypsum board and plywood that in practice qualify almost any contemporary building to meet the code requirements. However, the materials and assemblies themselves are not the main source of air barrier leakage problems – instead, most leakage occurs in the transitions between various materials. Field testing is the only method, short of continuous third-party inspection, that a continuous air barrier can be ensured. Seattle's experience, after mandating that air barriers be tested during this current code cycle (but not requiring that air barriers must meet the test standard) is that all buildings have passed the test.

The proposal eliminates most of the text between C402.4.1.2 and C402.4.1.2.3.1. However with the legislative format it is a little confusing. The net result of this proposal is Section D402.4.1.2 would read as follows:

C402.4.1.2 Air barrier testing. A continuous air barrier for the building envelope shall be tested and the air leakage rate of the *building envelope* shall not exceed 0.40 cfm/ft² at a pressure differential of 0.3 inches water gauge (2.0 L/s · m² at 75 Pa) in accordance with ASTM E 779 or an equivalent method approved by the code official. A report that includes the tested surface area, floor area, air by volume, stories above grade, and leakage rates shall be submitted to code official and the building owner. Where the tested rate exceeds 0.40 cfm/ft², a visual inspection of the air barrier shall be conducted and any leaks noted shall be sealed to the extent practicable. An additional report identifying the corrective actions taken to seal air leaks shall be submitted to the code official and the building owner, and shall be deemed to satisfy the requirements of this section.

Cost Impact: The code change proposal will increase the cost of construction.

CE168-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.4.1.2-EC-KRANZ.doc

CE169 – 13

C402.4.1.2, C402.1.4.2.1, C402.4.1.2.2, C402.4.1.2.3

Proponent: Jim Edelson, New Buildings Institute (jedelson@comcast.net), Chris Mathis, Mathis Consulting (Chris@mathisconsulting.com)

Revise as follows:

C402.4.1.2 Air barrier compliance options. ~~A continuous air barrier for the opaque building envelope. Buildings less than or equal to 25,000 square feet and less than or equal to 6 stories in height shall comply with Section C402.4.1.2.1. Buildings greater than 25,000 square feet or greater than 6 stories in height shall comply with Section C402.4.1.2.1 or C402.4.1.2.2, or C402.4.1.2.3.~~

C402.4.1.2.1 Materials. ~~Materials with an air permeability no greater than 0.004 cfm/ft² (0.02 L/s—m²) under a pressure differential of 0.3 inches water gauge (w.g.) (75 Pa) when tested in accordance with ASTM E 2178 shall comply with this section. Materials in Items 1 through 15 shall be deemed to comply with this section provided joints are sealed and materials are installed as air barriers in accordance with the manufacturer's instructions.~~

- ~~1. Plywood with a thickness of not less than 3/8 inch (10 mm).~~
- ~~2. Oriented strand board having a thickness of not less than 3/8 inch (10 mm).~~
- ~~3. Extruded polystyrene insulation board having a thickness of not less than 1/2 inch (12 mm).~~
- ~~4. Foil back polyisocyanurate insulation board having a thickness of not less than 1/2 inch (12 mm).~~
- ~~5. Closed cell spray foam a minimum density of 1.5 pcf (2.4 kg/m³) having a thickness of not less than 1 1/2 inches (36 mm).~~
- ~~6. Open cell spray foam with a density between 0.4 and 1.5 pcf (0.6 and 2.4 kg/m³) and having a thickness of not less than 4.5 inches (113 mm).~~
- ~~7. Exterior or interior gypsum board having a thickness of not less than 1/2 inch (12 mm).~~
- ~~8. Cement board having a thickness of not less than 1/2 inch (12 mm).~~
- ~~9. Built up roofing membrane.~~
- ~~10. Modified bituminous roof membrane.~~
- ~~11. Fully adhered single-ply roof membrane.~~
- ~~12. A Portland cement/sand parge, or gypsum plaster having a thickness of not less than 5/8 inch (16 mm).~~
- ~~13. Cast in-place and precast concrete.~~
- ~~14. Fully grouted concrete block masonry.~~
- ~~15. Sheet steel or aluminum.~~

C402.4.1.2.2 Assemblies. ~~Assemblies of materials and components with an average air leakage not to exceed 0.04 cfm/ft² (0.2 L/s—m²) under a pressure differential of 0.3 inches of water gauge (w.g.) (75 Pa) when tested in accordance with ASTM E 2357, ASTM E 1677 or ASTM E 283 shall comply with this section. Assemblies listed in Items 1 and 2 shall be deemed to comply provided joints are sealed and requirements of Section C402.4.1.1 are met.~~

- ~~1. Concrete masonry walls coated with one application either of block filler and two applications of a paint or sealer coating;~~
- ~~2. A Portland cement/sand parge, stucco or plaster minimum 1/2 inch (12 mm) in thickness.~~

C402.4.1.2.3 Building test C402.4.1.2.1 Whole building pressurization testing. ~~The completed building shall be tested and the air leakage rate of the *building envelope* shall not exceed 0.40 cfm/ft² at a pressure differential of 0.3 inches water gauge (2.0 L/s—m² at 75 Pa) in accordance with ASTM E 779 or an equivalent method approved by the code official. Compliance of the *continuous air barrier* shall be verified via testing in accordance with ASTM E779 or an equivalent test method approved by the *code official*. The air leakage rate shall not exceed 0.40 cfm/ft² of conditioned floor area under a pressure differential of 0.3 in. water (75 Pa).~~

C402.4.1.2.2 Continuous air barrier commissioning. The registered design professional shall provide evidence of continuous air barrier commissioning that shall include:

1. Clear identification of continuous air barrier components specified for the project and identified on approved construction documents
2. Review of planned construction details to ensure continuity of the air barrier over the entire building thermal envelope.
3. A field inspection checklist clearly showing requirements necessary for proper installation of the continuous air barrier.
4. Witnessing and reporting on any continuous air barrier testing specified by the owner.
5. Periodic field inspections over the course of project construction to ensure compliance with all continuous air barrier requirements including, but not limited to, proper material handling and storage, use of approved materials and approved substitutes, proper material and surface preparation, air barrier continuity at all building thermal envelope penetrations and other requirements as necessary to achieving the performance objective of the continuous air barrier.
6. A final commissioning report provided to the building owner and code official demonstrating compliance with the continuous air barrier requirements.

Reason: Buildings typically last for around 100 years. Unlike mechanical systems, the building envelope provisions may be in place for the life of the building and may not be replaced. That is why envelope provisions in new construction are so critically important. However, one of most important variables in envelope performance is not sufficiently addressed by the code – envelope air leakage.

Currently the code has multiple means of code compliance related to air leakage, relying on the tested performance of materials and assemblies and allowing for whole-building testing. But whole-building air leakage is not about the materials used. It is not about the assemblies employed. Instead, it is about how well all of the materials and assemblies go together.

Fortunately for the past few code cycles the energy code has increasingly prioritized reduction of uncontrolled air leakage – in duct work and through building envelopes. This is due in part to the growing recognition of the energy penalties associated with unwanted air leakage. Fortunately, the building industry also has continued to innovate and develop an array of product offerings specifically designed to help reduce air leakage, as well as develop improved, low-cost techniques for measuring air leakage on site.

This code proposal prioritizes control and measurement of envelope air leakage. It requires testing of small buildings and allows for commissioning of the continuous air barriers already required by the code.

The proposed language follows similar language from ASHRAE Guideline 0, NIBS Guideline 3 and Army Corp of Engineers Test Protocol for Building Envelopes. It aims to ensure that buildings actually meet the air leakage requirements of the code, regardless of the materials, systems or assemblies employed. It is based on the fundamental understanding that durable, long-term energy performance of a building actually requires proven compliance with the continuous air barrier objectives and air leakage requirements.

Uncontrolled air leakage is a significant contributor to moisture, comfort and energy problems in building envelopes. Moisture problems can cause mold and rot, can weaken the integrity of exterior walls, can degrade the performance of certain insulations, and can lead to poor indoor temperature, humidity and air quality control. Well-installed air barriers in commercial and industrial buildings are estimated to reduce air leakage by up to 83 percent, save on gas bills by more than 40 percent and cut down on electrical consumption as much as 25 percent, according to simulations by the National Institute of Standards and Technology (NIST).

This proposal is intended to target improved code compliance. Over 85 percent of the commercial buildings we build are less than 25,000 square feet in size. Buildings of this size can easily be tested to determine actual air leakage. Over the past two decades, the number of qualified air leakage testing professionals has grown to be able to address this need. If the code says “have envelope air leakage less than x” – then we can now easily measure it to ensure compliance. Whole-building testing is currently required for all US General Services Administration and Army Corps of Engineers projects.

This proposal is intended to be flexible. Some buildings can be harder to test. When buildings get over 10 stories in height or over 25,000 square feet, the code needs some other ways to ensure that a code-compliant continuous air barrier is in place and ready to perform to meet the requirements of the code. This proposal allows for the option to either test or commission the installation of the continuous air barrier on the building. This second option is being employed more and more as the recognition of the importance of air barrier commissioning grows. In the absence of testing, on-site quality assurance of air barrier insulation is essential regardless of the materials and assemblies used.

The new commissioning alternative for demonstrating compliance is in line with other policy objectives of the ICC. As a compliance option for continuous air barrier performance, commissioning offers both flexibility and firmer assurances that building envelopes will perform as intended over the useful life of the building.

“The term commissioning comes from ship builders that “commission” their ships to ensure that they are ready for service prior to the ships initial voyage and then are routinely inspected or “retrocommissioned” during their service life to maintain their performance.

An important yet underused path to energy savings, greenhouse gas emission reductions and overall building performance is through the commissioning of new buildings and the retrocommissioning of existing stock. In recent years commissioning has found its way into voluntary rating systems like LEED and, more recently, it has been included in the *International Green Construction Code*™ (IgCC™) and CALGreen building codes, and standards such as ASHRAE

189.1, which is helping to move it into the mainstream of construction practices.” Source: ICC G4-2012 Guideline for Commissioning

Envelope air tightness fundamentally is not about materials or assemblies. It is a performance objective. The code needs to improve the enabling structures to provide building inspectors, as well as owners and occupants, assurance of air barrier performance. This proposal offers two proven techniques for actually ensuring compliance with the code, as well as ensuring meeting the code’s stated intent:

R101.3 Intent. This code shall regulate the design and construction of buildings for the ***effective use and conservation of energy over the useful life of each building***. This code is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve this objective. This code is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances. Source: 2012 IECC. (emphasis added)

Cost Impact: The code change proposal will not increase the cost of construction.

CE169-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.4.1.2-EC-EDELSON-MATHIS.doc

CE170 – 13

C402.4.1.2.1, C402.4.1.2.2

Proponent: Theresa A. Weston, PhD., DuPont Building Innovations
(theresa.a.weston@usa.dupont.com)

Revise as follows:

C402.4.1.2 Air barrier compliance options. A continuous air barrier for the opaque building envelope shall comply with Section C402.4.1.2.1, C402.4.1.2.2, or C402.4.1.2.3.

C402.4.1.2.1 Materials. Materials with an air permeability no greater than 0.004 cfm/ft² (0.02 L/s · m²) under a pressure differential of 0.3 inches water gauge (w.g.) (75 Pa) when tested in accordance with ASTM E 2178 shall comply with this section. ~~Materials in Items 1 through 15 shall be deemed to comply with this section provided joints are sealed and materials are installed as air barriers in accordance with the manufacturer's instructions.~~

- ~~1. Plywood with a thickness of not less than 3/8 inch (10 mm).~~
- ~~2. Oriented strand board having a thickness of not less than 3/8 inch (10 mm).~~
- ~~3. Extruded polystyrene insulation board having a thickness of not less than 1/2 inch (12 mm).~~
- ~~4. Foil back polyisocyanurate insulation board having a thickness of not less than 1/2 inch (12 mm).~~
- ~~5. Closed cell spray foam a minimum density of 1.5 pcf (2.4 kg/m³) having a thickness of not less than 1 1/2 inches (36 mm).~~
- ~~6. Open cell spray foam with a density between 0.4 and 1.5 pcf (0.6 and 2.4 kg/m³) and having a thickness of not less than 4.5 inches (113 mm).~~
- ~~7. Exterior or interior gypsum board having a thickness of not less than 1/2 inch (12 mm).~~
- ~~8. Cement board having a thickness of not less than 1/2 inch (12 mm).~~
- ~~9. Built up roofing membrane.~~
- ~~10. Modified bituminous roof membrane.~~
- ~~11. Fully adhered single ply roof membrane.~~
- ~~12. A Portland cement/sand parge, or gypsum plaster having a thickness of not less than 5/8 inch (16 mm).~~
- ~~13. Cast in place and precast concrete.~~
- ~~14. Fully grouted concrete block masonry.~~
- ~~15. Sheet steel or aluminum.~~

C402.4.1.2.2 Assemblies. Assemblies of materials and components with an average air leakage not to exceed 0.04 cfm/ft² (0.2 L/s · m²) under a pressure differential of 0.3 inches of water gauge (w.g.) (75 Pa) when tested in accordance with ASTM E 2357, ASTM E 1677 or ASTM E 283 shall comply with this section. ~~Assemblies listed in Items 1 and 2 shall be deemed to comply provided joints are sealed and requirements of Section C402.4.1.1 are met.~~

- ~~1. Concrete masonry walls coated with one application either of block filler and two applications of a paint or sealer coating;~~
- ~~2. A Portland cement/sand parge, stucco or plaster minimum 1/2 inch (12 mm) in thickness.~~

Reason: This proposal deletes the "laundry lists" of generic materials and assemblies deemed to comply with the air barrier requirements. As there is a performance criteria and test method specified in the code for air barrier materials this list potentially confuses this requirement because the code would also allow any materials equivalent to this list. The list itself contains unspecified materials so that checking compliance would be difficult. Such deemed to comply lists are better suited for a commentary rather than in the code itself.

Cost Impact: The code change proposal will not increase the cost of construction.

CE170-13

Public Hearing: Committee: AS AM D

Assembly:

ASF

AMF

DF

C402.4.1.2.1-EC-WESTON.doc

CE171 – 13

C402.4.1.2

Proponent: Tim M. Mattox, Tremco, Inc. (tmattox@tremcoinc.com)

Revise as follows:

C402.4.1.2 Air barrier compliance options. A continuous air barrier for the opaque building envelope shall comply with Section C402.4.1.2.1, C402.4.1.2.2, ~~or~~ and C402.4.1.2.3.

Reason: The intention of this code section is to identify proper steps are taken to ensure the installation of an effective air barrier. In current form, this code section provides for options to choose a proper material (402.4.1.2.1), or to choose a properly tested assembly (402.4.1.2.2), or to test the application of the material/assembly once applied in a building (402.4.1.2.3). Ultimately the goal is to pass the third option, but for the design phase of a project it is difficult to know if a material or an assembly that has not been tested to the first two options would have a chance at passing the third option. Once a building is constructed, it becomes very costly to fix the problem if an underperforming material and application is selected. The requirements for this section should establish that air barrier compliance should be based on a material and application that has successfully met the requirements of Sections 402.4.1.2.1 and 402.4.1.2.2, and that the end result should meet the requirements of 402.4.1.2.3.

This code change proposal intends to clarify that an effective air barrier system needs to utilize the proper materials, be tested as an assembly to ensure the design can effectively prevent air leakage with some durability, and that the systems have been installed properly.

Cost Impact: While there may be an increase in the cost of construction, proper materials, design, and installation will ultimately reduce cost and use of energy. Proper sequencing will help to ensure the end result is achieved while mitigating costly repair work.

CE171-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.4.1.2-EC-MATTOX.doc

CE172 – 13

C402.4.1.2.1

Proponent: Tim M. Mattox, Tremco, Inc.(tmattox@tremcoinc.com)

Revise as follows:

C402.4.1.2.1 Materials. Materials with an air permeability no greater than 0.004 cfm/ft² (0.02 L/s • m²) under a pressure differential of 0.3 inches water gauge (w.g.) (75 Pa) when tested in accordance with ASTM E 2178 shall comply with this section. Materials in Items 1 through 15 shall be deemed to comply with this section provided joints and penetrations are sealed in accordance with Section C402.4.2 and materials are installed as air barriers in accordance with the manufacturer's instructions.

1. Plywood with a thickness of not less than $\frac{3}{8}$ inch (10 mm).
2. Oriented strand board having a thickness of not less than $\frac{3}{8}$ inch (10 mm).
3. Extruded polystyrene insulation board having a thickness of not less than $\frac{1}{2}$ inch (12 mm).
4. Foil-back polyisocyanurate insulation board having a thickness of not less than $\frac{1}{2}$ inch (12 mm).
5. Closed cell spray foam a minimum density of 1.5 pcf (2.4 kg/m³) having a thickness of not less than $1\frac{1}{2}$ inches (36 mm).
6. Open cell spray foam with a density between 0.4 and 1.5 pcf (0.6 and 2.4 kg/m³) and having a thickness of not less than 4.5 inches (113 mm).
7. Exterior or interior gypsum board having a thickness of not less than $\frac{1}{2}$ inch (12 mm).
8. Cement board having a thickness of not less than $\frac{1}{2}$ inch (12 mm).
9. Built up roofing membrane.
10. Modified bituminous roof membrane.
11. Fully adhered single-ply roof membrane.
12. A Portland cement/sand parge, or gypsum plaster having a thickness of not less than $\frac{5}{8}$ inch (16 mm).
13. Cast-in-place and precast concrete.
14. Fully grouted concrete block masonry.
15. Sheet steel or aluminum.

Reason: The first change adds penetrations to the building elements that need to be properly installed in the “deemed to comply” solutions. This is consistent with the remainder of Section C402. The second change references existing language for proper treatment of joints and penetrations in air barriers.

The addition of the specific reference to penetrations simply reflects the current intent and it ensures any breach of the air barrier membrane is restored.

Cost Impact: This code change proposal will not increase the cost of construction.

CE172-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.4.1.2.1-EC-MATTOX.doc

CE173 – 13

C402.4.1.2.1

Proponent: Charles Clark, Brick Industry Association, representing Masonry Alliance for Codes and Standards (ccclark@bia.org)

Revise as follows:

402.4.1.2.1 Materials. Materials with an air permeability no greater than 0.004 cfm/ft² (0.02 L/s·m²) under a pressure differential of 0.3 in. water (w.g.)(75 Pa) when tested in accordance with ASTM E2178 shall comply with this section. Materials in items 1 through ~~45~~ 16 shall be deemed to comply with this section provided joints are sealed and materials are installed as air barriers in accordance with the manufacturer's instructions.

16. Solid or fully grouted masonry constructed of clay or shale masonry units.

(Portions of text not shown remain unchanged)

Reason: Testing will show that fully grouted masonry constructed of clay or shale masonry units can meet the IECC requirements to be a material deemed-to-comply as an air barrier. This research is being conducted at the National Brick Research Center and will be available in time for consideration at the ICC Committee Hearings.

Cost Impact: This code change will not increase the cost of construction.

CE173-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.4.1.2.1-EC-CLARK.doc

CE174 – 13

C402.4.1.2.2

Proponent: Tim M. Mattox, Tremco, Inc. (tmattox@tremcoinc.com)

Revise as follows:

C402.4.1.2.2 Assemblies. Assemblies of materials and components with an average air leakage not to exceed 0.04 cfm/ft² (0.2 L/s • m²) under a pressure differential of 0.3 inches of water gauge (w.g.)(75 Pa) when tested in accordance with ASTM E 2357, ~~or ASTM E 1677 or ASTM E 283~~ shall comply with this section. Assemblies listed in Items 1 and 2 shall be deemed to comply provided joints are sealed and requirements of Section C402.4.1.1 are met.

1. Concrete masonry walls coated with one application either of block filler and two applications of a paint or sealer coating;
2. A Portland cement/sand parge, stucco or plaster minimum 1/2 inch (12 mm) in thickness.

Reason: An ASTM E2357 test prescribes running an ASTM E283 test twice during the course of testing - once before a wind conditioning sequence and once afterward. The E2357 test method also addresses the measurement of air leakage over a range of pressure differences and not just at 75 Pa, although the standard indicates that the air leakage rate of an assembly is reported as the leakage measured at a 75 Pa pressure differential. Allowing ASTM E283 by itself as an option to ASTM E2357 is a redundancy, except it leaves out the critical step of understanding how well a system accommodates movement. This is important to understand because movement will be realized as soon as a structure is erected and will endure for the life of a building. This revision also makes the text consistent with Normative Appendix B, subsection b of ASHRAE 189.1.

NFRC 400-2010 states the following when referencing ASTM E283 as a standard for measuring air leakage under test criteria note to item H:

"This procedure references the use of ASTM E283 as the only method for measuring individual product air leakage rates. ASTM E283 is a laboratory test method that has been used for many years to measure air leakage rates under controlled conditions. Because this test method measures air leakage rates at only one pressure differential, it is best used to compare the relative performance of fenestration products. It does not directly provide information on how a product will perform in a specific building application at field conditions."

Cost Impact: This change may have an effect on the cost of construction. ASTM E2357 is a more thorough test, having greater duration and greater cost than simply testing to ASTM E283, but the added benefit of installing more durable systems is likely to reduce costs of operation over time.

CE174-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.4.1.2.2-EC-MATTOX.doc

CE175 – 13

C402.4.1.2.2

Proponent: Charles Clark, Brick Industry Association, representing Masonry Alliance for Codes and Standards (ccclark@bia.org)

Revise as follows:

402.4.1.2.2 Assemblies. Assemblies of materials and components with an average air leakage not to exceed 0.04 cfm/ft² (0.2 L/s·m²) under a pressure differential of 0.3 inches of water gauge (w.g.) (75 Pa) when tested in accordance with ASTM E 2357, ASTM E 1677 or ASTM E 283 shall comply with this section. Assemblies listed in items 1 ~~and 2~~ through 3 shall be deemed to comply provided joints are sealed and requirements of Section 402.4.1.1 are met.

1. Concrete masonry walls coated with either one application ~~either~~ of block filler or ~~and~~ two applications of a paint or sealer coating;
2. Masonry walls constructed of clay or shale masonry units with a nominal width of 4-inches or more;
3. ~~2-~~ A Portland cement/sand parge, stucco or plaster minimum ½ inch (12 mm) in thickness.

Reason: This code change proposal modifies or adds text to the air barrier assembly section in two ways. It corrects the current requirement for a concrete masonry wall assembly to comply as an air barrier. And it adds an assembly option for masonry walls constructed of clay or shale masonry units.

The current text for concrete masonry walls is incorrectly worded. As was substantiated by testing submitted with code change proposal EC 146-09/10, a concrete masonry wall assembly is able to comply as an air barrier when EITHER (not both) of the following are applied:

- 1) One application of block filler, or
- 2) Two applications of a paint or sealer coating.

Testing to support both of these methods of compliance was previously submitted with EC146-09/10 and can be downloaded at the following URL: www.ncma.org/resources/design/Research%20Reports/MR36.pdf.

This code change proposal also adds an option for masonry construction made from clay or shale masonry units to qualify as an air barrier. Testing will show that masonry constructed of clay or shale masonry units can meet the IECC requirements to be an assembly deemed-to-comply as an air barrier. This research is being conducted at the National Brick Research Center and will be available in time for consideration at the ICC Committee Hearings.

Cost Impact: This code change proposal will not increase the cost of construction.

CE175-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.4.1.2.2-EC-CLARK.doc

CE176 – 13

C402.4.1.2.2

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

Revise as follows:

C402.4.1.2.2 Assemblies. Assemblies of materials and components with an average air leakage not to exceed 0.04 cfm/ft² (0.2 L/s · m²) under a pressure differential of 0.3 inches of water gauge (w.g.)(75 Pa) when tested in accordance with ASTM E 2357, ASTM E 1677 or ASTM E 283 shall comply with this section. Assemblies listed in Items 1 and 2 shall be deemed to comply provided joints are sealed and requirements of Section C402.4.1.1 are met.

- ~~1. Concrete masonry walls coated with one application either of block filler and two applications of a paint or sealer coating;~~
- ~~2. A Portland cement/sand parge, stucco or plaster minimum ¹/₂ inch (12 mm) in thickness.~~

Reason: This list is incomplete as common assemblies that could meet the requirement, or the incomplete list should be deleted. For example, the list should include ICF, a spray foam 1" or more, SIPS, and usually a high-density cellulose. No list is better than an incomplete list.

Cost Impact: The code change proposal will not increase the cost of construction.

CE176-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.4.1.2.2-EC-CONNER.doc

CE177 – 13

C402.4.1.2 (NEW), R402.1.2 (NEW), (IRC N1102.4.1.2 (NEW))

Proponent: Brent Ursenbach, Salt Lake County representing Utah Chapter ICC and Utah Association of Plumbing and Mechanical Officials Chapter ICC (bursenbach@slco.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Add new text as follows:

C 402.4.1.2 Combustion air openings. In climate zones 3 through 8, where open combustion air ducts provide combustion air to open combustion space conditioning fuel burning appliances, the appliances and combustion air opening shall be located outside the *building thermal envelope* or enclosed in a room, isolated from inside the thermal envelope. Such rooms shall be sealed and insulated in accordance with the envelope requirements of Table C402.1.2 or C402.2, where the walls shall meet a minimum of the below-grade wall R-value requirement. The door into the room shall be fully gasketed and any water lines and ducts in the room insulated in accordance with Section C403. The combustion air duct shall be insulated where it passes through conditioned space to a minimum of R-8.

Exceptions:

1. Direct vent appliances with both intake and exhaust pipes installed continuous to the outside.
2. Fireplaces and stoves complying with Sections 901, 902, 903, 904, and 905 of the *International Mechanical Code*, and Section 2111.13 of the *International Building Code*.

PART II – IECC-RESIDENTIAL PROVISIONS

Add new text as follows:

R402.4.1.2 (N1102.4.1.2) Combustion air openings. In climate zones 3 through 8, where open combustion air ducts provide combustion air to open combustion fuel burning appliances, the appliances and combustion air opening shall be located outside the *building thermal envelope* or enclosed in a room, isolated from inside the thermal envelope. Such rooms shall be sealed and insulated in accordance with the envelope requirements of Table R402.1.1, where the walls shall meet a minimum of the basement wall R-value requirement. The door into the room shall be fully gasketed and any water lines and ducts in the room insulated in accordance with Section R403. The combustion air duct shall be insulated where it passes through conditioned space to a minimum of R-8.

Exceptions:

1. Direct vent appliances with both intake and exhaust pipes installed continuous to the outside.
2. Fireplaces and stoves complying with Section 402.4.2 and Section R1006 of the *International Residential Code*.

Reason: (Part I) The entire section C402.4 Air leakage- is of little value when a combustion air duct is installed, open to the conditioned space, virtually placing a large hole through the thermal envelope. The building testing option for leakage in C402.4.1.2.3 cannot be accomplished with a combustion air opening inside the thermal envelope. Testers regularly block these opening as this is the only way they can pressurize the building; only to be opened after the test is completed. Ideally, direct vent, sealed combustion appliances solve the problem. Where less efficient, open combustion fuel burning appliances are used, it is reasonable and proper to isolate the appliances and the required combustion air from inside the thermal envelope.

(Part II) The entire section N1102.4 Air leakage- is of little value when a combustion air duct is installed, open to the conditioned space, virtually placing a large hole through the thermal envelope. Blower door testing as now required by the code cannot be accomplished with a combustion air opening inside the thermal envelope. Testers regularly block these opening as this is the only

way they can pressurize the home; only to be opened after the test is completed. Ideally, direct vent, sealed combustion appliances solve the problem. Where less efficient, open combustion fuel burning appliances are used, it is reasonable and proper to isolate the appliances and the required combustion air from inside the thermal envelope.

Cost Impact: The code change proposal will increase the cost of construction, while it will reduce the energy consumption and cost throughout the life of the home.

CE177-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.4.1.2 (NEW)-EC-URSENBACH.doc

CE178 – 13

C402.4.2

Proponent: Tim M. Mattox, Tremco, Inc. (tmattox@tremcoinc.com)

Revise as follows:

C402.4.2 Air barrier penetrations and joints. Penetrations, joints and gaps of the air barrier, and paths of air leakage shall be caulked, gasketed, covered with a moisture vapor-permeable wrapping material, or otherwise sealed in a manner compatible with the construction materials and location. ~~Joints and seals gaps shall be sealed in the same manner or taped or covered with a moisture vapor-permeable wrapping material. Sealing~~ Air barrier materials shall be appropriate to the construction materials being sealed. The ~~joints and seals~~ air barrier materials shall be securely installed in or on the joint for its entire length, ~~or penetration,~~ so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation.

Reason: These proposed changes are intended to clean up the code language

Cost Impact: This code change proposal will not increase the cost of construction.

CE178-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.4.2-EC-MATTOX.doc

CE179 – 13

C402.4.2, Table R402.4.1.1 (IRC Table N1102.4.1.1)

Proponent: Jeffrey M. Hugo, CBO, National Fire Sprinkler Association (hugo@nfsa.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C402.4.2 Air barrier penetrations. Penetrations of the air barrier and paths of air leakage shall be caulked, gasketed or otherwise sealed in a manner compatible with the construction materials and location. Joints and seals shall be sealed in the same manner or taped or covered with a moisture vapor-permeable wrapping material. Sealing materials shall be appropriate to the construction materials being sealed. The joints and seals shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation.

Exception:

1. Penetrations of the air barrier for automatic sprinkler systems installed according to the International Building Code or the International Fire Code.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

**TABLE R402.4.1.1 (N1102.4.1.1)
AIR BARRIER AND INSULATION INSTALLATION**

COMPONENT	CRITERIA ^a
Automatic sprinkler systems	Penetrations of the building envelope for <i>automatic</i> sprinkler systems installed according to the <i>International Residential Code</i> , <i>International Building Code</i> and <i>International Fire Code</i> are exempt from being sealed.
Air barrier and thermal barrier	A continuous air barrier shall be installed in the building envelope. Exterior thermal envelope contains a continuous air barrier. Breaks or joints in the air barrier shall be sealed. Air-permeable insulation shall not be used as a sealing material.
Ceiling/attic	The air barrier in any dropped ceiling/soffit shall be aligned with the insulation and any gaps in the air barrier sealed. Access openings, drop down stair or knee wall doors to unconditioned attic spaces shall be sealed.
Walls	Corners and headers shall be insulated and the junction of the foundation and sill plate shall be sealed. The junction of the top plate and top of exterior walls shall be sealed. Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier.

	Knee walls shall be sealed.
Windows, skylights and doors	The space between window/door jambs and framing and skylights and framing shall be sealed.
Rim joists	Rim joists shall be insulated and include the air barrier.
Floors (including above-garage and cantilevered floors)	Insulation shall be installed to maintain permanent contact with underside of subfloor decking. The air barrier shall be installed at any exposed edge of insulation.
Crawl space walls	Where provided in lieu of floor insulation, insulation shall be permanently attached to the crawlspace walls. Exposed earth in unvented crawl spaces shall be covered with a Class I vapor retarder with overlapping joints taped.
Shafts, penetrations	Duct shafts, utility penetrations, and flue shafts opening to exterior or unconditioned space shall be sealed.
Narrow cavities	Batts in narrow cavities shall be cut to fit, or narrow cavities shall be filled by insulation that on installation readily conforms to the available cavity space.
Garage separation	Air sealing shall be provided between the garage and conditioned spaces.
Recessed lighting	Recessed light fixtures installed in the building thermal envelope shall be air tight, IC rated, and sealed to the drywall.
Plumbing and wiring	Batt insulation shall be cut neatly to fit around wiring and plumbing in exterior walls, or insulation that on installation readily conforms to available space shall extend behind piping and wiring.
Shower/tub on exterior wall	Exterior walls adjacent to showers and tubs shall be insulated and the air barrier installed separating them from the showers and tubs.
Electrical/phone box on exterior walls	The air barrier shall be installed behind electrical or communication boxes or air sealed boxes shall be installed.
HVAC register boots	HVAC register boots that penetrate building thermal envelope shall be sealed to the subfloor or drywall.
Fireplace	An air barrier shall be installed on fireplace walls. Fireplaces shall have gasketed doors.

a. In addition, inspection of log walls shall be in accordance with the provisions of ICC-400.

Reason: (Part I) This proposal seeks to exempt fire sprinkler systems, specifically pendent sprinklers (and other similar sprinklers), that penetrate the typical building envelope at the ceilings by adding an exception.

Section C402.4.2 of the 2012 IECC states that the penetrations in the air barrier shall be caulked, gasketed or otherwise sealed in a manner compatible with the construction materials and location. Caulking the sprinkler, escutcheon, or cover plate could delay, cease or interrupt the flow of the fire sprinkler. In cases when a concealed pendent fire sprinkler is used, the caulk may adhere to the cover plate to the ceiling material and severely delay the fast response of the sprinkler.



Caulked Concealed

The same IECC section above, also states that the “sealing materials shall be appropriate to the construction materials being sealed”. Caulk and other sealants are never compatible with the sprinklers, escutcheons and cover plates. In fact, some caulks and sealants are chemically incompatible with certain piping and the pipe manufacturers shall be consulted prior to applying any material.

The fire sprinkler, escutcheon and cover plate are designed to fit together without any adhesive. Escutcheons and cover plates can have gaps or spaces that are required to meet certain specification tolerances for activation of the sprinkler, but in most cases the escutcheons and cover plates should fit tightly to the wall or ceiling.

Furthermore, the intent of the IECC (Section C101.3) is not “intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.” When fire sprinklers are installed or required by other codes such as the IBC, they are installed according to those referenced standards. Fire sprinklers are installed by NFPA 13 (Standard for the Installation of Sprinkler Systems), NFPA 13R (Standard for the Installation of Sprinkler Systems in Residential Occupancies Up to and Including Four Stories in Height) and NFPA 13D (Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes) along with IRC Section P2904.

These codes and standards require that all fire sprinklers, escutcheons and cover plates be listed and installed according to that listing. The testing and listing process (of fire sprinklers, escutcheons, and cover plates) does not take into account any additional field applied materials on the sprinkler, escutcheon and cover plate, such as: paint, caulk, drywall compound, and other construction materials. This prohibition is not only reiterated, but is enforced by NFPA 13 and NFPA 25 (Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems) as both of these standards require full replacement of the affected components when found. When a fire sprinkler is properly installed, the escutcheon and/or cover plate should adequately seal the penetration.

(Part II) This proposal seeks to exempt fire sprinkler systems, specifically pendent sprinklers (and other similar sprinklers), which penetrate the typical building envelope at the ceilings by adding a new automatic sprinkler systems row in the component and criteria columns of Table R402.4.1.1.

NFSA fire sprinkler contractors are reporting that local authorities and building owners are caulking fire sprinklers in order to pass the air leakage testing. Caulking the sprinkler, escutcheon, or cover plate could delay, cease or interrupt the flow of the fire sprinkler. In cases when a concealed pendent fire sprinkler is used, the caulk may adhere to the cover plate to the ceiling material and severely delay the fast response of the sprinkler.

Caulk and other sealants are never compatible with the sprinklers, escutcheons and cover plates. In fact, some caulks and sealants are chemically incompatible with certain piping and the pipe manufacturers shall be consulted prior to applying any material.

The fire sprinkler, escutcheon and cover plate are designed to fit together without any adhesive. Escutcheons and cover plates can have gaps or spaces that are required to meet certain specification tolerances for activation of the sprinkler, but in most cases the escutcheons and cover plates should fit tightly to the wall or ceiling.

The intent of the IECC (Section R101.3) is not “intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.” When fire sprinklers are installed or required by other codes such as the IBC, they are installed according to those referenced standards. Fire sprinklers are installed by NFPA 13 (Standard for the Installation of Sprinkler Systems), NFPA 13R (Standard for the Installation of Sprinkler Systems in Residential Occupancies Up to and Including Four Stories in Height) and NFPA 13D (Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes) along with IRC Section P2904.

These codes and standards require that all fire sprinklers, escutcheons and cover plates be listed and installed according to that listing. The testing and listing process (of fire sprinklers, escutcheons, and cover plates) does not take into account any additional field applied materials on the sprinkler, escutcheon and cover plate, such as: paint, caulk, drywall compound, and other construction materials. This prohibition is not only reiterated, but is enforced by NFPA 13 and NFPA 25 (Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems) as both of these standards require full replacement of the affected components when found. When a fire sprinkler is properly installed, the escutcheon and/or cover plate should adequately seal the penetration.

Cost Impact: The code change proposal will not increase the cost of construction.

CE179-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.4.2-EC-HUGO. doc

CE180 – 13

Table C402.4.3

Proponent: Jeff Inks, Window & Door Manufacturers Association (jinks@wdma.com)

Revise as follows:

**TABLE C402.4.3
MAXIMUM AIR INFILTRATION RATE
FOR FENESTRATION ASSEMBLIES**

FENESTRATION ASSEMBLY	MAXIMUM RATE (CFM/FT ²)	TEST PROCEDURE
Fixed windows	0.20 ^a	AAMA/WDMA/ CSA101/I.S.2/A440 or NFRC 400
Operable windows	0.30	
Sliding doors	0.20^a 0.30	
Swinging doors	0.20^a 0.50	
Skylights — with condensation weepage openings	0.30	
Skylights — all others	0.20 ^a	

(Portions of Table not shown remain unchanged)

For SI: 1 cubic foot per minute = 0.47L/s, 1 square foot = 0.093 m².

a. — The maximum rate for windows, sliding and swinging doors, and skylights is permitted to be 0.3 cfm per square foot of fenestration or door area when tested in accordance with AAMA/WDMA/CSA101/I.S.2/A440 at 6.24 psf (300 Pa).

Reason: During the last code development cycle as part of the comprehensive commercial revisions included in EC-147-09/10, air infiltration rates for windows, skylights, sliding doors and swinging doors were arbitrarily lowered without sound technical justification. Rather the only substantiation that was cited was debatable modeling which was said to show such reductions in air infiltration rates may improve performance by 1-2% in some types of commercial buildings and was not sufficiently comprehensive to justify lowering the rates to 0.20 cfm, especially for all types of commercial construction covered by the IECC. Other modeling can show gains are far less 1-2%.

Regardless of what modeling is used, the energy efficiency gains in the envelope and overall building efficiency as a result of the reduced rates are minimal at best and need to be more thoughtfully weighed against the negative impacts that result from them, primarily for operable fenestration which is the focus of this proposal. These include added costs to production, testing, and labeling for all products, increase in operational force (especially sliding fenestration products) which impairs operability for all users (and adds difficulty in meeting accessibility requirements) because of the additional sealing that would be required. In addition, the values also conflict with the values in AAMA/WDMA/CSA 101/I.S.2/A440.

In addition, if there are concerns that air infiltration rates for operable fenestration need to be made more stringent, they should be addressed in AAMA/WDMA/CSA 101/I.S.2/A440 and not in the body of the IECC.

For these reasons coupled with the minimal gains in building efficiency that may be achieved, we believe the reduction in air infiltration rates for operable fenestration is unjustified and unnecessary and that the rates should therefore be returned as proposed. It should be noted that this proposal maintains the air infiltration rate of 0.20 cfm for fixed windows.

Cost Impact: This code change proposal will not increase the cost of construction. This code change proposal will decrease the cost of construction.

CE180-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

C402.4.3-EC-INKS.doc

CE181 – 13

C402.4.3, Table C402.4.3

Proponent: Joseph R. Hetzel, P.E., Thomas Associates, Inc., representing the Door & Access Systems Manufacturers Association (DASMA) International (jhetzel@thomasamc.com)

Revise as follows:

C402.4.3 Air leakage of fenestration. The air leakage of fenestration assemblies shall meet the provisions of Table C402.4.3. Testing shall be in accordance with the applicable reference test standard in Table C402.4.3 by an accredited, independent testing laboratory and *labeled* by the manufacturer.

Exceptions:

1. Field-fabricated fenestration assemblies that are sealed in accordance with Section C402.4.1.
2. Fenestration in buildings that comply with Section C402.4.1.2.3 are not required to meet the air leakage requirements in Table C402.4.3.
3. Metal coiling doors in semi-heated spaces in climate zones 1 through 6 are not required to meet the air leakage requirements in Table C402.4.3.

TABLE C402.4.3
MAXIMUM AIR INFILTRATION LEAKAGE RATE
FOR FENESTRATION ASSEMBLIES

FENESTRATION ASSEMBLY	MAXIMUM RATE (CFM/FT ²)	TEST PROCEDURE
Windows	0.20 ^a	AAMA/WDMA/ CSA101/I.S.2/A440 or NFRC 400
Sliding doors	0.20 ^a	
Swinging doors	0.20 ^a	
Skylights - with condensation weepage openings	0.30	
Skylights - all other	0.20 ^a	
Curtain walls	0.06	NFRC 400 or ASTM E 283 at 1.57 psf (75 Pa)
Storefront glazing	0.06	
Commercial glazed swinging entrance doors	0.06	
Revolving doors	1.00	
Garage doors	0.40	ANSI/DASMA 105, NFRC 400, or ASTM E 283 at 1.57 psf (75 Pa)
Rolling doors	4.00	

For SI: 1 cubic foot per minute = 0.47 L/s, 1 square foot = 0.093 m²

- a. The maximum rate for windows, sliding and swinging doors, and skylights is permitted to be 0.3 cfm per square foot of fenestration or door area when tested in accordance with AAMA/WDMA/CSA101/I.S.2/A440 at 6.24 psf (300 Pa).

Reason: Rolling doors do not meet air leakage requirements, because their interlocking slat design is not intended for air leakage control. Such doors are typically used in semi-heated spaces, because they are associated with applications such as parking, storage and warehousing. The Exception is proposed to match similar language currently in ASHRAE 90.1. The proposed Table heading revision is editorial, for consistency with the language in C402.4.3.

Cost Impact: The code change proposal will not increase the cost of construction.

CE181-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

C402.4.3-EC-HETZEL.doc

CE182 – 13

Table C402.4.3

Proponent: Joseph R. Hetzel, P.E., Thomas Associates, Inc., representing the Door & Access Systems Manufacturers Association (DASMA) International (jhetzel@thomasamc.com)

Revise as follows:

**TABLE C402.4.3
MAXIMUM AIR INFILTRATION RATE
FOR FENESTRATION ASSEMBLIES**

FENESTRATION ASSEMBLY	MAXIMUM RATE (CFM/FT ²)	TEST PROCEDURE
Windows	0.20 ^a	AAMA/WDMA/ CSA101/I.S.2/A440 or NFRC 400
Sliding doors	0.20 ^a	
Swinging doors	0.20 ^a	
Skylights - with condensation weepage openings	0.30	
Skylights - all other	0.20 ^a	
Curtain walls	0.06	NFRC 400 or ASTM E 283 at 1.57 psf (75 Pa)
Storefront glazing	0.06	
Commercial glazed swinging entrance doors	0.06	
Revolving doors	1.00	
Garage doors	0.40	ANSI/DASMA 105, NFRC 400, or ASTM E 283 at 1.57 psf (75 Pa)
Rolling doors	1.00	
High speed doors ^b	1.30	

For SI: 1 cubic foot per minute = 0.47 L/s, 1 square foot = 0.093 m²

- The maximum rate for windows, sliding and swinging doors, and skylights is permitted to be 0.3 cfm per square foot of fenestration or door area when tested in accordance with AAMA/WDMA/CSA101/I.S.2/A440 at 6.24 psf (300 Pa).
- A non-swinging door intended for vehicular access and material transportation, with a minimum opening rate of 32 inches per second

Reason: "High speed doors" are typically automatically controlled, non-swinging doors, and are commonly used in conjunction with vehicular traffic or transportation of materials and are not generally intended for pedestrian traffic. Sizes typically range from 8x8 to 12x12. When high speed doors are used in a building exterior envelope, the primary purposes are for environmental control and/or building security.

High speed door panels or curtains are usually made of a thin layer of vinyl, fabric, rubber or composite material. Materials can be opaque, translucent or a combination thereof.

The assemblies are constructed of flexible materials at the perimeter to provide sealing against air leakage but yet to allow variations in contact between door panels/curtains and jamb construction to maximize the effectiveness of continual high speed operation. Thus, high speed doors cannot comply with prescriptive air leakage requirements for any current fenestration assembly type in Table C402.4.3. The high speed nature of these doors provides for minimizing of "air exchange", a valuable and predominant characteristic of minimizing overall energy losses through a door opening.

An air leakage value of 1.30 cfm/sf is recommended for a high speed door based on a tested value of 1.26 obtained via a March 2012 DASMA-sponsored test on a representative 8'x8' high speed door product.

Cost Impact: This code change proposal will not increase the cost of construction.

CE182-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

C402.4.3T-EC-HETZEL.doc

CE183 – 13

C402.4.4

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.4.4 Doors and access openings to shafts, chutes, stairways, and elevator lobbies. Doors and access openings from conditioned space to shafts, chutes, stairways and elevator lobbies not within the scope of the fenestration assemblies covered in Section C402.4.3 shall ~~either meet the requirements of Section C402.4.3 or~~ be gasketed, weatherstripped or sealed.

Exception: Door openings required to comply with Section 715 ~~or 715.4~~ of the *International Building Code*; or doors and door openings required to comply with UL 1784 by the International Building Code ~~to comply with UL 1784 shall not be required to comply with Section C402.4.4.~~

Reason: This proposal clarifies the components covered in the section on doors and access openings to shafts, chutes, stairways, and elevator lobbies are subject to air leakage provisions as components of the building thermal envelope, and provides a distinction between these doors and other doors that are already covered within the scope of fenestration assemblies. The objective of this proposal is to clarify the code to foster implementation and compliance verification.

Some doors are covered by Section C402.4.3 and the intent of the code should be that doors within the scope of fenestration that can be tested and listed *should* be tested and listed in accordance with and meet the provisions of Section C402.4.3. This leaves those doors that cannot be so tested and listed subject to the caulking and sealing criterion. This clarification is needed because the current code allows some doors that could (and should) be assessed as meeting the provisions of Section C402.4.3 through testing and listing only required to be “caulked or sealed.” The exception is revised to provide clarification and to eliminate the ending statement—an exception by definition means something is not required to comply.

Cost Impact: The code change proposal does not increase the cost of construction.

CE183-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.4.4-EC-WILLIAMS.doc

CE184 – 13

C402.4.4, C402.4.5, C402.4.5.1, C402.4.5.2, C403.2.4.4 (NEW)

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

~~C402.4.4 Doors and access openings to shafts, chutes, stairways, and elevator lobbies.~~ Doors and access openings from conditioned space to shafts, chutes stairways and elevator lobbies shall either meet the requirements of Section C402.4.3 or shall be gasketed, weatherstripped or sealed.

~~Exception:~~ Door openings required to comply with Section 715 or 715.4 of the *International Building Code*; or doors and door openings required by the *International Building Code* to comply with UL 1784 shall not be required to comply with Section C402.4.4.

C402.4.5 Air intakes, exhaust openings, stairways and shafts. Stairway enclosures and elevator shaft vents and other outdoor air intakes and exhaust openings integral to the building envelope shall be provided with dampers in accordance with Sections C402.4.5.1 and C402.4.5.2 C403.2.4.4.

~~C402.4.5.1 Stairway and shaft vents.~~ Stairway and shaft vents shall be provided with Class I motorized dampers with a maximum leakage rate of 4 cfm/ft² (20.3 L/s • m²) at 1.0 inch water gauge (w.g.) (249 Pa) when tested in accordance with AMCA 500D.

~~Stairway and shaft vent dampers shall be installed with controls so that they are capable of automatically opening upon:~~

- ~~1. The activation of any fire alarm initiating device of the building's fire alarm system; or~~
- ~~2. The interruption of power to the damper.~~

C402.4.5.2 Outdoor air intakes and exhausts. Outdoor air supply and exhaust openings shall be provided with Class IA motorized dampers with a maximum leakage rate of 4 cfm/ft² (20.3 L/s • m²) at 1.0 inch water gauge (w.g.) (249 Pa) when tested in accordance with AMCA 500D.

Exceptions:

- ~~1. Gravity (nonmotorized) dampers having a maximum leakage rate of 20 cfm/ft² (101.6 L/s • m²) at 1.0 inch water gauge (w.g.) (249 Pa) when tested in accordance with AMCA 500D are permitted to be used as follows:~~
 - ~~1.1 In buildings for exhaust and relief dampers.~~
 - ~~1.2 In buildings less than three stories in height above grade.~~
 - ~~1.3 For ventilation air intakes and exhaust and relief dampers in buildings of any height located in Climate Zones 1, 2 and 3.~~
 - ~~1.4 Where the design outdoor air intake or exhaust capacity does not exceed 300 cfm (141 L/s).~~~~Gravity (nonmotorized) dampers for ventilation air intakes shall be protected from direct exposure to wind.~~
- ~~2. Dampers smaller than 24 inches (610 mm) in either dimension shall be permitted to have a leakage of 40 cfm/ft² (203.2 L/s • m²) at 1.0 inch water gauge (w.g.) (249 Pa) when tested in accordance with AMCA 500D.~~

C403.2.4.4 Shutoff dampers. Outdoor air intake and exhaust openings and stairway and shaft vents shall be provided with Class 1 motorized dampers having a maximum air leakage rate of 4 cfm/ft² of damper surface area at 1.0 inch water gauge when tested in accordance with AMCA 500D.

Outdoor air intake and exhaust dampers shall be installed with automatic controls configured to close when the systems or spaces served are not in use or during unoccupied period warm-up and setback operation unless the systems served require outdoor or exhaust air in accordance with the *International Mechanical Code* or the dampers are opened to provide intentional economizer cooling.

Stairway and shaft vent dampers shall be installed with automatic controls configured to open upon the activation of any fire alarm initiating device of the building's fire alarm system or the interruption of power to the damper.

Exceptions: Gravity (non-motorized) dampers shall be permitted to be used as follows:

1. In buildings less than three stories in height above grade plane.
2. In buildings of any height in climate zones 1, 2 or 3.
3. Where the design exhaust capacity is not greater than 300 cfm.

All gravity (non-motorized) dampers shall have a maximum air leakage rate of 20 cfm/ft² where not less than 24 inches in either dimension and 40 cfm/ft² where less than 24 inches in either dimension. The rate of air leakage shall be determined at 1.0 inch water gauge when tested in accordance with AMCA 500D.

Reason: This proposal consolidates all provisions associated with leakage rates, sealing, dampers, etc. of mechanical system openings, vents, grills, etc. for air intakes, exhaust openings, stairways and shafts in one place in the code. The objective of this proposal is to clarify the code to foster implementation and compliance verification.

Currently shutoff dampers are covered in two places (envelope and mechanical) and based on experiences with energy code trainings is causing confusion. There is also a conflict in the current code where exhaust and relief dampers are allowed to be gravity dampers no matter the building height in Section C402.4.5.2 and per Section C403.2.4.4 only up to three stories in height in the mechanical section in Climate Zones 4-8. Because all exhaust and relief dampers are associated with mechanical systems, the more stringent requirement in the mechanical section is retained. Locating all the provisions in one place will eliminate this confusion and current and potential future conflicts. It is important to note that the code change does not change the technical content of the current code (other than addressing the above mentioned conflict) and simply places all the requirements in one better organized location in the code, noting Section 402.4.5 is retained in the envelope section of the code and refers the user to Section 403.2.4.4 where all damper provisions would be located.

A summary of the current code provisions in C402.4.5 and C403.2.4.4 finds the following:

- Stairway enclosures and elevator shaft vents need to have motorized dampers with 4.0 or less leakage and have controls allowing the dampers to automatically open with a fire alarm or power interruption.
- Outdoor air and exhaust openings integral to the building envelope need to have the same motorized damper leakage rate but in some cases these openings can be provided with gravity (non-motorized) dampers meeting certain leakage limits.
- Outdoor air supply and exhaust ducts need to have motorized dampers but no leakage limit is provided and gravity dampers are allowed in some cases.

The proposed code change contains all those provisions so the outcome from following the current code and the code change proposal above is the same, except where the current code provisions conflict, in which case the more specific or stringent has been applied in the code change proposal.

Cost Impact: The code change proposal does not increase the cost of construction.

CE184-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.4.5-EC-WILLIAMS.doc

CE185 – 13

C402.4.5, C402.4.5.1, C402.4.5.2, C403.2.4.4, C403.3.1.1.5 (New)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C402.4.5 Air intakes, exhaust openings, stairways and shafts. Stairway enclosures and elevator shaft vents and other outdoor air intakes and exhaust openings integral to the building envelope shall be provided with dampers in accordance with Section C403.2.4.4, ~~s C402.4.5.1 and C402.4.5.2.~~

C403.2.4.4 Shutoff dampers, controls. ~~Both outdoor air supply and exhaust ducts shall be equipped with motorized dampers that will automatically shut when the systems or spaces served are not in use.~~

Exceptions:

- ~~1. Gravity dampers shall be permitted in buildings less than three stories in height.~~
- ~~2. Gravity dampers shall be permitted for buildings of any height located in Climate Zones 1, 2 and 3.~~
- ~~3. Gravity dampers shall be permitted for outside air intake or exhaust airflows of 300 cfm (0.14 m³/s) or less.~~

Stairway and shaft vent shutoff dampers shall comply with Section C403.2.4.4.1 and outdoor air intakes and exhausts shall comply with Section C403.2.4.4.2.

~~C402.4.5.1~~ C403.2.4.4.1 Stairway and shaft vent shutoff dampers. Stairway and shaft vents shall be provided with Class I motorized dampers with a maximum leakage rate of 4 cfm/ft² (20.3 L/s · m²) at 1.0 inch water gauge (w.g.) (249 Pa) when tested in accordance with AMCA 500D. Stairway and shaft vent dampers shall be installed with controls so that they are capable of automatically opening upon:

1. The activation of any fire alarm initiating device of the building's fire alarm system; or
2. The interruption of power to the damper.

~~C402.4.5.2~~ C403.2.4.4.2 Outdoor air intakes and exhausts. Outdoor air supply and exhaust openings in the building envelope, ducts, or equipment shall be provided with Class 1 ~~IA~~ motorized dampers with a maximum leakage rate of 4 cfm/ft² (20.3 L/s · m²) at 1.0 inch water gauge (w.g.) (249 Pa) when tested in accordance with AMCA 500D. Outdoor air supply and exhaust motorized dampers shall be configured to automatically shut when the systems or spaces served are not in use.

Exceptions:

1. Gravity (nonmotorized) dampers having a maximum leakage rate of 20 cfm/ft² (101.6 L/s · m²) at 1.0 inch water gauge (w.g.) (249 Pa) when tested in accordance with AMCA 500D are permitted to be used as follows:
 - 1.1. In buildings less than three stories in height above grade plane for exhaust and relief dampers.
 - 1.2. ~~In buildings less than three stories in height above grade.~~
 - 1.3. ~~For ventilation air intakes and exhaust and relief dampers in buildings of any height located in Climate Zones 1, 2 and 3.~~
 - 1.4. 1.3. Where the design outdoor air intake or exhaust capacity does not exceed 300 cfm (141 L/s).

Gravity (nonmotorized) dampers for ventilation air intakes shall be protected from direct exposure to wind.

2. Gravity (nonmotorized) dampers smaller than 24 inches (610 mm) in either dimension shall be permitted to have a leakage of 40 cfm/ft² (203.2 L/s • m²) at 1.0 inch water gauge (w.g.) (249 Pa) when tested in accordance with AMCA 500D.
3. Dampers are not required for:
 - 3.1. Ventilation or exhaust systems serving unconditioned spaces.
 - 3.2. Exhaust systems serving Type 1 kitchen exhaust hoods.

C403.3.1.1.5 Dampers. Exhaust/relief, and *outdoor air* dampers shall comply with Section C403.2.4.4.1 outdoor air intakes and exhausts.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has been revised. The change ensures continued consistency between the IECC and standard 90.1-2010. Currently the damper class associated with 4.0 cfm/ft² leakage is Class 1 (not Class 1A – which is a 3.0 leakage rate) such that all dampers have the same classification and leakage rate provision. Damper provisions have been consolidated into the mechanical section to avoid inconsistency or confusion and are referenced from the envelope section.

Cost Impact: The code change proposal will not increase the cost of construction.

CE185-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.4.5-EC-FERGUSON.doc

CE186 – 13

C402.4.5.1

Proponent: Amanda Hickman, Intercode Incorporated, representing AMCA International
(Amanda@intercodeinc.com)

Revise as follows:

C402.4.5.1 Stairway and shaft vents. Stairway and shaft vents shall be provided with Class I motorized dampers. Dampers shall have with a maximum leakage rate of 4 cfm/ft² (20.3 L/s • m²) at 1.0 inch water gauge (w.g.) (249 Pa) and shall be labeled by an approved agency when tested in accordance with AMCA 500D for such purpose.

Stairway and shaft vent dampers shall be installed with controls so that they are capable of automatically opening upon:

1. The activation of any fire alarm initiating device of the building's fire alarm system; or
2. The interruption of power to the damper.

Reason: This change will make enforcement faster and easier. Applying sealed (low-leakage) dampers in the building envelope will save energy and will be more easily enforced because of the presence of a certification label.

The requirement for labeling dampers is already required in the International Building Code for fire and smoke dampers. However, there is no such labeling requirement for sealed low leakage dampers that indicates the certified air leakage rating verified by an approved third party agency. This is an important tool for designers and inspectors to ensure that the appropriate equipment is specified and installed.

There is no significant cost increase since the majority of damper manufacturers already have their products certified, and are already providing labels for other types of dampers. There may be some small increase in the cost of dampers for a manufacturer who are not already voluntarily participating in a certified ratings program.

Cost Impact: The code change proposal will increase the cost of construction. This proposal could minimally increase the cost of construction.

CE186-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.4.5-EC-HICKMAN.doc

CE187 – 13

C402.4.5.2

Proponent: Amanda Hickman, InterCode Incorporated, representing AMCA International

Revise as follows:

C402.4.5.2 Outdoor air intakes and exhausts. *Outdoor air* supply and exhaust openings shall be provided with Class IA ~~l~~ motorized dampers with a maximum leakage rate of 4 cfm/ft² (20.3 L/s • m²) at 1.0 inch water gauge (w.g.) (249 Pa) when tested in accordance with AMCA 500D.

Exceptions:

1. Gravity (nonmotorized) dampers having a maximum leakage rate of 20 cfm/ft² (101.6 L/s • m²) at 1.0 inch water gauge (w.g.) (249 Pa) when tested in accordance with AMCA 500D are permitted to be used as follows:
 - 1.1. In buildings for exhaust and relief dampers.
 - 1.2. In buildings less than three stories in height above grade.
 - 1.3. For ventilation air intakes and exhaust and relief dampers in buildings of any height located in Climate Zones 1, 2 and 3.
 - 1.4. Where the design *outdoor air* intake or exhaust capacity does not exceed 300 cfm (141 L/s).Gravity (nonmotorized) dampers for ventilation air intakes shall be protected from direct exposure to wind.
2. Dampers smaller than 24 inches (610 mm) in either dimension shall be permitted to have a leakage of 40 cfm/ft² (203.2 L/s • m²) at 1.0 inch water gauge (w.g.) (249 Pa) when tested in accordance with AMCA 500D.

Reason: This change is an editorial correction. The leakage specification of 4 cfm/ft² pertains to Class I, not Class IA, so the "A" needs to be dropped. Class 1A has a maximum leakage rate of 3 cfm/ft².

Cost Impact: This proposal will not increase the cost of construction.

CE187-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.4.5.2#1-EC-HICKMAN.doc

CE188 – 13

C402.4.5.2

Proponent: Amanda Hickman, InterCode Incorporated, representing AMCA International
(amanda@intercodeinc.com)

Revise as follows:

C402.4.5.2 Outdoor air intakes and exhausts. *Outdoor air* supply and exhaust openings shall be provided with Class IA motorized dampers. ~~The dampers shall have with a maximum leakage rate of 4 cfm/ft² (20.3 L/s · m²) at 1.0 inch water gauge (w.g.) (249 Pa) and shall be labeled by an approved agency~~ when tested in accordance with AMCA 500D for such purpose.

Reason: This change will make enforcement faster and easier. Applying sealed (low-leakage) dampers in the building envelope saves energy and is more easily enforced because of the presence of a certification label.

Cost Impact: The code change proposal could slightly increase the cost of construction.

CE188-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.4.5.2#2-EC-HICKMAN.doc

CE189 – 13

C402.4.5.2

Proponent: Amanda Hickman, InterCode Incorporation, representing AMCA International
(amanda@intercodeinc.com)

Revise as follows:

C402.4.5.2 Outdoor air intakes and exhausts. *Outdoor air* supply and exhaust openings shall be provided with Class IA motorized dampers with a maximum leakage rate of 4 cfm/ft² (20.3 L/s · m²) at 1.0 inch water gauge (w.g.) (249 Pa) when tested in accordance with AMCA 500D.

Exceptions:

1. Gravity (nonmotorized) dampers having a maximum leakage rate of 20 cfm/ft² (101.6 L/s · m²) at 1.0 inch water gauge (w.g.) (249 Pa) when tested in accordance with AMCA 500D are permitted to be used as follows:
 - 1.1. In buildings for exhaust and relief dampers.
 - 1.2. In buildings less than three stories in height above grade.
 - 1.3. For ventilation air intakes and exhaust and relief dampers in buildings of any height located in Climate Zones 1, 2 and 3.
 - 1.4. Where the design *outdoor air* intake or exhaust capacity does not exceed 300 cfm (141 L/s).
Gravity (nonmotorized) dampers for ventilation air intakes shall be protected from direct exposure to wind.
2. ~~Dampers smaller than 24 inches (610 mm) in either dimension shall be permitted to have a leakage of 40 cfm/ft² (203.2 L/s · m²) at 1.0 inch water gauge (w.g.) (249 Pa) when tested in accordance with AMCA 500D.~~

Reason: Exception #2 is unnecessary and probably confusing to some code users considering the charging statement. All damper manufacturers already make low-cost backdraft dampers that easily meet the leakage rate of 4 cfm/sq ft at 1 in. w.wg. as required in C402.4.5.2. This change will save energy while not increasing cost.

Cost Impact: The code change proposal will not increase the cost of construction.

CE189-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.4.5.2#3-EC-HICKMAN.doc

CE190 – 13

C402.4.7

Proponent: Lee Kranz, City of Bellevue, WA, representing Washington Association of Building Officials Technical Code Development (WABO TCD) (lkranz@bellevuewa.gov)

Revise as follows:

C402.4.7 Vestibules. All building entrances shall be protected with an enclosed vestibule, with all doors opening into and out of the vestibule equipped with self-closing devices. Vestibules shall be designed so that in passing through the vestibule it is not necessary for the interior and exterior doors to open at the same time. The installation of one or more revolving doors in the building entrance shall not eliminate the requirement that a vestibule be provided on any doors adjacent to revolving doors.

The exterior envelope of conditioned vestibules shall comply with the requirements for a conditioned space. Either the interior or exterior of unconditioned vestibules shall comply with building envelope requirements. The building lobby shall not be considered a vestibule.

Exceptions:

1. Buildings in Climate Zones 1 and 2.
2. Doors not intended to be used by the public, such as doors to mechanical or electrical equipment rooms, or intended solely for employee use.
3. Doors opening directly from a *sleeping unit* or dwelling unit.
4. Doors that open directly from an atmospherically-separated space less than 3,000 square feet (298 m²) in area that is not used as the entrance to areas of the building larger than 3000 square feet.
5. Revolving doors.
6. Doors used primarily to facilitate vehicular movement or material handling and adjacent personnel doors.
7. Building entrances in buildings that are less than four stories above grade and less than 10,000 square feet in area.

Reason: This change clarifies the requirements for continuity of the building thermal envelope at vestibules (and that only the inner wall or the outer wall of the vestibule must comply). Exception 4 adds a phrase that is necessary to clarify that the exception does not apply to lobbies and similar building entrances. Exception 7 adds a new exception for very small buildings, because the vestibule could impose a disproportionate burden for them.

Cost Impact: The code change proposal will not increase the cost of construction.

CE190-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.4.7-EC-KRANZ.doc

CE191 – 13

C402.4.7

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C402.4.7 Vestibules. All building entrances shall be protected with an enclosed vestibule, with all doors opening into and out of the vestibule equipped with self-closing devices. Vestibules shall be designed so that in passing through the vestibule it is not necessary for the interior and exterior doors to open at the same time. The installation of one or more revolving doors in the building entrance shall not eliminate the requirement that a vestibule be provided on any doors adjacent to revolving doors.

Exceptions:

1. Buildings in Climate Zones 1 and 2.
2. Doors not intended to be used regularly to gain access to the building by the public, such as doors to mechanical or electrical equipment rooms, or doors intended solely for emergency egress employee use.
3. Doors opening directly from a *sleeping unit* or dwelling unit.
4. Doors ~~that open directly from a space in buildings less than 3,000~~ 1,000 square feet (~~298~~ 100 m²) in area.
5. Revolving doors.
6. Doors used primarily to facilitate vehicular movement or material handling and adjacent personnel doors.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, does not match the exceptions that are shown in the IECC. The current vestibule requirements are similar, but additional work has been done by SSPC 90.1. This change ensures continued consistency between the IECC and standard 90.1-2010.

Cost Impact: The code change proposal will increase the cost of construction for buildings that now need vestibules that previously did not need them.

CE191-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.4.7-EC-FERGUSON.doc

CE192 – 13

C202 (NEW), C402.4.7, Chapter 5

Proponent: Amanda Hickman, InterCode Incorporated, representing AMCA International (amanda@intercodeinc.com)

Revise as follows:

C402.4.7 Vestibules. All building entrances shall be protected with an enclosed vestibule, with all doors opening into and out of the vestibule equipped with self-closing devices. Vestibules shall be designed so that in passing through the vestibule it is not necessary for the interior and exterior doors to open at the same time. The installation of one or more revolving doors in the building entrance shall not eliminate the requirement that a vestibule be provided on any doors adjacent to revolving doors.

Exceptions: Vestibules are not required for the following:

1. Buildings in Climate Zones 1 and 2.
2. Doors not intended to be used by the public, such as doors to mechanical or electrical equipment rooms, or intended solely for employee use.
3. Doors opening directly from a *sleeping unit* or dwelling unit.
4. Doors that open directly from a space less than 3,000 square feet (298 m2) in area.
5. Revolving doors.
6. Doors that have an installed air curtain that has been tested in accordance with ANSI/AMCA 220. Air curtains shall be controlled with the opening and closing of the door.

Add new definition as follows:

SECTION C202 GENERAL DEFINITIONS

AIR CURTAIN. A device that generates and discharges a laminar air stream installed at the building entrance intended to prevent the infiltration of external, unconditioned air into the conditioned spaces, or the loss of interior, conditioned air to the outside.

Add new standard to Chapter 5 as follows:

AMCA

220-05 Laboratory Methods of Testing Air Curtain Units for Aerodynamic Performance Rating.

Reason: This code change will allow an air curtain to be used as a low cost, low maintenance alternative to a vestibule, thereby saving valuable floor space and creating an invisible, energy saving barrier when the door is open. An air curtain's base function requires nothing more than ambient air. Air curtains can save from 1-10% of the building energy use, depending on climate zone, building size, wind exposure and traffic volume. On average, an air curtain saves 60 - 80% of the energy lost through an open unprotected doorway, while consuming as little as 7.5% of that energy to operate. They require minimal annual maintenance (such as cleaning or vacuuming) and have a life expectancy of 15 to 25 years.

Air curtains installed on the interior of a building provides a coherent sheet of air created by an air stream and the surrounding entrained air. This sheet of air is able to bend and resist thermal exchange over an opening by way of support from the building's interior pressure and the stability created as the air stream meets a return grill or splits when it meets a surface, such as a floor, or another air stream.

An additional benefit of using an air curtain is a cleaner environment. They prevent the infiltration of dirt, fumes and debris and repel flying insects. They are approved for use in the food service industry as a means of insect control for customer entry doors, kitchen service, and delivery doors. They also have less of a propensity to be unintentional defeated like a vestibule, by common situations such as high traffic or being held open for egress.

Numerous studies have been published that evaluate the effectiveness of air curtains. When compared to that of a vestibule, air curtains consistently outperform vestibules in energy savings. Recent studies take advantage of current technology to evaluate the air curtains efficiencies and effectiveness.

Cost Impact: The code change proposal will not increase the cost of construction. It will decrease the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, AMCA 220-05 Laboratory Methods of Testing Air Curtain Units for Aerodynamic Performance Rating, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

Note: The term 'air curtain' is currently defined in the IgCC. The definition is the same as proposed here.

CE192-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.4.7-EC-HICKMAN.doc

CE193 – 13

C402.4.8

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.4.8 Recessed lighting. Recessed luminaires installed in the building thermal envelope shall be:
~~sealed to limit air leakage between conditioned and unconditioned spaces. All recessed luminaires shall be~~

1. IC-rated, and
2. ~~L~~labeled as having an air leakage rate of not more than 2.0 cfm when tested in accordance with ASTM D E 283 at a 1.57 psf pressure differential, ~~and. All recessed luminaires shall be s~~
3. Sealed with gasket or caulk between the housing and interior wall or ceiling covering.

Reason: The location in the building thermal envelope defines by default the reason for the requirement (i.e. to limit air leakage). This proposal clarifies the language for sealing recessed lighting that is located in the building thermal envelope. The current language could be interpreted to require gasketing or caulking recessed fixtures even when not installed in the thermal envelope, even though there is no reason for this requirement. The objective of this proposal is to clarify the code to foster implementation and compliance verification.

Cost Impact: The code change proposal will not increase the cost of construction.

CE193-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.4.8-EC-WILLIAMS.doc

CE194 – 13

C402 (NEW), C402.1, C402.5 (NEW), C403.1, C403.5 (NEW), C403.6, C405.1, C405.10 (NEW)

Proponent: Tim Nogler, Washington Building Code Council (tim.nogler@des.wa.gov)

Revise as follows:

C402.1 General (Prescriptive). The building thermal envelope shall comply with Section C402.1.1. Section C402.1.2 shall be permitted as an alternative to the *R*-values specified in Section C402.1.1. Walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers shall comply with Section C402.5.

C402.5 Walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers. Walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers shall comply with all of the following:

1. Be equipped with automatic door closers that firmly close walk-in doors that have been closed to within 1 inch of full closure.

Exception: Automatic closers are not required for doors wider than 3 feet 9 inches or taller than 7 feet.

2. Doorways shall have strip doors, curtains, spring-hinged doors, or other method of minimizing infiltration when doors are open.
3. Walk-in coolers and refrigerated warehouse coolers shall contain wall, ceiling, and door insulation of not less than R-25 and walk-in freezers and refrigerated warehouse freezers shall contain wall, ceiling, and door insulation of not less than R-32.

Exception: Glazed portions of doors or structural members need not be insulated.

4. Walk-in freezers shall contain floor insulation of not less than R-28.
5. Transparent reach-in doors for walk-in freezers and windows in walk-in freezer doors shall be of triple-pane glass, either filled with inert gas or with heat-reflective treated glass.
6. Windows and transparent reach-in doors for walk-in coolers doors shall be of double-pane or triple-pane, inert gas-filled, heat-reflective treated glass.

C403.1 General. Mechanical systems and equipment serving the building heating, cooling, or ventilating needs shall comply with Section C403.2 (referred to as the mandatory provisions) and either:

1. Section C403.3 (Simple systems); or
2. Section C403.4 (Complex systems).

Walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers shall comply with Section C403.5.

C403.5 Walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers. Walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers shall comply with all of the following:

1. Evaporator fan motors that are less than 1 horsepower and less than 460 volts shall use electronically commutated motors, brushless direct current motors, or 3-phase motors.

2. Condenser fan motors that are less than 1 horsepower shall use electronically commutated motors, permanent split capacitor-type motors or 3-phase motors.
3. Where anti-sweat heaters without anti-sweat heater controls are provided, they shall have a total door rail, glass, and frame heater power draw of not more than 7.1 Watts per square foot of door opening for walk-in freezers, and 3.0 Watts per square foot of door opening for walk-in coolers.
4. Where anti-sweat heater controls are provided, they shall reduce the energy use of the anti-sweat heater as a function of the relative humidity in the air outside the door or to the condensation on the inner glass pane.

C405.1 General (Mandatory). This section covers lighting system controls, the connection of ballasts, the maximum lighting power for interior applications, electrical energy consumption, and minimum acceptable lighting equipment for exterior applications.

Exception: Dwelling units within commercial buildings shall not be required to comply with Sections C405.2 through C405.5 provided that not less than 75 percent of the permanently installed light fixtures, other than low voltage lighting, shall be fitted for, and contain only, high efficacy lamps. Walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers shall comply with Section C405.10.

C405.10 Walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers. Lights in walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers shall either use light sources with an efficacy of not less than 40 lumens per Watt, including ballast losses, or shall use light sources with an efficacy of not less than 40 lumens per Watt, including ballast losses, in conjunction with a device that turns off the lights within 15 minutes when the space is not occupied.

Add new definitions as follows:

SECTION C202 GENERAL DEFINITIONS

REFRIGERATED WAREHOUSE COOLER. An enclosed storage space capable of being refrigerated to temperatures above 32°F that can be walked into and has a total chilled storage area of not less than 3,000 square feet.

REFRIGERATED WAREHOUSE FREEZER: An enclosed storage space capable of being refrigerated to temperatures at or below 32°F that can be walked into and has a total chilled storage area of not less than 3,000 square feet.

WALK-IN COOLER. An enclosed storage space capable of being refrigerated to temperatures above 32°F that can be walked into and has a total chilled storage area of less than 3,000 square feet.

WALK-IN FREEZER: An enclosed storage space capable of being refrigerated to temperatures at or below 32°F that can be walked into and has a total chilled storage area of less than 3,000 square feet.

Reason: Refrigeration is one of the largest unregulated electrical loads in buildings. This proposal provides basic minimum performance levels for walk-in coolers and freezers, and for refrigerated warehouse coolers and refrigerated warehouse freezers. The national model code should set a minimum performance for these significant energy using systems. This proposal is based on industry standard practice.

Cost Impact: The code change proposal will increase the cost of construction.

CE194-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C402.1-EC-NOGLER.doc

CE195 – 13

C403.1, C403.2, C403.2.3, Table C403.2.3(7), Table C403.2.3(8), Table C403.2.3(9), C403.2.3.1, C403.2.3.2, C403.2.4, C403.2.5.1, C403.2.10, C403.2.10.1, C403.2.10.2, Table C403.2.10.1(1), Table C403.2.10.1(2), C403.3, C403.3.2, C403.4 thru C403.4.6, C403.4.1.3, C403.4.7, C406.2, Table C406.2(6), Table C406.2(7), Chapter 5

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C403.1 General. Mechanical systems and equipment serving all or a portion of the building heating, cooling or ventilating needs that are unitary or packaged in nature and serving a single zone and controlled by a single thermostat in the zone served, or are two-pipe heating only systems serving one or more zones, shall comply with Sections 403.2 (referred to as the mandatory provisions) and either:

- 1- ~~Section C403.3 (Simple systems prescriptive provisions); or~~
- 2- ~~Section C403.4 (Complex systems)~~ All other mechanical systems or equipment shall meet the provisions of Section 6 of ANSI/ASHRAE/IES Standard 90.1.

C403.2 Mechanical systems and equipment ~~Provisions applicable to all mechanical systems (Mandatory).~~ Mechanical systems and equipment serving the building heating, cooling or ventilating needs shall comply with Sections C403.2.1 through C403.2.11.

C403.2.3 HVAC equipment performance requirements. Equipment shall meet the minimum efficiency requirements of Tables C403.2.3(1), C403.2.3(2), C403.2.3(3), C403.2.3(4), C403.2.3(5), and C403.2.3(6), C403.2.3(7) and C403.2.3(8) when tested and rated in accordance with the applicable test procedure. ~~Plate-type liquid-to-liquid heat exchangers shall meet the minimum requirements of Table C403.2.3(9).~~ The efficiency shall be verified through certification under an *approved* certification program or, if no certification program exists, the equipment efficiency ratings shall be supported by data furnished by the manufacturer. Where multiple rating conditions or performance requirements are provided, the equipment shall satisfy all stated requirements. Where components, such as indoor or outdoor coils from different manufacturers are used, calculations and supporting data shall be furnished by the designer that demonstrates that the combined efficiency of the specified components meets the requirements herein.

~~TABLE C403.2.3(7)~~
~~MINIMUM EFFICIENCY REQUIREMENTS:~~
~~WATER CHILLING PACKAGES^a~~

~~TABLE C403.2.3(8)~~
~~MINIMUM EFFICIENCY REQUIREMENTS:~~
~~HEAT REJECTION EQUIPMENT~~

~~TABLE C403.2.3(9)~~
~~HEAT TRANSFER EQUIPMENT~~

C403.2.3.1 Water-cooled centrifugal chilling packages. Equipment not designed for operation at AHRI Standard 550/590 test conditions of 44°F (7°C) leaving chilled water temperature and 85°F (29°C) entering condenser water temperature with 3 gpm/ton (0.054 l/s - kW) condenser water flow shall have maximum full-load kW/ton and *NPLV* ratings adjusted using Equations 4-3 and 4-4.

~~Adjusted minimum full-load COP ratings =~~
~~—(Full-load COP from Table 6.8.1C of AHRI~~

$$\frac{\text{Standard 550/590}}{\text{Adjusted minimum NPLV rating}} \times K_{adj} \quad \text{(Equation 4-3)}$$

$$\frac{\text{Adjusted minimum NPLV rating}}{\text{(IPLV from Table 6.8.1C of AHRI Standard 550/590)} \times K_{adj}} \quad \text{(Equation 4-4)}$$

where:

$$K_{adj} = A \times B$$

$$A = 0.0000015318 \times (\text{LIFT})^4 - 0.000202076 \times (\text{LIFT})^3 + 0.0101800 \times (\text{LIFT})^2 - 0.264958 \times \text{LIFT} + 3.930196$$

$$B = 0.0027 \times L_{vg}^{\text{Evap}} (\text{°C}) + 0.982$$

$$\text{LIFT} = L_{vg}^{\text{Cond}} - L_{vg}^{\text{Evap}}$$

$$L_{vg}^{\text{Cond}} = \text{Full load condenser leaving water temperature (°C)}$$

$$L_{vg}^{\text{Evap}} = \text{Full load leaving evaporator temperature (°C)}$$

SI units shall be used in the K_{adj} equation.

The adjusted full-load and *NPLV* values shall only be applicable for centrifugal chillers meeting all of the following full-load design ranges:

1. The leaving evaporator fluid temperature is not less than 36°F (2.2°C).
2. The leaving condenser fluid temperature is not greater than 115°F (46.1°C).
3. LIFT is not less than 20°F (11.1 °C) and not greater than 80°F (44.4°C).

Exception: Centrifugal chillers designed to operate outside of these ranges need not comply with this code.

C403.2.3.2 Positive displacement (air- and water-cooled) chilling packages. Equipment with a leaving fluid temperature higher than 32°F (0°C), shall meet the requirements of Table C403.2.3(7) when tested or certified with water at standard rating conditions, in accordance with the referenced test procedure.

C403.2.4 HVAC system controls. Each heating and cooling system shall be provided with thermostatic controls as specified in Section C403.2.4.1, C403.2.4.2, C403.2.4.3, and C403.2.4.4, C403.4.1, C403.4.2, C403.4.3 or C403.4.4.

C403.2.5.1 Demand controlled ventilation. Demand control ventilation (DCV) shall be provided for spaces larger than 500 square feet (50 m²) and with an average occupant load of 25 people per 1000 square feet (93 m²) of floor area (as established in Table 403.3 of the *International Mechanical Code*) and served by systems with one or more of the following:

1. An air-side economizer;
2. Automatic modulating control of the outdoor air damper; or
3. A design outdoor airflow greater than 3,000 cfm (1400 L/s).

Exception: Demand control ventilation is not required for systems and spaces as follows:

1. Systems with energy recovery complying with Section C403.2.6.
2. Multiple-zone systems without direct digital control of individual zones communicating with a central control panel.
3. System with a design outdoor airflow less than 1,200 cfm (600 L/s).

4. Spaces where the supply airflow rate minus any makeup or outgoing transfer air requirement is less than 1,200 cfm (600 L/s).
5. Ventilation provided for process loads only.

C403.2.10 Air system design and control. Each HVAC system having a total fan system motor nameplate horsepower (hp) exceeding 5 horsepower (hp) (3.7 kW) shall meet the provisions of Sections C403.2.10.1 through C403.2.10.2 at fan system design conditions shall not exceed the allowable have a maximum fan system motor nameplate hp of 0.0011 X CFMs, where CFMs is the maximum design supply airflow rate to conditioned spaces served by the system in cubic feet per minute. (Option 1) or fan system bhp (Option 2) as shown in Table C403.2.10.1(1). This includes supply fans, and return/relief fans, and fan-powered terminal units associated with systems providing heating or cooling capability. ~~Single zone variable air volume systems shall comply with the constant volume fan power limitation.~~

Exception:

1. Hospital, vivarium and laboratory systems that utilize flow control devices on exhaust and/or return to maintain space pressure relationships necessary for occupant health and safety or environmental control shall be permitted to use variable volume fan power limitation.
2. Individual exhaust fans with motor nameplate horsepower of 1 hp or less.

C403.2.10.1 Allowable fan floor horsepower. ~~Each HVAC system at fan system design conditions shall not exceed the allowable fan system motor nameplate hp (Option 1) or fan system bhp (Option 2) as shown in Table C403.2.10.1(1). This includes supply fans, return/relief fans, and fan-powered terminal units associated with systems providing heating or cooling capability. Single zone variable air volume systems shall comply with the constant volume fan power limitation.~~

~~—Exception:~~ The following fan systems are exempt from allowable fan floor horsepower requirement:

1. Hospital, vivarium and laboratory systems that utilize flow control devices on exhaust and/or return to maintain space pressure relationships necessary for occupant health and safety or environmental control shall be permitted to use variable volume fan power limitation.
2. Individual exhaust fans with motor nameplate horsepower of 1 hp or less.

C403.2.10.2 Motor nameplate horsepower. For each fan, the selected fan motor shall be no larger than the first available motor size greater than the brake horsepower (bhp). The fan brake horsepower (bhp) shall be indicated on the design documents to allow for compliance verification by the ~~code official.~~

Exceptions:

1. For fans less than 6 bhp (4413 W), where the first available motor larger than the brake horsepower has a nameplate rating within 50 percent of the bhp, selection of the next larger nameplate motor size is allowed.
2. For fans 6 bhp (4413 W) and larger, where the first available motor larger than the bhp has a nameplate rating within 30 percent of the bhp, selection of the next larger nameplate motor size is allowed.

**TABLE C403.2.10.1(1)
FAN POWER LIMITATION**

**TABLE C403.2.10.1(2)
FAN POWER LIMITATION PRESSURE DROP ADJUSTMENT**

C403.3 Simple HVAC systems and equipment (Prescriptive). This section applies to buildings served by unitary or packaged HVAC equipment listed in Tables C403.2.3(1) through C403.2.3(8), each serving one zone and controlled by a single thermostat in the zone served. It also applies to two-pipe heating systems serving one or more zones, where no cooling system is installed.

C403.3 Mechanical systems and equipment (Prescriptive). Mechanical systems and equipment serving the building heating, cooling and ventilation needs shall comply with Sections C403.3.1 and C403.3.2.

C403.3.2 Hydronic systems controls. Hydronic heating systems comprised of multiple-packaged boilers and designed to deliver conditioned water or steam into a common distribution system shall include automatic controls capable of sequencing operation of the boilers and to automatically reduce flow through the boiler plant when another boiler is shut down. Hydronic heating systems comprised of a single boiler having an input design capacity over 500,000 Btu/h (146,550W) shall include either a multi-staging or modulating burner.

Hydronic systems of at least 300,000 Btu/h (87,930 W) design output capacity supplying heated and chilled water to comfort conditioning systems shall be designed for variable fluid flow with control valves designed to modulate or step down, and close, as a function of load and include controls that meet the requirements of Sections C403.4.3:

1. Automatically reset the supply water temperatures using zone-return water temperature, building-return water temperature, zone loads, or outside air temperature as an indicator of building heating demand. The temperature shall be capable of being reset by at least 25 percent of the design supply-to-return water temperature difference; and
2. Reduce system pump flow by at least 50 percent of design flow rate utilizing adjustable speed drive(s) on pump(s), or multiple-staged pumps where at least one-half of the total pump horsepower is capable of being automatically turned off.

C403.4.1.3 C403.3.1.1.5 Integrated economizer control. Economizer systems shall be integrated with the mechanical cooling system and be capable of providing partial cooling even where additional mechanical cooling is required to meet the remainder of the cooling load.

Exceptions:

1. Direct expansion systems that include controls that reduce the quantity of outdoor air required to prevent coil frosting at the lowest step of compressor unloading, provided this lowest step is no greater than 25 percent of the total system capacity.
2. Individual direct expansion units that have a rated cooling capacity less than 54,000 Btu/h (15 827 W) and use nonintegrated economizer controls that preclude simultaneous operation of the economizer and mechanical cooling.

C403.4 Complex HVAC systems and equipment. (Prescriptive). This section applies to buildings served by HVAC equipment and systems not covered in Section C403.3.

C403.4.1 Economizers. Economizers shall comply with Sections C403.4.1.1 through C403.4.1.4.

C403.4.1.1 Design capacity. Water economizer systems shall be capable of cooling supply air by indirect evaporation and providing up to 100 percent of the expected system cooling load at outdoor air temperatures of 50°F dry bulb (10°C dry bulb)/45°F wet bulb (7.2°C wet bulb) and below.

Exception: Systems in which a water economizer is used and where dehumidification requirements cannot be met using outdoor air temperatures of 50°F dry bulb (10°C dry bulb)/45°F wet bulb (7.2°C wet bulb) shall satisfy 100 percent of the expected system cooling load at 45°F dry bulb (7.2°C dry bulb)/40°F wet bulb (4.5°C wet bulb).

C403.4.1.2 Maximum pressure drop. Precooling coils and water-to-water heat exchangers used as part of a water economizer system shall either have a water-side pressure drop of less than 15 feet (4572 mm) of water or a secondary loop shall be created so that the coil or heat exchanger pressure drop is not seen by the circulating pumps when the system is in the normal cooling (noneconomizer) mode.

C403.4.1.3 Integrated economizer control. Economizer systems shall be integrated with the mechanical cooling system and be capable of providing partial cooling even where additional mechanical cooling is required to meet the remainder of the cooling load.

Exceptions:

1. Direct expansion systems that include controls that reduce the quantity of *outdoor air* required to prevent coil frosting at the lowest step of compressor unloading, provided this lowest step is no greater than 25 percent of the total system capacity.
2. Individual direct expansion units that have a rated cooling capacity less than 54,000 Btu/h (15,827 W) and use nonintegrated economizer controls that preclude simultaneous operation of the economizer and mechanical cooling.

C403.4.1.4 Economizer heating system impact. HVAC system design and economizer controls shall be such that economizer operation does not increase the building heating energy use during normal operation.

Exception: Economizers on VAV systems that cause zone level heating to increase due to a reduction in supply air temperature.

C403.4.2 Variable air volume (VAV) fan control. Individual VAV fans with motors of 7.5 horsepower (5.6 kW) or greater shall be:

1. Driven by a mechanical or electrical variable speed drive;
2. Driven by a vane axial fan with variable pitch blades; or
3. The fan shall have controls or devices that will result in fan motor demand of no more than 30 percent of their design wattage at 50 percent of design airflow when static pressure set point equals one-third of the total design static pressure, based on manufacturer's certified fan data.

C403.4.2.1 Static pressure sensor location. Static pressure sensors used to control VAV fans shall be placed in a position such that the controller setpoint is no greater than one-third the total design fan static pressure, except for systems with zone reset control complying with Section C403.4.2.2. For sensors installed down-stream of major duct splits, at least one sensor shall be located on each major branch to ensure that static pressure can be maintained in each branch.

C403.4.2.2 Set points for direct digital control. For systems with direct digital control of individual zone boxes reporting to the central control panel, the static pressure set point shall be reset based on the zone requiring the most pressure, i.e., the set point is reset lower until one zone damper is nearly wide open.

C403.4.3 Hydronic systems controls. The heating of fluids that have been previously mechanically cooled and the cooling of fluids that have been previously mechanically heated shall be limited in accordance with Sections C403.4.3.1 through C403.4.3.3. Hydronic heating systems comprised of multiple packaged boilers and designed to deliver conditioned water or steam into a common distribution system shall include automatic controls capable of sequencing operation of the boilers. Hydronic heating systems comprised of a single boiler and greater than 500,000 Btu/h (146,550 W) input design capacity shall include either a multistaged or modulating burner.

C403.4.3.1 Three-pipe system. Hydronic systems that use a common return system for both hot water and chilled water are prohibited.

C403.4.3.2 Two-pipe changeover system. Systems that use a common distribution system to supply both heated and chilled water shall be designed to allow a dead band between changeover from one mode to the other of at least 15°F (8.3°C) outside air temperatures; be designed to and provided with controls that will allow operation in one mode for at least 4 hours before changing over to the other mode; and be provided with controls that allow heating and cooling supply temperatures at the changeover point to be no more than 30°F (16.7°C) apart.

C403.4.3.3 Hydronic (water loop) heat pump systems. Hydronic heat pump systems shall comply with Sections C403.4.3.3.1 through C403.4.3.3.3.

C403.4.3.3.1 Temperature dead band. Hydronic heat pumps connected to a common heat pump water loop with central devices for heat rejection and heat addition shall have controls that are capable of providing a heat pump water supply temperature dead band of at least 20°F (11.1°C) between initiation of heat rejection and heat addition by the central devices.

Exception: Where a system loop temperature optimization controller is installed and can determine the most efficient operating temperature based on realtime conditions of demand and capacity, dead bands of less than 20°F (11°C) shall be permitted.

C403.4.3.3.2 Heat rejection. Heat rejection equipment shall comply with Sections C403.4.3.3.2.1 and C403.4.3.3.2.2.

Exception: Where it can be demonstrated that a heat pump system will be required to reject heat throughout the year.

C403.4.3.3.2.1 Climate Zones 3 and 4. For Climate Zones 3 and 4:

1. If a closed-circuit cooling tower is used directly in the heat pump loop, either an automatic valve shall be installed to bypass all but a minimal flow of water around the tower, or lower leakage positive closure dampers shall be provided.
2. If an open-circuit tower is used directly in the heat pump loop, an automatic valve shall be installed to bypass all heat pump water flow around the tower.
3. If an open- or closed-circuit cooling tower is used in conjunction with a separate heat exchanger to isolate the cooling tower from the heat pump loop, then heat loss shall be controlled by shutting down the circulation pump on the cooling tower loop.

C403.4.3.3.2.2 Climate Zones 5 through 8. For Climate Zones 5 through 8, if an open- or closed-circuit cooling tower is used, then a separate heat exchanger shall be provided to isolate the cooling tower from the heat pump loop, and heat loss shall be controlled by shutting down the circulation pump on the cooling tower loop and providing an automatic valve to stop the flow of fluid.

C403.4.3.3.3 Two position valve. Each hydronic heat pump on the hydronic system having a total pump system power exceeding 10 horsepower (hp) (7.5 kW) shall have a two-position valve.

C403.4.3.4 Part load controls. Hydronic systems greater than or equal to 300,000 Btu/h (87 930 W) in design output capacity supplying heated or chilled water to comfort conditioning systems shall include controls that have the capability to:

1. Automatically reset the supply water temperatures using zone return water temperature, building return water temperature, or outside air temperature as an indicator of building heating or cooling demand. The temperature shall be capable of being reset by at least 25 percent of the design supply to return water temperature difference; or
2. Reduce system pump flow by at least 50 percent of design flow rate utilizing adjustable speed drive(s) on pump(s), or multiple staged pumps where at least one-half of the total pump horsepower is capable of being automatically turned off or control valves designed to modulate or step down, and close, as a function of load, or other approved means.

C403.4.3.5 Pump isolation. Chilled water plants including more than one chiller shall have the capability to reduce flow automatically through the chiller plant when a chiller is shut down. Chillers piped in series for the purpose of increased temperature differential shall be considered as one chiller.

Boiler plants including more than one boiler shall have the capability to reduce flow automatically through the boiler plant when a boiler is shut down.

C403.4.4 Heat rejection equipment fan speed control. Each fan powered by a motor of 7.5 hp (5.6 kW) or larger shall have the capability to operate that fan at two-thirds of full speed or less, and shall have controls that automatically change the fan speed to control the leaving fluid temperature or condensing temperature/pressure of the heat rejection device.

Exception: Factory-installed heat rejection devices within HVAC equipment tested and rated in accordance with Tables C403.2.3(6) and C403.2.3(7).

C403.4.5 Requirements for complex mechanical systems serving multiple zones. Sections C403.4.5.1 through C403.4.5.4 shall apply to complex mechanical systems serving multiple zones. Supply air systems serving multiple zones shall be VAV systems which, during periods of occupancy, are designed and capable of being controlled to reduce primary air supply to each zone to one of the following before reheating, recooling or mixing takes place:

1. Thirty percent of the maximum supply air to each zone.
2. Three hundred cfm (142 L/s) or less where the maximum flow rate is less than 10 percent of the total fan system supply airflow rate.
3. The minimum ventilation requirements of Chapter 4 of the *International Mechanical Code*.

Exception: The following define where individual zones or where entire air distribution systems are exempted from the requirement for VAV control:

1. Zones where special pressurization relationships or cross-contamination requirements are such that VAV systems are impractical.
2. Zones or supply air systems where at least 75 percent of the energy for reheating or for providing warm air in mixing systems is provided from a site-recovered or site-solar energy source.
3. Zones where special humidity levels are required to satisfy process needs.
4. Zones with a peak supply air quantity of 300 cfm (142 L/s) or less and where the flow rate is less than 10 percent of the total fan system supply airflow rate.
5. Zones where the volume of air to be reheated, recoolled or mixed is no greater than the volume of outside air required to meet the minimum ventilation requirements of Chapter 4 of the *International Mechanical Code*.
6. Zones or supply air systems with thermostatic and humidistatic controls capable of operating in sequence the supply of heating and cooling energy to the zones and which are capable of preventing reheating, recooling, mixing or simultaneous supply of air that has been previously cooled, either mechanically or through the use of economizer systems, and air that has been previously mechanically heated.

C403.4.5.1 Single duct variable air volume (VAV) systems, terminal devices. Single duct VAV systems shall use terminal devices capable of reducing the supply of primary supply air before reheating or recooling takes place.

C403.4.5.2 Dual duct and mixing VAV systems, terminal devices. Systems that have one warm air duct and one cool air duct shall use terminal devices which are capable of reducing the flow from one duct to a minimum before mixing of air from the other duct takes place.

C403.4.5.3 Single fan dual duct and mixing VAV systems, economizers. Individual dual duct or mixing heating and cooling systems with a single fan and with total capacities greater than 90,000 Btu/h [(26 375 W) 7.5 tons] shall not be equipped with air economizers.

C403.4.5.4 Supply-air temperature reset controls. Multiple zone HVAC systems shall include controls that automatically reset the supply air temperature in response to representative building loads, or to outdoor air temperature. The controls shall be capable of resetting the supply air temperature at least 25 percent of the difference between the design supply air temperature and the design room air temperature.

Exceptions:

- ~~1. Systems that prevent reheating, recooling or mixing of heated and cooled supply air.~~
- ~~2. Seventy five percent of the energy for reheating is from site recovered or site solar energy sources.~~
- ~~3. Zones with peak supply air quantities of 300 cfm (142 L/s) or less.~~

C403.4.6 Heat recovery for service water heating. ~~Condenser heat recovery shall be installed for heating or reheating of service hot water provided the facility operates 24 hours a day, the total installed heat capacity of water-cooled systems exceeds 6,000,000 Btu/hr (1 758 600 W) of heat rejection, and the design service water heating load exceeds 1,000,000 Btu/h (293 100 W).~~

~~The required heat recovery system shall have the capacity to provide the smaller of:~~

- ~~1. Sixty percent of the peak heat rejection load at design conditions; or~~
- ~~2. The preheating required to raise the peak service hot water draw to 85°F (29°C).~~

Exceptions:

- ~~1. Facilities that employ condenser heat recovery for space heating or reheat purposes with a heat recovery design exceeding 30 percent of the peak water-cooled condenser load at design conditions.~~
- ~~2. Facilities that provide 60 percent of their service water heating from site solar or site recovered energy or from other sources.~~

C403.4.7 C403.3.2 Hot gas bypass limitation. Cooling systems shall not use hot gas bypass or other evaporator pressure control systems unless the system is designed with multiple steps of unloading or continuous capacity modulation. The capacity of the hot gas bypass shall be limited as indicated in Table C403.4.7

Exception: Unitary packaged systems with cooling capacities not greater than 90,000 Btu/h (26 379 W).

**TABLE C403.4.7 C403.3.2
MAXIMUM HOT GAS BYPASS CAPACITY**

RATED CAPACITY	MAXIMUM HOT GAS BYPASS CAPACITY (% of total capacity)
≤ 240,000 Btu/h	50
> 240,000 Btu/h	25

For SI: 1 British thermal unit per hour = 0.2931 W.

C406.2 Efficient HVAC performance. For systems required by Sections 403.1 to meet provisions of Sections C403.2 (mandatory provisions) and C403.3 (prescriptive provisions), equipment shall meet the minimum efficiency requirements of Tables C406.2.(1) through C406.2(7 5) in addition to the requirements in Section C403. This section shall only be used where the equipment efficiencies in Tables C406.2(1) through C406.2(7 5) are greater than the equipment efficiencies listed in Table C403.2.3(1) through 403.2.3(7 6) for the equipment type.

For systems required by Sections 403.1 to meet provisions of Section 6 of ANSI/ASHRAE/IES Standard 90.1 heating and cooling equipment shall have a rated efficiency 10% greater than required by Section 6 of ANSI/ASHRAE/IES Standard 90.1.

~~TABLE C406.2(6)~~
~~CHILLERS—EFFICIENCY REQUIREMENTS~~

~~TABLE C406.2(7)~~
~~ABSORPTION CHILLERS—EFFICIENCY REQUIREMENTS~~

Delete standard from Chapter 5 as follows:

AHRI

~~400—01 Liquid to Liquid Heat Exchangers with Addendum 2~~
~~550/590—03 Water Chilling Packages Using the Vapor Compression Cycle with Addenda~~
~~560—00 Absorption Water Chilling and Water-heating Packages~~

CTI Cooling Technology Institute
2611 FM 1960 West, Suite A-101
Houston, TX 77068

~~ATC 105 (00) — Acceptance Test Code for Water Cooling Tower~~
~~STD 201—09 — Standard for Certification of Water Cooling Towers Thermal Performances~~

Reason: The code change retains all the provisions of Section C403 of the 2012 IECC as applicable to simple HVAC systems and equipment as currently defined in the IECC, with some minor modifications for hydronic systems. Note that a significant majority of the commercial buildings constructed in the United States are on the order of 20,000 square feet or less in floor area and would likely be covered by these resultant provisions for simple systems and equipment.

The provisions for complex (e.g. non-simple) HVAC systems are updated and maintained by ASHRAE on a regular and ongoing basis. It seems duplicative and time consuming to try and keep the provisions of the IECC for such equipment and systems consistent with Standard 90.1, when so much effort is spent in SSPC 90.1 updating and maintaining these provisions. A review of the past few code development cycles finds very few changes were submitted to the provisions for complex systems other than to keep the IECC consistent with the provisions in Standard 90.1.

While there may be an advantage in having the provisions for complex systems provided directly in the IECC to foster their availability, such complex systems will have a registered design professional or engineer involved in the design and construction who should be providing sealed plans and specifications. Given the recent emphasis on the availability of resources for state and local code compliance verification efforts it seems reasonable to rely on Standard 90.1 for the criteria for such systems and equipment and the engineers and design professionals that would be involved in their implementation and compliance verification via their professional credentials.

An important note is that this is not a return to the prior "mix and match" approach of allowing developers to meet one section (e.g., envelope) in the IECC and another (say lighting) in ASHRAE 90.1. This is a clear referral and not an optional choice. Simple HVAC system provisions are in the IECC and the complex system requirements in ASHRAE 90.1 are included by reference. There is always the option of using ASHRAE 90.1 for the entire compliance path under section 401.2 or 401.2.1, but in either case, complex HVAC systems would be subject to requirements in ASHRAE 90.1.

This change will greatly simplify the code and as noted above continue to provide criteria for more complex systems through a singular process. Details to foster an understanding of this code change are provided below and correspond to each of the ten specific actions needed to implement this change and further simplify the provisions in the ICC for HVAC systems and equipment.

1. The proposed changes to C403.1 are intended to bring forward the scope of C403.3 for simple systems to the beginning of C403 to provide the necessary outline and structure for the resultant C403. Section C403.1 now clearly indicates what is covered by the building mechanical system provisions, what constitutes a simple HVAC system and equipment, and that such systems and equipment would need to comply with the provisions of the IECC and those that are not would now be required to comply with ANSI/ASHRAE/IES Standard 90.1 as currently referenced in the IECC. This eliminates the need to maintain separate and parallel provisions for other than simple systems in the IECC that are maintained in Standard 90.1.
2. The title of C403.2 requires revision to ensure the correct organization of the provisions of C403. Section C403.1 now establishes the scope of the provisions for simple HVAC systems and equipment. The sections after C403.1 apply to mechanical systems and equipment and are either mandatory (C403.2) or prescriptive (C403.3). If HVAC systems and equipment are not simple, as defined in C403.1, then the provisions of Standard 90.1 apply.
3. The scope of C403 as simple HVAC systems and equipment covering only unitary or packaged cooling equipment eliminates the relevance of Tables C403.2.3(7), and C403.2.3(8) which apply to equipment associated with complex systems as defined in the IECC now (e.g. non-simple). These same provisions are provided in Standard 90.1 and need not be provided here. By referencing Standard 90.1, it is unnecessary for IECC to undergo several code changes in order to keep the code consistent with Standard 90.1.
4. Sections C403.2.3.1 and C403.2.3.2 apply to water chilling packages that are associated with systems other than those covered by Section C403 pursuant to this change (e.g. non-simple systems that are now covered by Standard 90.1).

5. Sections C403.4.1 through C403.4.4 are deleted through this code change as discussed above and no longer need to be referenced. The provisions of C403.2.4.1 through C403.2.4.4 apply to simple HVAC systems and equipment and should be retained as currently presented.
6. Exception 2 to C403.2.5.1 would not be applicable to the scope of C403 as proposed herein (simple systems) because simple HVAC systems and equipment are limited to serving a singular zone and this exception applies to multiple zone systems.
7. In now applying to simple systems the provisions in C403.2.10.1 for fan system brake horsepower are no longer applicable and would be addressed in Standard 90.1. Table C403.2.10.1(1) can be deleted as the one remaining set of provisions is better presented in a textual rather than tabular form. Table C403.2.10.1(2) is deleted as it is only applicable to the brake horsepower path which is no longer present for the simplified path. What remains is a set of provisions for air system fan horsepower that can be stated in a singular section through modification to C403.2.10. The title of C403.2.10 is revised so it does not contain now nor would it contain any provisions on air system control.
8. With the movement of the current provisions of C403.3 to C403.1 to address the scope of C403 at the beginning of the section, the current performance provisions in C403.3 for simple systems need an appropriate introductory section.
9. The current hydronic system control provisions in Section C403.3.2 are modified for consistency with the scope of the proposed Section C403 and do not apply to chilled water systems. In addition, Section C403.4 would be deleted in deference to Standard 90.1 for complex (e.g. non-simple) HVAC systems and equipment as discussed above. The controls provisions now in Section C403.4 are brought forward as applicable to simple HVAC systems and equipment. The provisions applicable to hydronic systems covered by the new Section C403.3 (heating only systems) are Sections C403.4.3.4 and the second paragraph of Section C403.4.3.5, both of which are included in the code change above as new text to Section C403.3.2 on hydronic systems. There are minor modifications to improve pumping efficiency by requiring variable flow on smaller systems without variable speed drives being required.
10. The economizer integration requirements are currently located in C403.4.1.3 for complex systems and are applicable to simple systems as defined pursuant to this code change. As a consequence they need to be retained in the IECC and are proposed to be moved so they are retained for simple systems.
11. Unneeded complex system sections and tables are deleted. ASHRAE 90.1 becomes the reference for these systems.
12. Hot gas bypass restrictions are retained, as they apply to some larger simple systems.
13. The HVAC option in C406.2 needs to be adjusted to accommodate the reference to Standard 90.1 for complex systems. As proposed, Section C403 provides specific criteria within the IECC for simple mechanical systems and then defers to Standard 90.1 for complex systems in lieu of providing specific criteria within the IECC for complex systems. The provisions of C406.2 as written would and should continue to be applied over and above the specific criteria within the IECC. In now referencing Standard 90.1 for complex systems, a parallel option must also exist for those buildings that would comply using the specific criteria within the IECC but in the case of mechanical systems would defer to Standard 90.1.
14. High efficiency chiller tables are no longer required, as the high efficiency chiller option is indexed to ASHRAE 90.1.
15. Several reference standards are no longer required.

Any cost impact would be attributable to the loss of the provisions in Section C403.4 for complex HVAC systems and the impact of requiring compliance with ANSI/ASHRAE/IES Standard 90.1 alone on any particular system design. A comparison of the provisions in Section C403.4 and Standard 90.1 would have to be conducted and applied to each design to determine if there are any specific increases or decreases in first cost and life cycle costs. There should be little cost difference between the current complex provisions and the 90.1 complex provisions if the trend for ASHRAE 90.1 proposals to be incorporated into IECC continues. ASHRAE 90.1 proposals typically go through a cost effectiveness vetting as they are released for public comment and incorporation into standard 90.1, so any differences with increased cost would be cost effective.

Cost Impact: There is no significant impact on construction cost.

CE195-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.1-EC-WILLIAMS.doc

CE196 – 13

C403.2.1

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C403.2.1 Calculation of heating and cooling loads. Design loads associated with heating, ventilating and air conditioning of the building shall be determined in accordance with the procedures described in ANSI/ASHRAE/ACCA Standard 183 or by an *approved* equivalent computational procedure using the design parameters specified in Chapter 3. ~~The design loads shall account for the building envelope, lighting, ventilation and occupancy loads based on the project design.~~ Heating and cooling loads shall be adjusted to account for load reductions that are achieved where energy recovery systems are utilized in the HVAC system in accordance with the ASHRAE HVAC Systems and Equipment Handbook. ~~Alternatively, design loads shall be determined by an approved equivalent computational procedure using the design parameters specified in Chapter 3.~~

Reason: ASHRAE 183 provides the relevant details on how to calculate the loads. The “loads” are specified as associated with HVAC. This proposal simplifies the language requiring heating and cooling load calculations to simply reference ASHRAE 183. The objective of this proposal is to simplify the code to foster implementation and compliance verification.

Cost Impact: The code change proposal will not increase the cost of construction.

CE196-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.1-EC-WILLIAMS.doc

CE197 – 13

C403.2.1

Proponent: Richard J. Davis, The Evergreen State College, Kevin Folsom, Dallas Theological Institute, representing APPA, Leadership in Education Facilities, Standards and Codes Council.

Revise as follows:

C403.2.1 Calculation of heating and cooling loads. Design loads shall be determined in accordance with the procedures described in ANSI/ASHRAE/ACCA Standard 183. The design loads shall account for occupant movement, the comfort for those moving between spaces, the building envelope, lighting, ventilation and occupancy loads based on the project design. Heating and cooling loads shall be adjusted to account for load reductions that are achieved where energy recovery systems are utilized in the HVAC system in accordance with the *ASHRAE HVAC Systems and Equipment Handbook*. Alternatively, design loads shall be determined by an *approved* equivalent computation procedure, using the design parameters specified in Chapter 3.

Reason: When older buildings or portions of buildings have different interior temperatures from new buildings or spaces, facility managers must address the perception that there is something wrong with the newer facility. Widely differing temperature classroom and public space set- points are not acceptable to our students and faculty.

Cost Impact: Unknown. Site specific.

CE197-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.1-EC-DAVIS.doc

CE198 – 13

C403.2.2

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C403.2.2 Equipment and system sizing. The output capacity of heating and cooling equipment ~~and systems~~ shall not exceed the loads calculated in accordance with Section C403.2.1. A single piece of equipment providing both heating and cooling shall satisfy this provision for one function with the capacity for the other function as small as possible, within available equipment options.

Exceptions:

1. Required standby equipment and systems provided with controls and devices that allow such systems or equipment to operate automatically only when the primary equipment is not operating.
2. Multiple units of the same equipment type with combined capacities exceeding the design load and provided with controls that have the capability to sequence the operation of each unit based on load.

Reason: This proposal clarifies intent that the provisions are written to apply to the output capacity of the equipment that provides heating or cooling functions.

While not defined, there is a distinct difference between systems and equipment. The equipment refers to the piece of equipment (or the appliance) that converts delivered energy into heating or cooling capability. The system is much broader in scope and includes not only the equipment but the distribution system, controls, etc. The design loads in Section C403.2.1 will cover the distribution system loads such that the loads in question and the point of comparison with size occurs at the output to the equipment.

Cost Impact: The code change proposal will not increase the cost of construction.

CE198-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.2-EC-WILLIAMS.doc

CE199 – 13

Table C403.2.3(1), Table C403.2.3(3), Table C403.2.3(7)

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

TABLE C403.2.3(1)
MINIMUM EFFICIENCY REQUIREMENTS:
ELECTRICALLY OPERATED UNITARY AIR CONDITIONERS AND CONDENSING UNITS

Equipment Type	Size Category	Heating Section Type	Sub-Category or Rating Condition	Minimum Efficiency		Test Procedure ^a
				Before 6/1/2011	As of 6/1/2011	
Air Conditioners, air Cooled	<65,000 Btu/h ^b	All	Split System	13.0 SEER	13.0 SEER	AHRI 210/240
			Single Package	13.0 SEER	13.0 SEER	
Through-the-wall (air cooled)	≤30,000 Btu/h ^b	All	Split system	12.0 SEER	12.0 SEER	
			Single Package	12.0 SEER	12.0 SEER	
Small-duct high-velocity (air cooled)	<65,000 Btu/h ^b	All	Split System	10.0 SEER	10.0 SEER	
Air conditioners, air cooled	≥65,000 Btu/h and <135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.2 EER 11.4 IEER	11.2 EER 11.4 IEER	AHRI 340/360
		All other	Split System and Single Package	11.0 EER 11.2 IEER	11.0 EER 11.2 IEER	
	≥135,000 Btu/h and <240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.0 EER 11.2 IEER	11.0 EER 11.2 IEER	
		All other	Split System and Single Package	10.8 EER 11.0 IEER	10.8 EER 11.0 IEER	
	≥240,000 Btu/h and <760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	10.0 EER 10.1 IEER	10.0 EER 10.1 IEER	
		All other	Split System and Single Package	9.8 EER 9.9 IEER	9.8 EER 9.9 IEER	
	≥760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	9.7 EER 9.8 IEER	9.7 EER 9.8 IEER	
		All other	Split System and Single Package	9.5 EER 9.6 IEER	9.5 EER 9.6 IEER	
	< 65,000 Btu/h ^b	All	Split System and Single Package	12.1 EER 12.3 IEER	12.1 EER 12.3 IEER	
		All	Split System and Single Package	12.1 EER 12.3 IEER	12.1 EER 12.3 IEER	
Air Conditioners, water Cooled	≥65,000 Btu/h and <135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	12.1 EER 12.3 IEER	12.1 EER 12.3 IEER	AHRI 340/360
		All other	Split System and Single Package	11.9 EER 12.1 IEER	11.9 EER 12.1 IEER	
	≥135,000 Btu/h and <240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	12.5 EER 12.7 IEER	12.5 EER 12.7 IEER	
		All other	Split System and Single Package	12.3 EER 12.5 IEER	12.3 EER 12.5 IEER	
	≥240,000 Btu/h and <760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	12.4 EER 12.6 IEER	12.4 EER 12.6 IEER	
		All other	Split System and Single Package	12.2 EER 12.4 IEER	12.2 EER 12.4 IEER	
	≥760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	12.0 EER 12.4 IEER	12.0 EER 12.4 IEER	
		All other	Split System and Single Package	12.0 EER 12.2 IEER	12.0 EER 12.2 IEER	
	< 65,000 Btu/h ^b	All	Split System and Single Package	12.1 EER 12.3 IEER	12.1 EER 12.3 IEER	
		All	Split System and Single Package	12.1 EER 12.3 IEER	12.1 EER 12.3 IEER	
Air Conditioners, evaporatively cooled	< 65,000 Btu/h ^b	All	Split System and Single Package	12.1 EER 12.3 IEER	12.1 EER 12.3 IEER	AHRI 210/240

Equipment Type	Size Category	Heating Section Type	Sub-Category or Rating Condition	Minimum Efficiency		Test Procedure ^a
				Before 6/4/2011	As of 6/4/2011	
	≥65,000 Btu/h and <135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.5 EER 11.7 IEER	12.1 EER 12.3 IEER	AHRI 340/360
		All other	Split System and Single Package	11.3 EER 11.5 IEER	11.9 EER 12.1 IEER	
	≥135,000 Btu/h and <240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.0 EER 11.2 IEER	12.0 EER 12.2 IEER	
		All other	Split System and Single Package	10.8 EER 11.0 IEER	11.8 EER 12.0 IEER	
	≥240,000 Btu/h and <760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.0 EER 11.1 IEER	11.9 EER 12.1 IEER	
		All other	Split System and Single Package	10.8 EER 10.9 IEER	12.2 EER 11.9 IEER	
	≥760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.0 EER 11.1 IEER	11.7 EER 11.9 IEER	
		All other	Split System and Single Package	10.8 EER 10.9 IEER	11.5 EER 11.7 IEER	
Condensing units air cooled	≥135,000Btu/h			10.1 EER 11.4 IEER	10.5 EER 14.0 IEER	AHRI 365
Condensing units water cooled	≥135,000Btu/h			13.1 EER 13.6 IEER	13.5 EER 14.0 IEER	
Condensing units evaporatively cooled	≥135,000Btu/h			13.1 EER 13.6 IEER	13.5 EER 14.0 IEER	

(Portions of Table not shown remain unchanged)

TABLE C403.2.3(3)
MINIMUM EFFICIENCY REQUIREMENTS:
ELECTRICALLY OPERATED PACKAGED TERMINAL AIR CONDITIONERS,
PACKAGED TERMINAL HEAT PUMPS, SINGLE-PACKAGE VERTICAL AIR CONDITIONERS,
SINGLE VERTICAL HEAT PUMPS, ROOM AIR CONDITIONERS AND ROOM AIR-CONDITIONER HEAT PUMPS

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Minimum Efficiency		Test procedure ^a
			Before 10/08/2012	As of 10/08/2012	
PTAC (cooling mode) New Construction	All Capacities	95 F db outdoor air	12.5 - (0.213 x Cap/1000) EER	13.8 - (0.300 x Cap/1000) EER	AHRI 310/380
PTAC (cooling mode) replacements ^b	All Capacities	95 F db outdoor air	10.9 - (0.213 x Cap/1000) EER	10.9 - (0.213 x Cap/1000) EER	
PTHP (cooling mode) New Construction	All Capacities	95 F db outdoor air	12.3 - (0.213 x Cap/1000) EER	14.0 - (0.300 x Cap/1000) EER	
PTHP (cooling mode) replacements ^b	All Capacities	95 F db outdoor air	10.8 - (0.213 x Cap/1000) EER	10.8 - (0.213 x Cap/1000) EER	
PTHP (heating mode) new construction	All Capacities		3.2 - (0.26 x Cap/1000) COP	3.2 - (0.26 x Cap/1000) COP	
PTHP (heating mode) replacements ^b	All Capacities		2.9 - (0.26 x Cap/1000) COP	2.9 - (0.26 x Cap/1000) COP	
SPVAC (cooling mode)	<65,000 Btu/h	95 F db/ 75 F wb outdoor air	9.0 EER	9.0 EER	AHRI 390
	≥65,000 Btu/h and <135,000 Btu/h	95 F db/ 75 F wb outdoor air	8.9 EER	8.9 EER	
	≥135,000 Btu/h and <240,000 Btu/h	95 F db/ 75 F wb outdoor air	8.6 EER	8.6 EER	
SPVHP (cooling mode)	<65,000 Btu/h	95 F db/ 75 F wb outdoor air	9.0 EER	9.0 EER	
	≥65,000 Btu/h and <135,000 Btu/h	95 F db/ 75 F wb outdoor air	8.9 EER	8.9 EER	
	≥135,000 Btu/h and <240,000	95 F db/ 75 F wb outdoor air	8.6 EER	8.6 EER	

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Minimum Efficiency		Test procedure ^a
			Before 10/08/2012	As of 10/08/2012	
	Btu/h				
SPVHP (heating mode)	<65,000 Btu/h	47 F db/ 43 F wb outdoor air	3.0 COP	3.0 COP	
	≥65,000 Btu/h and <135,000 Btu/h	47 F db/ 43 F wb outdoor air	3.0 COP	3.0 COP	
	≥135,000 Btu/h and <240,000 Btu/h	47 F db/ 75 F wb outdoor air	2.9 COP	2.9 COP	
Room air conditioners, with louvered slides	<6,000 Btu/h	--	9.7 SEER	9.7 SEER	ANSI/AHAM RAC-1
	≥6,000 Btu/h and <8,000 Btu/h	--	9.7 EER	9.7 EER	
	≥8,000 Btu/h and <14,000 Btu/h	--	9.8 EER	9.8 EER	
	≥14,000 Btu/h and <20,000 Btu/h		9.7 SEER	9.7 SEER	
	≥20,000 Btu/h		8.5 EER	8.5 EER	
Room air conditioners, with louvered slides	<8,000 Btu/h		9.0 EER	9.0 EER	
	≥8,000 Btu/h and <20,000 Btu/h		8.5 EER	8.5 EER	
	≥20,000 Btu/h		8.5 EER	8.5 EER	
Room air-conditioner heat pumps with louvered sides	<20,000 Btu/h		9.0 EER	9.0 EER	
	≥20,000 Btu/h		8.5 EER	8.5 EER	
Room air-conditioner heat pumps without louvered sides	<14,000 Btu/h		8.5 EER	8.5 EER	
	≥14,000 Btu/h		8.0 EER	8.0 EER	
Room air conditioner casement only	All capacities		8.7 EER	8.7 EER	
Room air conditioner casement-slider	All capacities		9.5 EER	9.5 EER	

(Portions of Table not shown remain unchanged)

TABLE 503.2.3(7)
MINIMUM EFFICIENCY REQUIREMENTS:
WATER CHILLING PACKAGES^a

EQUIPMENT TYPE	SIZE CATEGORY	UNITS	BEFORE 1/1/2010		AS OF 1/1/2010 ^b				TEST PROCEDURE
					PATH A		PATH B		
			FULL LOAD	IPLV	FULL LOAD	IPLV	FULL LOAD	IPLV	
Air-cooled chillers	<150 tons	EER	≥ 9.562	≥ 10.416	≥ 9.562	≥ 12.500	NA	NA	AHRI 550/590
	≥ 150 tons	EER			≥ 9.562	≥ 12.750	NA	NA	
Air cooled without condenser, electrical operated	All capacities	EER	≥ 10.586	≥ 11.782	Air-cooled chillers without condensers shall be rated with matching condensers and comply with the air-cooled chiller efficiency requirements				
Water cooled, electrically operated, reciprocating	All capacities	kW/ton	≤ 0.837	≤ 0.696	Reciprocating units shall comply with water cooled positive displacement efficiency requirements				
Water cooled, electrically operated, positive displacement	<75 tons	kW/ton	≤ 0.790	≤ 0.676	≤ 0.780	≤ 0.630	≤ 0.800	≤ 0.600	
	≥ 75 tons and <150 tons	kW/ton			≤ 0.775	≤ 0.615	≤ 0.790	≤ 0.586	
	≥ 150 tons and <300 tons	kW/ton	≤ 0.717	≤ 0.627	≤ 0.680	≤ 0.580	≤ 0.718	≤ 0.540	
	≥ 300 tons	kW/ton	≤ 0.639	≤ 0.571	≤ 0.620	≤ 0.540	≤ 0.639	≤ 0.490	
Water cooled, electrically operated, centrifugal	<150 tons	kW/ton	≤ 0.703	≤ 0.669	≤ 0.634	≤ 0.596	≤ 0.639	≤ 0.450	
	≥ 150 tons and <300 tons	kW/ton	≤ 0.634	≤ 0.596					
	≥ 300 tons and <600 tons	kW/ton	≤ 0.576	≤ 0.549	≤ 0.576	≤ 0.549	≤ 0.600	≤ 0.400	
	≥ 600 tons	kW/ton	≤ 0.576	≤ 0.549	≤ 0.570	≤ 0.539	≤ 0.590	≤ 0.400	
Air cooled, absorption single effect	All capacities	COP	≥ 0.600	NR	≥ 0.600	NR	NA	NA	AHRI 560
Water-cooled, absorption single effect	All capacities	COP	≥ 0.700	NR	≥ 0.700	NR	NA	NA	
Absorption double effect, indirect-fired	All capacities	COP	≥ 1.000	≥ 1.050	≥ 1.000	≥ 1.050	NA	NA	
Absorption double effect, direct fired	All capacities	COP	≥ 1.000	≥ 1.000	≥ 1.000	≥ 1.000	NA	NA	

(Portions of Table not shown remain unchanged)

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings

and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

The requirements in these three columns would not be applicable to any new building designed and constructed under the 2015 IECC.

Cost Impact: The code change proposal will not increase the cost of construction. The proposal is editorial in nature and will not affect the cost of construction.

CE199-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.3(1)T-EC-THOMPSON-SEHPCAC

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Table C403.2.3(1), Table C403.2.3(2), Table C403.2.3(3), Table C403.2.3(8), Chapter 5

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

TABLE C403.2.3(1)
MINIMUM EFFICIENCY REQUIREMENTS:
ELECTRICALLY OPERATED UNITARY AIR CONDITIONERS AND CONDENSING UNITS

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY			TEST PROCEDURE ^a
				Before 6/1/2011	As of 6/1/2011 Before 1/1/2016	As of 1/1/2016	
Air conditioners, air cooled	< 65,000 Btu/h ^b	All	Split System	13.0 SEER	13.0 SEER	<u>13.0 SEER</u>	AHRI 210/240
			Single Package	13.0 SEER	13.0 14.0 SEER	<u>14.0 SEER</u>	
Through-the-wall (air cooled)	≤ 30,000 Btu/h ^b	All	Split system	12.0 SEER	12.0 SEER	<u>12.0 SEER</u>	
			Single Package	12.0 SEER	12.0 SEER	<u>12.0 SEER</u>	
Small-duct high-velocity (air cooled)	< 65,000 Btu/h ^b	All	Split System	10.0 SEER	10.0 11.0 SEER	<u>11.0 SEER</u>	
Air conditioners, air cooled	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.2 EER 11.4 IEER	11.2 EER 11.4 IEER	<u>11.2 EER</u> <u>12.8 IEER</u>	AHRI 340/360
		All other	Split System and Single Package	11.0 EER 11.2 IEER	11.0 EER 11.2 IEER	<u>11.0 EER</u> <u>12.6 IEER</u>	
	≥ 135,000 Btu/h and < 240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.0 EER 11.2 IEER	11.0 EER 11.2 IEER	<u>11.0 EER</u> <u>12.4 IEER</u>	
		All other	Split System and Single Package	10.8 EER 11.0 IEER	10.8 EER 11.0 IEER	<u>10.8 EER</u> <u>12.2 IEER</u>	
	≥ 240,000 Btu/h and < 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	10.0 EER 10.1 IEER	10.0 EER 10.1 IEER	<u>10.0 EER</u> <u>11.6 IEER</u>	
		All other	Split System and Single Package	9.8 EER 9.9 IEER	9.8 EER 9.9 IEER	<u>9.8 EER</u> <u>11.4 IEER</u>	
	≥ 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	9.7 EER 9.8 IEER	9.7 EER 9.8 IEER	<u>9.7 EER</u> <u>11.2 IEER</u>	
		All other	Split System and Single Package	9.5 EER 9.6 IEER	9.5 EER 9.6 IEER	<u>9.5 EER</u> <u>11.0 IEER</u>	
Air conditioners, water cooled	< 65,000 Btu/h ^b	All	Split System and Single Package	12.1 EER 12.3 IEER	12.1 EER 12.3 IEER	<u>12.1 EER</u> <u>12.3 IEER</u>	AHRI 210/240

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY			TEST PROCEDURE ^a
				Before 6/1/2011	As of 6/1/2011 Before 1/1/2016	As of 1/1/2016	
	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.5 EER 11.7 IEER	12.1 EER 12.3 IEER	<u>12.1 EER</u> <u>13.9 IEER</u>	AHRI 340/360
		All other	Split System and Single Package	11.3 EER 11.5 IEER	11.9 EER 12.1 IEER	<u>11.9 EER</u> <u>13.7 IEER</u>	
	≥ 135,000 Btu/h and < 240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.0 EER 11.2 IEER	12.5 EER 12.5 IEER	<u>12.5 EER</u> <u>13.9 IEER</u>	
		All other	Split System and Single Package	10.8 EER 11.0 IEER	12.3 EER 12.5 IEER	<u>12.3 EER</u> <u>13.7 IEER</u>	
	≥ 240,000 Btu/h And < 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.0 EER 11.1 IEER	12.4 EER 12.6 IEER	<u>12.4 EER</u> <u>13.6 IEER</u>	
		All other	Split System and Single Package	10.8 EER 10.9 IEER	12.2 EER 12.4 IEER	<u>12.2 EER</u> <u>13.4 IEER</u>	
	≥ 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.0 EER 11.1 IEER	12.2 EER 12.4 IEER	<u>12.2 EER</u> <u>13.5 IEER</u>	
		All other	Split System and Single Package	10.8 EER 10.9 IEER	12.0 EER 12.2 IEER	<u>12.0 EER</u> <u>13.3 IEER</u>	
	< 65,000 Btu/h ^b	All	Split System and Single Package	12.1 EER 12.3 IEER	12.1 EER 12.3 IEER	<u>12.1 EER</u> <u>12.3 IEER</u>	
		All	Split System and Single Package	12.1 EER 12.3 IEER	12.1 EER 12.3 IEER	<u>12.1 EER</u> <u>12.3 IEER</u>	
Air conditioners, evaporatively cooled	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.5 EER 11.7 IEER	12.1 EER 12.3 IEER	<u>12.1 EER</u> <u>12.3 IEER</u>	AHRI 340/360
		All other	Split System and Single Package	11.3 EER 11.5 IEER	11.9 EER 12.1 IEER	<u>11.9 EER</u> <u>12.1 IEER</u>	
	< 135,000 Btu/h and < 240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.0 EER 11.2 IEER	12.0 EER 12.2 IEER	<u>12.0 EER</u> <u>12.2 IEER</u>	
		All other	Split System and Single Package	10.8 EER 11.0 IEER	11.8 EER 12.0 IEER	<u>11.8 EER</u> <u>12.0 IEER</u>	
	< 240,000 Btu/h and < 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.0 ERR 11.1 IERR	11.9 ERR 12.1 IERR	<u>11.9 ERR</u> <u>12.1 IEER</u>	
		All other	Split System and Single Package	10.8 EER 10.9 IEER	12.2 11.7 ERR 11.9 IEER	<u>11.7 ERR</u> <u>11.9 IEER</u>	
	≥ 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.0 ERR 11.1 EER	11.7 ERR 11.9 ERR	<u>11.7 ERR</u> <u>11.9 ERR</u>	
		All other	Split System and Single Package	10.8 ERR 10.9 EER	11.5 ERR 11.7 ERR	<u>11.5 ERR</u> <u>11.7 ERR</u>	
	< 65,000 Btu/h ^b	All	Split System and Single Package	12.1 EER 12.3 IEER	12.1 EER 12.3 IEER	<u>12.1 EER</u> <u>12.3 IEER</u>	
		All	Split System and Single Package	12.1 EER 12.3 IEER	12.1 EER 12.3 IEER	<u>12.1 EER</u> <u>12.3 IEER</u>	

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY			TEST PROCEDURE ^a
				Before 6/1/2011	As of 6/1/2011 Before 1/1/2016	As of 1/1/2016	
Condensing units, air cooled	≥ 135,000 Btu/h			10.1 EER 11.4 IEER	10.5 EER 14.0 <u>11.8</u> IEER	<u>10.5 EER</u> <u>11.8 IEER</u>	AHRI 365
Condensing units, water cooled	≥ 135,000 Btu/h			13.1 EER 13.6 IEER	13.5 EER 14.0 IEER	<u>13.5 EER</u> <u>14.0 IEER</u>	
Condensing units, evaporatively cooled	≥ 135,000 Btu/h			13.1 EER 13.6 IEER	13.5 EER 14.0 IEER	<u>13.5 EER</u> <u>14.0 IEER</u>	

For SI: 1 British thermal unit per hour = 0.2931 W.

- a. Chapter 5 of the referenced standard contains a complete specification of the referenced test procedure, including the reference year version of the test procedure.
b. Single-phase, air-cooled air conditioners less than 65,000 Btu/h are regulated by NAECA. SEER values are those set by NAECA.

TABLE C403.2.3(2)
MINIMUM EFFICIENCY REQUIREMENTS:
ELECTRICALLY OPERATED UNITARY AND APPLIED HEAT PUMPS

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY		TEST PROCEDURE ^a
				Before 1/1/2016	As of 1/1/2016	
Air cooled (cooling mode)	< 65,000 Btu/h ^b	All	Split System	13.0 <u>14.0</u> SEER	<u>14.0 SEER</u>	AHRI 210/240
			Single Packaged	13.0 <u>14.0</u> SEER	<u>14.0 SEER</u>	
Through-the-wall, air cooled	≤ 30,000 Btu/h ^b	All	Split System	13.0 <u>12.0</u> SEER	<u>12.0 SEER</u>	
			Single Packaged	13.0 <u>12.0</u> SEER	<u>12.0 SEER</u>	
Single-duct high-velocity air cooled	< 65,000 Btu/h ^b	All	Split System	10.0 <u>11.0</u> SEER	<u>11 SEER</u>	
Air cooled (cooling mode)	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.0 EER 11.2 IEER	<u>11.0 EER</u> <u>12.0 IEER</u>	AHRI 340/360
		All other	Split System and Single Package	10.8 EER 11.0 IEER	<u>10.8 EER</u> <u>11.8 IEER</u>	
	≥ 135,000 Btu/h and	Electric Resistance (or None)	Split System and Single Package	10.6 EER 10.7 IEER	<u>10.6 EER</u> <u>11.6 IEER</u>	

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY		TEST PROCEDURE ^a
				<u>Before 1/1/2016</u>	<u>As of 1/1/2016</u>	
	< 240,000 Btu/h	All other	Split System and Single Package	10.4 EER 10.5 IEER	10.4 EER <u>11.4 IEER</u>	
	≥ 240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	9.5 EER 9.6 IEER	9.5 EER <u>10.6 IEER</u>	
		All other	Split System and Single Package	9.3 EER 9.4 IEER	9.3 EER <u>10.4 IEER</u>	
Water source (cooling mode)	< 17,000 Btu/h	All	86°F entering water	11.2 EER		ISO 13256-1
	≥ 17,000 Btu/h and < 65,000 Btu/h	All	86°F entering water	12.0 EER		
	≥ 65,000 Btu/h and < 135,000 Btu/h	All	86°F entering water	12.0 EER		
Ground water source (cooling mode)	< 135,000 Btu/h	All	59°F entering water	16.2 EER		
		All	77°F entering water	13.4 EER		
Water-source water-to-water (cooling mode)	< 135,000 Btu/h	All	86°F entering water	10.6 EER		ISO 13256-2
			59°F entering water	16.3 EER		
Ground water source Brine to water (cooling mode)	< 135,000 Btu/h	All	77°F entering fluid	12.1 EER		
Air cooled (heating mode)	< 65,000 Btu/h ^b	—	Split System	7.7 HSPF		AHRI 210/240
		—	Single Package	7.7 HSPF		
Through-the-wall, (air cooled, heating mode)	≤ 30,000 Btu/h ^b (cooling capacity)	—	Split System	7.4 HSPF		

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY		TEST PROCEDURE ^a
				<u>Before 1/1/2016</u>	<u>As of 1/1/2016</u>	
		—	Single Package	7.4 HSPF		
Small-duct high-velocity (air-cooled, heating mode)	< 65,000 Btu/h ^b	—	Split System	6.8 HSPF		
<u>Air-cooled</u> (heating mode)	<u>≥ 65,000 Btu/h</u> and <u>< 135,000 Btu/h</u> (cooling capacity)	—	<u>47°F db/43°F wb</u> <u>Outdoor Air</u>	<u>3.3 COP</u>		<u>AHRI</u> <u>340/360</u>
			<u>17°F db/15°F wb</u> <u>Outdoor Air</u>	<u>2.25 COP</u>		
	<u>≥ 135,000 Btu/h</u> (cooling capacity)	—	<u>47°F db/43°F wb</u> <u>Outdoor Air</u>	<u>3.2 COP</u>		
			<u>17°F db/15°F wb</u> <u>Outdoor Air</u>	<u>2.05 COP</u>		
<u>Water source</u> (heating mode)	<u>< 135,000 Btu/h</u> (cooling capacity)	—	<u>68°F entering water</u>	<u>4.2 COP</u>		<u>ISO 13256-1</u>
<u>Ground-water source</u> (heating mode)	<u>< 135,000 Btu/h</u> (cooling capacity)	—	<u>50°F entering water</u>	<u>3.6 COP</u>		
<u>Ground source</u> (heating mode)	<u>< 135,000 Btu/h</u> (cooling capacity)	—	<u>32°F entering fluid</u>	<u>3.1 COP</u>		
<u>Water source</u> <u>water to water</u> (heating mode)	<u>< 135,000 Btu/h</u> (cooling capacity)	—	<u>68°F entering water</u>	<u>3.7 COP</u>		<u>ISO 13256-2</u>
		—	<u>50°F entering water</u>	<u>3.1 COP</u>		
<u>Ground source</u> <u>brine to water</u> (heating mode)	<u>< 135,000 Btu/h</u> (cooling capacity)	—	<u>32°F entering fluid</u>	<u>2.5 COP</u>		
<u>Water to Air: Water Loop</u> (cooling mode)	<u>< 17,000 Btu/h</u>	<u>All</u>	<u>86 °F entering water</u>	<u>12.2 EER</u>	<u>12.2 EER</u>	<u>ISO 13256-1</u>
	<u>≥ 17,000 Btu/h and</u> <u>< 65,000 Btu/h</u>	<u>All</u>	<u>86 °F entering water</u>	<u>13 EER</u>	<u>13 EER</u>	

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY		TEST PROCEDURE ^a
				<u>Before 1/1/2016</u>	<u>As of 1/1/2016</u>	
	<u>≥65,000 Btu/h and <135,000 Btu/h</u>	<u>All</u>	<u>86 °F entering water</u>	<u>13 EER</u>	<u>13 EER</u>	
<u>Water to Air: Ground Water (cooling mode)</u>	<u><135,000 Btu/h</u>	<u>All</u>	<u>59 °F entering water</u>	<u>18.0 EER</u>	<u>18.0 EER</u>	<u>ISO 13256-1</u>
<u>Brine to Air: Ground Loop (cooling mode)</u>	<u><135,000 Btu/h</u>	<u>All</u>	<u>77 F entering water</u>	<u>14.1 EER</u>	<u>14.1 EER</u>	<u>ISO 13256-1</u>
<u>Water to Water: Water Loop (cooling mode)</u>	<u><135,000 Btu/h</u>	<u>All</u>	<u>86 °F entering water</u>	<u>10.6 EER</u>	<u>10.6 EER</u>	<u>ISO-13256-2</u>
<u>Water to Water: Ground Water (Cooling Mode)</u>	<u><135,000 Btu/h</u>	<u>All</u>	<u>59 °F entering water</u>	<u>16.3 EER</u>	<u>16.3 EER</u>	
<u>Brine to Water: Ground Loop (cooling mode)</u>	<u><135,000 Btu/h</u>	<u>All</u>	<u>77 °F entering water</u>	<u>12.1 EER</u>	<u>12.1 EER</u>	
<u>Air cooled (heating mode)</u>	<u><65,000 Btu/h^b</u>	<u>=</u>	<u>Split System</u>	<u>8.2 HSPF</u>	<u>8.2 HSPF</u>	<u>AHRI 210/240</u>
		<u>=</u>	<u>Single Package</u>	<u>8.0 HSPF</u>	<u>8.0 HSPF</u>	
<u>Through-the-wall, (air cooled, heating mode)</u>	<u>≤30,000 Btu/h^b (cooling capacity)</u>	<u>=</u>	<u>Split System</u>	<u>7.4 HSPF</u>	<u>7.4 HSPF</u>	
		<u>=</u>	<u>Single Package</u>	<u>7.4 HSPF</u>	<u>7.4 HSPF</u>	
<u>Small-Duct high velocity (air cooled, heating mode)</u>	<u><65,000 Btu/h^b</u>	<u>=</u>	<u>Split System</u>	<u>6.8 HSPF</u>	<u>6.8 HSPF</u>	
<u>Air Cooled (Heating Mode)</u>	<u>≥65,000 Btu/h and <135,000 Btu/h (Cooling Capacity)</u>	<u>=</u>	<u>47°F db/43°F wb Outdoor Air</u>	<u>3.3 COP</u>	<u>3.3 COP</u>	<u>AHRI 340/360</u>
			<u>17°F db/15°F wb Outdoor Air</u>	<u>2.25 COP</u>	<u>2.25 COP</u>	
	<u>≥135,000 Btu/h (Cooling Capacity)</u>	<u>=</u>	<u>47°F db/43°F wb Outdoor Air</u>	<u>3.2 COP</u>	<u>3.2 COP</u>	

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY		TEST PROCEDURE ^a
				<u>Before 1/1/2016</u>	<u>As of 1/1/2016</u>	
			<u>17°F db/15°F wb Outdoor Air</u>	<u>2.05 COP</u>	<u>2.05 COP</u>	
<u>Water to Air: Water Loop (heating mode)</u>	<u><135,000 Btu/h (cooling capacity)</u>	==	<u>68 °F entering water</u>	<u>4.3 COP</u>	<u>4.3 COP</u>	<u>ISO 13256-1</u>
<u>Water to Air: Ground Water (heating mode)</u>	<u><135,000 Btu/h (cooling capacity)</u>	==	<u>50 °F entering water</u>	<u>3.7 COP</u>	<u>3.7 COP</u>	
<u>Brine to Air: Ground Loop (heating mode)</u>	<u><135,000 Btu/h (cooling capacity)</u>	==	<u>32 °F entering fluid</u>	<u>3.2 COP</u>	<u>3.2 COP</u>	
<u>Water to Water: Water Loop (heating mode)</u>	<u><135,000 Btu/h (cooling capacity)</u>	==	<u>68 °F entering water</u>	<u>3.7 COP</u>	<u>3.7 COP</u>	<u>ISO 13256-2</u>
<u>Water to Water: Ground Water (heating mode)</u>	<u><135,000 Btu/h (cooling capacity)</u>	==	<u>50 °F entering water</u>	<u>3.1 COP</u>	<u>3.1 COP</u>	
<u>Brine to Water: Ground Loop (heating mode)</u>	<u><135,000 Btu/h (cooling capacity)</u>	==	<u>32 °F entering fluid</u>	<u>2.5 COP</u>	<u>2.5 COP</u>	

For SI: 1 British thermal unit per hour = 0.2931 W. °C = [(°F) – 32]/1.8

- Chapter 5 of the referenced standard contains a complete specification of the referenced test procedure, including the reference year version of the test procedure.
- Single-phase, air-cooled air conditioners less than 65,000 Btu/h are regulated by NAECA. SEER values are those set by NAECA.

TABLE C403.2.3(3)
MINIMUM EFFICIENCY REQUIREMENTS:
ELECTRICALLY OPERATED PACKAGED TERMINAL AIR CONDITIONERS,
PACKAGED TERMINAL HEAT PUMPS, SINGLE-PACKAGE VERTICAL AIR CONDITIONERS,
SINGLE VERTICAL HEAT PUMPS, ROOM AIR CONDITIONERS AND ROOM AIR-CONDITIONER HEAT PUMPS

EQUIPMENT TYPE	SIZE CATEGORY (INPUT)	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY		TEST PROCEDURE ^a
			Before 10/08/2012	As of 10/08/2012	
PTAC (cooling mode) new construction	All Capacities	95°F db outdoor air	$12.5 - (0.213 \times \text{Cap}/1000) \text{ EER}$	$13.8 - (0.300 \times \text{Cap}/1000) \text{ EER}$ $14.0 - (0.300 \times \text{Cap}/1000) \text{ EER}^c$	AHRI 310/380
PTAC (cooling mode) replacements ^b	All Capacities	95°F db outdoor air	$10.9 - (0.213 \times \text{Cap}/1000) \text{ EER}$	$10.9 - (0.213 \times \text{Cap}/1000) \text{ EER}$	
PTHP (cooling mode) new construction	All Capacities	95°F db outdoor air	$12.3 - (0.213 \times \text{Cap}/1000) \text{ EER}$	$14.0 - (0.300 \times \text{Cap}/1000) \text{ EER}$	
PTHP (cooling mode) replacements ^b	All Capacities	95°F db outdoor air	$10.8 - (0.213 \times \text{Cap}/1000) \text{ EER}$	$10.8 - (0.213 \times \text{Cap}/1000) \text{ EER}$	
PTHP (heating mode) new construction	All Capacities	—	$3.2 - (0.026 \times \text{Cap}/1000) \text{ COP}$	$3.2 - (0.026 \times \text{Cap}/1000) \text{ COP}$	
PTHP (heating mode) replacements ^b	All Capacities	—	$2.9 - (0.026 \times \text{Cap}/1000) \text{ COP}$	$2.9 - (0.026 \times \text{Cap}/1000) \text{ COP}$	
SPVAC (cooling mode)	< 65,000 Btu/h	95°F db/ 75°F wb outdoor air	9.0 EER	9.0 EER	AHRI 390
	≥ 65,000 Btu/h and < 135,000 Btu/h	95°F db/ 75°F wb outdoor air	8.9 EER	8.9 EER	
	≥ 135,000 Btu/h and < 240,000 Btu/h	95°F db/ 75°F wb outdoor air	8.6 EER	8.6 EER	
SPVHP (cooling mode)	< 65,000 Btu/h	95°F db/ 75°F wb outdoor air	9.0 EER	9.0 EER	
	≥ 65,000 Btu/h and < 135,000 Btu/h	95°F db/ 75°F wb outdoor air	8.9 EER	8.9 EER	
	≥ 135,000 Btu/h and < 240,000 Btu/h	95°F db/ 75°F wb outdoor air	8.6 EER	8.6 EER	
SPVHP (heating mode)	< 65,000 Btu/h	47°F db/ 43°F wb outdoor air	3.0 COP	3.0 COP	AHRI 390
	≥ 65,000 Btu/h and < 135,000 Btu/h	47°F db/ 43°F wb outdoor air	3.0 COP	3.0 COP	

	$\geq 135,000$ Btu/h and $< 240,000$ Btu/h	47°F db/ 75°F wb outdoor air	2.9 COP	2.9 COP	
Room air conditioners, with louvered slides	$< 6,000$ Btu/h	—	9.7 SEER	9.7 SEER	ANSI/AHAM RAC-1
	$\geq 6,000$ Btu/h and $< 8,000$ Btu/h	—	9.7 EER	9.7 EER	
	$\geq 8,000$ Btu/h and $< 14,000$ Btu/h	—	9.8 EER	9.8 EER	
	$\geq 14,000$ Btu/h and $< 20,000$ Btu/h	—	9.7 SEER	9.7 SEER	
	$\geq 20,000$ Btu/h	—	8.5 EER	8.5 EER	
Room air conditioners, with louvered slides	$< 8,000$ Btu/h	—	9.0 EER	9.0 EER	
	$\geq 8,000$ Btu/h and $< 20,000$ Btu/h	—	8.5 EER	8.5 EER	
	$\geq 20,000$ Btu/h	—	8.5 EER	8.5 EER	
Room air-conditioner heat pumps with louvered sides	$< 20,000$ Btu/h	—	9.0 EER	9.0 EER	
	$\geq 20,000$ Btu/h	—	8.5 EER	8.5 EER	
Room air-conditioner heat pumps without louvered sides	$< 14,000$ Btu/h	—	8.5 EER	8.5 EER	
	$\geq 14,000$ Btu/h	—	8.0 EER	8.0 EER	
Room air conditioner casement only	All capacities	—	8.7 EER	8.7 EER	
Room air conditioner casement-slider	All capacities	—	9.5 EER	9.5 EER	

For SI: 1 British thermal unit per hour = 0.2931 W, °C = [(°F) - 32]/1.8.

"Cap" = The rated cooling capacity of the project in Btu/h. If the unit's capacity is less than 7000 Btu/h, use 7000 Btu/h in the calculation. If the unit's capacity is greater than 15,000 Btu/h, use 15,000 Btu/h in the calculations

- Chapter 5 of the referenced standard contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.
- Replacement unit shall be factory labeled as follows: "MANUFACTURED FOR REPLACEMENT APPLICATIONS ONLY: NOT TO BE INSTALLED IN NEW CONSTRUCTION PROJECTS." Replacement efficiencies apply only to units with existing sleeves less than 16 inches (406 mm) in height and less than 42 inches (1067 mm) in width.

TABLE C403.2.3(8)
MINIMUM EFFICIENCY REQUIREMENTS:
HEAT REJECTION EQUIPMENT

EQUIPMENT TYPE^a	TOTAL SYSTEM HEAT REJECTION CAPACITY AT RATED CONDITIONS	SUBCATEGORY OR RATING CONDITIONⁱ	PERFORMANCE REQUIRED^{b, c, d, g, h}	TEST PROCEDURE^{e, f}
Propeller or axial fan open circuit cooling towers	All	95°F Entering Water 85°F Leaving Water 75°F Entering wb	≥ 38.2 ≥ 40.2 gpm/hp	CTI ATC-105 and CTI STD-201
Centrifugal fan open circuit cooling towers	All	95°F Entering Water 85°F Leaving Water 75°F Entering wb	≥ 20.0 gpm/hp	CTI ATC-105 and CTI STD-201
Propeller or axial fan closed circuit cooling towers	All	102°F Entering Water 90°F Leaving Water 75°F Entering wb	≥ 14.0 gpm/hp	CTI ATC-105S and CTI STD-201
Centrifugal closed circuit cooling towers	All	102°F Entering Water 90°F Leaving Water 75°F Entering wb	≥ 7.0 gpm/hp	CTI ATC-105S and CTI STD-201
Propeller or axial fan <u>evaporative condensers</u>	<u>All</u>	<u>Ammonia Test Fluid</u> <u>140°F entering gas temperature</u> <u>96.3°F condensing temperature 75°F entering wb</u>	<u>≥ 134,000 Btu/h·hp</u>	<u>CTI ATC-106</u>
<u>Centrifugal fan evaporative condensers</u>	<u>All</u>	<u>Ammonia Test Fluid</u> <u>140°F entering gas temperature</u> <u>96.3°F condensing temperature</u> <u>75°F entering wb</u>	<u>≥ 110,000 Btu/h·hp</u>	<u>CTI ATC-106</u>
<u>Propeller or axial fan evaporative condensers</u>	<u>All</u>	<u>R-507A Test Fluid</u> <u>165°F entering gas temperature</u> <u>105°F condensing temperature</u> <u>75°F entering wb</u>	<u>≥ 157,000 Btu/h·hp</u>	<u>CTI ATC-106</u>
<u>Centrifugal fan evaporative condensers</u>	<u>All</u>	<u>R-507A Test Fluid</u> <u>165°F entering gas temperature</u> <u>105°F condensing temperature</u> <u>75°F entering wb</u>	<u>≥ 135,000 Btu/h·hp</u>	<u>CTI ATC-106</u>
Air-cooled condensers	All	125°F Condensing Temperature R-22 Test Fluid 190°F Entering Gas Temperature 15°F Subcooling 95°F Entering db	≥ 176,000 Btu/h·hp	ARI 460

For SI: °C = [(°F)-32]/1.8, L/s · kW = (gpm/hp)/(11.83), COP = (Btu/h · hp)/(2550.7)

db = dry bulb temperature, °F, wb = wet bulb temperature, °F.

- a. The efficiencies and test procedures for both open and closed circuit cooling towers are not applicable to hybrid cooling towers that contain a combination of wet and dry heat exchange sections.
- b. For purposes of this table, open circuit cooling tower performance is defined as the water flow rating of the tower at the thermal rating condition listed in Table 403.2.3(8) divided by the fan nameplate rated motor power.
- c. For purposes of this table, closed circuit cooling tower performance is defined as the water flow rating of the tower at the thermal rating condition listed in Table 403.2.3(8) divided by the sum of the fan nameplate rated motor power and the spray pump nameplate rated motor power.
- d. For purposes of this table, air-cooled condenser performance is defined as the heat rejected from the refrigerant divided by the fan nameplate rated motor power.
- e. Chapter 6 of the referenced standard contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure. The certification requirements do not apply to field erected cooling towers.
- f. If a certification program exists for a covered product, and it includes provisions for verification and challenge of equipment efficiency ratings, then the product shall be listed in the certification program, or, if a certification program exists for a covered product, and it includes provisions for verification and challenge of equipment efficiency ratings, but the product is not listed in the existing certification program, the ratings shall be verified by an independent laboratory test report.
- g. All cooling towers shall comply with the minimum efficiency listed in the table for that specific type of tower with the capacity effect of any project specific accessories and / or options included in the capacity of the cooling tower
- h. For purposes of this table, evaporative condenser performance is defined as the heat rejected at the specified rating condition in the table divided by the sum of the fan motor nameplate power and the integral spray pump nameplate power
- i. Requirements for evaporative condensers are listed with ammonia (R-717) and R-507A as test fluids in the table. Evaporative condensers intended for use with halocarbon refrigerants other than R-507A shall meet the minimum efficiency requirements listed above with R-507A as the test fluid.

Add new standards as follows:

CTI

ATC 105S-11 Acceptance Test Code for Closed Circuit Cooling Towers

ATC 106-11 Acceptance Test Code for Mechanical Draft Evaporative Vapor Condensers

Reason: For consistency with Standard 90.1. This proposal contains all of the increased equipment efficiency requirements found in standard 90.1. As that standard is an alternative path to compliance with the IECC and there is a desire to maintain equivalency of the IECC with 90.1.

Cost Impact: The code change proposal will increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, CTI -ATC 105S-2011 Acceptance Test Code for Closed Circuit Cooling Towers, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

A review of the standard proposed for inclusion in the code, CTI-ATC 106-2011 Acceptance Test Code for Mechanical Draft Evaporative Vapor Condensers, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

CE200-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.3(1)T-EC-FERGUSON.doc

CE201 – 13

C202 (NEW), Table 403.2.3(9) (NEW), Chapter 5

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new Table as follows:

TABLE C403.2.3 (9)
MINIMUM EFFICIENCY AIR CONDITIONERS AND CONDENSING UNITS SERVING COMPUTER ROOMS

Equipment Type	Net Sensible Cooling Capacity ^a	Minimum SCOP-127 ^b Efficiency Downflow units / Upflow units	Test Procedure
Air conditioners, air cooled	65,000 Btu/h	2.20 / 2.09	ANSI/ASHRAE 127
	≥65,000 Btu/h and < 240,000 Btu/h	2.10 / 1.99	
	≥240,000 Btu/h	1.90 / 1.79	
Air conditioners, water cooled	65,000 Btu/h	2.60 / 2.49	
	≥65,000 Btu/h and < 240,000 Btu/h	2.50 / 2.39	
	≥240,000 Btu/h	2.40 / 2.29	
Air conditioners, water cooled with fluid economizer	65,000 Btu/h	2.55 / 2.44	
	≥65,000 Btu/h and < 240,000 Btu/h	2.45 / 2.34	
	≥240,000 Btu/h	2.35 / 2.24	
Air conditioners, glycol cooled (rated at 40% propylene glycol)	65,000 Btu/h	2.50 / 2.39	
	≥65,000 Btu/h and < 240,000 Btu/h	2.15 / 2.04	
	≥240,000 Btu/h	2.10 / 1.99	
Air conditioners, glycol cooled (rated at 40% propylene glycol) with fluid economizer	65,000 Btu/h	2.45 / 2.34	
	≥65,000 Btu/h and < 240,000 Btu/h	2.10 / 1.99	
	≥240,000 Btu/h	2.05 / 1.94	

- a. Net sensible cooling capacity: The total gross cooling capacity less the latent cooling less the energy to the air movement system. (Total Gross – latent – Fan Power)
- b. Sensible coefficient of performance (SCOP-127): a ratio calculated by dividing the net sensible cooling capacity in watts by the total power input in watts (excluding re-heaters and humidifiers) at conditions defined in ASHRAE Standard 127. The net sensible cooling capacity is the gross sensible capacity minus the energy dissipated into the cooled space by the fan system.

Add new definition as follows:

SECTION C202 GENERAL DEFINITIONS

COMPUTER ROOM. A room whose primary function is to house equipment for the processing and storage of electronic data and that has a design electronic data equipment power density exceeding 20 watts/ft² of conditioned floor area.

Add new standard to Chapter 5 as follows:

ASHRAE

127-07 Method of Testing for Raising Computer and Data Processing Room Unitary Air Conditioners

Reason: Computer rooms, due to the unique nature of the space, have a significant level of internal heat generation that must be addressed to ensure the equipment therein functions properly. This generally “trumps” any consideration of the sensible or latent

loads associated with the people in the space. The cooling equipment that addresses the loads associated with these spaces operates differently and responds to different loads and schedules. This necessitates the efficiency of such equipment be addressed differently than more traditional cooling equipment. ANSI/ASHRAE Standard 127 has been developed for use in measuring and expressing the performance of this equipment for this particular and unique application. This equipment is currently addressed by ASHRAE/IES 90.1-2010, which is adopted as an alternative means of compliance with the IECC. This proposed change addresses the need to cover this unique energy efficiency opportunity in a manner consistent with 90.1-2010. Without this change the IECC Commercial Provisions could not be deemed equivalent to 90.1-2010 or subsequent editions of 90.1 that retain these provisions. More importantly if this change is not approved then the equipment efficiency provisions currently in the IECC would continue to be applied to equipment serving such spaces inappropriately

Cost Impact: The code change proposal will increase the cost of construction as there were previously no requirements for this equipment.

Analysis: A review of the standard proposed for inclusion in the code, ASHRAE 127-2007 Method of Testing for Raining Computer and Data Processing Room Unitary Air Conditioners, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

CE201-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.3(9)T-EC-FERGUSON.doc

CE202 – 13

C403.2.3.1

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C403.2.3.1 Water-cooled centrifugal chilling packages. Equipment not designed for operation at AHRI Standard 550/590 test conditions of 44°F (7°C) leaving chilled-water temperature and 85°F (29°C) entering condenser water temperature with 3 gpm/ton (0.054 l/s · kW) condenser water flow shall have maximum full-load kW/ton and *NPLV* ratings adjusted using Equations 4-3 and 4-4.

Adjusted minimum full-load COP ratings = (Full-load COP from Table 6.8.1C of AHRI 550/590) × K_{adj}
(Equation 4-3)

Adjusted minimum *NPLV* rating = (IPLV from Table 6.8.1C of AHRI 550/590) × K_{adj} (Equation 4-4)

where:

$$\begin{aligned} K_{adj} &= A \times B \\ A &= 0.0000015318 \times (\text{LIFT})^4 - 0.000202076 \times (\text{LIFT})^3 + 0.0101800 \times (\text{LIFT})^2 - 0.264958 \times \\ &\quad \text{LIFT} + 3.930196 \\ B &= 0.0027 \times L_{vg}^{\text{Evap}} (\text{°C}) + 0.982 \\ \text{LIFT} &= L_{vg}^{\text{Cond}} - L_{vg}^{\text{Evap}} \\ L_{vg}^{\text{Cond}} &= \text{Full-load condenser leaving water temperature (°C)} \\ L_{vg}^{\text{Evap}} &= \text{Full-load leaving evaporator temperature (°C)} \end{aligned}$$

SI units shall be used in the K_{adj} equation.

The adjusted full-load and *NPLV* values shall only be applicable for centrifugal chillers meeting all of the following full-load design ranges:

1. The leaving evaporator fluid temperature is not less than 36°F (2.2°C).
2. The leaving condenser fluid temperature is not greater than 115°F (46.1°C).
3. LIFT is not less than 20°F (11.1 °C) and not greater than 80°F (44.4°C).

Exception: Centrifugal chillers designed to operate outside of ~~these~~ the temperature and flow ranges specified in this section need not meet the minimum efficiency requirements in Table C403.2.3(7) ~~need not comply with this code.~~

Reason: This proposal clarifies the code with respect to the type of systems that need not comply with the requirements. The ranges in question (temperature and flow) should be stated to eliminate any confusion as to what “these” refers. The result of the exception is more explicitly stated to refer to the minimum efficiency requirements in Table C403.2.3(7), as there are other requirements of “this code” related to the chiller that still apply, such as part load controls.

Cost Impact: The code change proposal will not increase the cost of construction.

CE202-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.3.1-EC-WILLIAMS.doc

CE203 – 13

C403.2.3.1, C403.2.3.2, Table C403.2.3(7)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C403.2.3.1 Water-cooled centrifugal chilling packages. Equipment not designed for operation at AHRI Standard 550/590 test conditions of 44°F (7°C) leaving chilled-water temperature and 2.4 gpm/ton evaporator fluid flow and 85°F (29°C) entering condenser water temperature with 3 gpm/ton (0.054 l/s • kW) condenser water flow shall have maximum full-load kW/ton (FL) and ~~NPLV~~ part load ratings requirements adjusted using Equations 4-3 and 4-4.

~~Adjusted minimum full-load COP ratings = (Full-load COP from Table 6.8.1C of AHRI Standard 550/590) × K_{adj}~~

$$FL_{adj} = FL / K_{adj}$$

~~Adjusted minimum NPLV rating = (IPLV from Table 6.8.1C of AHRI Standard 550/590) × K_{adj}~~

$$PLV_{adj} = IPLV / K_{adj}$$

Equation 4-4)

where:

$$K_{adj} = A \times B$$

$$A = 0.0000015318 \times (LIFT)^4 - 0.000202076 \times (LIFT)^3 + 0.0101800 \times (LIFT)^2 - 0.264958 \times LIFT + 3.930196$$

$$B = 0.0027 \times L_{vg}^{Evap} (°C) + 0.982$$

$$LIFT = L_{vg}^{Cond} - L_{vg}^{Evap}$$

$$L_{vg}^{Cond} = \text{Full-load condenser leaving water temperature (°C)}$$

$$L_{vg}^{Evap} = \text{Full-load leaving evaporator temperature (°C)}$$

~~SI units shall be used in the K_{adj} equation.~~

~~The adjusted full-load and NPLV values shall only be applicable for centrifugal chillers meeting all of the following full-load design ranges:~~

- ~~1. The leaving evaporator fluid temperature is not less than 36°F (2.2°C).~~
- ~~2. The leaving condenser fluid temperature is not greater than 115°F (46.1°C).~~
- ~~3. LIFT is not less than 20°F (11.1 °C) and not greater than 80°F (44.4°C).~~

~~**Exception:** Centrifugal chillers designed to operate outside of these ranges need not comply with this code.~~

FL = full-load kW/Ton value from Table C403.2.3(7)

FL_{adj} = maximum full-load kW/Ton rating, adjusted for non-standard conditions

IPLV = IPLV value from Table C403.2.3(7)

PLV_{adj} = maximum NPLV rating, adjusted for non-standard conditions

$$A = 0.00000014592 \times (LIFT)^4 - 0.0000346496 \times (LIFT)^3 + 0.00314196 \times (LIFT)^2 - 0.147199 \times (LIFT) + 3.9302$$

$$B = 0.0015 \times L_{vg}^{Evap} + 0.934$$

$$LIFT = L_{vg}^{Cond} - L_{vg}^{Evap}$$

$$L_{vg}^{Cond} = \text{Full-load condenser leaving fluid temperature (°F)}$$

LvgEvap = Full-load evaporator leaving temperature (°F)

The FL_{adj} and PLV_{adj} values are only applicable for centrifugal chillers meeting all of the following full-load design ranges:

- Minimum Evaporator Leaving Temperature:36°F
- Maximum Condenser Leaving Temperature:115°F
- 20°F ≤ LIFT ≤ 80°F

C403.2.3.2 Positive displacement (air- and water-cooled) chilling packages. Equipment with a leaving fluid temperature higher than 32°F (0°C) and water-cooled positive displacement chilling packages with a condenser leaving fluid temperature below 115°F, shall meet the requirements of Table C403.2.3(7) when tested or certified with water at standard rating conditions, in accordance with the referenced test procedure.

TABLE C403.2.3(7)
MINIMUM EFFICIENCY REQUIREMENTS:
WATER CHILLING PACKAGES^a

EQUIPMENT TYPE	SIZE CATEGORY	UNITS	BEFORE 1/1/2010		AS OF 1/1/2010 ^b				TEST PROCEDURE ^c
					PATH A		PATH B		
			FULL LOAD	IPLV	FULL LOAD	IPLV	FULL LOAD	IPLV	
Air-cooled chillers	<150 tons	EER	≥9.562	≥10.446	≥9.562	≥12.500	NA	NA	AHRI 550/590
	≥150 tons	EER			≥9.562	≥12.750	NA	NA	
Air-cooled without condenser, electrical operated	All capacities	EER	≥10.586	≥11.782	Air-cooled chillers without condensers shall be rated with matching condensers and comply with the air-cooled chiller efficiency requirements				
Water cooled, electrically operated, reciprocating	All capacities	kW/ton	≤0.837	≤0.696	Reciprocating units shall comply with water cooled positive displacement efficiency requirements				
Water cooled, electrically operated, positive displacement	<75 tons	kW/ton	≤0.790	≤0.676	≤0.780	≤0.630	≤0.800	≤0.600	
	≥75 tons and <150 tons	kW/ton			≤0.775	≤0.615	≤0.790	≤0.586	
	≥150 tons and <300 tons	kW/ton	≤0.717	≤0.627	≤0.680	≤0.580	≤0.718	≤0.540	
	≥300 tons	kW/ton	≤0.639	≤0.571	≤0.620	≤0.540	≤0.639	≤0.490	
Water cooled, electrically operated, centrifugal	<150 tons	kW/ton	≤0.703	≤0.669	≤0.634	≤0.596	≤0.639	≤0.450	
	≥150 tons and <300 tons	kW/ton	≤0.634	≤0.596					
	≥300 tons and <600 tons	kW/ton	≤0.576	≤0.549	≤0.576	≤0.549	≤0.600	≤0.400	
	≥600 tons	kW/ton	≤0.576	≤0.549	≤0.570	≤0.539	≤0.590	≤0.400	
Air-cooled, absorption single-effect	All capacities	COP	≥0.600	NR	≥0.600	NR	NA	NA	AHRI-560

Water cooled, absorption single effect	All capacities	COP	≥ 0.700	NR	≥ 0.700	NR	NA	NA
Absorption double effect, indirect fired	All capacities	COP	≥ 1.000	≥ 1.050	≥ 1.000	≥ 1.050	NA	NA
Absorption double effect, direct fired	All capacities	COP	≥ 1.000	≥ 1.000	≥ 1.000	≥ 1.000	NA	NA

For SI: 1 ton = 3517 W, 1 British thermal unit per hour = 0.2931 W, °C = [(°F) - 32]/1.8.

NA = Not applicable, not to be used for compliance; NR = No requirement.

- a. The centrifugal chiller equipment requirements, after adjustment in accordance with Section C403.2.3.1 or Section C403.2.3.2, do not apply to chillers used in low-temperature applications where the design leaving fluid temperature is less than 36°F. The requirements do not apply to positive displacement chillers with leaving fluid temperatures less than or equal to 32°F. The requirements do not apply to absorption chillers with design leaving fluid temperatures less than 40°F.
- b. Compliance with this standard can be obtained by meeting the minimum requirements of Path A or B. However, both the full-load and IPLV shall be met to fulfill the requirements of Path A or B.
- c. Chapter 6 of the referenced standard contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.

TABLE C403.2.3(7). Water Chilling Packages – Efficiency Requirements^{a, b, e}

Equipment Type	Size Category	Units	Effective 1/1/2010		Effective 1/1/2015		Test Procedure ^e
			Path A	Path B	Path A	Path B	
Air-Cooled Chillers	< 150 Tons	EER (Btu/W)	≥9.562 FL	NA ^d	≥10.100 FL	≥9.700 FL	
			≥12.500 IPLV	≥13.700 IPLV	≥15.800 IPLV		
	≥150 Tons		≥9.562 FL	NA ^d	≥10.100 FL	≥9.700 FL	
		≥12.750 IPLV		≥14.000 IPLV	≥16.100 IPLV		
Air-Cooled without Condenser, Electrically Operated	All Capacities	EER(Btu/W)	Air-cooled chillers without condenser must be rated with matching condensers and comply with air-cooled chiller efficiency requirements				
Water-Cooled, Electrically Operated Positive Displacement	< 75 Tons	kW/ton	≤0.780 FL	≤0.800 FL	≤0.750 FL	≤0.780 FL	
			≤0.630 IPLV	≤0.600 IPLV	≤0.600 IPLV	≤0.500 IPLV	
	≥ 75 tons and <150 tons		≤0.775 FL	≤0.790 FL	≤0.720 FL	≤0.750 FL	
			≤0.615 IPLV	≤0.586 IPLV	≤0.560 IPLV	≤0.490 IPLV	
	≥ 150 tons and < 300 tons		≤0.680-FL	≤0.718 FL	≤0.660 FL	≤0.680 FL	
			≤0.580 IPLV	≤0.540 IPLV	≤0.540 IPLV	≤0.440 IPLV	
	≥ 300 tons and < 600 tons		≤0.620-FL	≤0.639-FL	≤0.610 FL	≤0.625 FL	
			≤0.540 IPLV	≤0.490 IPLV	≤0.520 IPLV	≤0.410 IPLV	
	≥ 600 tons		≤0.620-FL	≤0.639 FL	≤0.560 FL	≤0.585 FL	
			≤0.540 IPLV	≤0.490 IPLV	≤0.500 IPLV	≤0.380 IPLV	
Water Cooled, Electrically Operated Centrifugal	< 150 Tons	kW/ton	≤0.634 FL	≤0.639-FL	≤0.610 FL	≤0.695 FL	
			≤0.596 IPLV	≤0.450 IPLV	≤0.550 IPLV	≤0.440 IPLV	
	≥ 150 tons and <300 tons		≤0.634 FL	≤0.639 FL	≤0.610 FL	≤0.635 FL	
			≤0.596 IPLV	≤0.450 IPLV	≤0.550 IPLV	≤0.400 IPLV	
	≥ 300 tons and <400 tons		≤0.576 FL	≤0.600 FL	≤0.560 FL	≤0.595 FL	
			≤0.549 IPLV	≤0.400 IPLV	≤0.520 IPLV	≤0.390 IPLV	
	≥ 400 tons and <600 tons		≤0.576-FL	≤0.600 FL	≤0.560 FL	≤0.585 FL	
			≤0.549 IPLV	≤0.400 IPLV	≤0.500 IPLV	≤0.380 IPLV	
	≥ 600 tons		≤0.570-FL	≤0.590 FL	≤0.560 FL	≤0.585 FL	
		≤0.539 IPLV	≤0.400 IPLV	≤0.500 IPLV	≤0.380 IPLV		
Air-Cooled Absorption, Single Effect	All Capacities	COP	≥0.600 FL	NA ^d	≥0.600 FL	NA ^d	AHRI 560
Water-Cooled	All	COP	≥0.700 FL	NA ^d	≥0.700 FL	NA ^d	

<u>Absorption, Single Effect</u>	<u>Capacities</u>					
<u>Absorption Double-Effect, Indirect-Fired</u>	<u>All Capacities</u>	<u>COP</u>	<u>≥1.000 FL</u> <u>≥1.050 IPLV</u>	<u>NA^d</u>	<u>≥1.000 FL</u> <u>≥1.050 IPLV</u>	<u>NA^d</u>
<u>Absorption Double-Effect, Direct-Fired</u>	<u>All Capacities</u>	<u>COP</u>	<u>≥1.000 FL</u> <u>≥1.000 IPLV</u>	<u>NA^d</u>	<u>≥1.000 FL</u> <u>≥1.000 IPLV</u>	<u>NA^d</u>

^aThe requirements for centrifugal chiller shall be adjusted for non-standard rating conditions per C403.2.3.1 and are only applicable for the range of conditions listed in C403.2.3.1. The requirements for air-cooled, water-cooled positive displacement and absorption chillers are at standard rating conditions defined in the reference test procedure.

^bBoth the full load and IPLV requirements must be met or exceeded to comply with this standard. When there is a Path B, compliance can be with either Path A or Path B for any application.

^cNA means the requirements are not applicable for Path B and only Path A can be used for compliance.

^eFL is the full load performance requirements and IPLV is for the part load performance requirements

Reason: For consistency with Standard 90.1. This proposal makes changes to the requirements for air and water cooled chillers as defined in section C403.2.3.1 and the efficiency requirements listed in table C403.2.3(7). This change is a continuation of the efficiency improvements that were implemented in 2010 by further improving the efficiency requirements. In 90.1-2010 a Path B was added for part load intensive water cooled chillers. This change also expands the Path B by adding requirements to include air cooled chillers. Also as part of this change, efforts were made to bring the efficiency requirements for water cooled positive displacement and centrifugal chillers together while considering the available technology, and that chillers can be applied at other application conditions where one technology may better suited than the other. The new efficiency requirements will go into effect on 1/1/2015.

The proposal was develop thru a working team of the AHRI chiller section and a unanimous vote was obtained on the proposal.

Cost Impact: The code change proposal will increase the cost of construction.

CE203-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

C403.2.3-EC-FERGUSON.doc

CE204 – 13

C403.2.4.1.2, C403.2.4.1.3 (NEW)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C403.2.4.1.2 C403.2.4.2 Set point overlap restriction Deadband. Where used to control both heating and cooling, zone thermostatic controls shall be capable of providing ~~provide~~ a temperature range or deadband of at least 5°F (2.8°C) within which the supply of heating and cooling energy to the zone is ~~capable of being~~ shut off or reduced to a minimum.

Exceptions:

1. Thermostats requiring manual changeover between heating and cooling modes.
2. Occupancies or applications requiring precision in indoor temperature control as approved by the code official.

C403.2.4.1.3 Setpoint overlap restriction. Where a zone has a separate heating and a separate cooling thermostatic control located within the zone, a limit switch, mechanical stop, or direct digital control system with software programming shall be provided with the capability to prevent the heating setpoint from exceeding the cooling setpoint and to maintain a deadband in accordance with Section C403.2.4.1.2.

Reason: The text in current Section C403.2.4.2 entitled set point overlap restriction is really focused on deadband and is virtually identical to Section 6.3.4.1.2 of ASHRAE/IES Standard 90.1-2010. For consistency this provision is being renamed deadband and included in a new subsection to C403.2.4.1 on thermostatic controls. In addition ASHRAE/IES Standard 90.1-2010 has a provision to address a different situation wherein a zone has a separate heating and a separate cooling system and a separate thermostat for each one. This situation is not addressed in the IECC and needs to be to prevent a situation where both systems could be operational at the same time. These changes will help make the IECC consistent with ASHRAE/IES 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions.

Cost Impact: The code change proposal will not increase the cost of construction.

CE204-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.4.1.2-EC-FERGUSON.doc

CE205 – 13

C403.2.4.5 (NEW)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new text as follows:

C403.2.4.5 Zone isolation. HVAC systems serving zones that are over 25,000 square feet in floor area or that span more than one floor and designed to operate or be occupied non-simultaneously shall be divided into isolation areas. Each isolation area shall be equipped with isolation devices and controls configured to automatically shut off the supply of conditioned air and outdoor air to and exhaust air from the isolation area. Each isolation area shall be controlled independently by a device meeting the requirements of Section C403.2.4.3.2. Central systems and plants shall be provided with controls and devices that will allow system and equipment operation for any length of time while serving only the smallest isolation area served by the system or plant.

Exceptions:

1. Exhaust air and outdoor air connections to isolation areas when the fan system to which they connect does not exceed 5000 cfm.
2. Exhaust airflow from a single isolation area of less than 10 percent of the design airflow of the exhaust system to which it connects.
3. Isolation areas intended to operate continuously or intended to be inoperative only when all other isolation areas in a zone are inoperative.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the commercial provisions of the IECC, has a provision to provide the ability to create isolation areas within zones under certain circumstances in order to allow for additional reductions in energy use and operating costs. This situation is not addressed in the IECC and should be to ensure technical compatibility between both documents.

Cost Impact: The code change proposal will increase the cost of construction.

CE205-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.4.5 (NEW)-EC-FERGUSON.doc

CE206 – 13

C403.2.4.5

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C403.2.4.5 Snow melt system controls. Snow – and ice-melting systems, ~~supplied through energy service to the building,~~ shall include automatic controls capable of shutting off the system when the pavement temperature is above 50°F and no precipitation is falling and an automatic or manual control that will allow shutoff when the outdoor temperature is above 40°F ~~so that the potential for snow or ice accumulation is negligible.~~

Reason: Because the energy for snow and ice-melting systems could come from an energy service other than the energy service for the building, the revision is needed to ensure all energy use for snow melting is covered. This proposal ensures that all snow melting systems are covered by the code. The language at the end of the last sentence being removed is not needed as it is not necessary to explain the intent of the provisions in the code.

Cost Impact: The code change proposal will not increase the cost of construction.

CE206-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.4.5-EC-WILLIAMS.doc

CE207 – 13

C403.2.4.5

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C403.2.4.5 Snow melt system controls. Snow- and ice-melting systems, supplied through energy service to the building, shall include automatic controls capable of shutting off the system when the pavement temperature is above 50°F (10°C) and no precipitation is falling and an automatic or manual control that will allow shutoff when the outdoor temperature is above 40°F (4°C) ~~so that the potential for snow or ice accumulation is negligible.~~

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

The text proposed for deletion expresses the intent of the provision, but is in itself unenforceable. The balance of the section adequately describes prescriptive requirements for a snowmelt system. As the prescriptive requirements are clear, there is no need for an 'intent' or 'performance' statement. What might be considered a negligible snow accumulation is Aspen might be considered a blizzard in Key West.

Cost Impact: The code change proposal will not increase the cost of construction. The proposal is editorial in nature and will not affect the cost of construction.

CE207-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.4.5-EC-THOMPSON-SEHPCAC

CE208 – 13

C403.2.4.5, C403.2.4.6 (NEW)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C403.2.4.5 Snow and ice melt system controls. ~~Snow- and ice-melting systems, supplied through energy service to the building,~~ shall include automatic controls capable of shutting off the system when the pavement temperature is above 50°F and no precipitation is falling and an automatic or manual control that will allow shutoff when the outdoor temperature is above 40°F ~~so that the potential for snow or ice accumulation is negligible.~~

C403.2.4.6 Freeze protection system controls. Freeze protection systems, such as heat tracing of outdoor piping and heat exchangers, including self-regulating heat tracing, shall include automatic controls configured to shut off the systems when outdoor air temperatures are above 40°F or when the conditions of the protected fluid will prevent freezing.

Reason: For consistency with ASHRAE/IES 90.1-2010. Section 6.4.3.8 of that document contains provisions for freeze protection systems. As that standard is an alternative path to compliance with the IECC and there is a desire to maintain equivalency of the IECC with 90.1 the issue of energy use for freeze protection systems must also be addressed in the IECC. The provisions associated with snow and ice melting systems are in the IECC but are not the same as those in 90.1. Since the energy for snow and ice melting systems could come from service other than to the building the revision is needed to ensure all energy use for snow melting is covered. The language at the end of the last sentence, while in 90.1, is suggested for deletion because it not necessary to explain the intent of the provisions in the code.

Cost Impact: The code change proposal will not increase the cost of construction.

CE208-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.4.5-EC-FERGUSON.doc

CE209 – 13

C403.2.4.6 (NEW)

Proponent: Eric Makela, Britt/Makela Group, Inc., representing Northwest Energy Codes Group (eric@brittmakela.com), Jim Edelson, New Buildings Institute

Add new text as follows:

C403.2.4.6 Economizer fault detection and diagnostics (FDD). Air-cooled unitary direct-expansion units listed in Tables C403.2.3(1) through (3) and variable refrigerant flow (VRF) units that are equipped with an economizer in accordance with Section C403.3 or Section C403.4 shall include a fault detection and diagnostics (FDD) system complying with all of the following:

1. The following temperature sensors shall be permanently installed to monitor system operation:
 - 1.1. Outside air,
 - 1.2. Supply air,
 - 1.3. Return air;
2. Temperature sensors shall have an accuracy of $\pm 2^{\circ}\text{F}$ over the range of 40°F to 80°F ;
3. Refrigerant pressure sensor, where used, shall have an accuracy of ± 3 percent of full scale;
4. The unit controller shall be capable of providing system status by indicating the following:
 - 4.1. Free cooling available.
 - 4.2. Economizer enabled.
 - 4.3. Compressor enabled.
 - 4.4. Heating enabled.
 - 4.5. Mixed air low limit cycle active.
 - 4.6. The current value of each sensor.
5. The unit controller shall be capable of manually initiating each operating mode so that the operation of compressors, economizers, fans, and heating system can be independently tested and verified;
6. The unit shall be capable of reporting faults to a fault management application accessible by day-to-day operating or service personnel, or annunciated locally on zone thermostats; and
7. The FDD system shall be capable of detecting the following faults:
 - 7.1. Air temperature sensor failure/fault.
 - 7.2. Not economizing when the unit should be economizing.
 - 7.3. Economizing when the unit should not be economizing.
 - 7.4. Damper not modulating.
 - 7.5. Excess outdoor air.

Reason: Commercial HVAC systems have been shown to have problems with economizer function, control, and performance in field studies and utility-sponsored maintenance programs. This results in reduced energy efficiency and potential energy savings from the economizer with fan-only operation. The proposed FDD specifications have been standardized in California Title 24-2013.

Major HVAC original equipment manufacturer representatives played a major role in the Title 24 process that developed this measure. They supported the decision to propose the RTU FDD as a Mandatory Measure, rather than a Prescription Option in Title 24. The manufacturer's participants recognized the importance of this technical issue and stated that the industry would be ready by January 2014, the 2013 Title 24 implementation date, to meet the mandatory FDD requirements. A key factor for industry support was that the proposed FDD functions could be implemented on approximately 70% of RTUs sold that are electromechanically controlled, along with higher tier equipment that is microprocessor controlled.

The link to the cost-effectiveness analysis of the Title 24 FDD Mandatory Measure is noted here. The specific FDD reference material is found in three separate places in the document: Pgs. 13-18, 31-45, Appendix B pg. 118-131.

http://www.energy.ca.gov/title24/2013standards/prerulemaking/documents/2011-04-27_workshop/review/2013_CASE_NR7_HVAC_Controls_and_Economizing_2011_04_20.pdf

Cost and benefit documentation is found in the Li and Braun (2007. Economic Evaluation of Benefits Associated with Automated Fault Detection and Diagnosis in Rooftop Air Conditioners. *ASHRAE Transactions* 113(2).) report, which states "Automated FDD reduces service costs due to reduced preventive maintenance inspections, fault prevention, lower-cost FDD, better scheduling of multiple service activities, and shifting service to low season."

Cost Impact: The code change proposal will increase the cost of construction but the increased level of efficiency over the life of the equipment will exceed the initial first cost.

CE209-13

Public Hearing: Committee:
Assembly:

AS
ASF

AM
AMF

D
DF

C403.2.4.6 (NEW)-EC-EDELSON-MAKELA.doc

CE210 – 13

C403.2.5.1

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C403.2.5.1 Demand controlled ventilation. Demand control ventilation (DCV) shall be provided for spaces larger than ~~500~~ 200 square feet (~~50~~ 20 m²) and with a design ~~an average~~ occupant load of not less than 25 people per 1000 square feet (93 m²) of floor area (as established in Table 403.3 of the *International Mechanical Code*) and served by systems with one or more of the following:

1. An air-side economizer;
2. Automatic modulating control of the outdoor air damper; or
3. A design outdoor airflow greater than 3,000 cfm (1400 L/s).

Exception: Demand control ventilation is not required for systems and spaces as follows:

1. Systems with energy recovery complying with Section C403.2.6.
- ~~2. Multiple zone systems without direct digital control of individual zones communicating with a central control panel.~~
- ~~3. 2.~~ System with a design outdoor airflow less than ~~1,200~~ 100 cfm (~~600~~ 50 L/s).
- ~~4. 3.~~ Spaces where the supply space outside airflow rate minus any makeup or outgoing transfer air exhausted from other spaces requirement is less than ~~1,200~~ 50 cfm (~~600~~ 25 L/s).
- ~~5. 4.~~ Ventilation provided for process loads only.

Reason: This proposal reduces thresholds associated with space size and design occupant density at which demand controlled ventilation (DCV) is required.

DCV reduces the amount of energy needed to ventilate and condition spaces with high-density occupancy because it allows the mechanical system to modulate ventilation based on occupant load, rather than always providing ventilation based on full design occupancy. In the time since the provisions for DCV were first included in the IECC, the cost for DCV has been reduced. DCV is now cost effective in smaller spaces than are covered in the current code.

DCV in smaller spaces can also be achieved with lower cost occupancy sensors, allowing fans on single zone systems to cycle or closing zone boxes on VAV systems when spaces are unoccupied.

The exception for multiple zone systems without DDC is removed for three reasons: (1) almost all multiple zone systems installed today have DDC control, (2) it is possible to provide DCV controls at the zone level without DDC, and (3) there are significant savings from ventilation control for zones in multiple zone systems due to high minimum airflow requirements under the International Mechanical Code in high density spaces.

The cost increase associated with this code change is limited to spaces from 201 to 500 ft² in floor area that are not subject to the exceptions because those spaces currently do not require DCV and, pursuant to this code change, would now need DCV. A detailed cost analysis conducted in support of similar provisions in California Title 24 (the California Energy Code) indicated that DCV was cost effective down to spaces 150 ft² in floor area. The cost effectiveness was shown for spaces supplied by VAV systems that were vacant on average 2 hours per weekday and for constant volume systems that were vacant on average 4 hours per weekday. This analysis was for relatively mild climates. In colder or warmer climates, more energy is used for heating or cooling ventilation air, so if the technology was cost effective in California, it will have greater savings and better cost effectiveness in colder or warmer climates. The incorporation of occupancy sensors into DCV controls and requirements for lighting occupancy sensors in most high-density spaces has also resulted in reduced incremental cost. As a result, occupancy sensor based DCV is cost effective in smaller spaces.

References:

2013 California Building Energy Efficiency Standards. 2011. Light Commercial Unitary HVAC
http://www.energy.ca.gov/title24/2013standards/prerulemaking/documents/current/Reports/Nonresidential/HVAC/2013_CASE_NR_Light_Commercial_Unitary_UPDATED_Nov_2011.pdf

Cost Impact: The code change proposal will increase the cost of construction in some buildings.

CE210-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

CE211 – 13

C403.2.5.2 (NEW)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new text as follows:

C403.2.5.2 Enclosed parking garage ventilation controls. Enclosed parking garages used for storing or handling automobiles operating under their own power shall employ contamination sensing devices and automatic controls configured to stage fans or modulate fan average airflow rates to 50 percent or less of design capacity or intermittently operate fans less than 20 percent of the occupied time or as required to maintain acceptable contaminant levels in accordance with IMC provisions. Failure of contamination sensing devices shall cause the exhaust fans to operate continuously at design airflow.

Exceptions:

1. Garages with total exhaust capacity less than 22,500 cfm (10,600 L/s) with ventilation systems that do not utilize heating or mechanical cooling.
2. Garages that have a garage area to ventilation system motor nameplate power ratio that exceeds 1125 cfm/hp (710 L/s/kW) and do not utilize heating or mechanical cooling.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has requirements for ventilation optimization control on parking ventilation systems that are not included in the IECC. These provisions provide significant energy savings. The change ensures continued consistency between the IECC and standard 90.1-2010 and provides significant energy savings in IECC.

Cost Impact: This code change proposal will increase the cost of construction when controls are now required.

CE211-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.5.2 (NEW)-EC-FERGUSON.doc

CE212 – 13

C403.2.6

Proponent: Tim Manz, City of Blaine, MN, representing the Association of Minnesota Building Officials (tmanz@ci.blaine.mn.us)

Revise as follows:

C403.2.6 Energy recovery ventilation systems. Where the supply airflow rate of a fan system exceeds the values specified in Table C403.2.6, the system shall include an energy recovery system. The energy recovery system shall have the capability to provide a change in the enthalpy of the outdoor air supply of not less than 50 percent of the difference between the outdoor air and return air enthalpies, at design conditions. Where an air economizer is required, the energy recovery system shall include a bypass or controls which permit operation of the economizer as required by Section C403.4

Exception: An energy recovery ventilation system shall not be required in any of the following conditions:

1. Where energy recovery systems are prohibited by the *International Mechanical Code*.
2. Laboratory fume hood systems that include at least one of the following features:
 - 2.1. Variable-air-volume hood exhaust and room supply systems capable of reducing exhaust and makeup air volume to 50 percent or less of design values except when higher volumes are required to maintain safe operating conditions.
 - 2.2. Direct makeup (auxiliary) air supply equal to at least 75 percent of the exhaust rate, heated no warmer than 2°F (1.1°C) above room setpoint, cooled to no cooler than 3°F (1.7°C) below room setpoint, no humidification added, and no simultaneous heating and cooling used for dehumidification control.
3. Systems serving spaces that are heated to less than 60°F (15.5°C) and are not cooled.
4. Where more than 60 percent of the outdoor heating energy is provided from site-recovered or site solar energy.
5. Heating energy recovery in Climate Zones 1 and 2.
6. Cooling energy recovery in Climate Zones 3C, 4C, 5B, 5C, 6B, 7 and 8.
7. Systems requiring dehumidification that employ energy recovery in series with the cooling coil.
8. Where the largest source of air exhausted at a single location at the building exterior is less than 75 percent of the design *outdoor air* flow rate.
9. Systems expected to operate less than 20 hours per week at the *outdoor air* percentage covered by Table C403.2.6
10. Systems exhausting toxic, flammable, paint, or corrosive fumes or dust.
11. Commercial kitchen hoods used for collecting and removing grease vapors and smoke.

Reason: Public health, safety and welfare takes precedence over reducing energy consumption, and the revision to Item 2.1 recognizes that with laboratory fume hoods. Additional exceptions 10 and 11 identify systems where energy recovery should not be used because what is being exhausted could be detrimental or destructive to any energy recovery equipment. All of these provisions are contained in the current Minnesota Commercial Energy Code.

Cost Impact: The code change proposal will increase the cost of construction.

CE212-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.6-EC-MANZ.doc

CE213 – 13

Table C403.2.6, Table C403.3.1(1), Table C403.3.1.1.3(1), Table C403.3.1.1.3(2)

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

**TABLE C403.2.6
ENERGY RECOVERY REQUIREMENT**

CLIMATE ZONE	PERCENT (%) OUTDOOR AIR AT FULL DESIGN AIRFLOW RATE					
	≥30% and < 40%	≥40% and < 50%	≥50% and < 60%	≥60% and < 70%	≥70% and < 80%	≥80%
	DESIGN SUPPLY FAN AIRFLOW RATE (cfm)					
3B, 3C, 4B, 4C, 5B	NR	NR	NR	NR	≥ 5000	≥ 5000
4B, 2B, 5C	NR	NR	≥ 26000	≥ 12000	≥ 5000	≥ 4000
6B	≥ 11000	≥ 5500	≥ 4500	≥ 3500	≥ 2500	≥ 1500
1A, 2A, 3A, 4A, 5A, 6A	≥ 5500	≥ 4500	≥ 3500	≥ 2000	≥ 1000	> 0
7, 8	≥ 2500	≥ 1000	> 0	> 0	> 0	> 0

**TABLE C403.3.1(1)
ECONOMIZER REQUIREMENTS**

CLIMATE ZONES	ECONOMIZER REQUIREMENT
1A, 4B	No requirement
2A, 2B, 3A, 3B, 3C, 4A, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8	Economizers on all cooling systems ≥ 33,000 Btu/h ^a

(Portions of Table not shown remain unchanged)

**TABLE C403.3.1.1.3(1)
HIGH-LIMIT SHUTOFF CONTROL OPTIONS FOR AIR ECONOMIZERS**

CLIMATE ZONES	ALLOWED CONTROL TYPES	PROHIBITED CONTROL TYPES
4B, 2B, 3B, 3C, 4B, 4C, 5B, 5C, 6B, 7, 8	Fixed dry bulb Differential dry bulb Electronic enthalpy ^a Differential enthalpy Dew-point and dry-bulb temperatures	Fixed enthalpy
1A, 2A, 3A, 4A	Fixed dry bulb Fixed enthalpy Electronic enthalpy ^a Differential enthalpy Dew-point and dry-bulb temperatures	Differential dry bulb
All other climate zones	Fixed dry bulb Differential dry bulb Fixed enthalpy Electronic enthalpy ^a Differential enthalpy Dew-point and dry-bulb temperatures	--

(Portions of Table not shown remain unchanged)

TABLE C403.3.1.1.3(2)
HIGH-LIMIT SHUTOFF CONTROL SETTING FOR AIR ECONOMIZERS

DEVICE TYPE	CLIMATE ZONE	REQUIRED HIGH LIMIT (ECONOMIZER OFF WHEN):	
		EQUATION	DESCRIPTION
Fixed dry bulb	4B, 2B, 3B, 3C, 4B, 4C, 5B, 5C, 6B, 7, 8	$T_{OA} > 75^{\circ}\text{F}$	Outdoor air temperature exceeds 75°F
	5A, 6A, 7A	$T_{OA} > 70^{\circ}\text{F}$	Outdoor air temperature exceeds 70°F
	All other zones	$T_{OA} > 65^{\circ}\text{F}$	Outdoor air temperature exceeds 65°F
Differential dry bulb	4B, 2B, 2B, 3C, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8	$T_{OA} > T_{RA}$	Outdoor air temperature exceeds return air temperature

(Portions of Table not shown remain unchanged)

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

Reasons for this specific proposal:

There are no listings of a climate zone 1B in Table C301.1 and Climate Zone 1B does not appear in Figure C301.1. Therefore the SEHPCAC believes that the zone should not be included in the regulations.

Please note that the table has been editorially revised to properly align the information in the Climate Zone column with the Equation and Description Columns.

Cost Impact: The code change proposal will not increase the cost of construction. The change is editorial in nature and will not affect construction costs.

CE213-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.6-EC-THOMPSON-SEHPCAC

CE214 – 13

Table C403.2.6

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

**TABLE C403.2.6
ENERGY RECOVERY REQUIREMENT**

CLIMATE ZONE	PERCENT (%) OUTDOOR AIR AT FULL DESIGN AIRFLOW RATE							
	<u>≥10% and <20%</u>	<u>≥20% and <30%</u>	≥ 30% and < 40%	≥ 40% and < 50%	≥ 50% and < 60%	≥ 60% and < 70%	≥ 70% and < 80%	≥ 80%
	DESIGN SUPPLY FAN AIRFLOW RATE (cfm)							
3B, 3C, 4B, 4C, 5B	<u>NR</u>	<u>NR</u>	NR	NR	NR	NR	≥5000 <u>NR</u>	≥5000 <u>NR</u>
1B, 2B, 5C	<u>NR</u>	<u>NR</u>	NR	NR	≥26000	≥12000	≥5000	≥4000
6B	<u>≥28000</u>	<u>≥26500</u>	≥11000	≥5500	≥4500	≥3500	≥2500	≥1500
1A, 2A, 3A, 4A, 5A, 6A	<u>≥26000</u>	<u>≥16000</u>	≥5500	≥4500	≥3500	≥2000	≥1000	> 0
7, 8	<u>≥4500</u>	<u>≥4000</u>	≥2500	≥1000	> 0	> 0	> 0	> 0

NR = not required

Reason: This proposal revises the requirements for the use of exhaust air energy recovery as defined in table C403.2.6

The current table requires energy recovery as a function of the percent outdoor air and design supply fan airflow. The current table defines requirements for energy recover for outdoor air ventilation rates above 30%. Many buildings operate with ventilation rates below 30%. Typical buildings in this category include offices, motels, hotels, grocery, and warehouses which represent a significant part of the market. Therefore by extending the table down we can save additional energy on these buildings where economically justified. SSPC 90.1 ran full 8760 hr simulation runs for building office, school and retail applications down to 10% outdoor air and then selected least restrictive cfm values for the table based on the 2010 scalar ratio methodology using a design life of 15 years. This results in additional requirements for energy recovery on larger systems in zones 1A, 2A, 3A, 4A, 5A, 6A, 7 and 8. These zones represent 30.8% of the market.

In addition to the changes to extend the table down low percent outdoor air ventilation rates, this also proposes to modify the requirements for zone 3B, 3C, 4B, 4C and 5B as they are not economical justified and have scalar values of 20.3 yrs up to infinity. We have received feedback that other studies have also confirmed that these values are not cost effective and it is felt these values need to be corrected.

The change ensures continued consistency between the IECC and Standard 90.1.

Cost Impact: The code change proposal will not increase the cost of construction.

CE214-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

C403.2.6-EC-FERGUSON.doc

CE215 – 13

C403.2.7

Proponent: Ron Burton, PTW Advisors, LLC, representing BOMA International
(ronburton@ptwadvisors.com)

Revise as follows:

C403.2.7 Duct and plenum insulation and sealing. All supply and return air ducts and plenums shall be insulated with a minimum of R-6 insulation where located in unconditioned spaces and a minimum of R-8 insulation where located outside the building. Where located within a building envelope assembly, the duct or plenum shall be separated from the building exterior or unconditioned or exempt spaces by minimum of R-8 insulation.

Exceptions:

1. Where located within equipment
2. Where the design temperature difference between the interior and exterior of the duct or plenum does not exceed 15° F (8°C).

All ducts, air handlers and filter boxes shall be sealed. Joints and seams shall comply with Section 603.9 of the *International Mechanical Code*.

Exception: Ducts and plenums located completely inside the building thermal envelope

Reason: To provide an exception to not require insulation on ducts and plenums, when the ducts and plenums are completely inside the building thermal envelope. This is the same as the provision already allowed in the residential portion of the code. Heat loss or gain from the ducts and plenums inside the conditioned space is only released to the conditioned area and thus does not have an impact on energy use.

Cost Impact: This code change proposal will not increase the cost of construction. The change will have a cost savings by exempting the required insulation on ducts and plenums.

CE215-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.7-EC-BURTON.doc

CE216 – 13

C403.2.7

Proponent: Mark Terzigni, Sheet Metal and Air Conditioning Contractors' National Association (SMACNA) (mterzigni@smacna.org)

Revise as follows:

C403.2.7 Duct and plenum insulation. ~~and sealing.~~ All supply and return air ducts and plenums shall be insulated with a minimum of R-6 insulation where located in unconditioned spaces and a minimum of R-8 insulation where located outside the building. Where located within a building envelope assembly, the duct or plenum shall be separated from the building exterior or unconditioned or exempt spaces by a minimum of R-8 insulation.

Exceptions:

1. Where located within equipment
2. Where the design temperature difference between the interior and exterior of the duct or plenum does not exceed 15°F (8 °C).

~~All ducts, air handlers and filter boxes shall be sealed. Joints and seams shall comply with Section 603.9 of the International Mechanical Code.~~

Reason: "Air handlers" should not be addressed under ducts and plenums. All sealing concerns should be addressed in the next section proposed C403.2.8 "insulation and sealing" are two distinct topics and should not be lumped together.

Cost Impact: This code change proposal will not increase the cost of construction.

CE216-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.7-EC-TERZIGNI.doc

CE217 – 13

C403.2.7

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C403.2.7 Duct and plenum insulation and sealing. All supply and return air ducts and plenums shall be insulated with a minimum of R-6 insulation where located in unconditioned spaces and ~~a minimum of R-8 insulation~~ where located outside the building with a minimum of R-8 insulation in climate zones 1 through 4 and a minimum of R-12 insulation in climate zones 5 through 8. Where located within a building envelope assembly, the duct or plenum shall be separated from the building exterior or unconditioned or exempt spaces by a minimum of R-8 insulation in climate zones 1 through 4 and a minimum of R-12 insulation in climate zones 5 through 8.

Exceptions:

1. Where located within equipment.
2. Where the design temperature difference between the interior and exterior of the duct or plenum does not exceed 15°F (8°C).

All ducts, air handlers and filter boxes shall be sealed. Joints and seams shall comply with Section 603.9 of the *International Mechanical Code*.

Reason: This proposal reduces the energy loss associated with duct systems, such as those in cold climates, by increasing the level of insulation required on ducts and plenums where it is cost effective.

Exterior ducts and plenums (i.e. those not totally inside the building conditioned space) in colder climate zones are subject to a higher heat loss and consequent higher use of energy due to a greater temperature difference across the duct or plenum surface. As the cost of energy increases and the need to reduce building energy use becomes more acute, enhancements to the energy code are necessary. Such ducts and plenums will benefit from improved insulation because the added insulation will reduce heat loss and allow more of the heat provided by the HVAC equipment to be delivered to the space. In some cases the added insulation will also allow reduced heating equipment size.

There is a cost impact associated with this proposed change since more insulation will be required on some ductwork in climate zones 5-8. A cost effectiveness analysis was completed. In this analysis it was found that for the additional duct insulation the simple payback was 11.2 years or less. Based on insulation life of 24 years, a discounted cost effective payback threshold is 14.2 years. The simple paybacks for all of the additional insulation required under this proposal are well below this cost effective threshold.

References:

R. Hart. 2012. Supporting Analyses for proposed changes to the commercial provisions of the 2012 IECC: Increase Duct and Plenum Insulation. <http://www.energycodes.gov/development/commercial/2015IECC>

Cost Impact: The code change proposal will increase the cost of construction.

CE217-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.7-EC-WILLIAMS.doc

CE218 – 13

C403.2.7

Proponent: Tim Manz, City of Blaine, MN, representing the Association of Minnesota Building Officials (tmanz@ci.blaine.mn.us)

Revise as follows:

C403.2.7 Duct and plenum insulation and sealing. Insulation shall be protected from damage, including that due to sunlight, moisture, equipment maintenance and wind. Insulation exposed to weather shall be suitable for outdoor service and shall be protected by aluminum, sheet metal, painted canvas, plastic cover or other similar materials approved by the code official. Cellular foam insulation shall be protected as above or painted with a coating that is water retardant and provides shielding from solar radiation that can cause degradation of the material. All supply, and, return, exhaust and relief air ducts and plenums shall be insulated with a minimum of R-6 insulation where located in unconditioned spaces and a minimum of R-8 insulation where located outside the building. Where located within a building envelope assembly, the duct or plenum shall be separated from the building exterior or unconditioned or exempt spaces by a minimum of R-8 insulation.

Exceptions:

1. Where located within equipment.
2. Where the design temperature difference between the interior and exterior of the duct or plenum does not exceed 15°F (8°C).

All ducts, air handlers and filter boxes shall be sealed. Joints and seams shall comply with Section 603.9 of the *International Mechanical Code*.

Reason: This proposed amendment incorporates language from the current Minnesota Commercial Energy Code, along with provisions from ASHRAE Standard 90.1-2010 that explain in detail the requirements necessary to protect ducts from physical damage and from other sources of damage, such as moisture and weather-related elements. These changes are necessary so that the insulation protection provides energy efficient and durable systems that are not likely to deteriorate due to the formation of condensation on the interior or exterior of the ducts or plenums.

Cost Impact: The code change proposal will increase the cost of construction.

CE218-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.7-EC-MANZ.doc

CE219 – 13

C403.2.7

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

Revise as follows:

C403.2.7 Duct and plenum insulation and sealing. All supply and return air ducts and plenums shall be insulated with a minimum of R-6 insulation where located in unconditioned spaces and a minimum of R-8 insulation where located outside the building. Where located within a building envelope assembly, the duct or plenum shall be separated from the building exterior or unconditioned or exempt spaces by a minimum of R-8 insulation.

Exceptions:

1. Where located within equipment.
2. Where the design temperature difference between the interior and exterior of the duct or plenum does not exceed 15°F (8°C).

All ducts, air handlers and filter boxes shall be sealed. Air handlers 3000 cfm or less shall have a manufacturer's designation for an air leakage of no more than 2 percent of the design air flow rate when tested in accordance with ASHRAE 193.

Joints and seams shall comply with Section 603.9 of the *International Mechanical Code*.

Reason: This adds the same airtight air handler requirement as is in residential. The standard is already in use in the industry. The requirement is limited to air handlers of 3000 cfm or less because that is the limit of the ASHRAE 193 test. Having a manufacturer's designation of a certain leakage or less makes inspection much simpler.

Cost Impact: The code change proposal will not increase the cost of construction.

CE219-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.7-EC-CONNER.doc

CE220 – 13

C403.2.7 (NEW), Table C403.2.7 (NEW)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new text as follows:

C403.2.7 Kitchen exhaust systems. Replacement air introduced directly into the exhaust hood cavity shall not exceed 10 percent of the hood exhaust airflow rate. Conditioned supply air delivered to any space containing a kitchen hood shall not exceed the greater of the ventilation rate required to meet the space heating or cooling load or the hood exhaust flow minus the available transfer air from adjacent space where available transfer air is considered that portion of outdoor ventilation air not required to satisfy other exhaust needs, such as restrooms, and not required to maintain pressurization of adjacent spaces.

When total kitchen hood exhaust airflow rate is greater than 5,000 cfm each hood shall have a maximum exhaust rate in accordance with Table C403.2.7 and shall meet one of the following:

1. At least 50 percent of all replacement air is transfer air that would otherwise be exhausted.
2. Demand ventilation systems on at least 75 percent of the exhaust air that are capable of at least 50 percent reduction in exhaust and replacement air system airflow rates, including controls necessary to modulate airflow in response to appliance operation and to maintain full capture and containment of smoke, effluent and combustion products during cooking and idle.
3. Listed energy recovery devices with a sensible heat recovery effectiveness of at least 40 percent on at least 50 percent of the total exhaust airflow.

When a single hood, or hood section, is installed over appliances with different duty ratings, then the maximum allowable flow rate for the hood or hood section shall be based on the requirements for the highest appliance duty rating under the hood or hood section.

Exception: When at least 75 percent of all the replacement air is transfer air that would otherwise be exhausted

TABLE C403.2.7
MAXIMUM NET EXHAUST FLOW RATE, CFM PER LINEAR FOOT OF HOOD LENGTH

<u>Type of Hood</u>	<u>Light Duty Equipment</u>	<u>Medium Duty Equipment</u>	<u>Heavy Duty Equipment</u>	<u>Extra Heavy Duty Equipment</u>
<u>Wall-mounted canopy</u>	<u>140</u>	<u>210</u>	<u>280</u>	<u>385</u>
<u>Single island</u>	<u>280</u>	<u>350</u>	<u>420</u>	<u>490</u>
<u>Double island (per side)</u>	<u>175</u>	<u>210</u>	<u>280</u>	<u>385</u>
<u>Eyebrow</u>	<u>175</u>	<u>175</u>	<u>Not allowed</u>	<u>Not allowed</u>
<u>Backshelf/Pass-over</u>	<u>210</u>	<u>210</u>	<u>280</u>	<u>Not allowed</u>

Reason: For consistency with Standard 90.1-2010. Considering that the IECC Commercial Provisions are intended to be technically compatible with that standard to facilitate adoption and implementation, ASHRAE is interested in keeping 2012 IECC Commercial Provisions aligned with ANSI/ASHRAE/IESNA Standard 90.1-2010.

The proposal basically outlaws "short-circuit" hoods.

Research and California Energy Commission has shown that direct supply of makeup air, in excess of 10% of hood exhaust airflow, into the hood cavity significantly deteriorates the Capture and Containment (C&C) performance of hoods. This research has also demonstrated that short-circuit hoods waste energy and degrade kitchen environment and hygiene. If we assume a generic baseline C&C rate for a cooking process, studies show the exhaust rates for short-circuit hoods generally exceed those for exhaust-only hoods by at least the amount of air short-circuited, thus decreasing performance and increasing energy consumption.

Engineers are often in the habit of simply providing makeup air units in kitchens to provide makeup air equal to the exhaust flow rate even when "free" transfer air is available from adjacent spaces. Adding makeup air when transfer air is available is a wasteful design

practice and should be prohibited. Using available transfer air saves energy and reduces the first cost of the makeup unit and exhaust system in the adjacent spaces. It simply requires some engineering and coordination to provide a path for the transfer air. The proposed change is also intended to get rid of a wasteful common practice: specifying excessive exhaust airflow by selecting hoods that are not listed or have not been subjected to a recognized performance test. The exhaust airflow flow rates in Table C403.2.7 are 30% below the minimum airflow rates in ASHRAE Standard 154-2003.

ASHRAE Research Project 1202 shows that hoods listed per UL Standard 710 and/or are engineered and tested per ASTM/ANSI 1704 have exhaust rates that are at least 30% less than the exhaust airflow requirements for unlisted or untested hoods. The intent is to conserve energy through the use of engineered hoods or performance based hoods that have been validated based on consensus standard test methods it should be noted that ASHRAE research has not demonstrated that exhaust rate reductions substantially beyond the 30% can or should be recommended at this time. This requirement should not increase first cost and in many cases will reduce first cost through downsizing of exhaust, supply and cooling equipment.

The 5,000 CFM threshold recognizes small restaurants. In addition makeup air can be fully conditioned. As a result there are now cost effective opportunities to reduce energy with demand ventilation systems or energy recovery devices.

Cost Impact: The code change proposal will not increase the cost of construction.

CE220-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.7 (NEW)-EC-FERGUSON.doc

CE221 – 13

C403.2.7.1, C403.2.7.1.1, C403.2.7.1.2, C403.2.7.1.3, C403.2.8 (NEW), C403.2.8.1 (NEW), C403.2.8.3 (NEW)

Proponent: Mark Terzigni, Sheet Metal and Air Conditioning Contractors' National Association (SMACNA) (mterzigni@smacna.org)

Delete and substitute as follows:

~~C403.2.7.1 Duct construction.~~ Ductwork shall be constructed and erected in accordance with the *International Mechanical Code*.

~~C403.2.7.1.1 Low-pressure duct systems.~~ All longitudinal and transverse joints, seams and connections of supply and return ducts operating at a static pressure less than or equal to 2 inches water gauge (w.g.) (500 Pa) shall be securely fastened and sealed with welds, gaskets, mastics (adhesives), mastic plus embedded fabric systems or tapes installed in accordance with the manufacturer's installation instructions. Pressure classifications specific to the duct system shall be clearly indicated on the construction documents in accordance with the *International Mechanical Code*.

Exception: Continuously welded and locking type longitudinal joints and seams on ducts operating at static pressures less than 2 inches water gauge (w.g.) (500 Pa) pressure classification.

~~C403.2.7.1.2 Medium-pressure duct systems.~~ All ducts and plenums designed to operate at a static pressure greater than 2 inches water gauge (w.g.) (500 Pa) but less than 3 inches w.g. (750 Pa) shall be insulated and sealed in accordance with Section C403.2.7. Pressure classifications specific to the duct system shall be clearly indicated on the construction documents in accordance with the *International Mechanical Code*.

~~C403.2.7.1.3 High-pressure duct systems.~~ Ducts designed to operate at static pressures in excess of 3 inches water gauge (w.g.) (750 Pa) shall be insulated and sealed in accordance with Section C403.2.7. In addition, ducts and plenums shall be leak-tested in accordance with the SMACNA *HVAC Air Duct Leakage Test Manual* with the rate of air leakage (CL) less than or equal to 6.0 as determined in accordance with Equation 4-5.

$$CL = F/P^{0.65} \text{ (Equation 4-5)}$$

where:

F = The measured leakage rate in cfm per 100 square feet of duct surface.

P = The static pressure of the test.

Documentation shall be furnished by the designer demonstrating that representative sections totaling at least 25 percent of the duct area have been tested and that all tested sections meet the requirements of this section.

C403.2.8 Duct construction Ductwork shall be constructed and erected in accordance with the *International Mechanical Code*

C403.2.8.1 Sealing requirements. Ductwork shall meet Seal Class A as defined below

Seal Class A requires that all joints, seams, and penetrations be sealed.

Exceptions:

1. Joints, seams, and penetrations where sealing would void listings, warranties, or inhibit proper use of the device.
2. Spiral seams.
3. Joints, seams, and penetrations sealed by gaskets.
4. Sheet metal screws.
5. Continuously welded seams.
6. Ductwork exposed to view and located in conditioned space.

Sealants shall comply with the *International Mechanical Code*.

C403.2.8.2 Duct air leakage testing. Ductwork shall be leak tested in accordance with *SMACNA HVAC Air Duct Leakage Test Manual* with the following requirements:

20 percent of the ductwork, based on surface area, shall be tested for air leakage. If the tested sections pass, the testing concludes.

If the tested sections fail, the deficiencies shall be corrected, and an additional 20 percent of the ductwork, based on surface area, shall be tested for air leakage. If the tested sections pass the testing concludes.

If the additional tested sections fail, the deficiencies shall be corrected, and the remainder of the ductwork shall be tested for air leakage and any deficiencies shall be corrected.

The acceptable rate of air leakage shall be determined in accordance with Equation 4-5

$$F = C_L \times P^{0.65} \quad \text{(Equation 4-5)}$$

where:

F = the measured leakage rate in cfm per 100 square feet of duct surface.

C_L = the leakage class which is less than or equal to 4 cfm per 100 square feet of duct surface area @ 1 in. w.g.

P = the static pressure of the test (in. w.g.) which cannot exceed the lowest designed operating pressure of any portion of the tested section

Exceptions: Leakage testing in accordance with this section is not required for the following:

1. Ductwork that is located in conditioned space
2. Ductwork subject to other leakage tests in accordance with the *International Mechanical Code*, *International Building Code* or *International Fire Code*
3. Exhaust ductwork used for any application other than odor removal

Reason: The above proposal properly addresses duct air leakage testing in a practical and beneficial manner.

1. Allows duct at any pressure to be leak tested
2. Reduces the allowable leakage from class 6 to class 4 – 33% reduction
3. Requires that essentially all duct be sealed to the most stringent seal class “a”
4. Provides direction if there is a test failure and requires remediation
5. Requires additional testing, up to 100% of the duct when warranted, which balances cost and effectiveness
6. Reduces energy usage without excessive requirements
7. This is a significant improvement over the existing requirements

Cost Impact: The code change proposal may increase the cost of construction depending on the specific project. SMACNA believes that this approach is the best balance between cost and reducing energy consumption.

CE221-13

Public Hearing: Committee: AS AM D

Assembly:

ASF

AMF

DF

C403.2.7.1-EC-TERZIGNI.doc

CE222 – 13

C403.2.7.1.1

Proponent: Vickie Lovell InterCode Inc. representing DuctMate Industries (vickie@intercodeinc.com)

Revise as follows:

C403.2.7.1.1 Low-pressure duct systems. All longitudinal and transverse joints, seams and connections of supply and return ducts operating at a static pressure less than or equal to 2 inches water gauge (w.g.) (500 Pa) shall be securely fastened and sealed with welds, gaskets, mastics (adhesives), mastic-plus embedded- fabric systems or tapes installed in accordance with the manufacturer's installation instructions. Pressure classifications specific to the duct system shall be clearly indicated on the construction documents in accordance with the *International Mechanical Code*.

Exception: ~~Continuously welded and locking type longitudinal joints and seams on ducts operating at static pressures less than 2 inches water gauge (w.g.) (500 Pa) pressure classification.~~ For ducts having a static pressure classification of less than 2 inches of water column (500 Pa), additional closure systems shall not be required for continuously welded joints and seams and locking-type joints and seams of other than the snap-lock and button-lock types.

Reason: This proposed text is derived from a revision to the International Mechanical Code that was proposed by the PMG Code Action Committee in M151-12 and was approved by the voting membership in Portland for the 2015 IMC.

Unless sealant or a gasket is used, snap-lock and button-lock type seams will leak significantly. The current exception attempted to prevent unnecessary sealing for joints and seams that leak very little or not at all, but it went too far by including all locking type joints and seams. Some locking joints are leak proof such as mechanically folded seams used for spiral seam duct, but this is not true for all locking joints.

The purpose of this code change is to create consistency between the IMC and the IECC.

Cost Impact: The code change proposal will not increase the cost of construction.

CE222-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.7.1.1-EC-LOVELL.doc

CE223 – 13

C403.2.7.1.1

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C403.2.7.1.1 Low-pressure duct systems. All longitudinal and transverse joints, seams and connections of supply and return ducts operating at a static pressure less than or equal to 2 inches water gauge shall be securely fastened and sealed with welds, gaskets, mastics (adhesives), mastic-plus-embedded-fabric systems or tapes installed in accordance with the manufacturer's installation instructions. Pressure classifications specific to the duct system shall be clearly indicated on the construction documents in accordance with the *International Mechanical Code*.

Exception: ~~Continuously welded and locking-type longitudinal joints and seams need not be sealed as specified in this section on ducts operating at static pressures less than 2 inches water gauge (w.g.) (500 Pa) pressure classification.~~

Reason: This proposal clarifies that locked joint construction methods for duct systems meet the code for longitudinal seams. The requirement clearly allows welded longitudinal seams to be acceptable, so that is not needed in the exception. As currently stated in the exception, it might be interpreted that the longitudinal seam must be both welded and locking. That is clearly not the intent, as welding and locking together are not typical duct sealing approaches.

Cost Impact: The code change proposal will not increase the cost of construction.

CE223-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.7.1.1-EC-WILLIAMS.doc

CE224 – 13

C403.2.7.1.1

Proponent: Amanda Hickman, InterCode Inc. representing DuctMate Industries
(amanda@intercodeinc.com)

Revise as follows:

C403.2.7.1.1 Low-pressure duct systems. All longitudinal and transverse joints, seams and connections of supply and return ducts operating at a static pressure less than or equal to 2 inches water gauge (w.g.) (500 Pa) shall be securely fastened and sealed with welds, gaskets, mastics (adhesives), mastic-plus embedded- fabric systems or tapes installed in accordance with the manufacturer's installation instructions. Pressure classifications specific to the duct system shall be clearly indicated on the construction documents in accordance with the *International Mechanical Code*.

~~**Exception:** Continuously welded and locking type longitudinal joints and seams on ducts operating at static pressures less than 2 inches water gauge (w.g.) (500 Pa) pressure classification.~~

Reason: The requirements for low pressure duct sealing were clarified in the International Mechanical Code in M151-12 (proposed by the PMG Code Action Committee). M151-12 was approved by the voting membership in Portland for the 2015 IMC.

Currently, low pressure duct sealing is addressed in the IMC, two places in the IECC, and in the IRC. Identical language in the IECC is not necessary since it defers to the IMC and the IRC (for residential mechanical).

If the code sections in the IMC, IRC, and IECC are not maintained cycle after cycle, inconsistencies can develop between the sections. It is more efficient to simply eliminate the sections altogether in the IECC since they are redundant.

A similar proposal is being submitted to the 2015 IECC residential chapter for consistency.

Cost Impact: The code change proposal will not increase the cost of construction.

CE224-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.7.1.1-EC-HICKMAN.doc

CE225 – 13

C403.2.7.1.3

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C403.2.7.1.3 High-pressure duct systems. Ducts and plenums designed to operate at static pressures ~~in excess of greater than 3 inches water gauge~~ shall be insulated and sealed in accordance with Section C403.2.7. In addition, ducts and plenums shall be leak tested in accordance with the SMACNA HVAC Air Duct Leakage Test Manual ~~with the~~ and shown to have a rate of air leakage (CL) less than or equal to 6.0 as determined in accordance with Equation 4-5.

$$CL = F/P^{0.65} \quad \text{(Equation 4-5)}$$

where:

F = The measured leakage rate in cfm per 100 square feet of duct surface.

P = The static pressure of the test.

Documentation shall be furnished by the designer demonstrating that representative sections totaling at least 25 percent of the duct area have been tested and that all tested sections meet the requirements of this section.

Reason: This proposal ensures consistency with the provisions in Section C403.2.7.1.2.

Cost Impact: The code change proposal will not increase the cost of construction.

CE225-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.7.1.3-EC-WILLIAMS.doc

CE226 – 13

403.2.7.1.3

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferugson@ashrae.org)

Revise as follows:

C403.2.7.1.3 High-pressure duct systems. All ducts and plenums designed to operate at static pressures in excess of 3 inches water gauge (750 Pa) shall be insulated and sealed in accordance with Section C403.2.7. In addition, ducts and plenums shall be leak tested in accordance with the SMACNA HVAC Air Duct Leakage Test Manual with the rate of air leakage (CL) less than or equal to ~~6.0~~ 4.0 as determined in accordance with Equation 4-5.

$$CL = F/P^{0.65} \quad \text{(Equation 4-5)}$$

where:

F = The measured leakage rate in cfm per 100 square feet of duct surface.

P = The static pressure of the test.

Documentation shall be furnished by the designer demonstrating that representative sections totaling at least 25 percent of the duct system area have been tested and that all tested sections meet the requirements of this section.

Reason: Consistency with the provisions in Section C403.2.7.1.2. In addition ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has been revised to limit the air leakage rate to 4.0. The change ensures continued consistency between the IECC and standard 90.1-2010.

Cost Impact: The code change proposal will not increase the cost of construction.

CE226-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.7.1.3-EC-FERGUSON.doc

CE227 – 13

C403.2.8 (NEW)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new text as follows:

C403.2.8 Laboratory exhaust systems. Buildings with laboratory exhaust systems having a total exhaust rate greater than 5,000 cfm shall be provided with at least one of the following:

1. A VAV laboratory exhaust and room supply system capable of reducing exhaust and makeup air flow rates to the minimum required in the *International Mechanical Code*
2. A VAV laboratory exhaust and room supply system capable of reducing exhaust and makeup air flow rates by at least 50 percent of design condition.
3. A heat recovery system to precondition makeup air from laboratory exhaust with at least a 50 percent sensible recovery effectiveness.
- 3.4. Direct makeup (auxiliary) air supply equal to at least 75 percent of the exhaust air flow rate that is not heated above room setpoint or cooled below room setpoint and does not utilize non-adiabatic humidification.

Reason: For consistency with Standard 90.1-2010. Considering that the IECC Commercial Provisions are intended to be technically compatible with that standard to facilitate adoption and implementation, ASHRAE is interested in keeping 2012 IECC Commercial Provisions aligned with ANSI/ASHRAE/IES Standard 90.1-2010.

Cost Impact: The code change proposal will not increase the cost of construction.

CE227-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.8 (NEW)-EC-FERGUSON.doc

CE228 – 13

C403.2.8.1

Proponent: Tim Manz, City of Blaine, MN, representing the Association of Minnesota Building Officials (tmanz@ci.blaine.mn.us)

Revise as follows:

C403.2.8.1 Protection of piping insulation. Piping insulation ~~exposed to weather~~ shall be protected from damage, including that due to sunlight, moisture, equipment maintenance and wind, and shall provide shielding from solar radiation that can cause degradation of the material. Adhesive tape shall not be permitted. In addition, piping insulation shall comply with the following:

1. Insulation exposed to weather shall be suitable for outdoor service and shall be protected by aluminum, sheet metal, painted canvas, plastic cover or other similar materials approved by the code official. Cellular foam insulation shall be protected as above or painted with a coating that is water retardant and provides shielding from solar radiation that can cause degradation of the material.
2. Insulation covering chilled-water piping or refrigerant suction piping located outside the conditioned space shall include a vapor retardant located outside the insulation ,or the insulation shall be installed at a thickness that qualifies as a Class I or Class II vapor retarder.

Reason: The proposed code change incorporates language from ASHRAE Standard 90.1-2010 that specifies protection for piping insulation where it is subject to damage, whether inside or outside the building. These changes are necessary to ensure that the pipe insulation and vapor retarder are maintained throughout the life of the system and are not destroyed prematurely by water or moisture intrusion which may deteriorate the insulation and/or vapor retarder. This results in energy efficient and durable piping systems.

Cost Impact: The code change proposal will increase the cost of construction.

CE228-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.8.1-EC-MANZ.doc

CE229 – 13

Table C403.2.8

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

TABLE C403.2.8
MINIMUM PIPE INSULATION THICKNESS (thickness in inches)^a

FLUID OPERATING TEMPERATURE RANGE AND USAGE (°F)	INSULATION CONDUCTIVITY		NOMINAL PIPE OR TUBE SIZE (inches)				
	Conductivity Btu · in./ (h · ft ² · °F) ^b	Mean Rating Temperature, °F	<1	1 to < 1½	1½ to < 4	4 to < 8	≤ 8
> 350	0.32 – 0.34	250	4.5	5.0	5.0	5.0	5.0
251 – 350	0.29 – 0.32	200	3.0	4.0	4.5	4.5	4.5
201 – 250	0.27 – 0.30	150	2.5	2.5	2.5	3.0	3.0
141 – 200	0.25 – 0.29	125	1.5	1.5	2.0	2.0	2.0
105 – 140	0.21 – 0.28	100	1.0	1.0	1.5	1.5	1.5
40 – 60	0.21 – 0.27	75	0.5	0.5	1.0	1.0	1.0
< 40	0.20 – 0.26	75 <u>50</u>	0.5	1.0	1.0	1.0	1.5

(Portions of Table not shown remain unchanged)

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has a different mean rating temperature for evaluating the thermal properties of insulation on piping serving fluids below 40°F. The change ensures continued consistency between the IECC and standard 90.1-2010.

Cost Impact: The code change proposal will not increase the cost of construction.

CE229-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

C403.2.8T-EC-FERGUSON.doc

CE230 – 13

C403.2.8.2 (NEW), R403.3.2 (NEW) (IRC N1103.2 (NEW))

Proponent: Howard Ahern, Airex Mfg., representing self (howard.ahern@airexmfg.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Add new text as follows:

C403.2.8.2 Chilled water and refrigerant suction piping. Insulation covering chilled water piping and refrigerant suction piping located outside the conditioned space shall include a Class I or Class II vapor retarding facing located outside the insulation. Piping insulation protection shall be removable and reusable. Piping insulation shall be in accordance with Section C403.2.8.1.

PART II – IECC-RESIDENTIAL PROVISIONS

Add new text as follows:

R403.3.2 (N1103.3.2) Refrigerant suction piping. Insulation covering refrigerant suction piping located outside the conditioned space shall include a Class I or Class II vapor-retardant facing located on the outside of the insulation. Piping insulation protection shall be removable and reusable. Piping insulation shall be in accordance with Section R403.3.

Reason: The use of Vapor Retarders with suction line pipe insulation has been a requirement of the ASHRAE 90.1 Standard going back to 2004. This code change is needed need to specify requirements for Chilled water and refrigerant suction piping. This change will ensure steady, long-term thermal performance, and prevent the transference of moisture. Preventing moisture exchange will help prevent Wet insulation and maintain system integrity, sustainability, and energy savings of the insulation. Preventing moisture transference will also help prevent the growth of mold.

All AC units require periodic maintenance. The frequency varies with how hard the unit operates, exterior temperature, preventive maintenance program, and many others. In every occasion, maintenance provides an excuse for the suction line insulation to be touched and or removed. Pipe insulation removal from suction lines often results in damage to the insulation itself requiring replacement.

Protection for the suction piping insulation therefore need to be removable and reusable. This will help insure system integrity and sustainability of the pipe insulation, reducing replacement.

Cost Impact: This code change will increase cost; For the vapor retarders only and not will not increase cost in those jurisdictions that use ASHRAE Standard 90.1 as vapor retarders has been part of ASHRAE Standard 90.1 since 2004.

CE230-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.8.2-EC-AHERN.doc

CE231 – 13

C403.2.10, C403.2.10.1, Table C403.2.10.1(1), Table C403.2.10.1(2)

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

Delete without substitution as follows:

~~C403.2.10 Air system design and control.~~ Each HVAC system having a total fan system motor nameplate horsepower (hp) exceeding 5 horsepower (hp) (3.7 kW) shall meet the provisions of Sections C403.2.10.1 through C403.2.10.2.

~~C403.2.10.1 Allowable fan floor horsepower.~~ Each HVAC system at fan system design conditions shall not exceed the allowable fan system motor nameplate hp (Option 1) or fan system bhp (Option 2) as shown in Table C403.2.10.1(1). This includes supply fans, return/relief fans, and fan-powered terminal units associated with systems providing heating or cooling capability. Single zone variable-air-volume systems shall comply with the constant volume fan power limitation.

~~Exception:~~ The following fan systems are exempt from allowable fan floor horsepower requirement.

- ~~1. Hospital, vivarium and laboratory systems that utilize flow control devices on exhaust and/or return to maintain space pressure relationships necessary for occupant health and safety or environmental control shall be permitted to use variable volume fan power limitation.~~
- ~~2. Individual exhaust fans with motor nameplate horsepower of 1 hp or less.~~

~~C403.2.10.2 Motor nameplate horsepower.~~ For each fan, the selected fan motor shall be no larger than the first available motor size greater than the brake horsepower (bhp). The fan brake horsepower (bhp) shall be indicated on the design documents to allow for compliance verification by the code official.

~~Exceptions:~~

- ~~1. For fans less than 6 bhp (4413 W), where the first available motor larger than the brake horsepower has a nameplate rating within 50 percent of the bhp, selection of the next larger nameplate motor size is allowed.~~
- ~~2. For fans 6 bhp (4413 W) and larger, where the first available motor larger than the bhp has a nameplate rating within 30 percent of the bhp, selection of the next larger nameplate motor size is allowed.~~

**TABLE C403.2.10.1(1)
FAN POWER LIMITATION**

**TABLE C403.2.10.1(2)
FAN POWER LIMITATION PRESSURE DROP ADJUSTMENT**

Reason: Checking the fan horsepower is impractical. This part of the code is seldom enforced, or even taught in class.

Cost Impact: The code change proposal will not increase the cost of construction.

CE231-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.10-EC-CONNER.doc

CE232 – 13

C403.2.10, C403.2.10.3 (NEW)

Proponent: Michael Ivanovich, AMCA International (mivanovich@amca.org)

Revise as follows:

C403.2.10 Air system design and control. Each HVAC system having a total fan system motor nameplate horsepower (hp) exceeding 5 horsepower (hp) (3.7 kW) shall meet the provisions of Sections C403.2.10.1 through ~~C403.2.10.2~~ C403.2.10.3.

C403.2.10.3 Fan efficiency verification. The efficiency of fans shall be verified through certification under an approved certification program or, where no certification program exists, the fan efficiency ratings shall be supported by data furnished by the manufacturer.

Reason: The energy usage of fans is under increasing scrutiny by designers, building owners, commissioning agents, code enforcement professionals, federal agencies, and other code users. This code change proposal requires fan manufacturers to provide relevant information related to the energy efficient performance of their products. The proposed language has been extracted from the IECC section on HVAC equipment in Section C403.2.3 as an equipment performance requirement. It is applicable to fan products.

Cost Impact: The code change proposal will not increase the cost of construction.

CE232-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.10-EC-IVANOVICH.doc

CE233 – 13

C202 (NEW), C403.2.10, C403.2.10.3 (NEW), Chapter 5

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C403.2.10 Air system design and control. Each HVAC system having a total fan system motor nameplate horsepower (hp) exceeding 5 horsepower (hp) (3.7 kW) shall meet the provisions of Sections C403.2.10.1 through ~~C403.2.10.2~~ C403.2.10.3.

C403.2.10.3 Fan efficiency. Fans shall have a *fan efficiency grade* (FEG) of at least 67 when determined in accordance with AMCA 205 by an *approved*, independent testing laboratory. In addition the total efficiency of the fan at the design point of operation shall be within 15 percentage points of the maximum total efficiency of the fan.

Exceptions:

1. Single fans with a motor nameplate horsepower of 5 hp or less, unless Exception 2 applies.
2. Multiple fans in series or parallel (e.g. fan arrays) that have a combined motor *nameplate horsepower* of 5 hp or less and are operated as the functional equivalent of a single fan.
3. Fans that are part of equipment covered under Section C403.2.3.
4. Fans included in an equipment package certified by an *approved agency* for air or energy performance.
5. Powered wall/roof ventilators.
6. Fans outside the scope of AMCA 205.
7. Fans that are intended to operate during only emergency conditions.

Add new definition as follows:

SECTION C202 GENERAL DEFINITIONS

FAN EFFICIENCY GRADE (FEG). A numerical rating identifier that specifies the fan's aerodynamic ability to convert shaft power, or impeller power in the case of a direct driven fan, to air power. FEGs are based on fan peak (optimum) energy efficiency that indicates the quality of the fan energy usage and the potential for minimizing the fan energy usage.

Add new standard to Chapter 5 as follows:

AMCA

205-12 Energy Efficiency Classification for Fans

Reason: ASHRAE/IES Standard 90.1, which is adopted by reference as an alternative to the IECC Commercial Provisions, has been revised to address the minimum efficiency of air system fans. The change ensures continued consistency between the IECC Commercial Provisions and standard 90.1.

The IECC Commercial Provisions do not currently have any provisions for fan efficiency. It is important and appropriate for the IECC Commercial Provisions to address this issue. The Section C 403.2.10 of the IECC Commercial Provisions addresses air system design and control and should be updated to include the criteria from standard 90.1-2010 as enhanced by this addendum in order to retain technical compatibility between the IECC Commercial Provisions and standard 90.1.

Fan power limits have been in the code for some time. These limits place restrictions on the design of systems and the amount of fan energy utilized. However the code has not had a requirement for a minimum fan efficiency. A fan efficiency metric was developed with fans being classified based on fan efficiency grades. This system is designated in AMCA 205-12.

Cost Impact: The code change proposal will increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, AMCA 205-2012 Energy Efficiency Classification for Fans,

with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

Note: The term 'fan efficiency grade' is currently defined in the IgCC. The wording of this proposal is identical to the IgCC definition.

CE233-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.10-EC-FERGUSON.doc

CE234 – 13

C202 (NEW), C403.2.10, C403.2.10.3 (NEW), Chapter 5

Proponent: Amanda Hickman, InterCode Incorporated, representing AMCA International (amanda@intercodeinc.com)

Revise as follows:

C403.2.10 Air system design and control. Each HVAC system having a total fan system motor nameplate horsepower (hp) exceeding 5 horsepower (hp) (3.7 kW) shall meet the provisions of Sections C403.2.10.1 through ~~C403.2.10.2~~ C403.2.10.3.

C403.2.10.3 Fan efficiency. Fans shall have a fan efficiency grade (FEG) of at least 67 when determined in accordance with AMCA 205 by an approved, independent testing laboratory and labeled by the manufacturer. The total efficiency of the fan at the design point of operation shall be within 15 percentage points of the maximum total efficiency of the fan.

Exceptions: The following fans are not required to have a fan efficiency grade:

1. Fans of 5 hp or less as follows:
 - 1.1 Single fan with a motor nameplate horsepower of 5 hp or less, unless Exception 1.2 applies.
 - 1.2 Multiple fans in series or parallel that have a combined motor nameplate horsepower of 5 hp or less and are operated as the functional equivalent of a single fan.
2. Fans that are part of equipment covered under Section C403.2.3.
3. Fans included in an equipment package certified by an *approved agency* for air or energy performance.
4. Powered wall/roof ventilators.
5. Fans outside the scope of AMCA 205.
6. Fans that are intended to operate only during emergency conditions.

Add new definition as follows:

SECTION C202 GENERAL DEFINITIONS

FAN EFFICIENCY GRADE (FEG). A numerical rating identifier that specifies the fan's aerodynamic ability to convert shaft power, or impeller power in the case of a direct driven fan, to air power. FEGs are based on fan peak (optimum) energy efficiency that indicates the quality of the fan energy usage and the potential for minimizing the fan energy usage.

Add new standard to Chapter 5 as follows:

AMCA

AMCA 205-12 Energy Efficiency Classification for Fans

Reason: The IECC Commercial Provisions do not currently have any provisions for fan efficiency. ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has been revised to address the minimum efficiency of air system fans.

C403.2.10 of the IECC Commercial Provisions addresses air system design and control and should be updated to include the criteria from ASHRAE Standard 90.1-2010 as enhanced by this addendum in order to retain technical compatibility between the IECC Commercial Provisions and standard 90.1. This change ensures continued consistency between the two documents.

Certified FEG ratings are calculated from test data taken during fan air-performance tests as part of routine participation in routine certified ratings program administered by AMCA International. Certified FEG ratings will not create a burden to designers and will not significantly increase cost of construction because dozens of fan manufacturers have already certified FEG ratings for hundreds of fan models.

Careful consideration has been given to the exceptions which are intended to provide relief for fans in certified packaged equipment, and fan types and sizes that do not easily conform to AMCA 205, or which, by virtue of their operating pressure, could lead to unwarranted incremental costs.

Cost Impact: The code change proposal will not significantly increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, AMCA 205-2012 Energy Efficiency Classification for Fans, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

Note: The term 'fan efficiency grade' is currently defined in the IgCC. The wording of this proposal is identical to the IgCC definition.

CE234-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.10.3 (NEW)-EC-HICKMAN.doc

CE235 – 13

C403.2.10.1

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C403.2.10.1 Allowable fan floor horsepower. Each HVAC system at fan system design conditions shall not exceed the allowable *fan system motor nameplate hp* (Option 1) or *fan system bhp* (Option 2) as shown in Table C403.2.10.1(1). This includes supply fans, exhaust fans, return/relief fans, and fan-powered terminal units associated with systems providing heating or cooling capability. Single zone variable-air-volume systems shall comply with the constant volume fan power limitation.

Exceptions: ~~The following fan systems are exempt from allowable fan floor horsepower requirement.~~

1. Hospital, vivarium and laboratory systems that utilize flow control devices on exhaust and/or return to maintain space pressure relationships necessary for occupant health and safety or environmental control shall be permitted to use variable volume fan power limitation.
2. Individual exhaust fans with motor nameplate horsepower of 1 hp or less2. Individual exhaust fans with motor nameplate horsepower of 1 hp or less are exempt from the allowable fan horsepower requirement.

Reason: This proposal involves editorial clarification and simplification of provisions for allowable fan horsepower. The proposal inserts the words "exhaust fans" that are missing from C403.2.10.1, even though exception 2 is for exhaust fans and the definition for *fan system motor nameplate hp* referred to in the section include exhaust fans. The parent section is clear as to scope (fan horsepower) however the two exceptions have different basis. The first exception allows use of the less strict variable fan formula from the table for certain constant volume systems, while what is covered in the second exemption is a blanket exemption. It is appropriate to delete the introductory reason and provide the extent of exception separately for each exception. The term "floor" does not appear to be appropriate within the context of this section. The intent is to limit fan horsepower so the term floor is removed.

Cost Impact: The code change proposal does not increase the cost of construction.

CE235-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.10.1-EC-WILLIAMS.doc

CE236 – 13

Table C403.2.10.1(2)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

TABLE C403.2.10.1(2)
FAN POWER LIMITATION PRESSURE DROP ADJUSTMENT

DEVICE	ADJUSTMENT
Credits	
Fully ducted return and/or exhaust air systems	0.5 inch w.c. (2.15 in w.c. for laboratory and vivarium systems)
Return and/or exhaust air flow control devices	0.5 inch w.c.
Exhaust filters, scrubbers, or other exhaust treatment.	The pressure drop of device calculated at fan system design condition
Particulate filtration credit: MERV 9 thru 12	0.5 inch w.c.
Particulate filtration credit: MERV 13 thru 15	0.9 inch. w.c.
Particulate filtration credit: MERV 16 and greater and electronically enhanced filters	Pressure drop calculated at 2x clean filter pressure drop at fan system design condition.
Carbon and other gas-phase air cleaners	Clean filter pressure drop at fan system design condition.
Biosafety cabinet	Pressure drop of device at fan system design condition.
Energy recovery device, other than coil runaround loop	(2.2 x energy recovery effectiveness) – 0.5 inch w.c. for each airstream
Coil runaround loop	0.6 inch w.c. for each airstream
Evaporative humidifier/cooler in series with another cooling coil	Pressure drop of device at fan system design conditions
Sound attenuation section (<u>fans serving spaces with design background noise goals below NC35</u>)	0.15 inch w.c.
Exhaust system serving fume hoods	0.35 inch w.c.
Laboratory and vivarium exhaust systems in high-rise buildings	0.25 inch w.c./100 feet of vertical duct exceeding 75 feet
<u>Deductions</u>	
<u>Systems without central cooling device</u>	<u>- 0.6 in. w.c.</u>
<u>Systems without central heating device</u>	<u>- 0.3 in. w.c.</u>
<u>Systems with central electric resistance heat</u>	<u>- 0.2 in. w.c.</u>

w.c. = water column

For SI: 1 inch w.c. = 249 Pa, 1 inch = 25.4 mm.

Reason: This proposal does the following:

1. Adds a requirement that the sound attenuation credit is only available if there are background noise criteria requirements.
2. Adds a deduction for systems without any central heating or cooling device. Since the base level fan power allowances include the assumption that those components are present, the deduction is warranted for those systems that do not include those component.
3. Adds a deduction for systems with electric resistance heating. Since the base level fan power allowances include the assumption that hydronic heating coils are present, systems with electric resistance heating coils that have less pressure drop do not need the full allowance assumed in the base level.

The change ensures continued consistency between the IECC and standard 90.1-2010.

Cost Impact: The code change proposal will not increase the cost of construction.

CE236-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.10.1(2)T-EC-FERGUSON.doc

CE237 – 13

C403.2.10.2

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C403.2.10.2 Motor nameplate horsepower. For each fan, the fan brake horse power shall be indicated on the construction documents and the selected motor shall be no larger than the first available motor size greater than the following: brake horsepower. ~~The fan brake horse power shall be indicated on the design documents to allow for compliance verification by the code official.~~

Exceptions:

1. For fans less than 6 bhp (4413 W), ~~where the first available motor larger than the brake horsepower has a nameplate rating within 50 percent of the bhp, selection of the next larger nameplate motor size is allowed.~~ 1.5 times the fan brake horsepower
2. For fans 6 bhp (4413 W) and larger, ~~where the first available motor larger than the bhp has a nameplate rating within 30 percent of the bhp, selection of the next larger nameplate motor size is allowed.~~ 1.3 times the fan brake horsepower.

Reason: This proposal simplifies provisions for motor nameplate horsepower by replacing complicated exceptions with positive statements of what is required. The complex exceptions are replaced with a positive statement of what is required. This will reduce confusion over the maximum horsepower requirement and foster implementation and compliance verification.

Cost Impact: The code change proposal will not increase the cost of construction.

CE237-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.10.2-EC-WILLIAMS.doc

CE238 – 13

C403.2.10.2

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C403.2.10.2 Motor nameplate horsepower. For each fan, the selected fan motor shall be no larger than the first available motor size greater than the brake horsepower (bhp). The fan brake horsepower (bhp) shall be indicated on the design documents to allow for compliance verification by the *code official*.

Exceptions:

1. For fans less than 6 bhp (4413 W), where the first available motor larger than the brake horsepower has a nameplate rating within 50 percent of the bhp, selection of the next larger nameplate motor size is allowed.
2. For fans 6 bhp (4413 W) and larger, where the first available motor larger than the bhp has a nameplate rating within 30 percent of the bhp, selection of the next larger nameplate motor size is allowed.
3. Systems complying with Section C403.2.10.1 *fan system motor nameplate hp* (Option 1).

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has been revised to eliminate unnecessary documentation of fan bhp in certain cases. The change ensures continued consistency between the IECC Commercial Provisions and standard 90.1-2010.

Cost Impact: The code change proposal will not increase the cost of construction.

CE238-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.10.2-EC-FERGUSON.doc

CE239 – 13

C403.2.12 (NEW), Table C403.2.12(1) (NEW), Table C403.2.12 (2) (NEW), Chapter 5

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new text as follows:

C403.2.12 Refrigeration equipment performance. Refrigeration equipment shall have an energy use in kWh/day not greater than the values of Tables C403.2.12(1) and C403.2.12(2) when tested and rated in accordance with AHRI Standard 1200. The energy use shall be verified through certification under an approved certification program or, where no certification program exists, the energy use shall be supported by data furnished by the equipment manufacturer.

TABLE C403.2.12(1)
MINIMUM EFFICIENCY REQUIREMENTS: COMMERCIAL REFRIGERATION

<u>Equipment Type</u>	<u>Application</u>	<u>Energy Use Limits (kWh per day)^a</u>	<u>Test Procedure</u>
<u>Refrigerator with solid doors</u>	<u>Holding Temperature</u>	<u>$0.10 \times V + 2.04$</u>	<u>AHRI 1200</u>
<u>Refrigerator with transparent doors</u>		<u>$0.12 \times V + 3.34$</u>	
<u>Freezers with solid doors</u>		<u>$0.40 \times V + 1.38$</u>	
<u>Freezers with transparent doors</u>		<u>$0.75 \times V + 4.10$</u>	
<u>Refrigerators/freezers with solid doors</u>		<u>the greater of $0.12 \times V + 3.34$ or 0.70</u>	
<u>Commercial refrigerators</u>	<u>Pulldown</u>	<u>$0.126 \times V + 3.51$</u>	

^aV = volume of the chiller or frozen compartment as defined in AHAM-HRF-1

TABLE C403.2.12(2)
MINIMUM EFFICIENCY REQUIREMENTS: COMMERCIAL REFRIGERATORS AND FREEZERS

<u>Equipment Type</u>				<u>Energy Use Limits (kWh/day) as of 1/1/2012^{a,b}</u>	<u>Test Procedure</u>
<u>Equipment Class^c</u>	<u>Family Code</u>	<u>Operating Mode</u>	<u>Rating Temperature</u>		
<u>VOP.RC.M</u>	<u>Vertical Open</u>	<u>Remote Condensing</u>	<u>Medium Temperature</u>	<u>$0.82 \times TDA + 4.07$</u>	<u>AHRI 1200</u>
<u>SVO.RC.M</u>	<u>Semivertical Open</u>	<u>Remote Condensing</u>	<u>Medium Temperature</u>	<u>$0.83 \times TDA + 3.18$</u>	
<u>HZO.RC.M</u>	<u>Horizontal Open</u>	<u>Remote Condensing</u>	<u>Medium Temperature</u>	<u>$0.35 \times TDA + 2.88$</u>	
<u>VOP.RC.L</u>	<u>Vertical Open</u>	<u>Remote Condensing</u>	<u>Low Temperature</u>	<u>$2.27 \times TDA + 6.85$</u>	
<u>HZO.RC.L</u>	<u>Horizontal Open</u>	<u>Remote Condensing</u>	<u>Low Temperature</u>	<u>$0.57 \times TDA + 6.88$</u>	
<u>VCT.RC.M</u>	<u>Vertical Transparent Door</u>	<u>Remote Condensing</u>	<u>Medium Temperature</u>	<u>$0.22 \times TDA + 1.95$</u>	

Equipment Type				Energy Use Limits (kWh/day) as of 1/1/2012^{a,b}	Test Procedure
Equipment Class^c	Family Code	Operating Mode	Rating Temperature		
<u>VCT.RC.L</u>	<u>Vertical Transparent Door</u>	<u>Remote Condensing</u>	<u>Low Temperature</u>	<u>0.56 × TDA + 2.61</u>	
<u>SOC.RC.M</u>	<u>Service Over Counter</u>	<u>Remote Condensing</u>	<u>Medium Temperature</u>	<u>0.51 × TDA + 0.11</u>	
<u>VOP.SC.M</u>	<u>Vertical Open</u>	<u>Self Contained</u>	<u>Medium Temperature</u>	<u>1.74 × TDA + 4.71</u>	
<u>SVO.SC.M</u>	<u>Semivertical Open</u>	<u>Self Contained</u>	<u>Medium Temperature</u>	<u>1.73 × TDA + 4.59</u>	
<u>HZO.SC.M</u>	<u>Horizontal Open</u>	<u>Self Contained</u>	<u>Medium Temperature</u>	<u>0.77 × TDA + 5.55</u>	
<u>HZO.SC.L</u>	<u>Horizontal Open</u>	<u>Self Contained</u>	<u>Low Temperature</u>	<u>1.92 × TDA + 7.08</u>	
<u>VCT.SC.I</u>	<u>Vertical Transparent Door</u>	<u>Self Contained</u>	<u>Ice Cream</u>	<u>0.67 × TDA + 3.29</u>	
<u>VCS.SC.I</u>	<u>Vertical Solid Door</u>	<u>Self Contained</u>	<u>Ice Cream</u>	<u>0.38 × V + 0.88</u>	
<u>HCT.SC.I</u>	<u>Horizontal Transparent Door</u>	<u>Self Contained</u>	<u>Ice Cream</u>	<u>0.56 × TDA + 0.43</u>	
<u>SVO.RC.L</u>	<u>Semivertical Open</u>	<u>Remote Condensing</u>	<u>Low Temperature</u>	<u>2.27 × TDA + 6.85</u>	
<u>VOP.RC.I</u>	<u>Vertical Open</u>	<u>Remote Condensing</u>	<u>Ice Cream</u>	<u>2.89 × TDA + 8.7</u>	
<u>SVO.RC.I</u>	<u>Semivertical Open</u>	<u>Remote Condensing</u>	<u>Ice Cream</u>	<u>2.89 × TDA + 8.7</u>	
<u>HZO.RC.I</u>	<u>Horizontal Open</u>	<u>Remote Condensing</u>	<u>Ice Cream</u>	<u>0.72 × TDA + 8.74</u>	
<u>VCT.RC.I</u>	<u>Vertical Transparent Door</u>	<u>Remote Condensing</u>	<u>Ice Cream</u>	<u>0.66 × TDA + 3.05</u>	
<u>HCT.RC.M</u>	<u>Horizontal Transparent Door</u>	<u>Remote Condensing</u>	<u>Medium Temperature</u>	<u>0.16 × TDA + 0.13</u>	
<u>HCT.RC.L</u>	<u>Horizontal Transparent Door</u>	<u>Remote Condensing</u>	<u>Low Temperature</u>	<u>0.34 × TDA + 0.26</u>	
<u>HCT.RC.I</u>	<u>Horizontal Transparent Door</u>	<u>Remote Condensing</u>	<u>Ice Cream</u>	<u>0.4 × TDA + 0.31</u>	
<u>VCS.RC.M</u>	<u>Vertical Solid Door</u>	<u>Remote Condensing</u>	<u>Medium Temperature</u>	<u>0.11 × V + 0.26</u>	
<u>VCS.RC.L</u>	<u>Vertical Solid Door</u>	<u>Remote Condensing</u>	<u>Low Temperature</u>	<u>0.23 × V + 0.54</u>	
<u>VCS.RC.I</u>	<u>Vertical Solid Door</u>	<u>Remote Condensing</u>	<u>Ice Cream</u>	<u>0.27 × V + 0.63</u>	
<u>HCS.RC.M</u>	<u>Horizontal Solid Door</u>	<u>Remote Condensing</u>	<u>Medium Temperature</u>	<u>0.11 × V + 0.26</u>	
<u>HCS.RC.L</u>	<u>Horizontal Solid Door</u>	<u>Remote Condensing</u>	<u>Low Temperature</u>	<u>0.23 × V + 0.54</u>	

<u>Equipment Type</u>				<u>Energy Use Limits (kWh/day) as of 1/1/2012^{a,b}</u>	<u>Test Procedure</u>
<u>Equipment Class^c</u>	<u>Family Code</u>	<u>Operating Mode</u>	<u>Rating Temperature</u>		
<u>HCS.RC.I</u>	<u>Horizontal Solid Door</u>	<u>Remote Condensing</u>	<u>Ice Cream</u>	<u>$0.27 \times V + 0.63$</u>	
<u>HCS.RC.I</u>	<u>Horizontal Solid Door</u>	<u>Remote Condensing</u>	<u>Ice Cream</u>	<u>$0.27 \times V + 0.63$</u>	
<u>SOC.RC.L</u>	<u>Service Over Counter</u>	<u>Remote Condensing</u>	<u>Low Temperature</u>	<u>$1.08 \times TDA + 0.22$</u>	
<u>SOC.RC.I</u>	<u>Service Over Counter</u>	<u>Remote Condensing</u>	<u>Ice Cream</u>	<u>$1.26 \times TDA + 0.26$</u>	
<u>VOP.SC.L</u>	<u>Vertical Open</u>	<u>Self Contained</u>	<u>Low Temperature</u>	<u>$4.37 \times TDA + 11.82$</u>	
<u>VOP.SC.I</u>	<u>Vertical Open</u>	<u>Self Contained</u>	<u>Ice Cream</u>	<u>$5.55 \times TDA + 15.02$</u>	
<u>SVO.SC.L</u>	<u>Semivertical Open</u>	<u>Self Contained</u>	<u>Low Temperature</u>	<u>$4.34 \times TDA + 11.51$</u>	
<u>SVO.SC.I</u>	<u>Semivertical Open</u>	<u>Self Contained</u>	<u>Ice Cream</u>	<u>$5.52 \times TDA + 14.63$</u>	
<u>HZO.SC.I</u>	<u>Horizontal Open</u>	<u>Self Contained</u>	<u>Ice Cream</u>	<u>$2.44 \times TDA + 9.0$</u>	
<u>SOC.SC.I</u>	<u>Service Over Counter</u>	<u>Self Contained</u>	<u>Ice Cream</u>	<u>$1.76 \times TDA + 0.36$</u>	
<u>HCS.SC.I</u>	<u>Horizontal Solid Door</u>	<u>Self Contained</u>	<u>Ice Cream</u>	<u>$0.38 \times V + 0.88$</u>	

^aV = Volume of the case, as measured in accordance with Appendix C of AHRI 1200.

^bTDA = Total display area of the case, as measured in accordance with Appendix D of AHRI 1200.

^cEquipment class designations consist of a combination (in sequential order separated by periods(AAA).(BB).(C)) of:

(AAA) An equipment family code where:

VOP=vertical open

SVO=semivertical open

HZO=horizontal open,

VCT=vertical transparent doors

VCS=vertical solid doors

HCT=horizontal transparent doors

HCS=horizontal solid doors

SOC=service over counter

(BB) An operating mode code, either

RC=remote condensing, or

SC=self-contained).

(C) A rating temperature code, either:

M=medium temperature (38 °F)

L=low temperature (0 °F), or

I=ice-cream temperature (15 °F).

For example, "VOP.RC.M" refers to the "vertical open, remote condensing, medium temperature" equipment class.

Add new standards to Chapter 5 as follows:

AHRI

1200-10 Performance Rating of Commercial Refrigerated Display Merchandisers and Storage Cabinets.

AHAM

HRF-1 2007 Energy, Performance and Capacity of Household Refrigerators, Refrigerator-Freezers and Freezers

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has been revised to address energy efficiency opportunities available from commercial refrigeration and freezing equipment. In

buildings where such equipment is located it contributes to the energy use of the building and now that there is a test procedure for efficiency of this equipment and minimum efficiencies are in standard 90.1-2010 it seems reasonable to include them in the IECC, noting this type of equipment is addressed in the IMC as to health and life safety. The change ensures continued consistency between the IECC and standard 90.1-2010.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, AHRI 1200-2010 Performance Rating of Commercial Refrigerated Display Merchandisers and Storage Cabinets, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

A review of the standard proposed for inclusion in the code, AHAM-HRF-1-2007 Energy, Performance and Capacity of Household Refrigerators, Refrigerator-Freezers and Freezers, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

CE239-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

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C202 (NEW), C403.2.12 (NEW), C403.2.13 (NEW), C403.5 (NEW), C403.5.1 (NEW), C403.5.2 (NEW)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new text as follows:

C403.2.12 Walk-in Coolers and Walk-in Freezers. Site assembled or site constructed *walk-in coolers* and *walk-in freezers* shall comply with the following:

1. Automatic door closers shall be provided that fully close walk-in doors that have been closed to within 1 inch of full closure.

Exception: Closers are not required for doors over 3 feet 9 inches wide or 7 feet tall.

2. Doorways shall be provided with strip doors, curtains, spring-hinged doors, or other method of minimizing infiltration when the doors are open.
3. Walls shall be provided with insulation having a thermal resistance of not less than R-25, ceilings shall be provided with insulation having a thermal resistance of not less than R-25 and doors of *walk-in coolers* and *walk-in freezers* shall be provided with insulation having a thermal resistance of not less than R-32.

Exception: Insulation is not required for glazed portions of doors or at structural members associated with the walls, ceiling or door frame.

4. The floor of *walk-in freezers* shall be provided with insulation having a thermal resistance of not less than R-28.
5. Evaporator fan motors that are less than 1 horsepower and less than 460 volts shall be electronically commutated motors or 3-phase motors.
6. Light sources shall have an efficacy of not less than 40 lumens per Watt, including any ballast losses or shall be provided with a device that automatically turns off the lights within 15 minutes of when the *walk-in cooler* or *walk-in freezer* was last occupied.
7. Transparent reach-in doors for and windows in opaque *walk-in freezer* doors shall be provided with triple-pane glass having the interstitial spaces filled with inert gas or provided with heat-reflective treated glass.
8. Transparent reach-in doors for and windows in opaque *walk-in cooler* doors shall be double-pane heat-reflective treated glass having the interstitial space gas filled;
9. Anti-sweat heaters that are not provided with anti-sweat heater controls shall have a total door rail, glass, and frame heater power draw not greater than 7.1 Watts per square foot of door opening for *walk-in freezers*, and not greater than 3.0 Watts per square foot of door opening for *walk-in coolers*.
10. Anti-sweat heater controls shall be capable of reducing the energy use of the anti-sweat heater as a function of the relative humidity in the air outside the door or to the condensation on the inner glass pane.

11. Condenser fan motors that are less than 1 horsepower in capacity shall be of the electronically commutated or permanent split capacitor-type or shall be 3-phase motors.

Exception: Fan motors in *walk-in coolers* and *walk-in freezers* combined in a single enclosure greater than 3,000 square feet in floor area are exempt.

C403.2.13 Refrigerated display cases. Site assembled or site constructed refrigerated display cases shall comply with the following:

1. Lighting in refrigerated display cases and glass doors installed on walk-in coolers and freezers shall be controlled by one of the following:
 - 1.1 Automatic time switch controls to turn off lights during non-business hours. Timed overrides for display cases or walk-in coolers and freezers may be used to turn the lights on for up to one hour and shall automatically time out to turn the lights off.
 - 1.2 Motion sensor controls on each display case or walk-in door section that reduce lighting power by at least 50 percent within 3 minutes after the area within the sensor range is vacated. how about is 'unoccupied' as you have used in other proposals.
2. All low temperature display cases shall incorporate temperature based defrost termination control with a time limit default. The defrost cycle shall terminate first on an upper temperature limit breach and second upon a time limit breach.
3. Anti-sweat heater controls shall reduce the energy use of the anti-sweat heater as a function of the relative humidity in the air outside the door or to the condensation on the inner glass pane.

C403.5 Refrigeration systems Refrigerated display cases, *walk-in coolers* or *walk-in freezers* that are served by remote compressors and remote condensers not located in a *condensing unit*, shall meet the requirements of Section C403.5 and C403.5.2.

Exception: Systems where the working fluid in the refrigeration cycle goes through both subcritical and supercritical states (transcritical) or systems that use ammonia refrigerant are exempt.

C403.5.1 Condensers serving refrigeration systems. Fan-powered condensers shall comply with the following:

1. The design *saturated condensing temperatures* for air-cooled condensers shall not exceed the design dry bulb temperature plus 10°F for *low temperature refrigeration systems*, and the design dry bulb temperature plus 15°F for *medium temperature refrigeration systems* where the *saturated condensing temperature* for blend refrigerants shall be determined using the average of liquid and vapor temperatures as converted from the condenser drain pressure
2. Condenser fan motors that are less than 1 horsepower shall use electronically commutated motors, permanent split capacitor-type motors or 3-phase motors.
3. All condenser fans for air-cooled condensers, evaporatively cooled condensers, air or water cooled fluid coolers or cooling towers shall reduce fan motor demand to no more than 30% of design wattage at 50% of design air volume, and incorporate one of the following continuous variable speed fan control approaches:
 - 3.1 Refrigeration system condenser control for air-cooled condensers shall use variable setpoint control logic to reset the condensing temperature setpoint in response to ambient drybulb temperature.

3.2 Refrigeration system condenser control for evaporatively cooled condensers shall use variable setpoint control logic to reset the condensing temperature setpoint in response to ambient wetbulb temperature.

4. Multiple fan condensers shall be controlled in unison.

5. The minimum condensing temperature setpoint shall be no greater than 70°F.

C403.5.2 Compressor systems. Refrigeration compressor systems shall comply with the following:

1. Compressors and multiple-compressor systems suction groups shall include control systems that use floating suction pressure control logic to reset the target suction pressure temperature based on the temperature requirements of the attached refrigeration display cases or walk-ins.

Exception. Controls are not required for the following:

1. Single compressor systems that do not have variable capacity capability.
2. Suction groups that have a design saturated suction temperature of 30°F or higher, suction groups that comprise the high stage of a two-stage or cascade system or suction groups that primarily serve chillers for secondary cooling fluids.
2. Liquid sub-cooling shall be provided for all low temperature compressor systems with a design cooling capacity equal to or greater than 100,000 Btu/hr with a design saturated suction temperature of -10°F or lower. The sub-cooled liquid temperature shall be controlled at a maximum temperature setpoint t of 50°F at the exit of the sub-cooler using either compressor economizer (inter-stage) ports or a separate compressor suction group operating at a saturated suction temperature of 18°F or higher.
- 2.1 Insulation for liquid lines with a fluid operating temperature less than 60°F are shall comply with Table C403.2.8.
3. All compressors that incorporate internal or external crankcase heaters shall provide a means to cycle the heaters off during compressor operation.

Add new definitions as follows:

SECTION C202 GENERAL DEFINITIONS

BUBBLE POINT. The refrigerant liquid saturation temperature at a specified pressure

CONDENSING UNIT. A factory-made assembly of refrigeration components designed to compress and liquefy a specific refrigerant. The unit consists of one or more refrigerant compressors, refrigerant condensers (air-cooled, evaporatively – cooled, and/or water-cooled), condenser fans and motors (where used) and factory-supplied accessories.

REFRIGERANT DEW POINT. The refrigerant vapor saturation temperature at a specified pressure.

REFRIGERATION SYSTEM, LOW TEMPERATURE. Systems for maintaining food product in a frozen state in refrigeration applications.

REFRIGERATION SYSTEM, MEDIUM TEMPERATURE. Systems for maintaining food product above freezing in refrigeration applications.

SATURATED CONDENSING TEMPERATURE. The saturation temperature corresponding to the measured refrigerant pressure at the condenser inlet for single component and azeotropic refrigerants.

and the arithmetic average of the dew point and *bubble point* temperatures corresponding to the refrigerant pressure at the condenser entrance for zeotropic refrigerants.

WALK-IN COOLER. An enclosed storage space less than 3,000 square feet in floor area, designed to maintain the space warmer than 32°F but cooler than 55°F that has a ceiling height of not less than 7 feet

WALK-IN FREEZER. An enclosed storage space less than 3,000 square feet in floor area, designed to maintain the space at no greater than 32°F that has a ceiling height of not less than 7 feet

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has been revised to address the energy efficiency associated with refrigeration systems and coolers. These systems and equipment are prevalent in many building types and should be addressed in the IECC because they represent an opportunity to save additional energy. The change ensures continued consistency between the IECC and standard 90.1.

Cost Impact: The code change proposal will increase the cost of construction.

CE240-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.2.12 (NEW) #2-EC-FERGUSON.doc

CE241 – 13

C403.1, C403.3, C403.3.1.1 (NEW), C403.1.1.1, C403.3.3.1.1.2, C403.3.1.2 (NEW), C403.3.1.1.3, Table C403.3.1.1(1), Table C403.3.1.1.3(2), C403.3.1.1.4, C403.3.1.4 (NEW), C403.3.1.4.1 (NEW), C403.3.1.4.2 (NEW), C403.3.2, C403.4 through C403.4.3.5

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C403.1 General. Mechanical systems and equipment serving the building heating, cooling or ventilating needs shall comply with Section C403.2 (referred to as the mandatory provisions) and ~~either:~~ shall comply with Sections C403.3 and C403.4 based on the equipment and systems provided.

- ~~1. Section C403.3 (Simple systems); or~~
- ~~2. Section C403.4 (Complex systems).~~

C403.3 Simple HVAC systems and equipment Economizers (Prescriptive). This section applies to buildings served by unitary or packaged HVAC equipment listed in Tables C403.2.3(1) through C403.2.3(8). ~~each serving one zone and controlled by a single thermostat in the zone served. It also applies to two-pipe heating systems serving one or more zones, where no cooling system is installed~~

C403.3.1 Economizers. Each cooling system that has a fan shall include either an air or water economizer meeting the requirements of Sections C403.3.1.1 through C403.3.1.1.4.

Exception: Economizers are not required for the systems listed below.

1. Individual fan-cooling units with a supply capacity less than the minimum listed in Table C403.3.1(1).
2. Where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above 35°F (1.7 °C) dew-point temperature to satisfy process needs.
3. Systems that serve *residential* spaces where the system capacity is less than five times the requirement listed in Table C403.3.1(1).
4. Systems expected to operate less than 20 hours per week.
5. Where the use of *outdoor air* for cooling will affect supermarket open refrigerated casework systems.
6. Where the cooling *efficiency* meets or exceeds the *efficiency* requirements in Table C403.3.1(2).

C403.3.1.1 Integrated economizer control. Economizer systems shall be integrated with the mechanical cooling system and be capable of providing partial cooling even where additional mechanical cooling is required to meet the remainder of the cooling load.

Exceptions:

1. Direct expansion systems that include controls that reduce the quantity of *outdoor air* required to prevent coil frosting at the lowest step of compressor unloading, provided this lowest step is no greater than 25 percent of the total system capacity.
2. Individual direct expansion units that have a rated cooling capacity less than 54,000 Btu/h (15 827 W) and use nonintegrated economizer controls that preclude simultaneous operation of the economizer and mechanical cooling.

C403.3.1.2 Economizer heating system impact. HVAC system design and economizer controls shall be such that economizer operation does not increase the building heating energy use during normal operation.

Exception: Economizers on VAV systems that cause *zone* level heating to increase due to a reduction in supply air temperature.

**TABLE C403.3.1(1)
ECONOMIZER REQUIREMENTS**

CLIMATE ZONES	ECONOMIZER REQUIREMENT
1A, 1B	No requirement
2A, 2B, 3A, 3B, 3C, 4A, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8	Economizers on all cooling systems ≥ 33,000 Btu/h ^a

For SI: 1 British thermal unit per hour = 0.2931 W.

- a. The total capacity of all systems without economizers shall not exceed 300,000 Btu/h per *building*, or 20 percent of its air economizer capacity, whichever is greater.

**TABLE C403.3.1(2)
EQUIPMENT EFFICIENCY
PERFORMANCE EXCEPTION FOR ECONOMIZERS**

CLIMATE ZONES	COOLING EQUIPMENT PERFORMANCE IMPROVEMENT (EER OR IPLV)
2B	10% Efficiency Improvement
3B	15% Efficiency Improvement
4B	20% Efficiency Improvement

C403.3.1.1.4 C403.3.1.3 Air economizers. Air economizers shall comply with Sections C403.3.1.1.4 through C403.3.1.1.4. C403.3.1.3.1 through C403.3.1.3.4.

C403.3.1.1.4 C403.3.1.3.1 Design capacity. Air economizer systems shall be capable of modulating *outdoor air* and return air dampers to provide up to 100 percent of the design supply air quantity as *outdoor air* for cooling.

C403.3.1.1.2 C403.3.1.3.2 Control signal. Economizer dampers shall be capable of being sequenced with the mechanical cooling equipment and shall not be controlled by only mixed air temperature.

Exception: The use of mixed air temperature limit control shall be permitted for systems controlled from space temperature (such as single-*zone* systems).

C403.3.1.1.3. C403.3.1.3.3 High-limit shutoff. Air economizers shall be capable of automatically reducing *outdoor air* intake to the design minimum *outdoor air* quantity when *outdoor air* intake will no longer reduce cooling energy usage. High-limit shutoff control types for specific climates shall be chosen from Table C403.3.1.1.3(1) C403.3.1.3.3(1). High-limit shutoff control settings for these control types shall be those specified in Table C403.3.1.1(2) C403.3.1.3.3(2).

TABLE C403.3.1.1(1) C403.3.1.3.3(1)
HIGH-LIMIT SHUTOFF CONTROL OPTIONS FOR AIR ECONOMIZERS

CLIMATE ZONES	ALLOWED CONTROL TYPES	PROHIBITED CONTROL TYPES
1B, 2B, 3B, 3C, 4B, 4C, 5B, 5C, 6B, 7, 8	Fixed dry bulb Differential dry bulb Electronic enthalpy ^a Differential enthalpy Dew-point and dry-bulb temperatures	Fixed enthalpy
1A, 2A, 3A, 4A	Fixed dry bulb Fixed enthalpy Electronic enthalpy ^a Differential enthalpy Dew-point and dry-bulb temperatures	Differential dry bulb
All other climates	Fixed dry bulb Differential dry bulb Fixed enthalpy Electronic enthalpy ^a Differential enthalpy Dew-point and dry-bulb temperatures	—

- a. Electronic enthalpy controllers are devices that use a combination of humidity and dry-bulb temperature in their switching algorithm.

TABLE C403.3.1.1.3(2) C403.3.1.3.3(2)
HIGH-LIMIT SHUTOFF CONTROL SETTING FOR AIR ECONOMIZERS

DEVICE TYPE	CLIMATE ZONE	REQUIRED HIGH LIMIT (ECONOMIZER OFF WHEN):	
		EQUATION	DESCRIPTION
Fixed dry bulb	1B, 2B, 3B, 3C, 4B, 4C, 5B, 5C, 6B, 7, 8	$T_{OA} > 75^{\circ}\text{F}$	Outdoor air temperature exceeds 75°F
	5A, 6A, 7A	$T_{OA} > 70^{\circ}\text{F}$	Outdoor air temperature exceeds 70°F
	All other zones	$T_{OA} > 65^{\circ}\text{F}$	Outdoor air temperature exceeds 65°F
Differential dry bulb	1B, 2B, 3B, 3C, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8	$T_{OA} > T_{RA}$	Outdoor air temperature exceeds return air temperature
Fixed enthalpy	All	$h_{OA} > 28 \text{ Btu/lb}^a$	Outdoor air enthalpy exceeds 28 Btu/lb of dry air ^a
Electronic Enthalpy	All	$(T_{OA}, RH_{OA}) > A$	Outdoor air temperature/RH exceeds the "A" setpoint curve ^b
Differential enthalpy	All	$h_{OA} > h_{RA}$	Outdoor air enthalpy exceeds return air enthalpy
Dew-point and dry bulb temperatures	All	$DP_{OA} > 55^{\circ}\text{F}$ or $T_{OA} > 75^{\circ}\text{F}$	Outdoor air dry bulb exceeds 75°F or outside dew point exceeds 55°F (65 gr/lb)

For SI: °C = (°F - 32) × 5/9, 1 Btu/lb = 2.33 kJ/kg.

- a. At altitudes substantially different than sea level, the Fixed Enthalpy limit shall be set to the enthalpy value at 75°F and 50-percent relative humidity. As an example, at approximately 6,000 feet elevation the fixed enthalpy limit is approximately 30.7 Btu/lb.
- b. Setpoint "A" corresponds to a curve on the psychrometric chart that goes through a point at approximately 75°F and 40-percent relative humidity and is nearly parallel to dry-bulb lines at low humidity levels and nearly parallel to enthalpy lines at high humidity levels.

C403.3.1.1.4 C403.3.1.3.4 Relief of excess outdoor air. Systems shall be capable of relieving excess *outdoor air* during air economizer operation to prevent over-pressurizing the building. The relief air outlet shall be located to avoid recirculation into the building.

C403.3.1.4 Water-side economizers. Water-side economizers shall comply with Sections C403.3.1.4.1 through C403.3.1.4.2

C403.3.1.4.1 Design capacity. Water economizer systems shall be capable of cooling supply air by indirect evaporation and providing up to 100 percent of the expected system cooling load at *outdoor air* temperatures of 50°F dry bulb (10°C dry bulb)/45°F wet bulb (7.2°C wet bulb) and below.

Exception: Systems in which a water economizer is used and where dehumidification requirements cannot be met using outdoor air temperatures of 50°F dry bulb (10°C dry bulb)/45°F wet bulb (7.2°C wet bulb) shall satisfy 100 percent of the expected system cooling load at 45°F dry bulb (7.2°C dry bulb)/40°F wet bulb (4.5°C wet bulb).

C403.3.1.4.2 Maximum pressure drop. Precooling coils and water-to-water heat exchangers used as part of a water economizer system shall either have a water-side pressure drop of less than 15 feet (4572 mm) of water or a secondary loop shall be created so that the coil or heat exchanger pressure drop is not seen by the circulating pumps when the system is in the normal cooling (noneconomizer) mode.

C403.3.2 Hydronic system controls. Hydronic systems of at least 300,000 Btu/h (87 930 W) design output capacity supplying heated and chilled water to comfort conditioning systems shall include controls that meet the requirements of Section C403.4.3.

C403.4 Complex Hydronic and multi-zone HVAC system controls and equipment. (Prescriptive). This section applies to buildings served by HVAC equipment and systems not covered in Section C403.3. Hydronic and multi-zone HVAC system controls and equipment shall comply with this section.

C403.4.1 Economizers. Economizers shall comply with Sections C403.4.1.1 through C403.4.1.4.

C403.4.1.1 Design capacity. Water economizer systems shall be capable of cooling supply air by indirect evaporation and providing up to 100 percent of the expected system cooling load at *outdoor air* temperatures of 50°F dry bulb (10°C dry bulb)/45°F wet bulb (7.2°C wet bulb) and below.

Exception: Systems in which a water economizer is used and where dehumidification requirements cannot be met using outdoor air temperatures of 50°F dry bulb (10°C dry bulb)/45°F wet bulb (7.2°C wet bulb) shall satisfy 100 percent of the expected system cooling load at 45°F dry bulb (7.2°C dry bulb)/40°F wet bulb (4.5°C wet bulb).

C403.4.1.2 Maximum pressure drop. Precooling coils and water-to-water heat exchangers used as part of a water economizer system shall either have a water-side pressure drop of less than 15 feet (4572 mm) of water or a secondary loop shall be created so that the coil or heat exchanger pressure drop is not seen by the circulating pumps when the system is in the normal cooling (noneconomizer) mode.

C403.4.1.3 Integrated economizer control. Economizer systems shall be integrated with the mechanical cooling system and be capable of providing partial cooling even where additional mechanical cooling is required to meet the remainder of the cooling load.

Exceptions:

1. Direct expansion systems that include controls that reduce the quantity of *outdoor air* required to prevent coil frosting at the lowest step of compressor unloading, provided this lowest step is no greater than 25 percent of the total system capacity.

- ~~2. Individual direct expansion units that have a rated cooling capacity less than 54,000 Btu/h (15 827 W) and use nonintegrated economizer controls that preclude simultaneous operation of the economizer and mechanical cooling.~~

~~C403.4.1.4 Economizer heating system impact.~~ HVAC system design and economizer controls shall be such that economizer operation does not increase the building heating energy use during normal operation.

~~Exception:~~ Economizers on VAV systems that cause zone level heating to increase due to a reduction in supply air temperature.

~~C403.4.2~~ C403.4.1 Variable air volume (VAV) fan control. Individual VAV fans with motors of 7.5 horsepower (5.6 kW) or greater shall be:

1. Driven by a mechanical or electrical variable speed drive;
2. Driven by a vane-axial fan with variable-pitch blades; or
3. The fan shall have controls or devices that will result in fan motor demand of no more than 30 percent of their design wattage at 50 percent of design airflow when static pressure set point equals one-third of the total design static pressure, based on manufacturer's certified fan data.

~~C403.4.2.1~~ C403.4.1.1 Static pressure sensor location. Static pressure sensors used to control VAV fans shall be placed in a position such that the controller setpoint is no greater than one-third the total design fan static pressure, except for systems with zone reset control complying with Section C403.4.2.2. For sensors installed down-stream of major duct splits, at least one sensor shall be located on each major branch to ensure that static pressure can be maintained in each branch.

~~C403.4.2.2~~ C403.4.1.2 Set points for direct digital control. For systems with direct digital control of individual zone boxes reporting to the central control panel, the static pressure set point shall be reset based on the zone requiring the most pressure, i.e., the set point is reset lower until one zone damper is nearly wide open.

~~C403.4.3~~ C403.4.2 Hydronic systems controls. The heating of fluids that have been previously mechanically cooled and the cooling of fluids that have been previously mechanically heated shall be limited in accordance with Sections ~~C403.4.3.1 through C403.4.3.3~~ C403.4.2.1 through C403.4.2.3. Hydronic heating systems comprised of multiple-packaged boilers and designed to deliver conditioned water or steam into a common distribution system shall include automatic controls capable of sequencing operation of the boilers. Hydronic heating systems comprised of a single boiler and greater than 500,000 Btu/h (146 550 W) input design capacity shall include either a multistaged or modulating burner.

~~C403.4.3.1~~ C403.4.2.1 Three-pipe system. Hydronic systems that use a common return system for both hot water and chilled water are prohibited.

~~C403.4.3.2~~ C403.4.2.2 Two-pipe changeover system. Systems that use a common distribution system to supply both heated and chilled water shall be designed to allow a dead band between changeover from one mode to the other of at least 15°F (8.3°C) outside air temperatures; be designed to and provided with controls that will allow operation in one mode for at least 4 hours before changing over to the other mode; and be provided with controls that allow heating and cooling supply temperatures at the changeover point to be no more than 30°F (16.7°C) apart.

~~C403.4.3.3~~ C403.4.2.3 Hydronic (water loop) heat pump systems. Hydronic heat pump systems shall comply with Sections ~~C403.4.3.3.1 C403.4.2.3.1, through C403.4.3.3.3~~ C403.4.2.3.2.

~~C403.4.3.3.1~~ C403.4.2.3.1 Temperature dead band. Hydronic heat pumps connected to a common heat pump water loop with central devices for heat rejection and heat addition shall have controls that are

capable of providing a heat pump water supply temperature dead band of at least 20°F (11.1°C) between initiation of heat rejection and heat addition by the central devices.

Exception: Where a system loop temperature optimization controller is installed and can determine the most efficient operating temperature based on realtime conditions of demand and capacity, dead bands of less than 20°F (11°C) shall be permitted.

~~C403.4.3.3.2~~ C403.4.2.3.2 Heat rejection. Heat rejection equipment shall comply with Sections ~~C403.4.3.3.2.1 and C403.4.3.3.2.2.~~ C403.4.2.3.2.1 and C403.4.2.3.2.2

Exception: Where it can be demonstrated that a heat pump system will be required to reject heat throughout the year.

~~C403.4.3.3.2.1~~ C403.4.2.3.2.1 Climate Zones 3 and 4. For climate zones 3 and 4:

1. If a closed-circuit cooling tower is used directly in the heat pump loop, either an automatic valve shall be installed to bypass all but a minimal flow of water around the tower, or lower leakage positive closure dampers shall be provided.
2. If an open-circuit tower is used directly in the heat pump loop, an automatic valve shall be installed to bypass all heat pump water flow around the tower.
3. If an open- or closed-circuit cooling tower is used in conjunction with a separate heat exchanger to isolate the cooling tower from the heat pump loop, then heat loss shall be controlled by shutting down the circulation pump on the cooling tower loop.

~~C403.4.3.3.2.2~~ C403.4.2.3.2.2 Climate Zones 5 through 8. For Climate Zones 5 through 8, if an open- or closed-circuit cooling tower is used, then a separate heat exchanger shall be provided to isolate the cooling tower from the heat pump loop, and heat loss shall be controlled by shutting down the circulation pump on the cooling tower loop and providing an automatic valve to stop the flow of fluid.

~~C403.4.3.3.3~~ C403.4.2.3.3. Two position valve. Each hydronic heat pump on the hydronic system having a total pump system power exceeding 10 horsepower (hp) (7.5 kW) shall have a two-position valve.

~~C403.4.3.4~~ C403.4.3.3 Part load controls. Hydronic systems greater than or equal to 300,000 Btu/h (87 930 W) in design output capacity supplying heated or chilled water to comfort conditioning systems shall include controls that have the capability to:

1. Automatically reset the supply-water temperatures using zone-return water temperature, building-return water temperature, or outside air temperature as an indicator of building heating or cooling demand. The temperature shall be capable of being reset by at least 25 percent of the design supply-to-return water temperature difference; or
2. Reduce system pump flow by at least 50 percent of design flow rate utilizing adjustable speed drive(s) on pump(s), or multiple-staged pumps where at least one-half of the total pump horsepower is capable of being automatically turned off or control valves designed to modulate or step down, and close, as a function of load, or other *approved* means.

~~C403.4.3.5~~ C403.4.3.4 Pump isolation. Chilled water plants including more than one chiller shall have the capability to reduce flow automatically through the chiller plant when a chiller is shut down. Chillers piped in series for the purpose of increased temperature differential shall be considered as one chiller.

Boiler plants including more than one boiler shall have the capability to reduce flow automatically through the boiler plant when a boiler is shut down.

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings

and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

Reasons for this specific proposal:

2012C has multiple conflicts:

- a. Air economizer only applied to simple systems.
- b. Water systems and references to "cooling" within the Simple System language (C403.3.1)
- c. Directing language that should apply to all economizer types was only under Complex (Integrated economizer, economizer control, relief of outdoor air). This language moved to Section 403.3.1 (basic economizer requirements, which requires either air or water economizers).
- d. Section C403.3.2, Hydronic system controls (under Simple Systems) references "chilled water", which is not a simple system. This same language is duplicated under Section C403.4.3.4 (Part Load controls). All hydronic controls are combined under this proposal to be under the retitled Section "C403.4 Complex Hydronic and multi-zone HVAC systems controls and equipment. (Prescriptive)". Any special multi-zone or hydronic requirements (formerly complex system) are under this section.
- e. A complex system could have air and water economizers. Where exceptions apply becomes a complicated process.
- f. Language in Section 403.3 (simple systems), includes references to Tables C403.2.3(1) through C403.2.3(8), which includes all equipment, including centrifugal chillers and cooling towers (always part of a complex system).

Complex and simple systems do not have a use in the IECC. These systems have no definitions. There are no other references to these systems anywhere else in the IECC. The need for these divisions in the IECC is no longer necessary and only leads to confusion and/or conflicting code requirements as noted in this proposal.

The intent of this proposal is to do the following:

1. An Economizer section with general requirements for all economizers in the same location. Requirements for Air and Water economizers are outlined. Exceptions are the same for either economizer type.
2. Complex Systems becomes a general prescriptive section for hydronic and multiple zone systems and the control of these systems.

A key element to making the revised provisions work, is revision to Section 403.1. As it stands in the 2012 code, Section 403.1 has a serious flaw that allows you to pick and choose a compliance path by saying "use either simple or complex" path requirements. The language is an "either A or B". It does not have a path to use both simple and complex when you have a building with both equipment types. It also allows cherry-picking of a path.

Section 403.1 does NOT require that a chilled water systems use the complex system Section 403.4 control/pump requirements. It can pick the Section 403.3 simple system path. A building can install an air economizer on a 100 ton (chilled water) VAV rooftop and not have to meet ANY of the requirements of Section 403.4 for VAV systems... And since an air economizer is included with most every VAV rooftop, that creates a gaping hole in code. And very little applies code will apply to a boiler or chiller you may have on the site.

Cost Impact: The 2012 code was flawed and the result would be inconsistent application of the economizer provisions. Because the 2012 does state specifically that an economize is required for complex systems, this could be viewed as an increase to the cost of construction. However since the energy savings envisioned by the balance of the HVAC requirements would not be realized without an installed economizer, most systems would be provided with one (or more) anyway.

CE241-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.1-EC-THOMPSON-SEHPCAC

CE242 – 13

C403.3.1, C403.4.1, C403.4.1.1

Proponent: Shirley Ellis, Energy Systems Laboratory, Texas A&M Engineering Experiment Station (shirleyellis@tamu.edu)

Revise as follows:

C403.3.1 Economizers. Each cooling system that has a fan shall include either an air or water economizer meeting the requirements of Sections C403.3.1.1 ~~through C403.3.1.1.4~~ or a water economizer meeting the requirements of Section C403.4.1.1.

Exception: Economizers are not required for the systems listed below.

1. Individual fan-cooling units with a supply capacity less than the minimum listed in Table C403.3.1(1).
2. Where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above 35°F (1.7 °C) dew-point temperature to satisfy process needs.
3. Systems that serve *residential* spaces where the system capacity is less than five times the requirement listed in Table C403.3.1(1).
4. Systems expected to operate less than 20 hours per week.
5. Where the use of *outdoor air* for cooling will affect supermarket open refrigerated casework systems.
6. Where the cooling *efficiency* meets or exceeds the *efficiency* requirements in Table C403.3.1(2).

C403.4.1. Economizers. ~~Economizers shall comply with Sections C403.4.1.1 through C403.4.1.4.~~ Each cooling system that has a fan shall include either an air or water economizer meeting the requirements of Section C403.3.1.1 or a water economizer meeting the requirements of Section C403.4.1.1.

C403.4.1.1 Water economizers. Water economizer systems shall comply with Sections C403.4.1.1.1 through C403.4.1.1.4 .

Exception: Systems in which a water economizer is used and where dehumidification requirements cannot be met using outdoor air temperatures of 50°F dry bulb (10°C dry bulb)/45°F wet bulb (7.2°C wet bulb) shall satisfy 100 percent of the expected system cooling load at 45°F dry bulb (7.2°C dry bulb)/40°F wet bulb (4.5°C wet bulb).

C403.4.1.1 C403.4.1.1.1 Design capacity. Water economizer systems shall be capable of cooling supply air by indirect evaporation and providing up to 100 percent of the expected system cooling load at *outdoor air* temperatures of 50°F dry bulb (10°C dry bulb)/45°F wet bulb(7.2°C wet bulb) and below.

Exception: ~~Systems in which a water economizer is used and where dehumidification requirements cannot be met using outdoor air temperatures of 50°F dry bulb (10°C dry bulb)/45°F wet bulb (7.2°C wet bulb) shall satisfy 100 percent of the expected system cooling load at 45°F dry bulb (7.2°C dry bulb)/40°F wet bulb (4.5°C wet bulb).~~

C403.4.1.2 C403.4.1.1.2 Maximum pressure drop. (No change to text)

C403.4.1.3 C403.4.1.1.3 Integrated economizer control (No change to text)

C403.4.1.4 C403.4.1.1.4 Economizer heating system impact. (No change to text)

Table C407.5.1(1)
Specifications for the Standard Reference and Proposed Designs

Cooling systems	Fuel Type: same as proposed design	As proposed
	Equipment type ^c : from Tables C407.5.1(2) and C407.5.1(3)	As proposed
	Efficiency: from Tables C403.2.3(1), C403.2.3(2) and C403.2.3(3)	As proposed
	Capacity ^b : sized proportionally to the capacities in the proposed design based on sizing runs, and shall be established such that no smaller number of unmet cooling load hours and no larger cooling capacity safety factors are provided than in the proposed design.	As proposed
	Economizer ^d : same as proposed, in accordance with Sections <u>C403.3.1</u> or C403.4.1	As proposed

- d. If an economizer is required in accordance with Table C403.3.1(1), and if no economizer exists or is specified in the proposed design, then a supply air economizer shall be provided in accordance with Section ~~C403.4.1~~ C403.3.1.1.

(Portions of Table not shown remain unchanged)

Reason: The 2012 IECC addresses air or water economizers for simple HVAC systems, but only water economizer systems for Complex HVAC systems. In addition, all the requirements for design capacity, control signals, high-limit shutoff and relief of excess outdoor air for air economizers is currently contained in the simple HVAC systems with no cross reference in the complex HVAC system section.

This proposal contains no new language, the change proposed to requirements for air economizers in the section for simple HVAC systems and the requirements for water economizers in the complex HVAC systems and cross reference the two. It also adds a reference for air economizers to the Total Building Performance Specification Table C407.5.1(1)

The change to Table C407.5.1(1) footnote d is to correct the Section reference to Air economizers.

Cost Impact: This code change proposal will not increase the cost of construction.

CE242-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.3.1-EC-ELLIS.doc

CE243 – 13

C403.3.1, Table C403.3.1(1)

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C403.3 Simple HVAC systems and equipment (Prescriptive). This section applies to buildings served by unitary or packaged HVAC equipment listed in Tables C403.2.3(1) through C403.2.3(8), each serving one *zone* and controlled by a single thermostat in the *zone* served. It also applies to two-pipe heating systems serving one or more *zones*, where no cooling system is installed.

C403.3.1 Economizers. Each cooling system that has a fan shall include either an air or water economizer meeting the requirements of Sections C403.3.1.1 through C403.3.1.1.4.

Exception: Economizers are not required for the systems listed below.

- ~~1. Individual fan-cooling units with a supply capacity less than the minimum listed in Table C403.3.1(1).~~
- ~~1. In cooling systems for buildings located in climate zones 1A and 1B.~~
- ~~2. In climate zones other than 1A and 1B, where individual cooling units have a capacity of less than 33,000 Btu/h. The total supply capacity of all fan-cooling units not provide with economizers shall not exceed 20 percent of the total supply capacity of all fan-cooling units in the building nor 300,000 Btu/h, whichever is greater.~~
- ~~2. 3. Where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above 35°F (1.7 °C) dew-point temperature to satisfy process needs.~~
- ~~3. 4. Systems that serve residential spaces where the system capacity is less than five times the requirement listed in Table C403.3.1(1).~~
- ~~4. 5. Systems expected to operate less than 20 hours per week.~~
- ~~5. 6. Where the use of outdoor air for cooling will affect supermarket open refrigerated casework systems.~~
- ~~6. 7. Where the cooling efficiency meets or exceeds the efficiency requirements in Table C403.3.1(2).~~

TABLE C403.3.1(1)
ECONOMIZER REQUIREMENTS

CLIMATE ZONES	ECONOMIZER REQUIREMENT
1A, 1B	No requirement
2A, 2B, 3A, 3B, 3C, 4A, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8	Economizers on all cooling systems \geq 33,000 Btu/h ^a

For SI: 1 British thermal unit per hour = 0.2931 W.

- a. ~~The total capacity of all systems without economizers shall not exceed 300,000 Btu/h per building, or 20 percent of its air economizer capacity, whichever is greater.~~

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

Reasons for this specific proposal:

The interaction between exception #1 and Table C403.3.1(1) is unclear. The exception states where economizers are not to be required, but the table appears to be a listing of economizer requirements. The intent is unclear as written. The proposal replaces

the table with 2 exceptions which are clearly exceptions from an economizer requirement. The first exception addresses climate zones 1A and 1B where no economizers are required regardless of the system capacity. The second exception addresses the other climate zones currently covered by the last line of the table and the footnote. Similar revision was made to the Massachusetts Stretch Code to address the confusion of this section and table.

The same format occurs in a parallel section in the IgCC. If this proposal is successful, the SEHPCAC will submit a companion proposal in 2014 for the IgCC.

Cost Impact: The code change proposal will not increase the cost of construction. The proposal is editorial in nature and will have no impact on the cost of construction.

CE243-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.3.1-EC-THOMPSON-SEHPCAC

CE244 – 13

C403.3.1, Table C403.3.1(1)

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C403.3.1 Economizers. Each cooling system that has a fan shall include either an air or water economizer meeting the requirements of Sections C403.3.1.1 through C403.3.1.1.4.

Exception: Economizers are not required for the systems listed below.

1. Individual fan-cooling units with a supply capacity less than the minimum listed in Table C403.3.1(1).
2. Where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above 35°F (1.7 °C) dew-point temperature to satisfy process needs.
3. Systems that serve *residential* spaces where the system capacity is less than five times the requirement listed in Table C403.3.1(1).4. Systems expected to operate less than 20 hours per week.
5. Where the use of *outdoor air* for cooling will affect supermarket open refrigerated casework systems.
6. Where the cooling *efficiency* meets or exceeds the *efficiency* requirements in Table C403.3.1(2).
7. Systems under 110,000 Btu/h total cooling capacity that utilize multiple stage cooling capacity control and multiple speed fan control.

TABLE C403.3.1(1)
ECONOMIZER REQUIREMENTS

CLIMATE ZONES	ECONOMIZER REQUIREMENT
1A, 1B	No requirement
2A, 2B, 3A, 3B, 3C, 4A, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8	Economizers on all cooling systems ≥ 33,000 <u>≥ 54,000</u> Btu/h ^a

For SI: 1 British thermal unit per hour = 0.2931 W.

- a. The total capacity of all systems without economizers shall not exceed 300,000 Btu/h per *building*, or 20 percent of its air economizer capacity, whichever is greater.

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

Reasons for this specific proposal:

The current trigger values for economizers are in conflict with current ASHRAE Standard 90.1. The modification to the 2012 IECC was based on the Green standard 189.1 additional energy measures; prescriptive requirements should not come from an optional code or standard. ASHRAE 90.1 reduced their trigger to 54,000 Btu/h in the 2010 version and is not decreasing the trigger in any addenda for the 2013 version. Intent is to align the code and standard. For 2013, California Title 24 revisited economizers and did not drop their trigger value below 54,000 Btu/h. No other mandatory code or standard has reduced below 54,000 Btu/h.

The first part of this proposal recommends matching Table C403.3.1(1) to the trigger to other codes and standards.

The second part of this proposal allows for one additional exception: small units (under 110,000 Btu/h) are not required to have an economizer if the units have multiple speed fans and multiple stage cooling capacity.

For this proposal, the efficiency measure is similar to a prescriptive requirement that California added for small units. We are proposing an exception to economizers for small units. As part of the 2013 California Title 24 proposals, multiple stage compressor

and fan control for small HVAC units (under the current 110,000 Btu/h trigger for multiple speed fans) was economically viable as a prescriptive measure and was included in Title 24.

http://www.energy.ca.gov/title24/2013standards/prerulemaking/documents/current/Reports/Nonresidential/HVAC/2013_CASE_NR_Fan_Control_Integrated_Economizers_Sept_2011.pdf has the complete report. Taylor Engineering performed the energy modeling. They report a possible 2-year payback for addition of multi-speed compressor & fan.

Per cost figures furnished to California by Dick Lord of Carrier, this proposed exception would be less than or equal to the cost of an economizer. So there is no cost impact.

Oregon BCD energy modeling used the Taylor Engineering baseline concept. We looked at the same building with these small HVAC units. We compared a building without economizers (not required in California for the HVAC size range) with the same units with economizer and with just the multi-speed configuration. Adding multi-speed configuration saves nearly 4-times more energy than adding an economizer.

So the proposed exception not only has an equal or lower cost, it will save a greater amount of energy.

Additional study performed by PNNL of economizers and other measures for small packaged HVAC equipment provides additional insight. PNNL Study #PNNL-20995 (http://www.pnnl.gov/main/publications/external/technical_reports/PNNL-20955.pdf), even though relative to retrofit of existing equipment, gives insight on the relative effectiveness of economizers, multi-speed control and Demand Control Ventilation (DCV). Multi-speed control is a more effective conservation measure than an economizer. See page 37:

- Multi-speed fan control and DCV are the two control strategies that contribute most to the HVAC energy savings.

Specifically, multi-speed fan control dominates the impact in a small number of cases, including all four building types in Miami and the small office building in Houston, Phoenix and Los Angeles. DCV dominates the impact for all other cases. The multi-speed fan contribution to savings can be negative in cold climates (e.g. Duluth and Fairbanks for all building types).

- Adding an air-side economizer after multi-speed fan control does not have a large impact on HVAC energy savings except for a few cases, such as the small office building in Los Angeles. In comparison with a nonintegrated economizer, the integrating economizer has negligible impact on HVAC energy savings.

Overall, this proposal provides both alignment with other standards and codes and is an improvement in energy conservation for anyone taking the new exception path.

So we are basing a request for modifying the levels on additional analysis conducted by Oregon Building Codes Division.

The analysis methods referenced for this proposal use the same energy models developed by ASHRAE and the Department of Energy (PNNL) for the Final Determination of ASHRAE 90.1-2010 in the Federal Register. We used the US DOE prototype energy model files and EnergyPlus software. NO new models were used; the simulation software was the same. Weighting of building types was the same as used by PNNL. Only buildings from the 90.1 determination that have packaged HVAC units in this size range were considered (not office buildings with VAV units). See these studies by PNNL for the analysis:

1. For the description for the modeling method
http://www.energycodes.gov/sites/default/files/documents/BECF_Energy_Cost_Savings_STD2010_May2011_v00.pdf
2. The DOE certification of 90.1-2010 (references the linked PNNL-20405 above)
http://www.energycodes.gov/sites/default/files/documents/BECF_FinalQuantitativeAnalysisReport901-2010Determination_Oct2011_v00.pdf

The national weighted-average annual energy savings per economizer for systems between 33,000 Btu/h and 110,000 Btu/h is \$41 per year per economizer. Using a first cost of \$750/economizer (including installation, set-up, initial testing) and a 15-year life cycle, economizers never provide a return on the cost premium, much less recover the cost of maintenance. On the basis of these models, we feel the trigger levels should be re-examined. Weighting of life cycle costs were based on EIA national average utility costs, 15-year life cycle and 3% discount rate for the \$750 average first cost and \$50/year for maintenance.

The table below is the raw data of savings per economizer by building type and climate zone. Weighting used the same data from the DOE/PNNL studies. Green highlights show over \$85/year, which might cover first costs and maintenance.

ANNUAL SAVINGS PER ECONOMIZER (RAW DATA)														
BUILDING PROTOTYPE/ CLIMATE ZONE	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	6A	6B	7	8
Fast Food Restaurant					\$ 65		\$ 135	\$ 94		\$ 87		\$ 82	\$ 69	\$ 38
Small Hotel	\$ 109	\$ 123	\$ 128	\$ 108		\$ 85		\$ 80	\$ 80	\$ 67	\$ 82		\$ 63	
Strip Mall Retail	\$ 18	\$ 26	\$ 16	\$ 41	\$ 76	\$ 22	\$ 32	\$ 75	\$ 29	\$ 50	\$ 54	\$ 58	\$ 37	\$ 31
Strip Mall Office	\$ 18	\$ 4	\$ 11	\$ 23		\$ 26	\$ 34	\$ 33	\$ 25	\$ 29	\$ 35	\$ 32	\$ 28	\$ 23
Warehouse	\$ 11	\$ (14)	\$ 9	\$ 10		\$ 0	\$ (1)	\$ (3)		\$ (2)	\$ (3)	\$ (4)		\$ (3)
Stand Alone Retail	\$ 76	\$ 99	\$ 96	\$ 105	\$ 210	\$ 102	\$ 152	\$ 130	\$ 99	\$ 122	\$ 123	\$ 134	\$ 126	\$ 119
Primary School	\$ 31	\$ 35	\$ 31	\$ 39	\$ 105	\$ 42	\$ 57	\$ 48	\$ 41	\$ 49	\$ 42	\$ 135	\$ 160	\$ 163

When looking at the Life Cycle Costs by building type, there is not a return on investment. And this simulation considers a perfectly functioning economizer. If the weighting were to include a factor for non-functioning economizers, becomes difficult to justify any economizer below 110,000 Btu/h.

WEIGHTED LIFE CYCLE COST BY BUILDING TYPE							
BUILDING TYPE	FAST FOOD	SMALL HOTEL	STRIP MALL	SMALL OFFICE	WAREHOUSE	STAND-ALONE RETAIL	PRIMARY SCHOOL
WEIGHTED LCC	(\$288)	(\$201)	(\$1,014)	(\$1,097)	(\$1,286)	(\$128)	(\$875)

Buildings are more efficient due to improvements in the codes. Contributing reasons why these systems no longer viable at the current triggers:

1. Improvements to the building envelope: glazing improvements reduce solar gain; envelope insulation delays thermal conductivity gains.
2. Reduced lighting power: 30-45% reductions from 2006 levels.
3. Equipment efficiency improvements: 30% increase in SEER requirement for 60,000 Btu/h (5-ton) units and smaller.

With less cooling required during the year (the building is more efficient), there is a smaller "pool of energy use" to reduce with this measure. And because of the improved building characteristics, there are fewer hours where cooling needs overlap with outdoor conditions suitable for economizer operation. An economizer on units in this size range has little chance of paying back its cost premium during the life cycle of the unit. The effects of code improvements over the years could not be analyzed without a full energy model. And the DOE/PNNL files are among the best available and are used by DOE for analyzing 90.1.

The current 33,000 Btu/h trigger (thru 110,000 Btu/h) only returns its cost over the life of the equipment when there are either high load conditions (computer closets) or nearly continuous operation (18-24 hours per day, 7-days per week). And positive returns are only found in a few climate zones, not on a national weighting by building type. The 33,000 Btu/h figure should only remain if there are exceptions for smaller units with operating hours of under 112 hours per week (above the 20 hour per week exception already in code) or if there are high internal loads. But this is difficult to put into enforceable code language.

We propose to match the current 90.1-2010 level of 54,000 Btu/h; 90.1 is not considering any further revisions below this level. The weighted average economizer savings increases slightly closer to a level where it might pay back.

Cost Impact: The code change proposal will not increase the cost of construction.

CE244-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.3.1(1)T-EC-THOMPSON-SEHPCAC

CE245 – 13

C403.3.1, Table C403.3.1(1), C403.3.1.4, C403.3.1.5 (NEW), Table C403.3.1.1.3(2), C403.3.1.2 (NEW), C403.3.1.2.1 (NEW)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C403.3.1 Economizers. Each cooling system that has a fan shall include either an air or water economizer meeting the requirements of Sections C403.3.1.1 through ~~C403.3.1.4.4~~ C403.3.1.1.5.

Exception: Economizers are not required for the systems listed below.

1. Individual fan-cooling units with a supply capacity less than the minimum listed in Table C403.3.1(1).
2. Where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above 35°F (1.7 °C) dew-point temperature to satisfy process needs.
3. Systems that serve residential spaces where the system capacity is less than five times the requirement listed in Table C403.3.1(1).
4. Systems expected to operate less than 20 hours per week.
5. Where the use of outdoor air for cooling will affect supermarket open refrigerated casework systems.
6. Where the cooling efficiency meets or exceeds the efficiency requirements in Table C403.3.1(2).
7. Systems that include a heat recovery system in accordance with Section C403.4.6.
8. Systems that serve spaces whose sensible cooling load at design conditions, excluding transmission and infiltration loads, is not more than the transmission and infiltration losses at an outdoor temperature of 60°F.

**TABLE C403.3.1(1)
ECONOMIZER REQUIREMENTS**

CLIMATE ZONES	ECONOMIZER REQUIREMENT
1A, 1B	No requirement
2A, 2B, 3A, 3B, 3C, 4A, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8	Economizers on all cooling systems ≥ 33,000 <u>54,000</u> Btu/h ^a

For SI: 1 British thermal unit per hour = 0.2931 W.

- a. The total capacity of all systems without economizers shall not exceed 300,000 Btu/h per *building*, or 20 percent of its air economizer capacity, whichever is greater.

C403.3.1.1.4 Dampers. Return, exhaust/relief, and outdoor air dampers shall in accordance with Section C402.4.5.2

C403.3.1.1.5 Relief of excess outdoor air. Systems shall be capable of relieving excess outdoor air during air economizer operation to prevent over-pressurizing the building. The relief air outlet shall be located to avoid recirculation into the building.

TABLE C403.3.1.1.3(2)
HIGH-LIMIT SHUTOFF CONTROL SETTING FOR AIR ECONOMIZERS

DEVICE TYPE	CLIMATE ZONE	REQUIRED HIGH LIMIT (ECONOMIZER OFF WHEN):	
		EQUATION	DESCRIPTION
Fixed dry bulb	1B, 2B, 3B, 3C, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8	$T_{OA} > 75^{\circ}\text{F}$	Outdoor air temperature exceeds 75°F
	5A, 6A, 7A	$T_{OA} > 70^{\circ}\text{F}$	Outdoor air temperature exceeds 70°F
	All other zones	$T_{OA} \geq 65^{\circ}\text{F}$	Outdoor air temperature exceeds 65°F
Differential dry bulb	1B, 2B, 3B, 3C, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8	$T_{OA} > T_{RA}$	Outdoor air temperature exceeds return air temperature
Fixed enthalpy	All <u>2A, 3A, 4A, 5A, 6A</u>	$h_{OA} > 28 \text{ Btu/lb}^a$	Outdoor air enthalpy exceeds 28 Btu/lb of dry air ^a
Electronic Enthalpy	All	$(T_{OA}, RH_{OA}) > A$	Outdoor air temperature/RH exceeds the "A" setpoint curve ^b
Differential enthalpy	All	$h_{OA} > h_{RA}$	Outdoor air enthalpy exceeds return air enthalpy
Dew-point and dry bulb temperatures	All	$DP_{OA} > 55^{\circ}\text{F}$ or $T_{OA} > 75^{\circ}\text{F}$	Outdoor air dry bulb exceeds 75°F or outside dew point exceeds 55°F (65 gr/lb)

For SI: °C = (°F - 32) × ⁵/9, 1 Btu/lb = 2.33 kJ/kg.

- At altitudes substantially different than sea level, the Fixed Enthalpy limit shall be set to the enthalpy value at 75°F and 50-percent relative humidity. As an example, at approximately 6,000 feet elevation the fixed enthalpy limit is approximately 30.7 Btu/lb.
- Setpoint "A" corresponds to a curve on the psychrometric chart that goes through a point at approximately 75°F and 40-percent relative humidity and is nearly parallel to dry-bulb lines at low humidity levels and nearly parallel to enthalpy lines at high humidity levels.

C403.3.1.2 Water economizers. Water economizers shall comply with Sections C403.3.1.2.1 through C403.3.1.2.2.

C403.3.1.2.1 Design capacity. Water economizer systems shall be capable of cooling supply air by indirect evaporation and providing up to 100 percent of the expected system cooling load at outdoor air temperatures not greater than 50°F dry bulb/45°F wet bulb.

Exceptions:

- Systems primarily serving computer rooms in which 100 percent of the expected system cooling load at 40°F dry bulb/35°F wet bulb is met with evaporative water economizers.
- Systems primarily serving computer rooms with dry cooler water economizers which satisfy 100 percent of the expected system cooling load at 35°F dry bulb.
- Systems where dehumidification requirements cannot be met using outdoor air temperatures of 50°F dry bulb/45°F wet bulb and where 100 percent of the expected system cooling load at 45°F(7°C) dry bulb/40°F (4°C) wet bulb is met with evaporative water economizers.

C403.3.1.2.2 Maximum pressure drop. Precooling coils and water-to-water heat exchangers used as part of a water economizer system shall either have a water-side pressure drop of less than 15 feet of water (45 kPa) or a secondary loop shall be created so that the coil or heat exchanger pressure drop is not seen by the circulating pumps when the system is in the normal cooling (non-economizer) mode.

Reason: This proposal makes the air economizer requirements consistent with ANSI/ASHRAE/IES Standard 90.1. Quite a bit of collaboration has gone into this proposal to achieve consensus, and is a result of many years of research investigating the cost effectiveness of economizer use in each climate zone.

In addition, new requirements for water economizers are being added.

Cost Impact: The code change proposal will not increase the cost of construction.

CE245-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.3.1-EC-FERGUSON.doc

CE246 – 13

C202 (NEW), Table C403.3.1.1.3(1)

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

TABLE C403.3.1.1.3(1)
HIGH-LIMIT SHUTOFF CONTROL OPTIONS FOR AIR ECONOMIZERS

CLIMATE ZONES	ALLOWED CONTROL TYPES	PROHIBITED CONTROL TYPES
1B, 2B, 3B, 3C, 4B, 4C, 5B, 5C, 6B, 7, 8	Fixed dry bulb Differential dry bulb Electronic enthalpy ^a Differential enthalpy Dew-point and dry-bulb temperatures	Fixed enthalpy
1A, 2A, 3A, 4A	Fixed dry bulb Fixed enthalpy Electronic enthalpy ^a Differential enthalpy Dew-point and dry-bulb temperatures	Differential dry bulb
All other climates	Fixed dry bulb Differential dry bulb Fixed enthalpy Electronic enthalpy ^a Differential enthalpy Dew-point and dry-bulb temperatures	—

a. Electronic enthalpy controllers are devices that use a combination of humidity and dry-bulb temperature in their switching algorithm.

Add new definition as follows:

SECTION C202 **GENERAL DEFINITIONS**

ELECTRONIC ENTHALPY CONTROLLER. A device that uses a combination of humidity and dry bulb temperature in its switching algorithm.

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

The footnote is a definition of a device. It provides no information that enhances the enforcement of the table other than defining one of the pieces of equipment. Chapter 2 is the preferred location for definitions. If this is approved, the SEHPCAC will submit a companion code change in 2014 to address parallel provisions in the IgCC.

Cost Impact: The code change proposal will not increase the cost of construction.

CE246-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.3.1.3(1)T-EC-THOMPSON-SEHPCAC

CE247 – 13

C403.3.1.1, C403.3.1.1.5 (NEW)

Proponent: Amanda Hickman, InterCode Incorporated, representing AMCA International
(amanda@intercodeinc.com)

Revise as follows:

C403.3.1.1 Air economizers. Air economizers shall comply with Sections C403.3.1.1.1 through ~~C403.3.1.1.4~~ C403.3.1.1.5.

C403.3.1.1.5 Economizer dampers. Dampers used in economizers shall comply with the requirements of Section C402.4.5.2.

Reason: This change will ensure that economizer intake dampers are low-leakage, and that the low-leakage ratings are certified to ensure the design intent and energy savings. Having them labeled will also make this provision easier to enforce.

This is a companion change to the proposal we submitted to C402.4.5.2 Outdoor air intakes and exhausts.

Cost Impact: The code change proposal will not increase the cost of construction.

CE247-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.3.1.1-EC-HICKMAN.doc

CE248 – 13

C403.4.1

Proponent: Gerald Anderson, City of Overland Park, KS, representing self
(jerry.anderson@opkansas.org)

Revise as follows:

C403.4.1 Economizers. ~~Economizers shall comply with~~ Each cooling system that has a fan shall include either an air or water economizer complying with Sections C403.4.1.1 through C403.4.1.4

Reason: The purpose of this code change is to place a charging statement within the body of the code. As the code is currently written, there is no requirement for economizers in Complex HVAC systems and equipment.

Cost Impact: The code change proposal will not increase the cost of construction.

CE248-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.4.1-EC-ANDERSON.doc

CE ~~249~~ – 13
C403.4.1, Table C403.4.1(NEW)

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C403.4.1 Economizers. ~~Economizers shall comply with~~ Each cooling system shall include either an air economizer in compliance with Section C403.3.1.1 or water economizer in compliance with Sections C403.4.1.1 through C403.4.1.4.

Exceptions: Economizers are not required for the systems listed below.

1. Individual fan-cooling units with a supply capacity less than the minimum listed in Table C403.3.1(1) that either:
 - 1.1. Have direct expansion cooling coils, or
 - 1.2. Where the total chilled water system capacity less the capacity of fan units with air economizers is less than the minimum listed in Table C403.4.1.
2. Chilled-water cooling systems that are passive (without a fan) or use induction where the total chilled water system capacity less the capacity of fan units with air economizers is less than the minimum listed in Table C403.4.1.
3. Individual cooling units that are in compliance with exceptions 2 through 6 to economizers under Section C403.3.1.

TABLE C403.4.1

MINIMUM CHILLED WATER SYSTEM COOLING CAPACITY FOR DETERMINING ECONOMIZER COOLING REQUIREMENTS
~~Minimum Chilled Water System Cooling Capacity~~
~~for Determining Economizer Cooling Requirements~~

Climate Zones (Cooling)	Total Chilled Water System Capacity Less Capacity of Cooling Units with Air Economizers	
	Local Water-Cooled Chilled Water Systems	Air-cooled Chilled Water Systems or District Chilled Water Systems
1a	No economizer requirement	No economizer requirement
1b, 2a, 2b	960,000 Btu/h (280 kW)	1,250,000 Btu/h (365 kW)
3a, 3b, 3c, 4a, 4b, 4c	720,000 Btu/h (210 kW)	940,000 Btu/h (275 kW)
5a, 5b, 5c, 6a, 6b, 7, 8	1,320,000 Btu/h (385 kW)	1,720,000 Btu/h (505 kW)

Reason: This proposal improves cooling efficiency by requiring a water-side economizer for non-fan systems (e.g. radiant cooling, passive chilled beam systems), and for systems with small individual fan systems served by chilled water systems at least 50 tons in size. Such systems include fan coil units, radiant cooling systems, and chilled beam cooling systems.

During part-load cooling situations, cooling towers can be used to provide chilled water to meet cooling load. This technology can apply to small individual fan systems served by chilled water and to non-fan systems such as radiant cooling and passive chilled beam systems. There are a number of approaches to meeting the proposed requirements: (1) a separate closed circuit cooling tower (evaporative fluid cooler) that pre-cools chilled water return before it enters the chiller that is sized to meet the requirements of section C403.4.1.1, (2) an integrated operation with return chilled water precooled by the chiller tower and then completely cooled by the chiller, or (3) an either/or approach, where the chilled water is generated by the tower until load can no longer be met and then only the chiller is used. To analyze cost effectiveness, option 1 was analyzed, as it is most straightforward, and has clearly defined cost boundaries.

There is a cost impact associated with this proposed change since a heat exchanger or more expensive closed-circuit cooling tower and additional pipes, pumps, and controls will typically be required. A cost effectiveness analysis found that with reduced chiller operation the requirement for the waterside economizer was cost effective. Based on a system life of 22 years, a discounted cost effective payback threshold is 13.1 years. The simple paybacks in all of the climate zones where waterside economizers would be required under this proposal are well below this cost effective threshold.

References:

R. Hart. 2012. *Supporting Analyses for proposed changes to the commercial provisions of the 2012 IECC: Water-side Economizer for Non-Fan Cooling Systems*.

<http://www.energycodes.gov/development/commercial/2015IECC>

Cost Impact: The code change proposal will increase the cost of construction.

CE~~249~~–13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.4.1-EC-WILLIAMS.doc

CE250 – 13

C403.4.1.3, Table C403.4.1.3 (NEW), C403.4.2.1 (NEW), Table C403.4.2.1 (NEW), C403.4.2.1, C403.4.2.2, C403.4.7

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C403.4.1.3 Integrated economizer control. Economizer systems shall be integrated with the mechanical cooling system and be capable of providing partial cooling even where additional mechanical cooling is required to meet the remainder of the cooling load. Controls shall not be capable of creating a false load the mechanical cooling systems by limiting or disabling the economizer or any other means, such as hot gas bypass except at the lowest stage of mechanical cooling.

Units that include an air economizer shall comply with the following:

1. Unit controls shall have the mechanical cooling capacity control interlocked with the air economizer controls such that the outdoor air damper is at the 100 percent open position when *mechanical cooling* is on and the outdoor air damper does not begin to close to prevent coil freezing due to minimum compressor run time until the leaving air temperature is less than 45°F.
2. DX units that control 75,000 Btu/h or greater of rated capacity of the capacity of the mechanical cooling directly based on occupied space temperature shall have no fewer than 2 stages of mechanical cooling capacity
3. All other DX units including those that control space temperature by modulating the airflow to the space shall be in accordance with Table C403.4.1.3

Exceptions:

- ~~1. Direct expansion systems that include controls that reduce the quantity of *outdoor air* required to prevent coil frosting at the lowest step of compressor unloading, provided this lowest step is no greater than 25 percent of the total system capacity.~~
- ~~2. Individual direct expansion units that have a rated cooling capacity less than 54,000 Btu/h (15 827 W) and use nonintegrated economizer controls that preclude simultaneous operation of the economizer and mechanical cooling.~~

TABLE C403.4.1.3
DX COOLING STATESTAGE REQUIREMENTS FOR MODULATING AIRFLOW UNITS

<u>Rating Capacity</u>	<u>Minimum Number of Mechanical Cooling Stages</u>	<u>Minimum Compressor Displacement^a</u>
<u>≥65,000 Btu/h and <240,000 Btu/h</u>	<u>3 stages</u>	<u>≤35% of full Load</u>
<u>≥240,000 Btu/h</u>	<u>4 stages</u>	<u>≤25% full load</u>

- a. For *mechanical cooling* stage control that does not use variable compressor displacement the percent displacement shall be equivalent to the mechanical cooling capacity reduction evaluated at the full load rating conditions for the compressor.

C403.4.2 Variable air volume (VAV) fan control. Individual VAV fans with motors of 7.5 horsepower (5.6 kW) or greater shall be:

- ~~1. Driven by a mechanical or electrical variable speed drive;~~
- ~~2. Driven by a vane axial fan with variable pitch blades; or~~

3. ~~The fan shall have controls or devices that will result in fan motor demand of no more than 30 percent of their design wattage at 50 percent of design airflow when static pressure set point equals one-third of the total design static pressure, based on manufacturer's certified fan data~~

C403.4.2.1 Fan airflow control Each cooling system listed in Table C403.4.2.1 shall be designed to vary the indoor fan airflow as a function of load and shall comply with the following requirements.

1. DX and chilled water cooling units that control the capacity of the mechanical cooling directly based on space temperature shall have no fewer than 2 stages of fan control. Low or minimum speed shall not exceed 66 percent of full speed. At low or minimum speed the fan system shall draw no more than 40 percent of the fan power at full fan speed. Low or minimum speed shall be used during periods of low cooling load and ventilation only operation.
2. All other units including DX cooling units and chilled water units that control the space temperature by modulating the airflow to the space shall have modulating fan control. Minimum speed shall not exceed 50 percent of full speed. At minimum speed the fan system shall draw no more than 30 percent of the power at full fan speed. Low or minimum speed shall be used during periods of low cooling load and ventilation only operation.
3. Units that include an airside economizer to meet the requirements of Section C403.3.1 shall have no fewer than of 2 speeds of fan control during economizer operation

Exceptions:

1. Modulating fan control is not required for chilled water and evaporative cooling units with fan motors of less than 1 HP where the units are not used to provide *ventilation air* and the indoor fan cycles with the load.
2. Where the volume of outdoor air required to meet the *ventilation* requirements of the *International Mechanical Code* at low speed exceeds the air that would be delivered at the speed defined in Section C403.4.2 then the minimum speed shall be selected to provide the required *ventilation air*.

**TABLE C403.4.2.1
EFFECTIVE DATES FOR FAN CONTROL**

<u>Cooling System Type</u>	<u>Fan Motor Size</u>	<u>Mechanical Cooling Capacity</u>
<u>DX Cooling</u>	<u>any</u>	<u>≥75,000 Btu/h (before 1/1/2016)</u>
		<u>≥65,000 Btu/h (after 1/1/2016)</u>
<u>Chilled Water and Evaporative cooling</u>	<u>≥5 HP</u>	<u>Any</u>
	<u>≥1/4 HP</u>	<u>Any</u>

~~C403.4.2.1~~ C403.2.2 VAV Static pressure sensor location. Static pressure sensors used to control VAV fans shall be placed in a position such that the controller setpoint is no greater than one-third the total design fan static pressure, except for systems with *zone* reset control complying with Section C403.4.2.2. For sensors installed down-stream of major duct splits, at least one sensor shall be located on each major branch to ensure that static pressure can be maintained in each branch.

~~C403.4.2.2~~ C403.4.2.3 VAV Set points for direct digital control. For systems with direct digital control of individual *zone* boxes reporting to the central control panel, the static pressure set point shall be reset based on the *zone* requiring the most pressure, i.e., the set point is reset lower until one *zone* damper is nearly wide open.

C403.4.7 Hot gas bypass limitation. Cooling systems shall not use hot gas bypass or other evaporator pressure control systems unless the system is designed with multiple steps of unloading or continuous capacity modulation. The capacity of the hot gas bypass shall be limited as indicated in Table C403.4.7 as limited by Section C403.4.1.3

Exception: Unitary packaged systems with cooling capacities not greater than 90,000 Btu/h (26 379 W).

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, does not contain the exceptions that are shown in the IECC. Those exceptions were in standard 90.1-2007 but were removed in standard 90.1-2010. The change ensures continued consistency between the IECC and standard 90.1-2010.

Cost Impact: The code change proposal will increase the cost of construction.

CE250-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.4.1.3-EC-FERGUSON.doc

CE251 – 13

C403.4.2.1, C403.4.2.2

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C403.4.2.1 Static pressure sensor location. Static pressure sensors used to control VAV fans shall be placed in a position located such that the controller setpoint is no greater than one-third the total design fan static pressure, except for systems with zone reset control complying with Section C403.4.2.2-1.2 inches w.c. For sensors Where this results in one or more sensors being installed located down-stream of major duct splits, at least one sensor shall be located on each major branch to ensure that static pressure can be maintained in each branch.

C403.4.2.2 Set points for direct digital control. For systems with direct digital control of individual ~~zone boxes~~ zones reporting to the central control panel, the static pressure set point shall be reset based on the zone requiring the most pressure, i.e., the set point is reset lower until one *zone* damper is nearly wide open. The direct digital controls shall be capable of monitoring zone damper positions; or shall have an alternative method of indicating the need for static pressure which is capable of all of the following:

1. Automatically detecting any zone which excessively drives the reset logic;
2. Generating an alarm to the system operational location; and
3. Allowing an operator to readily remove one or more zones from the reset algorithm.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has been revised with respect to controls for certain aspects of HVAC systems. The change ensures continued consistency between the IECC and standard 90.1-2010.

Cost Impact: The code change proposal will increase the cost of construction where controls will now be required.

CE251-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.4.2.1-EC-FERGUSON.doc

CE252 – 13

C403.4.3.3.2, C403.4.3.3.2.1, C403.4.3.3.2.2

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C403.4.3.3.2 Heat rejection. For heat pump systems ~~Heat rejection equipment shall comply with Sections C403.4.3.3.2.1 and C403.4.3.3.2.2. in Climate Zones 3 through 8:~~

1. Where a closed-circuit cooling tower is used directly in the heat pump loop, one of the following shall be provided:
 - 1.1 An automatic valve capable of providing a bypass to all but a minimal flow of water around the tower; or
 - 1.2 Low leakage positive closure dampers.
2. Where an open-circuit tower is used directly in the heat pump loop, an automatic valve shall be installed capable of providing a bypass of all heat pump water flow around the tower.
3. Where an open-circuit cooling tower is used in conjunction with a separate heat exchanger to isolate the cooling tower from the heat pump loop, then heat loss shall be capable of being controlled by shutting down the circulation pump on the cooling tower loop.

Exception: Where it can be demonstrated that a heat pump system will be required to reject heat throughout the year.

~~C403.4.3.3.2.1 Climate Zones 3 and 4.~~ For Climate Zones 3 and 4:

1. ~~If a closed-circuit cooling tower is used directly in the heat pump loop, either an automatic valve shall be installed to bypass all but a minimal flow of water around the tower, or lower leakage positive closure dampers shall be provided.~~
2. ~~If an open-circuit tower is used directly in the heat pump loop, an automatic valve shall be installed to bypass all heat pump water flow around the tower.~~
3. ~~If an open- or closed-circuit cooling tower is used in conjunction with a separate heat exchanger to isolate the cooling tower from the heat pump loop, then heat loss shall be controlled by shutting down the circulation pump on the cooling tower loop.~~

~~C403.4.3.3.2.2 Climate Zones 5 through 8.~~ For Climate Zones 5 through 8, if an open- or closed-circuit cooling tower is used, then a separate heat exchanger shall be provided to isolate the cooling tower from the heat pump loop, and heat loss shall be controlled by shutting down the circulation pump on the cooling tower loop and providing an automatic valve to stop the flow of fluid.

Reason: For consistency with ASHRAE/IES 90.1-2010. . As that standard is an alternative path to compliance with the IECC and there is a desire to maintain equivalency of the IECC with 90.1 the issue of energy use for freeze protection systems must also be addressed in the IECC. These requirements for heat pump heat loss have been in 90.1 for a few years. This change will bring the requirements in line with 90.1.

Cost Impact: The code change proposal will not increase the cost of construction.

CE252-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.4.3.3.2-EC-FERGUSON.doc

CE253 – 13

C403.4.3.4

Proponent: Eric Makela, Britt/Makela Group, Inc., representing Northwest Energy Codes Group (eric@brittmakela.com)

Revise as follows:

C403.4.3.4 Part load controls. Hydronic systems greater than or equal to ~~300,000~~ 500,000 Btu/h (87 930W) in design output capacity supplying heated or chilled water to comfort conditioning systems shall include controls that have the capability to:

1. Automatically reset the supply-water temperatures in response to varying building heating and cooling demand using: coil valve position, zone-return water temperature, building-return water temperature, or out-side air temperature as an indicator of building heating or cooling demand. The temperature shall be capable of being reset by at least 25 percent of the design supply-to-return water temperature difference; ~~or and~~
2. Automatically vary fluid flow for hydronic systems with a combined motor capacity of 10 hp (7.5 kW) or larger with three or more ~~Reduce systems pump flow by at least 50 percent of design flow rate utilizing adjustable speed drive(s) on pump(s), or multiple staged pumps where at least one-half of the total pump horsepower is capable of being automatically turned off or~~ control valves or other devices by reducing the system design flow rate by at least 50 percent by designed valves that modulate or step open down, and close, or pumps that modulate or turn on and off as a function of load or other approved means; and
3. Automatically vary pump flow on chilled water systems and heat rejection loops serving water cooled unitary air-conditioners with a combined motor capacity of 10 hp (7.5 kW) or larger by reducing system pump design flow by at least 50 percent of design flow rate utilizing adjustable speed drive(s) on pump(s), or multiple-staged pumps where at least one-half of the total pump horsepower is capable of being automatically turned off or control valves designed to modulate or step down, and close, as a function of load, or other approved means. Pump flow shall be controlled to maintain one control valve nearly wide open or to satisfy the minimum differential pressure.

Exceptions:

1. Supply-water temperature reset for chilled water systems supplied by offsite district chilled water or chilled water from ice storage systems.
2. Minimum flow rates other than 50 percent as required by the equipment manufacturer for proper operation of equipment where using flow bypass or end-of-line 3-way valves.
3. Variable pump flow on dedicated equipment circulation pumps where configured in primary / secondary design to meet minimum flow requirements required by the equipment manufacturer for proper operation of equipment,

Reason: It's recommended this code section is revised for the following reasons:

Increase Hydronic System Capacity Threshold: This proposal recommends the current 300,000 Btu/h (25 tons) hydronic system capacity threshold is increased to 500,000 Btu/h (42 tons). As shown in the table below, these capacities represent small building sizes (~ 20,000 sqft) which generally are not served by hydronic heating and cooling systems. For example, a hydronic system serving the minimum capacity would have a circulation pump of only 1 or 2 HP. Supply water temperature reset has small energy benefits on small hydronic systems relative to the added control costs and complexity. The 500,000 Btu/h capacity also aligns with boilers requiring a multistage or modulating burner controls, see section C403.4.3.

Hyrdonic System Capacity Btu/h	Equivalent Capacity in Tons	Estimate of Building Size - Sqft		
		Eff Bldg	Std Bldg	Less Eff Bldg
		20 Btuh / Sqft	25 Btuh / Sqft	30 Btuh / Sqft
300,000	25.0	15,000	12,000	10,000
500,000	41.7	25,000	20,000	16,667
750,000	62.5	37,500	30,000	25,000
1,000,000	83.3	50,000	40,000	33,333

Requirements Additive and Not Mutually Exclusive: The requirements shouldn't exclude one another, but should add to each other. As currently written only one of the following control requirements need to be implemented. With the revised code language and added exceptions, all three of the following control requirements should be implemented.

- Supply Water Temperature Reset
- Variable Flow Control
- Variable or Stepped Pumping

Variable flow control (requirement 2) in hydronic systems is needed in order to implement variable or stepped pumping (requirement 3). Therefore requirement 2 is defined prior to requirement 3. Requirement 2 applies to all other hydronic systems since 2-way valve control is less expensive than 3-way valve control. This requirement also aligns with section C403.3.3.3, which requires 2-way valve control on heat pump hydronic systems.

Cooling System Variable Flow or Stepped Pumping: Cooling systems with pump capacity 10hp or greater should have variable flow using variable speed drives or stepped pumping. Allowing cooling pumps to vary flow and ride the pump curve should not be allowed on larger pumping systems. Heating only hydronic systems of any size are excluded from this requirement since pump inefficiencies are recaptured as a heat source in the hydronic heating system. A cost effective analysis, as shown in the table below, indicates cooling systems with a pump capacity of 10HP to be cost effective. The analysis assumes an average pump run time of 2000 hours. This is thought to be a conservative chilled water pump run time from a national prospective. This analysis only accounts for pump motor energy savings and doesn't account for the reduced heat rejected from the cooling pump into the chilled water system.

Cost Impact: The code change proposal will increase the cost of construction.

CE253-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

C403.4.3.4-EC-MAKELA.doc

CE254 – 13

C202 (NEW), C403.4.3.5 (NEW), Table C403.4.3.5 (NEW)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new text as follows:

C403.4.3.5 Boiler Turndown. Boiler systems with design input of greater than 1,000,000 Btu/h shall comply with the turndown ratio specified in Table 403.4.3.5.

The system turndown requirement shall be met through the use of multiple single input boilers, one or more *modulating boilers* or a combination of single input and modulating boilers.

**TABLE 403.4.3.5
BOILER TURNDOWN**

<u>Boiler System Design Input (Btu/h)</u>	<u>Minimum Turndown Ratio</u>
<u>≥ 1,000,000 and less than or equal to 5,000,000</u>	<u>3 to 1</u>
<u>> 5,000,000 and less than or equal to 10,000,000</u>	<u>4 to 1</u>
<u>> 10,000,000</u>	<u>5 to 1</u>

Add new definitions as follows:

SECTION C202 GENERAL DEFINITIONS

BOILER, MODULATING. A boiler that is capable of more than a single firing rate in response to a varying temperature or heating load.

BOILER SYSTEM. One or more boilers, their piping and controls that work together to supply steam or hot water to heat output devices remote from the boiler.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has been revised to include boiler turndown requirements for boilers larger than 1,000,000 Btu/h. These requirements are in addition to the efficiency requirements in TABLE C403.2.8. The change ensures continued consistency between the IECC and Standard 90.1-2010.

Cost Impact: The code change proposal will increase the cost of construction.

CE254-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

C403.4.3.5-EC-FERGUSON.doc

CE255 – 13

C403.4.4, C403.4.4.1 (NEW), C403.4.4.2 (NEW), C403.4.4.2.1 (NEW), C403.4.4.2.2 (NEW), C403.4.4.3, C403.4.4.4 (NEW)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C403.4.4 Heat rejection equipment fan speed control. Each fan powered by a motor of 7.5 hp (5.6 kW) or larger shall have the capability to operate that fan at two-thirds of full speed or less, and shall have controls that automatically change the fan speed to control the leaving fluid temperature or condensing temperature/pressure of the heat rejection device.

Exception: Factory-installed heat rejection devices within HVAC equipment tested and rated in accordance with Tables C403.2.3(6) and C403.2.3(7).

C403.4.4.1 General. Heat rejection equipment such as air-cooled condensers, dry coolers, open-circuit cooling towers, closed-circuit cooling towers, and evaporative condensers used for comfort cooling applications shall comply with this section.

Exception: Heat rejection devices whose energy usage is included in the equipment efficiency ratings listed in Tables C403.2.3 (6) and C403.2.3 (7).

C403.4.4.2 Fan speed control. The fan speed shall be controlled as follows:

C403.4.4.2.1 Fan motors at least 7.5 hp. Each fan powered by a motor of 7.5 hp (5.6 kW) or larger shall have the capability to operate that fan at two-thirds of full speed or less, and shall have controls that automatically change the fan speed to control the leaving fluid temperature or condensing temperature/pressure of the heat rejection device.

Exceptions: The following fan motors over 7.5 hp are exempt:

1. Condenser fans serving multiple refrigerant circuits.
2. Condenser fans serving flooded condensers.
3. Installations located in climate zones 1 and 2.

C403.4.4.2.2 Multiple cell heat rejection equipment. Multiple cell heat rejection equipment with variable speed fan drives shall:

1. Be controlled to operate the maximum number of fans allowed that comply with the manufacturer's requirements for all system components, and
2. Be controlled so all fans can operate at the same fan speed required for the instantaneous cooling duty as opposed to staged (on/off) operation.

Minimum fan speed shall be the minimum allowable speed of the fan drive system in accordance with the manufacturer's recommendations.

C403.4.4.3 Limitation on centrifugal fan open-circuit cooling towers. Centrifugal fan open-circuit cooling towers with a combined rated capacity of 1100 gpm or greater at 95°F condenser water return, 85°F condenser water supply, and 75°F outdoor air wet-bulb temperature shall meet the energy efficiency requirement for axial fan open-circuit cooling towers listed in Table C403.2.3(8).

Exception: Centrifugal open-circuit cooling towers that designed with inlet or discharge ducts or require external sound attenuation.

C403.4.4.4 Tower flow turndown. Open circuit cooling towers used on water cooled chiller systems that are configured with multiple or variable speed condenser water pumps shall be designed so that all open circuit cooling tower cells can be run in parallel with the larger of the flow that is produced by the smallest pump at its minimum expected flow rate or at 50 percent of the design flow for the cell.

Reason: ASHRAE/IES Standard 90.1, which is adopted by reference as an alternative to the IECC Commercial Provisions, has been revised to enhance the provisions applicable to cooling tower controls and supports further reductions in energy use. The change ensures continued consistency between the IECC and 90.1.

Cost Impact: The code change proposal will increase the cost of construction.

CE255-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.4.4-EC-FERGUSON.doc

CE256– 13

C403.4.5

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C403.4.5 Requirements for complex mechanical systems serving multiple zones. Sections C403.4.5.1 through C403.4.5.3 shall apply to complex mechanical systems serving multiple zones. Supply air systems serving multiple zones shall be VAV systems which, during periods of occupancy, are designed and capable of being controlled to reduce primary air supply to each *zone* to one of the following before reheating, recooling or mixing takes place:

1. Thirty percent of the maximum supply air to each *zone*.
2. Three hundred cfm (142 L/s) or less where the maximum flow rate is less than 10 percent of the total fan system supply airflow rate.
3. The minimum ventilation requirements of Chapter 4 of the *International Mechanical Code*.
4. Any higher rate that can be demonstrated to reduce overall system annual energy use by offsetting reheat/recool energy losses through a reduction in *outdoor air* intake for the system, as approved by the code official.

Exception: The following define where individual *zones* or where entire air distribution systems are exempted from the requirement for VAV control:

1. *Zones* where special pressurization relationships or cross-contamination requirements are such that VAV systems are impractical.
2. *Zones* or supply air systems where at least 75 percent of the energy for reheating or for providing warm air in mixing systems is provided from a site-recovered or site-solar energy source.
3. *Zones* where special humidity levels are required to satisfy process needs.
4. *Zones* with a peak supply air quantity of 300 cfm (142 L/s) or less and where the flow rate is less than 10 percent of the total fan system supply airflow rate.
5. *Zones* where the volume of air to be reheated, recoolled or mixed is no greater than the volume of outside air required to meet the minimum ventilation requirements of Chapter 4 of the *International Mechanical Code*.
6. *Zones* or supply air systems with thermostatic and humidistatic controls capable of operating in sequence the supply of heating and cooling energy to the *zones* and which are capable of preventing reheating, recooling, mixing or simultaneous supply of air that has been previously cooled, either mechanically or through the use of economizer systems, and air that has been previously mechanically heated.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, contains an important exception to zone minimum airflow that is not included in the IECC. The exception is important to allow optimization of multi-zone system ventilation, and saves significant energy nationally. The change ensures continued consistency between the IECC and standard 90.1-2010.

Cost Impact: The code change proposal will not increase the cost of construction.

CE256-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.4.5 #1-EC-FERGUSON.doc

CE257 – 13

C403.4.5

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferuson@ashrae.org)

Revise as follows:

C403.4.5 Requirements for complex mechanical systems serving multiple zones. Sections C403.4.5.1 through C403.4.5.3 shall apply to complex mechanical systems serving multiple zones. Supply air systems serving multiple zones shall be VAV systems which, during periods of occupancy, are designed and capable of being controlled to reduce primary air supply to each *zone* to one of the following before reheating, recooling or mixing takes place:

1. Thirty percent of the maximum supply air to each *zone*.
2. Three hundred cfm (142 L/s) or less where the maximum flow rate is less than 10 percent of the total fan system supply airflow rate.
3. The minimum ventilation requirements of Chapter 4 of the *International Mechanical Code*.
4. Any higher rate that can be demonstrated to reduce overall system annual energy use by offsetting reheat/recool energy losses through a reduction in *outdoor air* intake for the system, as approved by the code official.
5. The air flow rate required to comply with applicable codes or accreditation standards, such as pressure relationships or minimum air change rates.

Exception: The following define where individual *zones* or where entire air distribution systems are exempted from the requirement for VAV control:

- ~~1. Zones where special pressurization relationships or cross-contamination requirements are such that VAV systems are impractical.~~
- ~~2. 1. Zones or supply air systems where at least 75 percent of the energy for reheating or for providing warm air in mixing systems is provided from a site-recovered or site-solar energy source.~~
- ~~3. 2. Zones where special humidity levels are required to satisfy process needs.~~
- ~~4. 3. Zones with a peak supply air quantity of 300 cfm (142 L/s) or less and where the flow rate is less than 10 percent of the total fan system supply airflow rate.~~
- ~~5. 4. Zones where the volume of air to be reheated, recooling or mixed is no greater than the volume of outside air required to meet the minimum ventilation requirements of Chapter 4 of the *International Mechanical Code*.~~
- ~~6. 5. Zones or supply air systems with thermostatic and humidistatic controls capable of operating in sequence the supply of heating and cooling energy to the *zones* and which are capable of preventing reheating, recooling, mixing or simultaneous supply of air that has been previously cooled, either mechanically or through the use of economizer systems, and air that has been previously mechanically heated.~~

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, contains an important exception to zone minimum airflow that is not included in the IECC. The exception is important to allow optimization of multi-zone system ventilation, and saves significant energy nationally. The change ensures continued consistency between the IECC and standard 90.1-2010.

Cost Impact: The code change proposal will not increase the cost of construction.

CE257-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.4.5 #2-EC-FERGUSON.doc

CE258 – 13

C403.4.5.4 (NEW)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new text as follows:

C403.4.5.4 Fractional HP fan motors. Motors for fans that are 1/12 HP or greater and less than 1 HP shall be electronically-commutated motors or shall have a minimum motor efficiency of 70 percent rated in accordance with DOE 10 CFR 431 . These motors shall also have the means to adjust motor speed for either balancing or remote control. The use of belt-driven fans to sheave adjustments for airflow balancing in lieu of a varying motor speed shall be permitted.

Exception Motors in the airstream within fan-coils and terminal units that only provide heating to the space served.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, contains an important exception to zone minimum airflow that is not included in the IECC. Research conducted by the California Energy Commission and others indicates that Electronically Commutated Motors (ECM) are more efficient and are cost effective compared to standard (e.g. PSC) motors in applications where the fan runs many hours per day (e.g. toilet exhaust fans, series fan-powered VAV boxes, and fan-coil units) other than those in the airstream that operate only when heating a space since the motor in that case behave essentially as an electric resistance heater. ECMs also reduce energy because their speed can be adjusted for balancing rather than throttling dampers. (ECMs can also be used for variable speed capacity control but that is not a requirement of this section.). The change ensures continued consistency between the IECC and standard 90.1-2010.

Cost Impact: The code change proposal will increase the cost of construction.

CE258-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.4.5.4 (NEW)-EC-FERGUSON.doc

CE259 – 13

C403.4.5.5 (NEW)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new text as follows:

C403.4.5.5 Multiple-zone VAV system ventilation optimization control. Multiple-zone VAV systems with direct digital control of individual zone boxes reporting to a central control panel shall have automatic controls configured to reduce outdoor air intake flow below design rates in response to changes in *system ventilation efficiency (E_v)* as defined by the *International Mechanical Code*.

Exceptions:

1. VAV systems with zonal transfer fans that recirculate air from other zones without directly mixing it with outdoor air, dual-duct dual-fan VAV systems, and VAV systems with fan-powered terminal units.
2. Systems having exhaust air energy recovery complying with Section C403.2.6.
3. Systems where total design exhaust airflow is more than 70 percent of total design outdoor air intake flow requirements.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has requirements for ventilation optimization control on VAV systems that are not included in the IECC. These provisions provide significant energy savings. The change ensures continued consistency between the IECC and standard 90.1-2010 and provides significant energy savings in IECC.

Cost Impact: The code change proposal will increase the cost of construction.

CE259-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.4.5.5 (NEW)-EC-FERGUSON.doc

CE260 – 13

C403.4.8 (New)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new text as follows:

C403.4.8 Window switch controls. Any conditioned space with operable wall or roof openings to the outdoors shall be provided with controls that, when any such opening is open:

1. Disable mechanical heating or reset the heating set point to 55°F or lower.
2. Disable mechanical cooling or reset the cooling set point to 90°F or greater unless the outside air temperature is below the conditioned space temperature

Exceptions: These controls are not required for:

1. Building entries with automatic closing devices
2. Any space without a thermostat
3. Alterations to existing buildings

Reason: When a space with operable windows has non-integrated mechanical heating and cooling, it is likely that annual HVAC energy will be increased when compared to the same space without operable windows. This can be attributed to operable windows being left open when conditions are not favorable, resulting in high infiltration loads on the HVAC system. There are many reasons why windows are opened when conditions are not favorable:

1. Occupant wants more fresh air and is inconsiderate or unaware of the energy penalty of opening the window when indoor/outdoor conditions are not favorable. This is particularly likely when the HVAC system has sufficient capacity to maintain the space indoor temperature at setpoint despite the increased infiltration load.
2. Occupant does not have sufficient information regarding the indoor air temperature, outdoor air temperature, or HVAC mode of operation to properly determine if opening the window will reduce or increase energy use.
3. Occupant opened the window during favorable conditions, but left the room while the window was open. During their time away from the space, the conditions transitioned to unfavorable.

The intent of this measure is to reduce unnecessary use of energy for heating or cooling of additional un-tempered air if an operable window is left open outside of times when it is beneficial to leave it open. This is accomplished with a simple mechanical switch that integrates the HVAC system operation with operable window position.

The change ensures continued consistency between the IECC and Standard 90.1-2010.

Cost Impact: The code change proposal will increase the cost of construction .

CE260-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.4.8-EC-FERGUSON.doc

CE261 – 13

C403.4.8 (NEW)

Proponent: Eric Makela, Britt/Makela Group, Inc., representing Northwest Energy Codes Group (eric@brittmakela.com)

Add new text as follows:

C403.4.8 Limitation of air-cooled cooling. Buildings with more than 3,600,000 Btu/h (300 tons, 85 kW) total cooling capacity supplied by chilled water shall not have more than 1,200,000 Btu/h (100 tons, 30 kW) provided by air-cooled chillers.

Exceptions:

1. Where the water quality at the building site fails to meet manufacturer's specifications for the use of water-cooled chillers as approved by the code official.
2. Where chillers are used to charge a thermal energy storage system with a design temperature of less than 40°F (4°C).
3. Air-cooled chillers with IPLV ratings 12 percent greater than efficiencies required by Section C403.2.3 or Section C406.2, whichever is used.

Reason: The goal of this proposal is to require buildings with 300 tons or greater peak cooling load to have no more than 100 tons served by air-cooled systems. Include exceptions for high-efficiency air-cooled systems and systems with thermal storage.

Water-cooled chillers are significantly more efficient than air-cooled chillers, using about 30 percent less energy. Once cooling capacity reaches a certain size, it is reasonable to install the more complex water-cooled chiller equipment. The code change proposal limits the capacity of air-cooled chillers in larger chilled water plants.

This proposal places a limit on capacity of less efficient equipment in the prescriptive path. As such it does not limit the ability to use such equipment, as the reasonable and cost effective efficiency gains in this proposal can be made up through trade off in the performance path in other energy using areas of the building if there is a desire or need to install air-cooled equipment above the prescriptive capacity limits.

Where an air cooled chiller is desired, exception 3 allows higher efficiency units to be used. A review of available equipment shows that at least two manufacturers have equipment that can meet the 12% greater IPLV required in the exception for all sizes and a third manufacturer meets that threshold for half the available models.

There would be a cost increase associated with this code change for buildings with chiller plants larger than 300 tons in capacity that are not subject to the exceptions because those buildings currently do not require more complex water-cooled systems. A detailed cost analysis conducted in support of similar provisions for the 2005 version of California Title 24 (the California energy code) found that this requirement was cost effective. In this analysis, the limitation was cost effective in San Francisco, a climate with one of the lowest national ratios of total cooling use to cooling design temperature. If the Net Present Value results for Fresno are de-rated to 40% to account for larger cooling tower sizing and higher airflows in humid climates due to higher wet bulb design temperatures, they would be still be cost effective in moist climates like Houston, Memphis, and Miami.

Cost Impact: The code change proposal will increase the cost of construction.

CE261-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C403.4.8 (NEW)-EC-MAKELA.doc

CE262-13

Table C404.2, C404.2.1 (New)

Proponent: Steve Ferguson representing the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (sferguson@ashrae.org)

Revise as follows:

**TABLE C404.2
MINIMUM PERFORMANCE OF WATER-HEATING EQUIPMENT**

EQUIPMENT TYPE	SIZE CATEGORY (input)	SUBCATEGORY OR RATING CONDITION	PERFORMANCE REQUIRED ^{a,b}	TEST PROCEDURE
Water heaters, electric	$\leq 12 \text{ kW}^d$	Resistance	0.97 - 0.00 132 V, EF	DOE 10 CFR Part 430
	$> 12 \text{ kW}$	Resistance	$1.73 V + 155 \text{ SL, Btu/h}$ $(0.3 + 27/V_m), \text{ %/h}$	ANSI Z21.10.3
	$\leq 24 \text{ amps and}$ $\leq 250 \text{ volts}$	Heat pump	0.93 - 0.00 132 V, EF	DOE 10 CFR Part 430
Storage water heaters, oil	$\leq 105,000 \text{ Btu/h}$	$\geq 20 \text{ gal}$	0.59 - 0.0019 V, EF	DOE 10 CFR Part 430
	$\geq 105,000 \text{ Btu/h}$	$< 4,000 \text{ Btu/h/gal}$	$78\% \text{ } 80\% E_t$ $(Q/800 + 110\sqrt{V})\text{SL, Btu/h}$	ANSI Z21.10.3
Heat pump pool heaters	All	50°F dry bulb and 44.2°F wet bulb outdoor air and 80.0°F entering water	4.0 COP	AHRI 1160

b. Standby loss (SL) is the maximum Btu/h based on a nominal 70°F temperature difference between stored water and ambient requirements. In the SL equation, Q is the nameplate input rate in Btu/h. and In the SL equations for electric water heaters, V is the rated volume in gallons and V_m is the measured volume in gallons. In the SL equation for oil and gas water heaters and boilers, V is the rated volume in gallons.

d. Electric water heaters with an input rating of 12kW or less that are designed to heat water to temperatures of 180°F or greater shall comply with the requirements for electric water heaters that have an input rating greater than 12kW.

(Portions of Table not shown remain unchanged)

C402.2.1 High input-rated service water heating systems. This section shall apply only to gas fired water heating equipment installed in new buildings. Where a singular piece of water heating equipment serves the entire building and the input rating of the equipment is 1,000,000 Btu/h (293 kW) or greater, such equipment shall have a thermal efficiency, E_t , of not less than 90 percent. Where multiple pieces of water heating equipment serve the building and the combined input rating of the water heating equipment is 1,000,000 Btu/h (293 kW) or greater, the combined input-capacity-weighted-average thermal efficiency, E_t , shall be not less than 90 percent.

Exceptions:

1. Where 25 percent of the annual *service water heating* requirement is provided by site-solar or site-recovered energy, the minimum thermal efficiency requirements of this section shall not apply.
2. The input rating of water heaters installed in individual dwelling units shall not be required to be included in the total input rating of *service water heating* equipment for a building.
3. The input rating of water heaters with an input rating of not greater than 100,000 Btu/h (29.3 kW) shall not be required to be included in the total input rating of *service water heating* equipment for a building.

Reason: This proposal adds requirement for the use of gas condensing service water heaters in newly constructed buildings. Additionally, the proposed addendum makes several changes to Table C404.2 to reflect current Federal energy regulations for electric water heaters, to match the requirements of the newest edition ASHRAE 146 heat pump pool heater standard and to increase the minimum efficiency for certain oil storage water heaters from 78 to 80 percent. This makes the IECC consistent with 90.1.

Cost Impact: This code change proposal will increase the cost of construction.

CE262-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C404.6(NEW)-EC-FERGUSON.DOC

CE263-13

Table C404.2

Proponent: Jennifer. Hatfield, J. Hatfield & Associates, PL representing Association of Pool & Spa Professionals (APSP) (jhatfield@apsp.org)

Revise as follows:

TABLE C404.2
MINIMUM PERFORMANCE OF WATER-HEATING EQUIPMENT

EQUIPMENT TYPE	SIZE CATEGORY (input)	SUBCATEGORY OR RATING CONDITION	PERFORMANCE REQUIRED ^{a,b}	TEST PROCEDURE
Pool heaters, gas and oil	All	--	78 <u>82</u> % E_t	ASHRAE 146

(Portions of Table not shown remain unchanged)

Reason: Per federal Department of Energy requirements, the minimum efficiency level for pool gas heaters went from 78% to 82%, effective April 2013. This change ensures consistency with federal requirements.

Cost Impact: The code change proposal will not increase the cost of construction.

CE263-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

404.2T-EC-HATFIELD.DOC

CE264 – 13

C404.2

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C404.2 Service water-heating equipment performance. Water-heating equipment and hot water storage tanks shall meet the requirements of Table C404.2. The efficiency shall be verified through data furnished by the manufacturer of the equipment or through certification under an *approved* certification program. Water heating equipment also intended to be used to provide space heating shall meet the applicable provisions of Table C404.2.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has a provision to address the efficiency of equipment used to provide both space heating and service water heating functions. This situation is not addressed in the IECC and needs to be to ensure consistency between standard 90.1-2010 and the IECC.

Cost Impact: The code change proposal will increase the cost of construction.

CE264-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C404.2-EC-FERGUSON.doc

CE265-13

C404.2 (NEW)

Proponent: Steve Ferguson representing the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (sferguson@ashrae.org)

Add new text as follows:

C404.2 Equipment and system sizing. The output capacity of service water heating equipment and systems shall not exceed the loads calculated by the system designer.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has been revised to require service hot water system sizing. The change ensures continued consistency between the IECC and standard 90.1-2010.

Cost Impact: This code change proposal will not increase the cost of construction.

CE265-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C404.2 (NEW)-EC-FERGUSON.DOC

CE266-13

C404.3

Proponent: Gary Klein, Affiliated International Management, LLC, representing self,
(gary@aim4sustainability.com)

Revise as follows:

C404.3 Temperature controls. ~~Service water heating equipment shall be provided with controls to allow a setpoint of 110°F (43°C) for equipment serving dwelling units and 90°F (32°C) for equipment serving other occupancies.~~ The outlet temperature of lavatories in public facility rest rooms shall be limited to 110°F (43°C).

Reason: While there may be some energy saving reasons for having controls on service water heating equipment that limit the output temperature of the water, the temperatures chosen are right in the "sweet spot" that enables pathogens, such as Legionella, to multiply exceedingly. These provisions encourage unsafe hot water distribution systems and should be removed.

Cost impact: The code change proposal will not increase the cost of construction.

CE266-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C404.3 #2-EC-KLEIN

CE267-13

C404.3

Proponent: Gary Klein, Affiliated International Management, LLC, representing self,
(gary@aim4sustainability.com)

Revise as follows:

C404.3 Temperature controls. Service water-heating equipment shall be provided with controls to allow a setpoint of 110°F (43°C) for equipment serving dwelling units and 90°F (32°C) for equipment serving other occupancies. ~~The outlet temperature of lavatories in public facility rest rooms shall be limited to 110°F (43°C).~~

Reason: The International Plumbing Code already has the requirement for limiting the temperature of water discharged from “public” lavatory fixture fitting (See IPC Section 416.5 below). This is more a safety issue than it is an energy savings issue. The plumbing code also requires that the temperature of the water be controlled by a temperature limited device (a thermostatic mixing valve) that complies with ASSE 1070 or CSA B125.3. Simply setting a water heater thermostat to 110F is not an acceptable method for controlling temperature at the lavatory outlet. Having this temperature requirement in this section of the IECC implies that setting a water heater thermostat to control the water temperature for the public lavatories is acceptable which is not the case!

Also, there is some confusion about what constitutes a “public facility restroom” – it is not a defined term. The plumbing code has been dealing with the right way to specify what lavatories need the temperature control. Let the plumbing code continue to deal with the intricacies of this requirement and remove this sentence from the IECC so that conflicts do not occur.

2012 IPC Section 416.5 for reference:

416.5 Tempered water for public hand-washing facilities. *Tempered water* shall be delivered from lavatories and group wash fixtures located in public toilet facilities provided for customers, patrons and visitors. *Tempered water* shall be delivered through an *approved* water-temperature limiting device that conforms to ASSE 1070 or CSA B125.3.

Cost impact: The code change proposal will not increase the cost of construction.

CE267-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C404.3 #1-EC-KLEIN

CE268-13

C404.3, C404.5, C404.6

Proponent: Jennifer. Hatfield, J. Hatfield & Associates, PL representing Association of Pool & Spa Professionals (APSP) (jhatfield@apsp.org)

Revise as follows:

C404.3 Temperature controls. Service water-heating equipment shall be provided with controls to allow a setpoint of 110°F (43°C) for equipment serving dwelling units and 90°F (32°C) for equipment serving other occupancies. The outlet temperature of lavatories in public facility rest rooms shall be limited to 110°F (43°C). This section shall not apply to pool heaters.

C404.5 Pipe insulation. For automatic-circulating hot water and heat-traced systems, piping shall be insulated with not less than 1 inch (25 mm) of insulation having a conductivity not exceeding 0.27 Btu per inch/h × ft² × °F (1.53 W per 25 mm/m² × K). The first 8 feet (2438 mm) of piping in non-hot water-supply temperature maintenance systems served by equipment without integral heat traps shall be insulated with 0.5 inch (12.7 mm) of material having a conductivity not exceeding 0.27 Btu per inch/h × ft² × °F (1.53 W per 25 mm/m² × K). This section shall not apply to piping associated with pool heaters.

Exception: Heat-traced piping systems shall meet the insulation thickness requirements per the manufacturer's installation instructions. Untraced piping within a heat traced system shall be insulated with not less than 1 inch (25 mm) of insulation having a conductivity not exceeding 0.27 Btu per inch/h × ft² × °F (1.53 W per 25 mm/m² × K).

C404.6 Hot water system controls. Circulating hot water system pumps or heat trace shall be arranged to be turned off either automatically or manually when there is limited hot water demand. Ready access shall be provided to the operating controls. This section shall not apply to pool heaters.

Reason: The requirements of these sections were never intended to apply to pool heaters. But pool heaters, by the fact that they are indicated in Table C404.2 SERVICE WATER HEATING EQUIPMENT, are service water heating equipment. Pool heaters operate at different temperatures and the temperatures maximums are covered by the International Swimming Pool and Spa Code. Insulating pool piping to these requirements is futile as the pool itself radiates far more heat than the piping loses. Controls for pool pumps (circulating pumps) are already regulated by the International Swimming Pool and Spa Code. The added lines of text in these sections solves the problems.

Cost impact: The code change proposal will not increase the cost of construction.

CE268-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C404.3-EC-HATFIELD.DOC

CE269-13

C404.3 (NEW)

Proponent: Tim Nogler, Washington State Building Code Council (tim.nogler@des.wa.gov)

Add new text as follows:

C404.3 Hot water meters required. In buildings of Group R2 occupancy having apartments that are served by a centralized service hot water system for the building, the hot water service pipe to each apartment shall have a water meter. Such water meters shall meet the technical requirements for customer billing purposes. The meters shall not be required to be located within the apartments.

Reason: The purpose of this proposal is to save energy. Apartment residents use less hot water when they are individually billed for their usage.

Cost Impact: The code change proposal will increase the cost of construction.

CE269-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C404.8 (NEW)-EC-NOGLER.doc

CE270-13

C404.5, IPC [E] 607.5

THIS IS A 2 PART CODE CHANGE PROPOSAL. PARTS I AND II WILL BE HEARD BY THE IECC COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THE COMMITTEE.

Proponent: Steve Ferguson representing the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (sferguson@ashrae.org)

PART I-IECC-COMMERCIAL PROVISIONS

Delete and substitute as follows:

C404.5 Pipe insulation. For Automatic-circulating hot water and heat-traced systems, piping shall be insulated with not less than 1 inch (25 mm) of insulation having a conductivity not exceeding 0.27 Btu per inch/h \times ft² \times °F (1.53 W per 25 mm/m² \times K). The first 8 feet (2438 mm) of piping in non-hot water supply temperature maintenance systems served by equipment without integral heat traps shall be insulated with 0.5 inch (12.7 mm) of material having a conductivity not exceeding 0.27 Btu per inch/h \times ft² \times °F (1.53 W per 25 mm/m² \times K).

Exception: Heat-traced piping systems shall meet the insulation thickness requirements per the manufacturer's installation instructions. untraced piping within a heat traced system shall be insulated with not less than 1 inch (25 mm) of insulation having a conductivity not exceeding 0.27 Btu per inch/h \times ft² \times °F (1.53 W per 25 mm/m² \times K).

C404.5 Pipe insulation. Piping in circulating hot water systems and heat-trace temperature maintenance systems shall be insulated in accordance with Table C403.2.8. In hot water systems that have a storage tank and that do not have a circulating hot water system, the first 8 feet (2438 mm) of outlet water piping connecting to a storage water heater or a hot water storage tank shall be insulated in accordance with Table C403.2.8. The pipe between the inlet of a storage tank and a heat trap shall be insulated in accordance with Table C403.2.8.

PART II - IPC

[E] 607.5 Pipe insulation. Hot water piping in automatic temperature maintenance systems shall be insulated with 1 inch (25 mm) of insulation having a conductivity not exceeding 0.27 Btu per inch/h \times ft² \times °F (1.53 W per 25 mm/m² \times K). The first 8 feet (2438 mm) of hot water piping from a hot water source that does not have heat traps shall be insulated with 0.5 inch (12.7 mm) of material having a conductivity not exceeding 0.27 Btu per inch/h \times ft² \times °F (1.53 W per 25 mm/m² \times K). Piping in circulating hot water systems and heat-trace temperature maintenance systems shall be insulated in accordance with Table C403.2.8 of the *International Energy Conservation Code*. In hot water systems that have a storage tank and that do not have a circulating hot water system, the first 8 feet (2438 mm) of outlet water piping connecting to a storage water heater or a hot water storage tank shall be insulated in accordance with Table C403.2.8 of the *International Energy Conservation Code*. The pipe between the inlet of a storage tank and a heat trap shall be insulated in accordance with Table C403.2.8 of the *International Energy Conservation Code*. This section shall not apply to the piping in Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane. Piping in circulating hot water systems and heat-trace temperature maintenance systems in Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane shall be insulated in accordance with R403.4.2 of the *International Energy Conservation Code*.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, references the HVAC piping insulation provisions. The 2012 IECC Commercial Provisions have separate insulation requirements for service water heating piping. It seems logical that the heat loss of the pipe under identical conditions regardless of whether

supplying potable water or water for HVAC applications would be the same and should be addressed in the same manner. This situation should be addressed in the IECC to ensure consistency between standard 90.1-2010 and the IECC.

Cost Impact: This code change proposal will increase the cost of construction where pipe insulation > 1 inch wall thickness is required.

CE270-13

PART I – IECC COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IPC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C404.5-EC-FERGUSON.DOC

CE271-13

C202 (NEW), C404.5, C404.5.1 (NEW), Table C404.5.1 (NEW), C404.5.2 (NEW), C404.5.3 (NEW), IPC [E]607.5

THIS IS A 2 PART CODE CHANGE PROPOSAL. PARTS I AND II WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS TWO SEPARATE CODE CHANGES.

Proponent: Gary Klein, Affiliated International Management, LLC, representing self, gary@aim4sustainability.com

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C404.5 Pipe Insulation of piping. For automatic-circulating hot water and heat-traced systems, piping shall be insulated with not less than 1 inch (25 mm) of insulation having a conductivity not exceeding 0.27 Btu per inch/h • ft² • °F (1.53 W per 25 mm/m² • K). The first 8 feet (2438 mm) of piping in non-hot water supply temperature maintenance systems served by equipment without integral heat traps shall be insulated with 0.5 inch (12.7 mm) of material having a conductivity not exceeding 0.27 Btu per inch/h • ft² • °F (1.53 W per 25 mm/m² • K). Piping to the inlet of a water heater and piping conveying water heated by a water heater shall be insulated in accordance with Sections C404.5.1, C404.5.2 and C404.5.2.3. Where tubular pipe insulation is used for insulating piping, the thermal conductivity, k, of such insulation shall be not greater than 0.28 Btu per inch/h • ft² • °F [0.40 W/(m • K)] for water temperatures less than or equal to 140°F (60°C) and not greater than 0.29 Btu per inch/h • ft² • °F [0.42 W/(m • K)] for water temperatures greater than 140°F (60°C) and less than or equal to 200°F (93.3°C). Tubular pipe insulation shall be installed in accordance with the insulation manufacturer's instructions. Pipe insulation shall be continuous except where the piping passes through a framing member. The minimum insulation thickness requirements of this section shall not supersede any greater insulation thickness requirements necessary for the protection of piping from freezing temperatures or the protection of personnel against external surface temperatures on the insulation. This section shall not be construed as requiring insulation on the following:

Exception: Heat-traced piping systems shall meet the insulation thickness requirements per the manufacturer's installation instructions. Untraced piping within a heat traced system shall be insulated with not less than 1 inch (25 mm) of insulation having a conductivity not exceeding 0.27 Btu per inch/h • ft² • °F (1.53 W per 25 mm/m² • K).

1. The tubing from the connection at the termination of the fixture supply piping to a fixture fitting or a water consuming appliance.
2. Valves, pumps, strainers and threaded unions in piping that is 1 inch or less in nominal diameter
3. Piping from user-controlled shower and bath mixing valves to the water outlets.
4. Cold water piping of a demand recirculation water system.
5. Tubing from a hot drinking-water heating unit to the water outlet.
6. Piping at locations where a vertical support of the piping is installed.

C404.5.1 Circulating system piping and heat-traced piping. Heated water circulation system piping shall be insulated in accordance with Table C404.5.1. Piping that is heat-traced to maintain heated water temperature shall be insulated in accordance with Table C404.5.1 or shall have insulation thickness in accordance with the heat tracing manufacturer's requirements. Untraced piping within a heat-traced system shall be insulated in accordance with Table C404.5.1.

TABLE C404.5.1

MINIMUM TUBULAR PIPE INSULATION WALL THICKNESS

NOMINAL PIPE OR TUBE DIAMETER (inches)	MINIMUM INSULATION WALL THICKNESS (inches)	
	≤140 °F WATER TEMPERATURE	>140 °F to 200°F WATER TEMPERATURE
≤3/8	3/8	3/8
> 3/8 to <3/4	1/2	1/2
≥ 3/4 to <1	3/4	1
≥1 to <1 1/2	1	1 1/2
≥1 1/2 to <4	1 1/2	2
≥4 to <8	1 1/2	2
≥8	1 1/2	2

For SI: 1 inch = 25.4 mm, °C= [(°F – 32)/1.8]

C404.5.2 Inlet piping connecting to water heaters and storage tanks. Where a water heater or a heated water storage tank is not equipped with integral heat traps, the inlet piping within 8 feet (2438 mm) of piping length of the water heater or storage tank shall be insulated in accordance with Table C404.5.1. This requirement shall not supersede the water heater manufacturer's requirements for a greater insulation thickness on the inlet piping.

Exceptions:

1. Inlet piping or tubing to a water heater serving only *plumbing fixtures* or *plumbing appliances* that are within 8 feet (2438 mm) piping length of the water heater shall not be required to be insulated.
2. Valves, pumps, strainers and threaded unions in water heater or heated water storage inlet piping that is 1 inch (25.4 mm) nominal diameter or less shall not be required to be insulated.

C404.5.3 Other heated water piping. Piping conveying heated water that is not addressed by Sections C404.5.1 and C404.5.2 shall have insulation with a wall thickness of not less than that indicated in Table C404.5.1.

Exceptions:

1. Outlet piping or tubing from a water heater serving only *plumbing fixtures* or *plumbing appliances* that are within 8 feet (2438 mm) piping length of the water heater shall not be required to be insulated.
2. Piping or tubing that is completely surrounded by not less than 1 inch (25.4 mm) thickness of building thermal envelope insulation in walls, attics and crawl spaces shall not be required to be insulated with tubular pipe insulation provided that the piping or tubing is 1 inch (25.4 mm) nominal diameter or smaller.

Add new definition as follows:

WATER HEATER. Any heating appliance or equipment that heats potable water and supplies such water to the potable hot water distribution system.

PART II-IPC

Revise as follows:

[E] 607.5 Pipe Insulation of piping. Hot water piping in automatic temperature maintenance systems shall be insulated with not less than 1 inch (25 mm) of insulation having a conductivity not exceeding 0.27 Btu per inch/h • ft² • °F (1.53 W per 25 mm/m² • K). The first 8 feet (2438 mm) of hot water piping from a hot water source that does not have heat traps shall be insulated with 0.5 inch (12.7 mm) of material having a conductivity not exceeding 0.27 Btu per inch/h • ft² • °F (1.53 W per 25 mm/m² • K). For other than Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane, piping to the inlet of a water heater and piping conveying water heated by a water heater shall be insulated in accordance with Sections C404.5 through C404.5.3 of the *International Energy Conservation Code*. For Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane, piping to the inlet of a water heater and piping conveying water heated by a water heater shall be insulated in accordance with Section R403.4.2 of the *International Energy Conservation Code*.

Reason: This section has generated a lot of questions over the many years since it was put into the IECC. Some people believe that this section requires all hot water piping to have 1 inch insulation. Others believe that this section only requires that hot water circulating system piping (or heat traced piping) have 1 inch of insulation. Another question that arises is what is meant by "hot water" as there is not a definition of such in the IECC. Other questions that arise are "Is the insulation required to be continuous along the piping?" and "Should really small piping and tubing be insulated?" The exception really isn't an exception but requirements for heat-traced systems.

There is no other place in the Commercial Provisions of the IECC that covers the insulation of Service Water Heating piping. This subject is important! In summary, the language in this section is a mess and the words do not clearly state the intended requirements. Let's stop dancing around this important aspect of lessening energy consumption.

The proposed revisions and why:

C404.5

The intent of the struck-out language can be found in new sections C404.5.1 and C404.5.2. The new language for this struck language is discussed later in this reason statement.

The phrase "water heated by a water heater" was used instead of "hot water" because the IECC does not have a definition for hot water. Code users could refer to the definition found in the IRC and the IPC for hot water which says water of a temperature 110F or greater. But what about tempered water (IPC definition of 85F to 110F)? Keep in mind that ASHRAE 90.1-2007 only requires insulation of service water piping conveying water of 105F or greater. It doesn't seem reasonable to say only "hot water" (as defined by the IPC). If necessary, the committee could request a public comment to amend this section to indicate that the section only covers water 105F and greater.

The statement about protection of personnel from external insulation temperatures and freezing conditions is really common sense but it is added for clarity. It also serves as a reminder for the designer to consider these important issues.

The language "The insulation shall be continuous along the piping." was added to answer the obvious and most often asked question. But keep in mind that this requirement could have serious structural implications when piping is routed through light frame construction members (wood studs and joist, metal studs and solid web joists). The holes to accommodate the piping diameter and insulation could become quite large and in some cases, making piping installation very difficult to perform unless soffits and chases are added and wall thicknesses are increased. Again, the committee could express its opinion on this issue by requesting that a public comment for *not* having insulation be continuous through wood studs and joist/metal studs and solid web joists. Either way, this question needs to be answered in a definitive manner.

The list of items where pipe insulation is not required is almost common sense but still, these items need to be stated to avoid confusion and possible misinterpretations by the code officials. Insulating valves is time consuming and if the right type of valve is not used, insulating is almost impossible (think ball valve without a raised handle). A few uninsulated valves in the system are not going to lose a lot of heat. Pumps are also difficult to insulate and in some cases, insulation might cause overheating of the pump motor. Threaded unions usually only occur in smaller diameter piping systems and are time consuming to insulate. Again, a small amount of heat loss compared to the entire system. Piping or tubing from a small tankless water heater serving one sink is too small to easily insulate. The heat loss is negligible.

C404.5.1

The first sentence of this section is saying exactly what the first struck out sentence in C404.5 says. The second sentence picks up the intent of the requirement in the first sentence of the struck out exception.

C404.5.2

The first sentence picks up the intent of the second sentence of struck-out language in C404.5. If a water heater (or heated water storage tank) does not have integral heat traps, there will be standby heat losses from convection of the heated water into the water inlet and outlet piping of the storage water heater or heated water storage tank. Insulating the inlet and outlet piping for 8 feet mitigates this heat loss. But it is not necessary to include the outlet piping in this section because new Section C404.5.3 requires insulating all other piping (which would include the heater or storage tank outlet piping). If the water (or heated water storage tank) serves a circulating system, then there is no convection of heat water into the piping connected to the heater and storage tank--the water is circulating and Section C404.5.1 takes care of the insulating requirement.

The statement about the water heater manufacturer's insulation thickness requirements is necessary because energy compliance listing for the water heater could require that the inlet and outlet piping be insulated with a thickness greater than ½ inch. And this section should not apply to tankless water heaters as they do not have storage that leads to standby heat losses.

C404.5.3

This section covers the insulation requirements for all other heated water piping that isn't addressed in the two preceding sections. The table of insulation thicknesses mirrors what is required by ASHRAE 90.1-2007 except an entry was added for 3/8 inch pipe or tubing. Some people would like to have the insulation thickness be 1 inch for all piping for "simplicity". But what they fail to realize is that such a requirement would make the installation of smaller piping near or at the ends (outlets) of the system very difficult to accomplish. For example, imagine trying to install 1/2 inch copper (or PEX) tubing (now 2 5/8 inch diameter with the required insulation) in a 3 1/2 inch deep wall cavity with other piping crossing over. Or making that large diameter pass through wood or light frame steel members for a 3 1/2 inch deep wall cavity. While 1/2 inch insulation thickness on 1/2 inch tubing is still a challenge to install, it is easier. Ideally, many fixtures could be installed using 3/8 inch tubing (only about 1 1/4 inch diameter with the required insulation) inside 3 1/2 inch wall cavities. Let's be reasonable and in touch with how buildings are constructed.

Part II – IPC

Section 607.5 did not read exactly the same way as the IECC section (C404.5) that drives this section although the intent was the same. The proposal changes Section 607.5 makes the section read exactly the same way as proposed changes to C404.5. Also, because the IPC covers plumbing for Group R2, R3, R4 occupancies that are 3 stories or less above grade plane, Section 607.5 must have a statement to *exclude* those occupancies because there are different IECC requirements (the Residential provisions of IECC) for those occupancies.

Cost impact: None

CE271-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
Assembly:		ASF	AMF	DF

PART II – IPC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C404.5-EC-KLEIN

CE272-13

C404.5, IPC [E] 607.5

THIS IS A 2 PART CODE CHANGE PROPOSAL. PARTS I AND II WILL BE HEARD BY THE IECC COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS 2 SEPARATE CODE CHANGES.

Proponent: Tim Manz, City of Blaine, MN, representing the Association of Minnesota Building Officials (tmanz@ci.blaine.mn.us)

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C404.5 Pipe insulation. Insulation in accordance with Table C403.2.8 shall applied to the following:

1. Supply and return piping of a hot water recirculating system connected to a storage water heater or a hot water storage tank.
2. A minimum of eight feet (2438 mm) of outlet piping that begins at a storage water heater or a hot water storage tank that does not serve a hot water recirculating system.
2. Inlet piping between a heat trap and a storage water heater or a hot water storage tank that does not serve a hot water recirculating system.
3. Piping heated by heat trace or impedance methods.
5. Piping where the potential for condensation on the outside of the piping exists and the water temperature in the piping is not less than 40 °F and not greater than 60°F.

~~For automatic-circulating hot water and heat-traced systems, piping shall be insulated with not less than 1 inch (25 mm) of insulation having a conductivity not exceeding 0.27 Btu per inch/h × ft² × °F (1.53 W per 25 mm/m² × K). The first 8 feet (2438 mm) of piping in non-hotwater-supply temperature maintenance systems served by equipment without integral heat traps shall be insulated with 0.5 inch (12.7 mm) of material having a conductivity not exceeding 0.27 Btu per inch/h × ft² × °F (1.53 W per 25 mm/m² × K).~~

Exception: ~~Heat-traced piping systems shall meet the insulation thickness requirements per the manufacturer's installation instructions. Untraced piping within a heat traced system shall be insulated with not less than 1 inch (25 mm) of insulation having a conductivity not exceeding 0.27 Btu per inch/h × ft² × °F (1.53 W per 25 mm/m² × K).~~

PART II-IPC

Revise as follows:

[E] 607.5 Pipe insulation. This section shall not apply to Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane. Insulation in accordance with Table C403.2.8 shall applied to the following:

1. Supply and return piping of a hot water recirculating system connected to a storage water heater or a hot water storage tank.
2. A minimum of eight feet (2438 mm) of outlet piping that begins at a storage water heater or a hot water storage tank that does not serve a hot water recirculating system.

2. Inlet piping between a heat trap and a storage water heater or a hot water storage tank that does not serve a hot water recirculating system.
4. Piping heated by heat trace or impedance methods.
5. Piping where the potential for condensation on the outside of the piping exists and the water temperature in the piping is not less than 40 °F and not greater than 60°F.

~~Hot water piping in automatic temperature maintenance systems shall be insulated with 1 inch (25 mm) of insulation having a conductivity not exceeding 0.27 Btu per inch/h • ft² • °F (1.53 W per 25 mm/m² • K). The first 8 feet (2438 mm) of hot water piping from a hot water source that does not have heat traps shall be insulated with 0.5 inch (12.7 mm) of material having a conductivity not exceeding 0.27 Btu per inch/h • ft² • °F (1.53 W per 25 mm/ m² • K).~~

Reason: This proposed code change incorporates language from the Minnesota Commercial Energy Code that specifies pipe insulation requirements for service water heating equipment and related piping. This standard provides better clarity than the provisions in IECC Section C404.5. This language is necessary because it results in energy efficient piping systems that may otherwise not be required to have pipe insulation due to the ambiguity in this section.

Cost Impact: This code change proposal will not increase the cost of construction.

CE272-13

PART I-IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II-IPC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C404.5-EC-MANZ.DOC

CE273-13

C404.5, R403.4.2 (IRC N1103.4.2), Table R403.4.2 (IRC N1103.4.2), IPC [E] 607.5, IPC [E] 607.5.1 (NEW), IPC [E] 607.5.2 (NEW)

THIS IS A 4 PART CODE CHANGE. PARTS I AND II WILL BE HEARD BY THE IECC COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS 2 SEPARATE CODE CHANGES. PARTS III AND IV WILL BE HEARD BY THE IECC RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Ryan Meres, Institute for Market Transformation, representing self (ryan@imt.org)

PART I — IECC-COMMERCIAL PROVISIONS

Delete and substitute as follows:

C404.5 Pipe insulation. For automatic-circulating hot water and heat-traced systems, piping shall be insulated with not less than 1 inch (25 mm) of insulation having a conductivity not exceeding 0.27 Btu per inch/h \times ft² \times °F (1.53 W per 25 mm/m² \times K). The first 8 feet (2438 mm) of piping in non-hotwater-supply temperature maintenance systems served by equipment without integral heat traps shall be insulated with 0.5 inch (12.7 mm) of material having a conductivity not exceeding 0.27 Btu per inch/h \times ft² \times °F (1.53 W per 25 mm/m² \times K).

Exception: Heat-traced piping systems shall meet the insulation thickness requirements per the manufacturer's installation instructions. Untraced piping within a heat traced system shall be insulated with not less than 1 inch (25 mm) of insulation having a conductivity not exceeding 0.27 Btu per inch/h \times ft² \times °F (1.53 W per 25 mm/m² \times K).

C404.5 Pipe Insulation. Circulating hot water system piping shall be insulated with not less than 1 inch (25.4 mm) of insulation. Other heated water piping in distribution systems that have a circulating hot water system shall be insulated with not less than 0.5 inch (12.7 mm) of insulation. Heat-trace temperature maintenance system piping shall be insulated in accordance with the heat trace manufacturer's instructions. Other heated water piping in distribution systems that have a heat trace temperature maintenance system shall be insulated with not less than 1 inch (25 mm) of insulation. Other than the insulation in accordance with the heat trace manufacturer instructions, the insulation required by this section shall have a thermal conductivity, k , not exceeding 0.27 Btu per inch/h \bullet ft² \bullet °F (140 W/meter/K).

Exceptions: The following piping shall not be required to be insulated in accordance with this section:

1. Piping within 1 foot (304.8mm) of the outlet end termination of a fixture supply.
2. The portion of piping that passes through a framing member.
3. Piping that is surrounded by at least 1 inch (25.4 mm) thickness of building thermal envelope insulation.

PART II-IPC

Delete and substitute as follows:

[E] 607.5 Pipe insulation. Hot water piping in automatic temperature maintenance systems shall be insulated with 1 inch (25 mm) of insulation having a conductivity not exceeding 0.27 Btu per inch/h \times ft² \times °F (1.53 W per 25 mm/m² \times K). The first 8 feet (2438 mm) of hot water piping from a hot water source that does not have heat traps shall be insulated with 0.5 inch (12.7 mm) of material having a conductivity not exceeding 0.27 Btu per inch/h \times ft² \times °F (1.53 W per 25 mm/m² \times K). For other than Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane, insulation of heated water piping shall be in accordance with Section 607.5.1.

[E] 607.5.1 Pipe insulation, other than low rise Group R2, R3 and R4. This section shall apply to other than Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane. Circulating hot water system piping shall be insulated with not less than 1 inch (25.4 mm) of insulation. Other heated water piping in distribution systems that have a circulating hot water system shall be insulated with not less than 0.5 inch (12.7 mm) of insulation. Heat-trace temperature maintenance system piping shall be insulated in accordance with the heat trace manufacturer's instructions. Other heated water piping in distribution systems that have a heat trace temperature maintenance system shall be insulated with not less than 1 inch (25 mm) of insulation. Other than the insulation in accordance with the heat trace manufacturer, the insulation required by this section shall have a thermal conductivity, k , not exceeding 0.27 Btu per inch/h • ft² • °F (140 W/meter/K).

Exceptions: The following piping shall not be required to be insulated in accordance with this section:

1. Piping within 1 foot (304.8 mm) of the termination of a fixture supply.
2. The portion of piping that passes through a framing member.
3. Piping that is surrounded by at least 1 inch thickness of building thermal envelope insulation.

PART III—IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R403.4.2 (N1103.4.2) Hot Heated water pipe insulation (Prescriptive). Piping conveying heated water from a water heater to the termination of fixture supplies shall be insulated with insulation having a for hot water pipe with a minimum thermal resistance (R -value) of not less than R-3. shall be applied to the following:

1. Piping larger than 3/4 inch nominal diameter.
2. Piping serving more than one dwelling unit.
3. Piping from the water heater to kitchen outlets.
4. Piping located outside the conditioned space.
5. Piping from the water heater to a distribution manifold.
6. Piping located under a floor slab.
7. Buried piping.
8. Supply and return piping in recirculation systems other than demand recirculation systems.
9. Piping with run lengths greater than the maximum run lengths for the nominal pipe diameter given in Table R403.4.2.

All remaining piping shall be insulated to at least R-3 or meet the run length requirements of Table R403.4.2.

Exceptions: The following piping shall not be required to be insulated in accordance with this section:

1. Piping within 1 foot (304.8 mm) of the termination of a fixture supply.
2. The portion of piping that passes through a framing member.
3. Piping that is surrounded by at least 1 inch thickness of building thermal envelope insulation.

**TABLE R403.4.2 (IRC N1103.4.2)
MAXIMUM RUN LENGTH (feet)^a**

Nominal Pipe Diameter of Largest Diameter Pipe in the Run (inch)	3/8	1/2	3/4	> 3/4
Maximum Run Length	30	20	10	5

For SI: 1 inch = 25.4 mm, 1 foot 304.8 mm.

a. Total length of all piping from the distribution manifold or the recirculation loop to a point of use.

PART IV-IPC

Revise as follows:

[E] 607.5 Pipe insulation. In Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane, insulation of heated water piping shall be in accordance with Section 607.5.1. For all other occupancies, hot water piping in automatic temperature maintenance systems shall be insulated with 1 inch (25 mm) of insulation having a conductivity not exceeding 0.27 Btu per inch/h × ft² × °F (1.53 W per 25 mm/m² × K). The first 8 feet (2438 mm) of hot water piping from a *hot water* source that does not have heat traps shall be insulated with 0.5 inch (12.7 mm) of material having a conductivity not exceeding 0.27 Btu per inch/h × ft² × °F (1.53 W per 25 mm/m² × K).

[E] 607.5.1 Pipe insulation, low rise Groups R2, R3 and R4. This section shall apply to Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane. Piping conveying heated water from a water heater to the termination of fixture supplies shall be insulated with insulation having a thermal resistance (*R-value*) of not less than R-3.

Exceptions: The following piping shall not be required to be insulated in accordance with this section:

1. Piping within 1 foot (304.8 mm) of the termination of a fixture supply.
2. The portion of piping that passes through a framing member.
3. Piping that is surrounded by at least 1 inch thickness of building thermal envelope insulation.

Parts I & II Reason: The provisions in the IPC, which are based on section C404.5 in the IECC are not the same. As a consequence, the requirement to insulate the first 8 feet of piping became unclear when the 2012 IPC added recirculation systems and heat trace as sources of hot water (in addition to *Water Heaters*). To avoid confusion and misinterpretation, the IPC and IECC should be correlated on pipe insulation.

The intent of this proposal is to make the provisions in the IPC identical to those in the IECC, and require pipe insulation on all heated water piping. The provisions are now more clear, easier to inspect and enforce.

Parts III & IV Reason: The 2012 edition of the IECC added Section R403.4.2 on hot water pipe insulation, containing a list of 9 factors or locations that require pipe to be insulated to R-3. After the list of 9 locations, the section goes on to say "All remaining piping shall be insulated to at least R-3 or meet the run length requirements..." This section as it is printed in the 2012 IECC essentially requires that all hot water piping be insulated to R-3 unless a given diameter of piping meets the maximum run length requirements of the table. The current section provides far more language and complexity than is necessary, making compliance and enforcement difficult.

The proposed code change simplifies the language making it easier for compliance by plumbing trades and enforcement by code officials; while still retaining the intent of the 2012 language.

The same provisions need to be correlated with Section 607.5 in the IPC. Section 607.5 of the IPC currently correlates with only the commercial provisions of the IECC. The new Section 607.5.1 is identical to the requirements of what is proposed for Section R403.4.2 making the language of the IPC section appropriate for Group R2, R3 and R4 occupancies. For example, under the 2012 codes, a 3 story apartment complex would fall under the residential provisions of the IECC, and also governed by the IPC, and the heated water piping requirements of the two codes are in conflict. If all parts of this proposal is approved, the conflict will be eliminated. (Note that if Parts II & IV of this proposal is approved, the section IPC section number for Part IV will automatically be renumbered to 607.5.2).

Given the 2012 code provisions, we estimate that this change will result in an increase cost of construction of about 20 percent or \$27-\$65. This direct cost is offset by the reduced cost of trying to figure out what piping needed to be insulated and to the extra cost of inspection due to a complicated code provision.

¹ Klein, Gary, "Cost Estimation for Materials and Installation of Hot Water Piping Insulation," prepared for Pacific Northwest National Laboratory, June 2012, accessible at <<http://bc3.pnnl.gov/wiki/index.php/Downloads>>.

Reason: The provisions in the IPC, which are based on this section in the IECC are not the same. As a consequence, the requirement to insulate the first 8 feet of piping became unclear when the 2012 IPC added recirculation systems and heat trace as sources of hot water (in addition to *Water Heaters*). To avoid confusion and misinterpretation, the IPC and IECC should be correlated on pipe insulation.

The intent of this proposal is to make the provisions in the IPC identical to those in the IECC, and require pipe insulation on all heated water piping. The provisions are now more clear, easier to inspect and enforce.

Cost Impact: This code change proposal will increase the cost of construction only for builders that may have used the “maximum run length” exception and only for hot water piping that was subject to that exception. A recent estimate¹ of the cost of insulating hot water piping with R-3 foam insulation is \$1.10 to \$1.50 per linear foot, including labor, materials, and profit for the plumbing subcontractor. The cost of insulating all hot water piping in a 2400 ft² home was estimated by the same study to be \$135 to \$325, depending on building configuration. It should be noted that these estimates are based on insulation of *all* hot water piping in the home.

CE273-13

PART I-IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II-IPC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART III-IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART IV-IPC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C404.5 (NEW)-EC-MERES.DOC

CE274-13

C202 (NEW), C404.5 (NEW), C404.5.1 (NEW), C404.5.1 (NEW), Table C404.5.1 (NEW), C404.5.2 (NEW), C404.5.2.1 (NEW)

Proponent: Gary Klein, Affiliated International Management, LLC, representing self,
gary@aim4sustainability.com

Add new text as follows:

C404.5 Efficient heated water supply piping. Heated water supply piping shall be in accordance with Section C404.5.1 or Section C404.5.2. The flow rate through ¼ inch piping shall not exceed 0.5 gpm (1.9 Lpm). The flow rate through 5/16 inch piping shall not exceed 1 gpm (3.8 Lpm). The flow rate through 3/8 inch piping shall not exceed 1.5 gpm (5.7 Lpm).

C404.5.1 Maximum allowable pipe length method. The maximum allowable piping length from the nearest source of heated water to the termination of the fixture supply pipe for *plumbing fixtures* and *plumbing appliances* shall be in accordance with the maximum piping length column in Table C404.5.1. Where the piping contains more than one size of pipe, the largest size of pipe within the piping shall be used for determining the maximum allowable length of the piping in Table C404.5.1.

**TABLE C404.5.1
PIPING VOLUME AND MAXIMUM PIPING LENGTHS**

NOMINAL PIPE SIZE (inch)	VOLUME (liquid ounces per foot length)	MAXIMUM PIPING LENGTH (feet)	
		WATER FROM A WATER HEATER	WATER FROM A RECIRCULATION LOOP OR HEAT TRACED PIPE
1/4	0.33	50	50
5/16	0.5	50	48
3/8	0.75	50	32
1/2	1.5	43	16
5/8	2	32	12
3/4	3	21	8
7/8	4	16	6
1	5	13	5
1 ¼	8	8	3
1 ½	11	6	2
2 or larger	18	4	1

1 Gallon = 128 ounces. For SI: 1 inch=25.4 mm, 1 foot = 304.8 mm, 1 liquid ounce = 0.030 L

C404.5.2 Maximum allowable pipe volume method. The water volume in the piping shall be calculated in accordance with Section C404.5.2.1. The maximum volume from the nearest source of heated water to the termination of the fixture supply pipe for a *plumbing fixture* or *plumbing appliance* shall be 0.5 gallon (1.89 L) where the source of heated water is a water heater; and 0.19 gallon (0.7 L) where the source of heated water is a recirculating system or heat-traced piping.

C404.5.2.1 Water volume determination. The volume shall be the sum of the internal volumes of pipe, fittings, valves, meters and manifolds between the nearest source of heated water and the termination of the fixture supply pipe. The volume in the piping shall be determined from the volume column in Table C404.5.1. The volume contained within fixture shut off valves, within flexible water supply connectors to a fixture fitting and within a fixture fitting shall not be included in the water volume determination. Where heated water is supplied by a recirculating system or

heat-traced piping, the volume shall include the portion of the fitting on the branch pipe that supplies water to the fixture.

Add new definition as follows:

SECTION C202 GENERAL DEFINITIONS

WATER HEATER. Any heating appliance or equipment that heats potable water and supplies such water to the potable hot water distribution system.

Reason: This change speeds hot water to the user, saves energy and water, and potentially lowers construction costs. All these are accomplished by limiting the volume of water in the pipes.

We have all have turned on the hot water and waited for it to get hot. While we wait water runs down the drain, wasting clean water. While we wait, our time is wasted. When we are done there is still hot water in the pipes, water which cools thereby wasting as much energy as it took to heat the water in the pipes. Pipes with larger volumes take longer to fill, waste more and are potentially more expensive to build.

This proposal remedies the problems above by reducing the water volume between the source of heated water and the use. The first method (Section R403.4.2.1) requires no calculation; it limits the water volume in the pipes by limiting the pipe length. The second option (Section R403.4.2.1) requires a calculation of volume in the pipes, but provides a table that translates the pipe length into a volume (columns 1 and 2); and provides quick options for different pipe assumptions in columns 3 and 4.

In simple form, cutting the volume in half: cuts the wait time in half, cuts the clean water wasted down the drain in half, cuts the energy loss while water goes through the pipes in half, and cuts the loss of energy from hot water left in the pipes after use in half.

Why is the maximum volumes 0.5 gallon when the source of heated water is a water heater? So that following standard practice for plumbing engineers and meeting the minimum requirements in the energy code will be aligned. At present, they are not, with the result that hot water delivery times are greater than 30 seconds after the tap is opened; unacceptable performance according to the American Society of Plumbing Engineers.

The American Society of Plumbing Engineers (ASPE) provides plumbing engineers with the guidance for hot water distribution system design as shown in Figure 1. I believe that the minimum energy code should have at least marginal performance at typical actual flow rates. These actual flow rates generally range from 1-2 gpm for private lavatory faucets, showerheads, dishwashers and washing machines. This is true even though faucets are allowed to be 2.2 gpm @ 60 psi and showerheads 2.5 gpm @80 psi. The reason for actual flow rates being lower than rated flow rates is due to the fact that the pressure in the building is often less than the rated pressure. With fixed orifice aerators, common in minimally legal faucets and showerheads, the flow rate drops off rather rapidly as the pressure decreases.

It makes sense to me that the minimum code should provide for at least marginal performance in buildings that are supplied with low pressure. This means that we need to be sure that the time-to-tap is still reasonable even when flow rates are at the lower end of the typical range; that is close to 1 gpm. According to ASPE, marginal performance would mean that hot water needs to arrive in no longer than 30 seconds after the tap is opened. Figure 2 shows that this will be true when the volume of water between the source and the use does not exceed 0.5 gallon.

Figure 1 ASPE Time-to-Tap Performance Criteria

	Acceptable Performance	1 – 10 seconds
	Marginal Performance	11 – 30 seconds
	Unacceptable Performance	31+ seconds

Source: Domestic Water Heating Design Manual – 2nd Edition, ASPE, 2003, page 234

Figure 2 Converting Flow Rate and Pipe Volume to Time-to-Tap

Volume in the Pipe		Minimum Time-to-Tap (seconds) at Selected Flow Rates					
Gallons	Ounces	0.25 gpm	0.5 gpm	1 gpm	1.5 gpm	2 gpm	2.5 gpm
0.02	2	4	1.9	0.9	0.6	0.5	0.4
0.03	4	8	4	1.9	1.3	0.9	0.8
0.06	8	15	8	4	2.5	1.9	1.5
0.13	16	30	15	8	5	4	3
0.19	24	45	23	11	8	6	5
0.25	32	60	30	15	10	8	6
0.50	64	120	60	30	20	15	12
1.00	128	240	120	60	40	30	24

Why is the maximum volume 0.19 gallon when the source of heated water is a circulation loop or heat-traced pipe? In exchange for the flexibility in the location of the water heater relative to the plumbing fixtures and plumbing appliances, the allowable volume that will be wasted has been reduced and the time-to-tap improved so that it will almost always fall into ASPE's range for Acceptable Performance.

The definition proposed is used in both the IPC and the IRC.

For more information and background on issues related to hot water distribution and for a more detailed analysis in support of this proposal please go to <http://www.aim4sustainability.com> Follow the link on the home page to Codes.

Cost impact: There are several ways to meet the requirements of this proposal, many of which cost less than current piping practices. I would recommend that builders and developers select one of the less expensive methods.

CE274-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C404.5 #2 (NEW)-EC-KLEIN

CE275-13

C202 (NEW), C404.5 (NEW), C404.5.1 (NEW), Table C404.5.1 (NEW), C404.5.2 (NEW), C404.5.2.1 (NEW)

Proponent: Gary Klein, Affiliated International Management, LLC, representing self, (gary@aim4sustainability.com)

Add new text as follows:

C404.5 Efficient heated water supply piping. Heated water supply piping shall be in accordance with Section C404.5.1 or Section C404.5.2. The flow rate through ¼ inch piping shall not exceed 0.5 gpm (1.9 Lpm). The flow rate through 5/16 inch piping shall not exceed 1 gpm (3.8 Lpm). The flow rate through 3/8 inch piping shall not exceed 1.5 gpm (5.7 Lpm).

C404.5.1 Maximum allowable pipe length method. The maximum piping length from the nearest source of heated water to the termination of the fixture supply pipe for a public lavatory faucet shall be in accordance with the maximum piping length column in Table C404.5.1. Where the piping contains more than one size of pipe, the largest size of pipe within the piping shall be used for determining the maximum allowable length of the piping in Table C404.5.1.

**TABLE C404.5.1
PIPING VOLUME AND MAXIMUM PIPING LENGTHS**

NOMINAL PIPE SIZE (inch)	VOLUME (liquid ounces per foot length)	MAXIMUM PIPING LENGTH (feet)
		LAVATORY FAUCETS— PUBLIC
1/4	0.33	6
5/16	0.5	4
3/8	0.75	3
1/2	1.5	2
5/8	2	1
3/4	3	0.5
7/8	4	0.5
1	5	0.5
1 ¼	8	0.5
1 ½	11	0.5
2 or larger	18	0.5

For SI: 1 inch=25.4 mm, 1 foot = 304.8 mm, 1 liquid ounce = 0.030 L

C404.5.2 Maximum allowable pipe volume method. The maximum piping volume from the nearest source of heated water to the termination of the fixture supply pipe for a public lavatory faucet shall be 2 ounces (0.06 L). The water volume in the piping shall be calculated in accordance with Section C404.5.2.1.

C404.5.2.1 Water volume determination. The volume shall be the sum of the internal volumes of pipe, fittings, valves, meters and manifolds between the nearest source of heated water and the termination of the fixture supply pipe. The volume in the piping shall be determined from the volume column in Table C404.5.1. The volume contained within fixture shut off valves, within flexible water supply connectors to a fixture fitting and within a fixture fitting shall not be included in the water volume determination. Where heated water is supplied by a recirculating system or heat-traced piping, the volume shall include the portion of the fitting on the branch pipe that supplies water to the fixture.

Add new definition as follows:

**SECTION C202
GENERAL DEFINITIONS**

WATER HEATER. Any heating appliance or equipment that heats potable water and supplies such water to the potable hot water distribution system.

Reason: The problem of heated water taking an excessively long time to arrive at lavatory faucets in public restrooms is well known. The length of time the faucets are used during each hand washing event is very short, often around 5 seconds. Federal law requires low flow rate or small, metered volumes for the faucets in these applications. Health codes expect heated water for washing hands in these applications. The dilemma is that the volume of not-hot water in the piping from the source of hot water to the faucets is much too large for the heated water to arrive in a timely fashion; even at the 50-foot limit currently required in the 2012 IPC.

Supporting this proposal will correlate the IECC with Federal law and local health codes by providing heated water for hand washing in a timely matter.

The delivery of hot water to public lavatory faucets needs to be considered separately because of potential health issues. The events are short and the flow rates are low. Table 1 shows the time-to-tap performance based on the requirements in the proposal. The 0.25 and 0.5 gpm columns are typical of the flow rates for public lavatory faucets. The volume in the pipe was chosen so that heated water would arrive in the first part of the hot water event so that every person who uses the public lavatory will have the benefits of hot water.

Table 1 Time-to-Tap Performance when the Volume in the Piping from the Source to the Use is 2 ounces

Volume in the Pipe (ounces)	Minimum Time-to-Tap (seconds) at Selected Flow Rates					
	0.25 gpm	0.5 gpm	1 gpm	1.5 gpm	2 gpm	2.5 gpm
2	3.8	1.9	0.9	0.6	0.5	0.4

The energy savings comes from not losing the heat from the water as it tries to arrive at the faucets.

For more information and background on issues related to hot water distribution please read the 4-part series at:

http://www.allianceforwaterefficiency.org/Residential_Hot_Water_Distribution_System_Introduction.aspx

Cost impact: There are several ways to meet the requirements of this proposal, some of which cost less than current heated water system practices. I would recommend that builders and developers select one of the less expensive methods.

CE275-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

C404.5 #3 (NEW)-EC-KLEIN

CE276-13

C404.5 (NEW), Table C404.5 (NEW)

Proponent: Gary Klein, Affiliated International Management, LLC, representing self,
(gary@aim4sustainability.com)

Add new text as follows:

C404.5 Fixture supply piping size for conveying heated water. The fixture supply piping conveying heated water to fixture fittings or appliances shall be sized in accordance with Table C404.5. The maximum length of such fixture supply piping shall be 50 feet (1270 mm). The heated water fixture supply piping and the cold water fixture supply piping to a plumbing fixture or a plumbing appliance shall be the same nominal size. The fixture supply piping sizes of this section shall supercede the minimum fixture supply pipe sizing in Section 604.5 of the *International Plumbing Code*.

**TABLE C404.5
FIXTURE SUPPLY PIPING SIZE
FOR CONVEYING HEATED WATER**

FLOW RATE (gpm)	NOMINAL PIPING OR TUBING SIZE (inches)
≤ 0.5	1/4
>0.5 to ≤1.0	5/16
>1.0 to ≤1.5	3/8

For SI: 1 gallon per minute = 3.875 L/m, 1 inch = 25.4 mm

Reason: The purpose of this code change is to ensure that the minimum diameter of the tubing on a fixture supply is safely (pressure drop and velocity) matched to the flow rate of the fixture to which it is connected.

Enabling smaller diameter tubing is important to energy efficiency because it reduces the volume in the fixture supply, which reduces the temperature drop during the use periods and the energy that is lost when the water in the piping cools down. It also has the benefit of reducing the time it takes for hot water to arrive.

As plumbing fixture and appliance flow rates get lower, as long as the maximum flow rate is selected properly, the physics clearly indicates that there will be no pressure loss or velocity problems if smaller diameter tubing is allowed. Calculations were performed using the same formula used by plumbing engineers to design hot water distribution systems to determine the combinations of flow rates and diameters shown in the table. In order to ensure that a piping system will work properly for heated water with a limit of 50 feet of developed length, the maximum developed length was capped at 50 feet for the analysis done to support this code change. The pressure drop was limited to 5 psi and the velocity was limited to 4 feet per second. PEX, CPVC and copper Types K, L, and M were evaluated. In order to make it simple to inspect, the maximum flow rate for each nominal diameter was chosen so that the worst performing material still met the criteria.

Cost impact: The code change proposal will not increase the cost of construction.

CE276-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

C404.5 #1 (NEW)-EC-KLEIN

CE277-13

C404.5.1 (NEW)

Proponent: Howard Ahern representing Airex Mfg. (howard.ahern@airexmfg.com)

Add new text as follows:

C404.5.1 Water heater piping insulation protection. Exposed water piping that is insulated and that is connected to a water heater shall have the insulation protected from damage by a removable and reusable covering. The covering shall extend for not less than 5 feet (1524 mm) from the water heater. The covering shall not be adhesive tape.

Reason. This code change is needed to insure integrity of the water heater piping insulation. Pipe insulation is often silt open to install over water heating piping, the slits often stay open or adhesive used to glue slit close degrade and slits open wasting energy and money. Removable and reusable covering will insure pipe insulation slits are closed to save energy. This change will ensure steady, long-term thermal performance and maintain system integrity, sustainability, of the insulation saving energy.

Water Heating equipment require periodic maintenance. The frequency varies with how hard the unit operates, exterior temperature, preventive maintenance program, and many others. In every occasion, maintenance provides an excuse for the piping insulation to be touched and or removed. Pipe insulation removal often results in damage to the insulation itself requiring replacement.

Protection for piping insulation therefore needs to be removable and reusable. This will help insure system integrity and sustainability of the pipe insulation, reducing replacement.

Cost Impact: The code change proposal will increase the cost of construction.

CE277-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C404.5.1 (NEW)-EC-AHERN.DOC

CE278-13

C404.6, C404.7 (NEW), IPC [E] 607.2.1, IPC [E] 607.2.1.1 (NEW)

Proponent: Steve Ferguson representing the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (sferguson@ashrae.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PARTS I AND II WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C404.6 Hot water temperature maintenance system controls. For hot water distribution system circulating hot water system pumps or and heat trace, the pumps and heat trace shall be arranged to be turned off either automatically or manually when there is limited not hot water demand. Operating controls shall be readily accessible .

C404.7.1 Storage tank hot water circulation systems. Circulating pumps intended to maintain storage tank water temperature shall have controls that will limit operation of the pump from heating cycle start up to not greater than 5 minutes after the end of the cycle. Ready access shall be provided to the operating controls.

PART II-IPC

Revise as follows:

[E] 607.2.1 Hot water temperature maintenance system controls. Automatic For hot water distribution system circulating hot water system pumps or and heat trace, the pumps and heat trace shall be arranged to be conveniently turned off either automatically or manually when there hot water system is not in operation. is limited not hot water demand. Ready access shall be provided to the operating controls. This section and Section 607.2.1.1 shall not apply to hot water temperature maintenance system controls in Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane. Hot water temperature maintenance system controls in Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane shall be in accordance with Section R403.4.1 of the International Energy Conservation Code.

[E] 607.2.1.1 Storage tank hot water circulation systems. Circulating pumps intended to maintain storage tank water temperature shall have controls that will limit operation of the pump from heating cycle start up to not greater than 5 minutes after the end of the cycle. Ready access shall be provided to the operating controls.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the criteria of the IECC Commercial Provisions, has a provision to circulating system pump controls. This situation is not addressed in the IECC and needs to be to ensure consistency between standard 90.1-2010 and the IECC.

Cost Impact: The code change proposal will not increase the cost of construction.

CE278-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IPC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C404.6-EC-FERGUSON.DOC

CE279-13

C404.6, C404.6.1 (NEW), C404.6.2 (NEW), Chapter 5, IPC [E]607.2.1, IPC [E]607.2.1.1 (NEW), IPC [E]607.2.1.1.1 (NEW), IPC [E]607.2.1.1.2 (NEW), IPC Chapter 14

THIS IS A 2 PART CODE CHANGE PROPOSAL. PARTS I AND TWO WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

Proponent: Gary Klein, Affiliated International Management, LLC, representing self, (gary@aim4sustainability.com)

PART I-IECC-COMMERCIAL PROVISIONS

Revise as follows:

C404.6 ~~Circulating hot~~ Heated water circulating and temperature maintenance systems controls (Mandatory). ~~Circulating hot water systems shall be provided with an automatic or readily accessible manual switch that can turn off the hot water circulating pump when the system is not in use~~ Heated water circulation systems shall be in accordance with Section C404.6.1. Heat trace temperature maintenance systems shall be in accordance with Section C404.6.2. Automatic controls, temperature sensors and pumps shall be accessible. Manual controls shall be readily accessible.

C404.6.1 Circulation systems. Heated water circulation systems shall be provided with a circulation pump. The system return pipe shall be a dedicated return pipe or a cold water supply pipe. Gravity and thermo-syphon circulation systems shall be prohibited. Circulation system pump controls shall be demand activated. The controls shall start the pump upon sensing the presence of a user of a fixture or appliance, receiving a signal from the action of an action of a user of a fixture or appliance or sensing the flow of heated water to a fixture or appliance. The controls shall limit the water temperature increase in the return water piping to not more than 10°F (5.6 °C) greater than the initial temperature of the water in the return piping and shall limit the return water temperature to 102°F (38.9°C).

C404.6.2 Heat trace systems. Electric heat trace systems shall comply with IEEE 515.1. Controls for such systems shall be able to automatically adjust the energy input to the heat tracing to maintain the desired water temperature in the piping in accordance with the times when heated water is used in the occupancy.

Add new standard to Chapter 5 as follows:

IEEE The Institute of Electrical and Electronic Engineers, Inc.
3 Park Avenue
New York, NY 1016-5997

515.1-2012 IEEE Standard for the Testing, Design, Installation, and Maintenance of
Electrical Resistance Trace Heating for Commercial Applications

PART II-IPC

Revise as follows:

[E] 607.2.1 ~~Hot~~ Heated water circulation and temperature maintenance systems controls. For Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane, automatic circulating hot water systems pumps or heat trace shall be arranged to be provided with a conveniently turned off, automatically or manually switch having ready access or an automatic switch, that can turn off

~~when the hot water circulating pump when the system is not in use operation. Heated water circulation and temperature maintenance systems for other than Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane shall be in accordance with Section 607.2.1.1.~~

[E] 607.2.1.1 For other than Group R2, R3 and R4 occupancies 3 stories or less. This section shall apply to other than Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane. Heated water circulation systems shall be in accordance with Section 607.2.1.1.1. Heat trace temperature maintenance systems shall be in accordance with Section 607.2.1.1.2. Access to automatic controls, temperature sensors and pumps shall be provided. Ready access to manual controls shall be provided.

[E] 607.2.1.1.1 Circulation systems. Heated water circulation systems shall be provided with a circulation pump. The system return pipe shall be a dedicated return pipe or a cold water supply pipe. Gravity and thermo-syphon circulation systems shall be prohibited. Circulation system pump controls shall be demand activated. The controls shall start the pump upon sensing the presence of a user of a fixture or appliance, receiving a signal from the action of an action of a user of a fixture or appliance or sensing the flow of heated water to a fixture or appliance. The controls shall limit the water temperature increase in the return water piping to not more than 10°F (5.6 °C) greater than the initial temperature of the water in the return piping and shall limit the return water temperature to 102°F (38.9°C).

[E] 607.2.1.1.2 Heat trace systems. Electric heat trace systems shall comply with IEEE 515.1. Controls for such systems shall be able to automatically adjust the energy input to the heat tracing to maintain the desired water temperature in the piping in accordance with the times when heated water is used in the occupancy.

Add new standard to Chapter 14 as follows:

The Institute of Electrical and Electronic Engineers, Inc.
3 Park Avenue
New York, NY 1016-5997

IEEE

515.1-2012 IEEE Standard for the Testing, Design, Installation, and Maintenance of
Electrical Resistance Trace Heating for Commercial Applications

Reason: There are 2 primary reasons for this proposed change. 1) Correlate the language in the IECC and the IPC; 2) Clarify the requirements for heated water circulation systems and for heat trace systems, if they are installed. The proposed changes do not require the use of circulation or heat trace.

The current code language is not the same in the IECC and the IPC. It should be.

The current language allows for continuously operating circulation pumps, which creates inefficiency in the hot water distribution system. It also does not address the use of heat trace in both codes and there is currently no requirement that the heat trace be suitable for the application. The consequence is that water heating energy consumption is increased.

Figure 1 shows that demand activated circulation is significantly more energy efficient than any other type of heated water circulation system. The annual energy needed to keep the loop hot with water heated electrically or with natural gas are shown separately from the energy needed for the pump. The majority of the energy is lost in keeping the water in the loop at the desired temperature (all of it if there is a gravity loop). A small loop, 100 feet including the supply and the return was analyzed. The savings ranges from 87.5 percent when compared to a recirculation system that runs only 2-hours per day to 99 percent when compared to a recirculation system that runs only 24-hours per day. The operating costs and savings remain proportional as the length of the circulation loop and the flow rate of the pump increase.

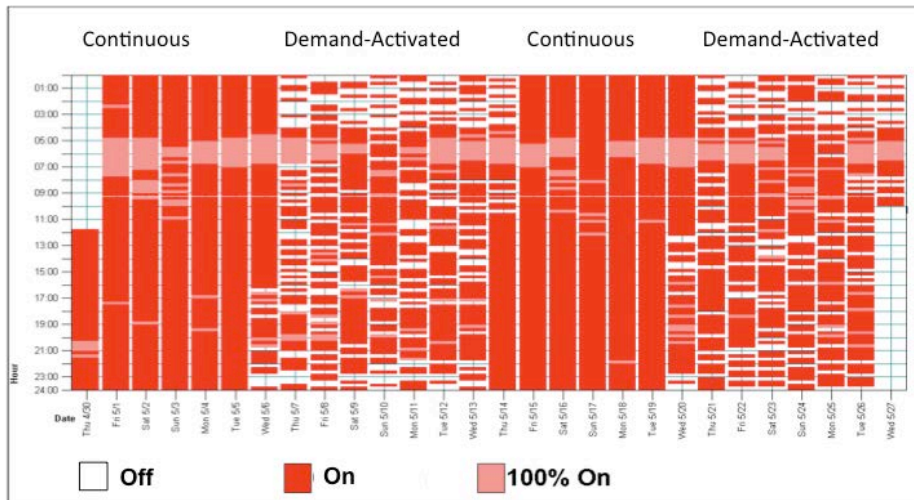
Figure 1 Annual Energy Requirements for Demand Activated Circulation and Standard Recirculation

	Standard Recirculation						Demand Activated Circulation
	Daily Hours of Operation						
	24	12	8	6	4	2	0.25
Loop Heat Losses							

Natural Gas (therms)	292	146	97	73	49	24	3
Electric (kWh)	6,388	3,194	2,129	1,597	1,065	532	67
Pump Energy (kWh)	438	219	146	110	73	37	8

Figure 2 shows the differences in run-time at the water heater (or boiler) between a continuously pumped recirculation loop and one that has a demand activated pump control. Blank space (white) means the water heater was off. Red means some percent of run-time between zero and continuous. Pink means the water heater or boiler was running continuously. The test results come from studies done by Southern California Gas Company on a sample of more than 300 multi-family buildings with central water heaters and recirculation systems. Most systems tested were built before insulation was required on hot water recirculation loops. Savings ranged from 10-30 percent of the water heating energy use and 84 percent of the pump electricity use. The costs for installing the retrofit were paid back in just about one year. In new construction, the marginal costs would be recovered in just a few months

Figure 2 Run-time of Water Heater with Two Different Pump Controls



Why is demand-activated circulation such an efficient strategy? The 2012 IECC, IPC and IRC require that the hot water piping in automatic temperature maintenance systems in new buildings be insulated with pipe insulation. This means the water in the circulation loop will stay hot for a very long time – up to 45 minutes for ¾ inch nominal pipe up to 2 hours for 2-inch nominal pipe – even if the circulating pump is shut off. If this is the case, why run the pump when the water is still hot? Why run the pump when no one is in the building or when no one is demanding hot water? The only time it makes sense to run the pump is shortly before hot water is needed: hence the requirement that the pump be controlled on-demand.

The requirements for heat trace are partly to ensure that the systems can be operated in the most energy efficient manner consistent with providing heated water to the occupancy. The reference standards are included to ensure that installed systems are safe for the intended application. The energy consequences of using heat trace are very reasonable. Figure 3 presents the energy requirements for a heat trace system with the same hot water supply piping as the circulation systems shown in Figure 1. The energy requirements of keeping the trunk line hot – the same as keeping the supply portion of the loop hot in a circulating system – are 701 kWh per year, assuming 12 hours at high temp (115F) and 12 hours at economy temp (105F). This is equivalent to operating the loop about 3 hours per day, but with hot water available 24/7 in the supply trunk! This is a significant savings when water heating is done electrically or with a similarly expensive fuel. If the branches are also traced, we can deliver heated water even more quickly to the fixtures using only 1,682 kWh per year, which is the same energy as running the loop a little more than 6 hours a day.

Figure 3. Annual Energy Needed for Electric Heat Trace Systems

Heat Trace			
	(kWh per year)		
	Trunk	Br	T-Br
Supply Heat Losses			
High Temp	394	552	946
Economy Temp	307	429	736
Total Electricity	701	981	1,682

Cost impact: The proposal does not require either circulation or heat trace; however if either is selected, it clarifies the requirements for installation. Most recirculation systems today are installed with some form of control, usually a timer, a bandwidth thermostat (aquastat) or both. Some come with more sophisticated controls, such as programmable or are connected to an energy

management system. In some cases, switching from these control strategies to demand activated controls will cost less. In other cases, the demand-activated controls will cost more.

Analysis: A review of the standards proposed for inclusion in the code, CSA 22.2 No. 130 and UL 515 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1 2013.

CE279-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

PART II-IPC

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

C404.6-EC-KLEIN

CE280-13

C404.6, C404.6.1 (NEW), C404.6.2 (NEW), IPC [E] 607.2.1, IPC [E] 607.2.1.1, IPC [E] 607.2.1.2, R403.4.1 (IRC N1103.4.1), R403.4.1.1 (NEW) (IRC N1103.4.1.1 NEW), R403.4.1.2 (NEW) (IRC N1103.4.1.2 NEW)

THIS IS A 3 PART CODE CHANGE PROPOSAL. PARTS I AND II WILL BE HEARD BY THE IECC-COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS 2 SEPARATE CODE CHANGES. PART III WILL BE HEARD BY THE IECC-RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Greg Towsley, Grundfos, representing self (gtowsley@grundfos.com)

PART I - IECC-COMMERCIAL PROVISIONS

Revise as follows:

C404.6 Hot Heated water system controls. Circulating hot water system pumps or heat trace water temperature maintenance systems shall be controlled in accordance with Sections C404.6.1 and C406.6.2, arranged to be turned off either automatically or manually when there is limited hot water demand. Ready access shall be provided to the operating controls. Automatic controls, temperature sensors, and pumps shall be accessible. Manual controls shall be readily accessible. Heated water circulation systems without controls such as gravity and thermo-syphon circulation systems, shall be prohibited. Continuous operation of pumps in heated water circulation systems shall be prohibited.

C404.6.1 Circulation pumps. Controls for circulating hot water system pumps shall start the pump based on the identification of a demand for heated water within the occupancy. The controls shall automatically turn off the pump when the water in the circulation loop is at the desired temperature and when there is no demand for hot water.

C404.6.2 Heat trace. Heat trace controls shall automatically adjust the energy input to the piping to maintain the desired water temperature in the piping system. The controls shall adjust the energy input to the heat tracing when the controls identify demand for heated water.

PART II - IPC

Revise as follows:

[E] 607.2.1 Hot water system controls. Automatic Circulating hot water system pumps or and heat trace water temperature maintenance systems shall be controlled in accordance with Sections 607.2.1.1 and 607.2.1.2, arranged to be turned off automatically or manually when there is limited hot water demand. Ready access shall be provided to the operating controls. Access shall be provided to automatic controls, temperature sensors, and pumps. Ready access shall be provided to manual controls. Hot water circulation systems without controls such as gravity and thermo-syphon circulation systems, shall be prohibited. Continuous operation of pumps in hot water circulation systems shall be prohibited.

[E] 607.2.1.1 Circulation pumps. Controls for circulating hot water system pumps shall start the pump based on the identification of a demand for heated water within the occupancy. The controls shall automatically turn off the pump when the water in the circulation loop is at the desired temperature and when there is no demand for hot water.

[E] 607.2.1.2 Heat trace. Heat trace controls shall automatically adjust the energy input to the piping to maintain the desired water temperature in the piping system. The controls shall adjust the energy input to the heat tracing when the controls identify demand for heated water.

PART III – IECC – RESIDENTIAL PROVISIONS

Revise as follows:

R403.4.1 (N1103.4.1) Circulating hot water systems (Mandatory). Circulating hot water systems and heat trace water temperature maintenance systems shall be controlled in accordance with Sections R403.4.1.1 and R403.4.1.2, provided with an automatic or readily accessible manual switch that can turn off the hot water circulating pump when the system is not in use. Automatic controls, temperature sensors, and pumps shall be accessible. Manual controls shall be readily accessible. Hot water circulation systems without controls such as gravity and thermo-syphon circulation systems, shall be prohibited. Continuous operation of pumps in hot water circulation systems shall be prohibited.

R403.4.1.1 (N1103.4.1.1) Circulation pumps. Controls for circulating hot water system pumps shall start the pump based on the identification of a demand for hot water within the occupancy. The controls shall automatically turn off the pump when the water in the circulation loop is at the desired temperature and when there is no demand for hot water.

R403.4.1.2 (N1103.4.1.2) Heat trace. Heat trace controls shall automatically adjust the energy input to the piping to maintain the desired water temperature in the piping system. The controls shall adjust the energy input to the heat tracing when the controls identify demand for heated water.

Reason: The current code text allows for the use of continuously operating circulation pumps in a hot water system. With no limitation of prohibiting pumps that operate continuously, this control methodology is not energy efficient, even when there is no need for hot water or there is ample hot water available in the system.

Energy can be saved with circulating hot water systems by operating the pump only when there is a demand for hot water. In addition, the pump does not need to operate when the hot water system is capable of providing the hot water at the desired temperature.

Cost Impact: The code change proposal will not increase the cost of construction.

CE280-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IPC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART III– IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C404.6-EC-TOWSLEY.DOC

CE281-13

IPC [E]607.2.1, IPC [E]607.2.1.1 (New), IPC [E]607.2.1.2 (New)

Proponent: Gary Klein, Affiliated International Management, LLC, representing self,
gary@aim4sustainability.com

Revise as follows:

[E] 607.2.1 ~~Hot water system~~ Controls for circulating systems and heat trace. The controls for automatic heated water circulating hot water system pumps ~~or and~~ heat trace for maintaining heated water temperature shall be in accordance with Sections 607.2.1.1 and 607.2.1.2, ~~arranged to be conveniently turned off, automatically or manually, when the hot water system is not in operation.~~

[E] 607.2.1.1 Controls in R2, R3 and R4 occupancies. In Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade, the controls for hot water circulating system pumps shall be provided with an automatic or manual switch that can turn off the hot water circulating pump when the system is not in use. *Ready access* shall be provided to manual switches.

[E] 607.2.1.2 Controls in all other occupancies. In occupancies not covered by Section 607.2.1.1, circulating hot water pumps or heat trace shall be arranged to be turned off either automatically or manually when there is limited hot water demand. *Ready access* shall be provided to the operating controls.

Reason: The proposal is strictly logistical – no new requirements are being added. The IECC has slightly different language for residential and commercial requirements for controls for heated water circulation system pumps and heat tracing. The current section in the IPC only reflects the IECC requirements for commercial buildings. But remember, the IPC covers buildings that the IECC considers to be residential buildings. The different needs for residential buildings needs to be called out in the IPC. These requirements, IPC 607.2.1.1 and IPC 607.2.1.2, are coming from IECC Sections C404.6 and R403.4.1, respectively. The IPC needs to be revised to handle the requirements separately. Although the current language of the two sections is similar, it is anticipated that other code change proposals in this cycle and in future cycles will cause significant difference between the commercial and residential provisions for this subject in the IECC. The IPC needs to be aligned to handle this event. Another intent of this code change is to indicate that the technical requirements of Sections 607.2.1.1 and 607.2.1.2 be identical to those in the IECC.

Cost Impact: The code change proposal will not increase the cost of construction.

CE281-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

IPC [E]607.2.1-EC-KLEIN

CE282-13

C404.7 (NEW), IPC Chapter 2, IPC [E]607.2.1.1 (NEW)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PARTS I AND TWO WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

Proponent: Gary Klein, Affiliated International Management, LLC, representing self, (gary@aim4sustainability.com)

PART I – IECC-COMMERCIAL PROVISIONS

Add new text as follows:

C404.7 Demand recirculation controls. A water distribution system having one or more recirculation pumps that pump water from a heated water supply pipe back to the heated water source through a cold water supply pipe shall be a *demand recirculation water system*. Pumps shall have controls that comply with both of the following:

1. The control shall start the pump upon receiving a signal from the action of a user of a fixture or appliance, sensing the presence of a user of a fixture or sensing the flow of hot or tempered water to a fixture fitting or appliance.
2. The control shall limit the water temperature increase in the cold water piping to not more than 10°F (5.6 °C) greater than the initial temperature of the water in the piping and limits the temperature entering the cold water piping to 102°F (38.9 °C).

PART II-IPC

Add new text as follows:

[E] 607.2.1.1 Demand recirculation controls. A water distribution system having one or more recirculation pumps that pump water from a heated water supply pipe back to the heated water source through a cold water supply pipe shall be a *demand recirculation water system*. Pumps shall have controls that comply with both of the following:

1. The control shall start the pump upon receiving a signal from the action of a user of a fixture or appliance, sensing the presence of a user of a fixture or sensing the flow of hot or tempered water to a fixture fitting or appliance.
2. The control shall limit the water temperature increase in the cold water piping to not more than 10°F (5.6 °C) greater than the initial temperature of the water in the piping and limits the temperature entering the cold water piping to 102°F (38.9 °C).

Add definition as follows:

DEMAND RECIRCULATION WATER SYSTEM. A water distribution system where one more pumps prime the service hot water piping with heated water upon demand for hot water.

Reason: The purpose of this code change proposal is to clarify the requirements for installing circulation pumps in applications that use a cold water supply pipe to circulate the water back to the water heater. Demand recirculation water systems are significantly more energy efficient than other recirculation systems and are inherently safer when the cold water supply is used as the return.

Figure 1 shows that demand activated circulation is significantly more energy efficient than any other type of heated water circulation system. The annual energy needed to keep the loop hot with water heated electrically or with natural gas are shown separately from the energy needed for the pump. The majority of the energy is lost in keeping the water in the loop at the desired temperature (all of it if there is a gravity loop). A small loop, 100 feet including the supply and the return was analyzed. The savings ranges from 87.5 percent when compared to a recirculation system that runs only 2-hours per day to 99 percent when compared to

a recirculation system that runs only 24-hours per day. The operating costs and savings remain proportional as the length of the circulation loop and the flow rate of the pump increase.

Figure 1 Annual Energy Requirements for Demand Activated Circulation and Standard Recirculation

	Standard Recirculation						Demand Activated Circulation
	Daily Hours of Operation						
	24	12	8	6	4	2	0.25
Loop Heat Losses							
Natural Gas (therms)	292	146	97	73	49	24	3
Electric (kWh)	6,388	3,194	2,129	1,597	1,065	532	67
Pump Energy (kWh)	438	219	146	110	73	37	8

The inherently better safety comes from the fact that the controls specified for demand recirculation water systems limit the flow of water from the hot water supply into the cold water supply to only minutes a day and because they limit the temperature of the water that is allowed to go into the cold water supply. There are five other control strategies for heated water recirculation systems (thermosiphon (gravity), continuous pumping, timer controlled, bandwidth temperature sensor (aquastat) controlled and a combination of timer and bandwidth temperature sensor (aquastat) controlled and none of them has the ability to meet these stringent requirements.

The requirements of this section should be identical in both the IECC and the IPC, since the language for the controls does not depend on occupancy

For more information and background on issues related to hot water distribution and for a more detailed analysis in support of this proposal please go to <http://www.aim4sustainability.com>. Follow the link on the home page to Codes.

Cost impact: This proposal will not increase the cost of construction, as it does not require the use of demand recirculation water systems. In addition, the ability to use cold-water supply piping as a return pipe may reduce the cost of installing a circulation loop.

CE282-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing: Committee: AS AM D
 Assembly: ASF AMF DF

PART II-IPC

Public Hearing: Committee: AS AM D
 Assembly: ASF AMF DF

C404.7-EC-KLEIN

CE283-13

C404.7 (NEW), Table C407.5.1(1), Chapter 5, R403.4.3 (NEW) (N1103.5 (NEW)), Chapter 5, IRC P2903.11 (NEW)

THIS IS A 3 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE IECC-COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. PART III WILL BE HEARD BY THE IRC-PLUMBING COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Gerald Van Decker, RenewABILITY Energy Inc., representing self (gerald@renewability.com), Gary Klein, Affiliated International Management, LLC, representing self, (gary@aim4sustainability.com)

PART I IECC-COMMERCIAL PROVISIONS

Revise as follows:

C404.7 Drain water heat recovery units. Drain water heat recovery units shall comply with CSA 55.2. Potable water-side pressure loss shall be less than 10 psi at maximum design flow. For Group R occupancies, the efficiency of drain water heat recovery unit efficiency shall be in accordance with CSA 55.1.

TABLE C407.5.1(1)
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Service water heating ^{f,g,h,i}	Fuel type: same as proposed Efficiency: in accordance with Table C404.2 Capacity: same as proposed Where a service water hot water system does not exist or is not specified in the proposed design, a service hot water heating shall not be modeled.	As proposed <u>For Group R, as proposed multiplied by SWHF</u> <u>For other than Group R, as proposed multiplied by efficiency as provided by the manufacturer of the DWHR unit.</u> As proposed

(Portions of Table not shown remain unchanged)

j. SWHF means service water heat recovery factor. DWHR means drain water heat recovery. The SWHF shall be applied as follows:

$$= (1 - (\text{DWHR unit efficiency} \times 0.36))$$

where potable water from the DWHR unit supplies not less than 1 shower and not greater than 2 showers, of which the drain water from the same showers flows through the DWHR unit.

$$= (1 - (\text{DWHR unit efficiency} \times 0.33))$$

where potable water from the DWHR unit supplies not less than 3 showers and not greater than 4 showers, of which the drain water from the same showers flows through the DWHR unit.

$$= (1 - (\text{DWHR unit efficiency} \times 0.26))$$

where potable water from the DWHR unit supplies not less than 5 showers and not greater than 6 showers, of which the drain water from the same showers flows through the DWHR unit.

= 1.0
where the other conditions are not met.

Add new standards to Chapter 5 as follows:

CSA

CSA 55.1-2012 Test method for measuring efficiency and pressure loss of drain water heat recovery units

CSA 55.2-2012 Drain water heat recovery units

PART II IECC-RESIDENTIAL PROVISIONS

Add new text as follows:

R403.4.3 (N1103.4.3) Drain water heat recovery units. Drain water heat recovery units shall comply with CSA 55.2. Drain water heat recovery units shall be in accordance with CSA 55.1. Potable water-side pressure loss of drain water heat recovery units shall be less than 3 psi (20.7 kPa) for individual units connected to one or two showers. Potable water-side pressure loss of drain water heat recovery units shall be less than 2 psi (13.8 kPa) for individual units connected to three or more showers.

Add new standards to Chapter 5 as follows:

CSA

CSA 55.1-2012 Test method for measuring efficiency and pressure loss of drain water heat recovery units

CSA 55.2-2012 Drain water heat recovery units

PART III IRC-P

Add new text as follows:

P2903.11 Drain water heat recovery units. Drain water heat recovery units shall be in accordance with Section N1103.4.3

Reason: There are two reasons for this proposal. 1) To enable developers to take credit for efficiency improvements due to the use of drain water heat recovery devices in the performance calculations in the energy code; and 2) to make comparisons of the efficiency of different units based on an existing standard.

Drain water heat recovery (DWHR) works particularly well where heated water flows down the drain at the same time as water flows in that needs to be heated; this "coincident flow" occurs in occupancies with showering and lavatory use. Performance of a DWHR unit is characterized by both efficiency and pressure loss. It is important to ensure that DWHR devices do not impose large pressure losses in the piping in order to minimize the impact on water flow in the building. Given the available DWHR efficiencies, savings are typically 10% to 35% of the energy used for heating water. Over 25,000 drain water heat recovery units have been installed in homes in Canada and the United States.

This change adds two standards for drain water heat recovery units (DWHR units). Drain water heat recovery is often a cost effective way to add to energy efficiency by recapturing hot water energy that is literally "going down the drain". The proposed standards have already been in use by designers for 10 years and the resulting ratings are in use by a variety of energy efficiency programs. Commercial (i.e. non multi-unit residential) applications are engineered systems while multi-unit residential applications are non-engineered and straightforward.

CSA B55.2 standard is for fabrication and material quality of DWHR units. The CSA B55.1 standard is for testing and labeling of DWHR units efficiency and pressure loss at 2.5gpm (9.5lpm). These existing standards were developed through a consensus process by the Canadian Standards Association and are referenced by the Ontario Building Code.

A typical drain water heat recovery unit is shown below:

POWER-PIPE®

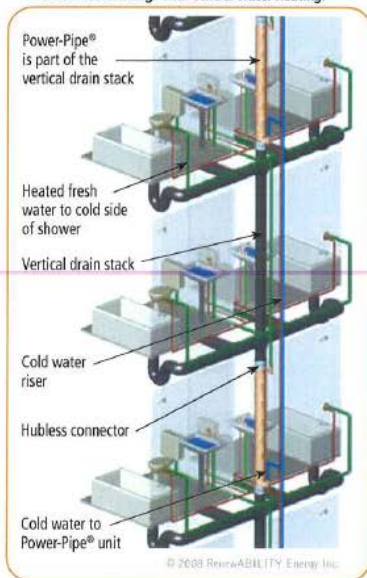
Drain Water Heat Recovery Systems

Reduce Operating Costs for Multi-Unit Residential Buildings

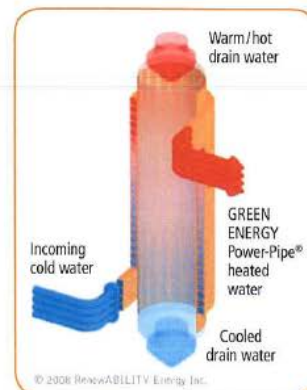
Cost-Effective Green Energy Technology

- The Power-Pipe® is **proven, practical, affordable** and in use today saving energy for thousands of residential suites.
- **Water heating is typically the second highest energy cost** in multi-unit residential buildings; in fact it can even be the highest energy cost.
- As building envelopes have become more efficient in recent years water heating has become an even larger portion of the remaining energy costs.
- Much of the drain water leaving a residential building carries with it valuable and recoverable heat energy.
- The all copper Power-Pipe is a double-wall heat exchanger that can **reduce water heating costs by 20-40%** by recovering heat energy from drain (waste) water in multi-residential building drain (waste) stacks.
- The patented and patent pending Power-Pipe design is the only heat exchanger that efficiently allows for up to 4 apartment suites to be plumbed without noticeable loss in water pressure... in fact this results in a **2 to 4 times faster payback** than other heat exchangers.
- The Power-Pipe is very **simple to specify and install** and its savings typically translate to a **3 to 4 year simple payback**; even faster with government or utility incentives.

Detail for buildings with central water heating:



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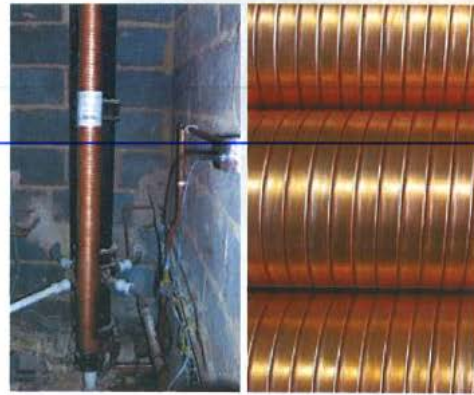
How It Works

- 1 As drain water falls down any vertical drain stack it clings to the inner wall, rather than going down the middle of the pipe. This results in a quickly falling thin film.
- 2 The energy (heat) from this falling film of drain water is easily and efficiently transferred through the copper to the fresh cold water which is flowing around the drain pipe in the outer coils.
- 3 Cold fresh water is plumbed into the bottom of the Power-Pipe from the main cold water riser.
- 4 Power-Pipe heated water is then plumbed to either:
 - the cold side of up to 4 showers, for buildings with central water heating, thereby reducing hot water demand
 - the cold side of the shower and water heater, for buildings with in-suite water heaters

877-606-5559
www.renewability.com

Advantages of the Power-Pipe®

- The Power-Pipe® is **very simple to install** during new construction and it integrates with any plumbing system
- The Power-Pipe **can be retrofit** in buildings where there is access to the drain stacks and fresh water lines
- Maintenance-free, 50+ year life
- The Power-Pipe will increase effective hot water capacity, thereby reducing the risk of running out of hot water
- **Quality** is never compromised; the coils of every Power-Pipe unit consist of 100% Type L or heavier copper tube
- The Power-Pipe also provides significant cost-effective **reductions in green house gases** as a result of reduced primary energy demand
- The performance of the Power-Pipe has been **verified by the Canadian Government** (Ministry of Natural Resources Canada and the University of Waterloo) in independent third-party testing
- The Power-Pipe will **assist in obtaining LEED Certification** (and similar programs) for your building
- Many Governments and Utilities also offer **financial incentives** resulting in a quicker payback
- The Power-Pipe is the most proven, most used drain water heat recovery technology; many building designers have been specifying the Power-Pipe as a standard in their buildings for many years now, there are now thousands of suites in which Power-Pipes are saving money and energy daily.



Sampling of Projects

Regent Park Toronto, Ontario New Construction - Affordable Housing	Hotel North Battleford, Saskatchewan New Construction
OMHM Montreal, Quebec New Construction - Affordable Housing	National Defense Halifax, Nova Scotia Officers Residence
University of Toronto Toronto, Ontario Student Dorm	Eastern Oregon University Eugene, Oregon Student Dorm
University of Oregon Eugene, Oregon Student Dorm	Maison Transitionelle Montreal, Quebec New Construction - Affordable Housing
Yee Kang Centre Montreal, Quebec New Construction - Affordable Housing	Benny Farms Montreal, Quebec LEED Platinum Status and International Award
Bury Court Bedford, England Retrofit - Affordable Housing	ETS Montreal, Quebec Student Dorm
Prison North Bend, Oregon Retrofit - Government Facility	Cloverdale Housing Coop Montreal, Quebec Retrofit - Affordable Housing
University of Waterloo Waterloo, Ontario Student Townhouses	
Adelaide Project Toronto, Ontario New Construction - Affordable Housing	

Applications Include:

- | | |
|-----------------------|-----------------|
| • CONDOMINIUMS | • STUDENT DORMS |
| • APARTMENT BUILDINGS | • HOSPITALS |
| • HOTELS | • PRISONS |
| • AFFORDABLE HOUSING | • TOWNHOUSES |

Developed and manufactured by:



What We Provide:

- We provide free and full support including feasibility analysis, design consultation, CAD drawing elements, and training.
- 10 Year Warranty



SAVINGS VERIFIED BY
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Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standards proposed for inclusion in the code, CSA B55.1 and B55.2 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

CE283-13

PART I IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II IECC- RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART III IRC-P

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R405.5.2(1)T-EC-VANDECKER.DOC

CE284-13

C404.8 (NEW), C408.1, C408.2, C408.2.3.2, C408.2.4, C408.2.4.1, C408.2.5.2, C408.2.5.4

Proponent: Jeremiah Williams / U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C404.8 Service water heating systems commissioning and completion requirements. *Service water heating systems, swimming pool water heating systems, spa water heating systems and the controls for those systems shall be commissioned and completed in accordance with Section C408.2.*

C408.1 General. This section covers the commissioning of the building mechanical systems in Section C403, service water heating systems in Section C404, and electrical power and lighting systems in Section C405.

C408.2 Mechanical systems and service water heating systems commissioning and completion requirements. Prior to passing the final mechanical and plumbing inspections, the *registered design professional* shall provide evidence of mechanical systems and service water heating systems *commissioning* and completion in accordance with the provisions of this section. Construction document notes shall clearly indicate provisions for *commissioning* and completion requirements in accordance with this section and are permitted to refer to specifications for further requirements. Copies of all documentation shall be given to the owner and made available to the *code official* upon request in accordance with Sections C408.2.4 and C408.2.5.

Exception: The following systems are exempt from the commissioning requirements:

1. Mechanical systems and service water heating systems in buildings where the total ~~mechanical~~-equipment capacity is less than 480,000 Btu/h (140 690 W) cooling capacity and 600,000 Btu/h (175 860 W) combined service water heating and space heating capacity.
2. Systems included in Section C403.3 that serve dwelling units and sleeping units in hotels, motels, boarding houses or similar units.

C408.2.3.2 Controls. HVAC and service water heating control systems shall be tested to document that control devices, components, equipment, and systems are calibrated, adjusted and operate in accordance with approved plans and specifications. Sequences of operation shall be functionally tested to document they operate in accordance with *approved* plans and specifications.

C408.2.4 Preliminary commissioning report. A preliminary report of commissioning test procedures and results shall be completed and certified by the *registered design professional* or *approved agency* and provided to the building owner. The report shall be organized with mechanical and service hot water findings in separate sections to allow independent review. The report shall be identified as "Preliminary Commissioning Report" and shall identify:

1. Itemization of deficiencies found during testing required by this section that have not been corrected at the time of report preparation.
2. Deferred tests that cannot be performed at the time of report preparation because of climatic conditions.
3. Climatic conditions required for performance of the deferred tests.

C408.2.4.1 Acceptance of report. *Buildings*, or portions thereof, shall not pass the final mechanical and plumbing inspections, until such time as the *code official* has received a letter of transmittal from the *building* owner acknowledging that the *building* owner has received the Preliminary Commissioning Report.

C408.2.5.2 Manuals. An operating and maintenance manual shall be provided and include all of the following:

1. Submittal data stating equipment size and selected options for each piece of equipment requiring maintenance.
2. Manufacturer's operation manuals and maintenance manuals for each piece of equipment requiring maintenance, except equipment not furnished as part of the project. Required routine maintenance actions shall be clearly identified.
3. Name and address of at least one service agency.
4. HVAC and service hot water controls system maintenance and calibration information, including wiring diagrams, schematics, and control sequence descriptions. Desired or field-determined setpoints shall be permanently recorded on control drawings at control devices or, for digital control systems, in system programming instructions.
5. A narrative of how each system is intended to operate, including recommended setpoints.

C408.2.5.4 Final commissioning report. A report of test procedures and results identified as "Final Commissioning Report" shall be delivered to the building owner ~~and shall include.~~ The report shall be organized with mechanical system and service hot water system findings in separate sections to allow independent review. The report shall include the following:

1. Results of functional performance tests.
2. Disposition of deficiencies found during testing, including details of corrective measures used or proposed.
3. Functional performance test procedures used during the commissioning process including measurable criteria for test acceptance, provided herein for repeatability.

Exception: Deferred tests which cannot be performed at the time of report preparation due to climatic conditions.

Reason: This proposal increases HVAC commissioning scope to also include the building service water heating systems.

The value of commissioning a commercial building has been documented and was included for mechanical and lighting systems during the prior code development cycle as a new Section C408 in the IECC. Those provisions are intended to ensure that the building has been "tuned" prior to occupancy to make sure it is properly operating and capable of continuing to operate properly. Many hot water systems have recirculation or heat trace systems that need to be checked to verify that time or other controls are in place to avoid excessive unoccupied piping heat loss. This extends the value and validity of the code provisions because there is little value in requiring something be provided in a building if it is not properly installed and ready to perform its intended function.

The commissioning of the service hot water system is the next logical step in enhancing the value of the IECC. As noted above, there is no reason to add something to the code if there is no review process to make sure it is properly installed and can perform its intended function.

The proposed change expands the scope of mechanical commissioning to include service hot water systems. For buildings not exempt from commissioning, service hot water and mechanical systems are often integrated and the controls and commissioning are likely to be completed by the same parties. For integral tank temperature controls, the commissioning authority can design appropriate simple testing such as a spot check of delivered water temperature to ensure proper control operation. The provisions require that the preliminary and final commissioning reports be organized so that mechanical and service hot water results are separate and can be independently reviewed. This will allow mechanical and plumbing inspectors to separately review the results where appropriate.

There is a cost impact associated with this proposed change to the degree that the commissioning activity is currently not being performed and would have to be performed and documented in the proposed change. The cost would be modest, as it could be accomplished by the same staff completing the mechanical commissioning and would be included in the same commissioning report. There should also be a decrease in costs because such commissioning reduces the burden on state and local government to ensure and document compliance with the code. Without commissioning to ensure the code-required controls and other systems are in place, the cost effectiveness of other energy code provisions is in jeopardy. A study of 643 commissioned building in 26 states found that new building commissioning had a median payback of 4.2 years.

References:

Evan Mills. 2009. Building Commissioning: A golden opportunity for Reducing Energy Costs and Greenhouse-Gas Emissions. <http://cx.lbl.gov/2009-assessment.html>

Cost Impact: The code change proposal will increase the cost of construction.

CE284-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

C404.8 (NEW)-EC-WILLIAMS.DOC

CE285 – 13

C202, C405.1, R202 (IRC N1109.1) R404.1 (IRC N1104.1)

Proponent: Deborah Frankhouser, Four Point Lighting Design, representing the International Association of Lighting Designers (deborah@fourpointlighting.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C405.1 General (Mandatory). This section covers lighting system controls, the connection of ballasts, the maximum lighting power for interior applications, electrical energy consumption, and minimum acceptable lighting equipment for exterior applications.

Exception: Dwelling units within commercial buildings shall not be required to comply with Sections C405.2 through C405.5 provided that they comply with Section R404.1. ~~not less than 75 percent of the permanently installed light fixtures, other than low voltage lighting, shall be fitted for, and contain only, high efficacy lamps.~~

Delete definition without substitution as follows:

SECTION C202 GENERAL DEFINITIONS

~~**HIGH-EFFICACY LAMPS.** Compact fluorescent lamps, T-8 or smaller diameter fluorescent lamps, or lamps with a minimum efficacy of:~~

- ~~1. 60 lumens per watt for lamps over 40 watts,~~
- ~~2. 50 lumens per watt for lamps over 15 watts to 40 watts,~~
- ~~3. 40 lumens per watt for lamps 15 watts or less.~~

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R404.1 (N1104.1) Lighting equipment (Mandatory). ~~A minimum of 75 percent of the lamps in permanently installed lighting fixtures shall be high-efficacy lamps or a minimum of 75 percent of the permanently installed lighting fixtures shall contain only high-efficacy lamps. All permanently installed lighting shall be high efficiency luminaires.~~

Exception: Low-voltage lighting shall not be required to use high-efficiency lamps.

1. Luminaires that utilize lamps that operate at less than 25 volts if separately controlled by a dimmer or an automatic control device and controlled separately from high-efficiency luminaires.
2. Up to 50 percent of the luminaires not qualifying for Exception 1 shall be permitted to be other than high-efficiency luminaires if they are controlled by a dimmer or automatic control device. High- efficiency luminaires shall be controlled separately from non high-efficiency luminaires.

Revise definition as follows:

SECTION R202 (N1101.9) GENERAL DEFINITIONS

HIGH-EFFICIENCY EFFICACY LAMPS LUMINAIRES. Luminaires containing only compact fluorescent lamps, T-8 or smaller diameter fluorescent lamps with electronic ballasts, or lamps or light emitting diodes (LED's) with a minimum efficacy of:

- 1.60 lumens per watt for lamps over 40 watts,
- 2.50 lumens per watt for lamps over 15 watts to 40 watts,
- 3.40 lumens per watt for lamps 15 watts or less.

Reason: (Part I) The exception to C405.1 establishes a different standard for lighting efficiency in dwellings from Section R404.1. Section C405.1 is a luminaire-based standard, whereas Section R404.1 is a lamp-based standard. There is no reason for the code to set an efficiency standard for lighting within dwelling units in multi-family buildings that is different from the standard for lighting in detached houses. Residential lighting is the same regardless of the building it is located in.

(Part II):

1. Increases the overall requirement for high-efficiency luminaires from 75% to 100% with certain exceptions designed to save energy and provide maximum flexibility to designers, owners and code officials.
2. Changes the Chapter 2 definitions from *high efficacy lamps* to *high efficiency luminaires* as determined by lamp efficacy. This means owners, designers, and building code officials would count luminaires (light fixtures) vs. counting light bulbs to determine the amount of high or low efficient lighting on a project. Luminaires often have multiple lamps, making counting more cumbersome for both the owner/designer as well as the code official. By counting luminaires, the code official simply has to identify lamp type, but doesn't have to count individual lamps within each luminaire.
3. Allows for an optional and more flexible energy savings approach for owners and designers by allowing up to 50% low efficiency luminaires as long as lighting controls are used to reduce or turn off the low efficiency luminaires.

The current code requires 75% of lighting to be *high-efficacy*. However, there is a high amount of dissatisfaction with compact fluorescents because of their poor color, noise, incompatibility with dimming, and mercury content. (Reference, Dept. of Energy's "Compact Fluorescent Lighting in America: Lessons Learned on the Way to Market," prepared by Pacific Northwest National Laboratory, June 2006) LED technology is still emerging and many of the inexpensive LED's continue to have poor color and incompatibility with dimming.

The most efficient light is the one that is off. The current code does not use lighting controls as a means of energy savings. Regardless of efficacy, light sources achieve maximum energy savings when they are off or reduced to the minimum required by the task. For 120 volt incandescent/halogen sources, dimming reduces energy use, increases lamp life, and dimmers are inexpensive. Automatic controls turn lighting off when not being used. (See reference documentation listed below.)

Cost implications: In most cases, the required high efficiency Fluorescent and LED light fixtures are more expensive than their low efficiency 120 volt incandescent equivalents simply because fluorescent and LED have additional required components such as ballasts and drivers. Dimmers vary significantly in cost, but a 120v incandescent dimmer can be purchased for as little as \$15. When installed with the less expensive 120v incandescent lighting, this combination can be less expensive than purchasing many fluorescent or LED versions controlled by a switch. There are many options for owners and adding dimmers does not necessarily equal adding dollars when comparing low efficiency and high efficiency luminaires. Also, in residential, dimming is important for reasons other than energy savings and dimming fluorescent and LED sources can significantly increase dimming costs.

Residential is not commercial. In residences, it is very common for decorative lighting to be the main lighting source in a room. Decorative chandeliers are often only available in 120v incandescent medium or candelabra based sockets. Often times these chandeliers exceed the current allowance (25%) even when using high efficacy light sources for other types of architectural lighting such as down lights, task lighting, etc. These fixtures do not qualify for the Low Voltage Exception currently in the code. The proposed Exception 2 gives a greater allowance for 120v incandescent/halogen luminaires than the current code allows to accommodate these decorative products, but encourages energy savings through the use of controls.

4. Clarifies the low voltage lighting exception currently in the code and adds stringency by requiring lighting controls as an energy savings approach for these light fixture types. The current code allows for the use of low voltage with no limits. They are lower in VOLTAGE not WATTAGE. Adding controls will increase the overall energy efficiency of these products.

References

Several reports document savings from using controls residentially, such as:

- <http://www.lrc.rpi.edu/programs/lightingTransformation/economics/table2.asp> [shows 20% to 40% savings depending on space type for using occupancy sensors]
- [http://www.energy.ca.gov/title24/2013standards/prerulemaking/documents/current/Reports/Residential/Lighting/open Residential Lighting PDF](http://www.energy.ca.gov/title24/2013standards/prerulemaking/documents/current/Reports/Residential/Lighting/open%20Residential%20Lighting%20PDF) and see page 32 [shows 10% savings from dimmers, 30% savings from occupancy sensors]
- Heschong Mahone Group Lighting Efficiency Technology Report Vol. 1, see page 83. www.energy.ca.gov/efficiency/lighting/VOLUME01.PDF [shows 20% savings from dimmers and 54% savings from occupancy sensors]

Cost Impact: The code change proposal will not increase the cost of construction.

CE285-13

PART I – IECC-COMMERCIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.1-EC-FRANKHOUSER.doc

CE286 – 13

C405.1, C405.8 (NEW)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C405.1 General (Mandatory). This section covers lighting system controls, the connection of ballasts, the maximum lighting power for interior applications, electrical energy consumption, controls for electric receptacles, and minimum acceptable lighting equipment for exterior applications.

Exception: Dwelling units within commercial buildings shall not be required to comply with Sections C405.2 through C405.5 provided that not less than 75 percent of the permanently installed light fixtures, other than low voltage lighting, shall be fitted for, and contain only, high efficacy lamps.

C405.8 Automatic receptacle control. Automatic controls shall be provided for at least 50 percent of the 125 volt 15- and 20-Ampere receptacles in private offices, computer classrooms and individual workstations and receptacles associated with branch circuit feeds that are installed to supply electrical power to modular furniture in such spaces. These receptacles shall be labeled "Automatic Control Receptacle". The automatic controls shall:

1. Be capable of operating on a scheduled basis using a time-of-day operated control device that will turn receptacles off at specific programmed times and provide for an independent program schedule for areas not larger than 25,000 square feet but not larger than one floor, or
2. Be an occupant sensor that is capable of turning receptacles off within 30 minutes of all occupants leaving a space, or
3. Be capable of providing a signal to another control or alarm system that indicates the area is unoccupied.

Exceptions: Automatic receptacle controls need not be provided for:

1. Receptacles specifically designated for equipment requiring 24 hour operation.
2. Spaces where an automatic shutoff would endanger the safety or security of the room or building occupants.

Reason: Energy is used in supplying power to receptacles in offices, computer classrooms, individual work stations and modular furniture in such spaces. As with occupancy sensors that can reduce energy use associated with lighting and mechanical ventilation, the equipment supported by electrical receptacles is also subject to use and non-use based on occupancy. ASHRAE/IES Standard 90.1, which is adopted by reference in the IECC Commercial Provisions, contains provisions to provide for at least half of the electrical receptacles in certain spaces to have automatic controls as enhanced by addendum v to the standard. This change ensures consistency between the IECC Commercial Provisions and the latest criteria in standard 90.1.

Cost Impact: The code change proposal will increase the cost of construction.

CE286-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.1-EC-FERGUSON.doc

CE287 – 13

C202 (NEW), C405.2, C405.2.1, C405.2.1.1, C405.2.2, C405.2.2.1, C405.2.1.1, C405.2.1.2, C405.2.2, C405.2.2.1, C405.2.2.3, C405.2.2.3.1, C405.2.2.3.2, C405.2.2.3.3, C405.2.3, C405.2.4

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C405.2 Lighting Controls (Mandatory). Lighting systems shall be provided with controls as specified in Sections C405.2.1, C405.2.2, C405.2.3, and C405.2.4, and C405.2.5.

Exceptions: Lighting controls are not required for the following:

1. Areas designated as security or emergency areas that are required to be continuously lighted;
2. Stairways and corridors; and
3. Emergency egress lighting that is normally off.

~~**C405.2.1 Manual lighting controls.** All buildings shall include manual lighting controls that meet the requirements of Sections C405.2.1.1 and C405.2.1.2.~~

~~**C405.2.2.2 C405.2.1 Occupant sensors sensor controls.** *Occupant sensors sensor controls* shall be installed in all classrooms, conference/meeting rooms, employee lunch and break rooms, private offices, restrooms, storage rooms and janitorial closets, and other spaces 300 square feet (28 m²) or less that are enclosed by floor-to-ceiling height partitions. These automatic control devices shall be installed to~~

~~**C405.2.1.1 Occupant sensor control function.** Occupant sensor controls shall comply with the following:~~

- ~~1. Automatically turn off lights within 30 minutes of all occupants leaving the space; and~~
- ~~2. Shall either be manual on or shall be controlled to automatically turn the lighting on to not more than 50 percent power; and~~
- ~~3. Shall incorporate a *manual control* to allow occupants to turn lights off.~~

~~**Exception:** Full automatic-on controls shall be permitted to control lighting in public corridors, stairways, restrooms, primary building entrance areas and lobbies, and areas where manual-on operation would endanger the safety or security of the room or building occupants~~

~~**C405.2.1.1 Interior lighting controls.** Each area enclosed by walls or floor-to-ceiling partitions shall have at least one manual control for the lighting serving that area. The required controls shall be located within the area served by the controls or be a remote switch that identifies the lights served and indicates their status.~~

~~**Exceptions:**~~

- ~~1. Areas designated as security or emergency areas that need to be continuously lighted.~~
- ~~2. Lighting in stairways or corridors that are elements of the means of egress.~~

~~**C405.2.2 Additional lighting Time switch controls.** Each area that is required to have a manual control shall also have controls that meet the requirements of Sections C405.2.2.1, C405.2.2.2 and C405.2.2.3. Each area of the building that is not provided with *occupant sensor controls* complying with Section C405.2.1.1 shall be provided with *time switch controls* complying with Section C405.2.2.1.~~

Exceptions: Where a *manual control* provides light reduction in accordance with Section C405.2.2.2, automatic controls additional lighting controls need not be provided shall not be required for the following:

1. *Sleeping units.*
2. Spaces where patient care is directly provided.
3. Spaces where an automatic shutoff would endanger occupant safety or security.
4. Lighting intended for continuous operation.

C405.2.2.1 Automatic Time switch control devices function. ~~Automatic time switch controls shall be installed to control lighting in all areas of the building. Each space provided with *time switch controls* shall also be provided with a *manual control* for light reduction in accordance with Section C405.2.2.2. *Time switch controls* shall include an override switching device that complies with the following:~~

Exceptions:

- ~~1. Emergency egress lighting does not need to be controlled by an automatic time switch.~~
- ~~2. Lighting in spaces controlled by occupancy sensors does not need to be controlled by automatic time switch controls.~~

~~The automatic time switch control device shall include an override switching device that complies with the following:~~

- ~~1. The override switch shall be a *manual control* in a readily accessible location;~~
- ~~2. The override switch shall be located where the lights controlled by the switch are visible; or the switch shall provide a mechanism which announces the area controlled by the switch;~~
- ~~3. The override switch shall permit manual operation;~~
- ~~2.4. The override switch, when initiated, shall permit the controlled lighting to remain on for a maximum duration of 2 hours; and~~
3. Any individual override switch shall control the lighting for a maximum area of 5,000 square feet (465 m²).

Exceptions:

1. Within malls, arcades, auditoriums, single tenant retail spaces, industrial facilities and arenas:
 - ~~4. 1.1.~~ The time limit shall be permitted to exceed 2 hours provided the override switch is a captive key device; and
 - ~~2. 1.2.~~ The area controlled by the override switch is permitted to exceed 5,000 square feet (465 m²), but shall not exceed 20,000 square feet (1860 m²).
2. Where provided with *manual control*, the following areas are not required to have light reduction control:
 - 2.1. Spaces that have only one luminaire with a rated power of less than 100 watts;
 - 2.2. Spaces that use less than 0.6 watts per square foot (6.5 W/m²); and
 - 2.3. Corridors, equipment rooms, public lobbies, electrical or mechanical rooms.

C405.2.1.2 C405.2.2.2 Light reduction controls. ~~Each area that is required to have a manual control shall also allow the occupant to~~ Spaces required to have light reduction controls shall have a *manual control* that allows the occupant to reduce the connected lighting load in a reasonably uniform pattern by at least 50 percent. Lighting reduction shall be achieved by one of the following or other *approved* methods:

1. Controlling all lamps or luminaires;
2. Dual switching of alternate rows of luminaires, alternate luminaires, or alternate lamps;
3. Switching the middle lamp luminaires independently of the outer lamps; or
4. Switching each luminaire or each lamp.

Exception: ~~Light reduction controls need not be provided in the following areas and spaces:~~ are not required in daylight zones with *daylight responsive controls* complying with C405.3.2.

- ~~1. Areas that have only one luminaire, with rated power less than 100 watts.~~
- ~~2. Areas that are controlled by an occupant-sensing device.~~
- ~~3. Corridors, equipment rooms, storerooms, restrooms, public lobbies, electrical or mechanical rooms.~~
- ~~4. Sleeping unit (see Section C405.2.3).~~
- ~~5. Spaces that use less than 0.6 watts per square foot (6.5 W/m²).~~
- ~~6. Daylight spaces complying with Section C405.2.2.3.2.~~

C405.2.2.3 Manual controls. Manual controls for lights shall meet the following requirements:

1. Shall be readily accessible to occupants; and
2. Shall be located where the controlled lights are visible; or the control shall identify the area served by the lights and indicate their status.

~~C405.2.2.3~~ C405.3 Daylight zone control. *(Portions of text not shown remains unchanged)*

~~C405.2.2.3.1~~ C405.3.1 Manual daylight controls. *(Portions of text not shown remains unchanged)*

~~C405.2.2.3.2~~ Automatic daylight controls. C405.3.2 Daylight responsive controls. *(Portions of text not shown remains unchanged)*

~~C405.2.2.3.3~~ C405.3.3 Multi-level lighting controls. *(Portions of text not shown remains unchanged)*

~~C405.2.3~~ C405.2.4 Specific application controls. *(Portions of text not shown remains unchanged)*

~~C405.2.4~~ C405.2.5 Exterior lighting controls. *(Portions of text not shown remains unchanged)*

Add new definitions as follows:

SECTION C202 GENERAL DEFINITIONS

TIME SWITCH CONTROL. An automatic control device or system that controls lighting or other loads, including switching off, based on time schedules.

OCCUPANT SENSOR CONTROL. An automatic control device or system that detects the presence or absence of people within an area and causes lighting, equipment, or appliances to be regulated accordingly.

DAYLIGHT RESPONSIVE CONTROL. A device or system that provides automatic control of electric light levels based on the amount of daylight in a space.

Reason: This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 2 open meetings and over 15 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

Reasons for this proposal are as follows:

Overview:

This proposal reorganizes, but does not delete requirements related to lighting controls in the 2012 IECC.

Section C405.2 of the 2012 IgCC is confusing. It puts information that is often irrelevant first, and surprises with essential and relevant information only after one has suffered through trying to decipher what the implications of the irrelevant information might be. Section C405.2 also contains redundant information and the relationship of various

subsections of C405.2 to one another is often unclear and ambiguous. This proposal reorganizes Section C405.2 to provide the clarity that is necessary for its proper application and enforcement. This proposal is a reorganization only and does not contain technical changes or increases or decreases in stringency.

Section C405.2:

According to the IBC, all interior stairways and corridors are elements of the means of egress. The original intent of this language may have been to exempt corridors and stairways which are part of an exit as defined by the IBC, but the way the code is currently written it also exempts exit access and exit discharge components, i.e. the entire building. Exceptions 1 and 2 are moved here from deleted former Section C405.2.1.1.

Proposed Exception 3 to Section C405.2:

"Emergency egress lighting that is normally off" does not seem to be exempt from controls requirements in the current code, but it needs to be.

Section C405.2.1.1:

This proposal deletes existing Section C405.2.1.1 and replaces it with new text. The way the code is currently structured most users probably would not realize that a manual switch is always required, even with automatic-on occupant sensors. This clarifies the fact that a manual switch is always required.

Exception to Proposed Section C405.1.1:

Former Section C405.2.2 is proposed to be moved and split into two sections: Sections C405.2.1 and C405.2.1.1. The requirements under proposed new Section C405.2.1.1 have been itemized for clarity. Note that the requirement for occupant sensor controls in "other spaces 300 square feet or less" is extremely broad and will encompass all of the lighting on smaller projects. For example, this is applicable to sleeping units, dwelling units, etc. Whether or not this was the original intention, this is how the code currently reads, and this proposal is intended to provide clarity, it is not intended to make technical changes.

Exception 1 to Section C405.2.2:

Note that the current code does not offer an exception for dwelling units. Dwelling units that are not exempt from all of 405.2 are required to comply with the requirements for automatic controls and light reduction controls.

Exception 4 to Section C405.2.2:

The exception that is currently in the code is for "lighting" that is intended for continuous operation, not for "spaces". This is an important distinction, because it allows light fixtures that are intended for night lighting of unoccupied spaces to be left off the automatic control system (like retail stores for security reasons, where select lights might be left on all night long).

The current code does not offer a blanket exemption for continuously operational emergency egress "night" lighting. Under current code, all emergency egress lighting that is not located in a corridor or stairwell must have a manual control device for override, even though it does not need to be automatically controlled.

Exception 2 to Section C405.2.1 and Section C405.2.1.2:

This exception is derived from 2012 IECC Section C405.2.1.2, which this proposal deletes. Storerooms and restrooms should not be in this list because they are required to be provided with occupant sensor controls.

Sections C405.2.1.1, C405.2.2.1 and C405.2.2.3:

This new section is a combination of the requirements in existing Sections C405.2.1.1 and C405.2.2.1 that pertain to manual controls. Therefore, existing Section C405.2.1.1 is proposed to be deleted and Section C405.2.2.1 is proposed to be revised. Existing Section C405.2.2.3 is not replaced, it is renumbered, as are all affected subsequent sections.

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: The code change proposal will not increase the cost of construction. This proposal is a clarification and, as such, will not increase the cost of construction.

CE287-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.2-EC-THOMPSON-SEHPCAC

CE288 – 13

C202 (NEW), C405.2, C405.2.1, C405.2.1, C405.2.1.1, C405.2.2, C405.2.2.1, C405.2.2.2, C405.2.2.3 (NEW)

Proponent: Don Iverson, National Electrical Manufacturers Association (don.iverson@nema.org)

Revise as follows:

C405.2 Lighting controls (Mandatory). Lighting systems shall be provided with controls as specified in Sections C405.2.1, C405.2.2, C405.2.3, and C405.2.4, and C405.2.5.

Exceptions: Lighting controls are not required for the following:

1. Areas designated as security or emergency areas that are required to be continuously lighted;
2. Stairways and corridors.
3. Emergency egress lighting that is normally off.

C405.2.1 Manual lighting controls. All buildings shall include manual lighting controls that meet the requirements of Sections C405.2.1.1 and C405.2.1.2.

C405.2.2.2 Occupancy sensors. C405.2.1 Occupant sensor controls. Occupancy sensors Occupant sensor controls shall be installed in all classrooms, conference/meeting rooms, employee lunch and break rooms, private offices, restrooms, storage rooms and janitorial closets, and other spaces 300 square feet (28 m²) or less enclosed by floor-to-ceiling height partitions. ~~These automatic control devices shall be installed to~~

C405.2.1.1 Occupant sensor control function. Occupant sensor controls shall comply with all of the following:

1. Automatically turn off lights within 30 minutes of all occupants leaving the space; and
2. Shall either be manual on or shall be controlled to automatically turn the lighting on to not more than 50 percent power.
3. Shall incorporate a *manual* control to allow users to turn lights off.

Exception: Full automatic-on controls shall be permitted to control lighting in public corridors, stairways, restrooms, primary building entrance areas and lobbies, and areas where manual-on operation would endanger the safety or security of the room or building occupants

~~**C405.2.1.1 Interior lighting controls.** Each area enclosed by walls or floor-to-ceiling partitions shall have at least one manual control for the lighting serving that area. The required controls shall be located within the area served by the controls or be a remote switch that identifies the lights served and indicates their status.~~

Exceptions:

1. ~~Areas designated as security or emergency areas that need to be continuously lighted.~~
2. ~~Lighting in stairways or corridors that are elements of the means of egress.~~

~~**C405.2.2 Additional lighting Time switch controls.** Each area that is required to have a manual control shall also have controls that meet the requirements of Sections C405.2.2.1, C405.2.2.2 and C405.2.2.3.~~
Each area of the building that is not provided with *occupant sensor controls* complying with Section C405.2.1.1 shall be provided with *time switch controls* complying with Section C405.2.2.1.

Exceptions: Where a *manual* control provides light reduction in accordance with Section 405.2.2.2, additional lighting controls need not be provided shall not be required for the following:

1. *Sleeping units.*
2. Spaces where patient care is directly provided.
3. Spaces where an automatic shutoff would endanger occupant safety or security.
4. Lighting intended for continuous operation.

C405.2.2.1 Automatic Time switch control devices function. Automatic time switch controls shall be installed to control lighting in all areas of the building. Each space provided with *time switch controls* shall also be provided with a *manual control* for light reduction in accordance with Section 405.2.2.2. *Time switch controls* shall include an override switching device that complies with the following:

Exceptions:

1. Emergency egress lighting does not need to be controlled by an automatic time switch.
2. Lighting in spaces controlled by occupancy sensors does not need to be controlled by automatic time switch controls.

The automatic time switch control device shall include an override switching device that complies with the following:

1. The override switch shall be ~~in a readily accessible location; a *manual control*.~~
2. ~~The override switch shall be located where the lights controlled by the switch are visible; or the switch shall provide a mechanism which announces the area controlled by the switch;~~
3. ~~The override switch shall permit manual operation;~~
4. 2. The override switch, when initiated, shall permit the controlled lighting to remain on for a maximum duration of 2 hours; and
5. 3. Any individual override switch shall control the lighting for a maximum area of 5,000 square feet (465 m²).

Exceptions:

1. Within malls, arcades, auditoriums, single tenant retail spaces, industrial facilities and arenas:
 1. ~~1.1.~~ The time limit shall be permitted to exceed 2 hours provided the override switch is a captive key device; and
 2. ~~1.2.~~ The area controlled by the override switch is permitted to exceed 5,000 square feet (465 m²), but shall not exceed 20,000 square feet (1860 m²).
2. Where provided with *manual control*, the following areas are not required to have light reduction control:
 - 2.1. Spaces that have only one luminaire, with rated power less than 100 watts;
 - 2.2. Spaces that use less than 0.6 watts per square foot (6.5 W/m²); and
 - 2.3. Corridors, equipment rooms, public lobbies, electrical or mechanical rooms.

C405.2.1.2 C405.2.2.2 Light reduction controls. ~~Each area that is required to have a manual control shall also allow the occupant~~ Spaces required to have light reduction controls shall have a *manual control* that allows the occupant to reduce the connected lighting load in a reasonably uniform pattern by at least 50 percent. Lighting reduction shall be achieved by one of the following or other *approved* methods:

1. Controlling all lamps or luminaires;
2. Dual switching of alternate rows of luminaires, alternate luminaires, or alternate lamps;
3. Switching the middle lamp luminaires independently of the outer lamps; or
4. Switching each luminaire or each lamp.

Exception: Light reduction controls need not be provided in the following areas and spaces: are not required in daylight zones with daylight responsive controls complying with C405.3.2.

- ~~1. Areas that have only one luminaire, with rated power less than 100 watts.~~
- ~~2. Areas that are controlled by an occupant sensing device.~~
- ~~3. Corridors, equipment rooms, storerooms, restrooms, public lobbies, electrical or mechanical rooms.~~
- ~~4. Sleeping unit (see Section C405.2.3).~~
- ~~5. Spaces that use less than 0.6 watts per square foot (6.5 W/m²).~~
- ~~6. Daylight spaces complying with Section C405.2.2.3.2.~~

C405.2.2.3 Manual controls. Manual controls for lights shall comply with the following:

1. Controls shall be readily accessible to occupants; and
2. Controls shall be located where the controlled lights are visible; or the control shall identify the area served by the lights and indicate their status.

~~C405.2.2.3~~ **C405.3 Daylight zone control.** *(Portions of text not shown remains unchanged)*

~~C405.2.2.3.1~~ **C405.3.1 Manual daylight controls.** *(Portions of text not shown remains unchanged)*

~~C405.2.2.3.2~~ **Automatic daylight controls.** **C405.3.2 Daylight responsive controls.** *(Portions of text not shown remains unchanged)*

~~C405.2.2.3.3~~ **C405.3.3 Multi-level lighting controls.** *(Portions of text not shown remains unchanged)*

~~C405.2.3~~ **C405.2.4 Specific application controls.** *(Portions of text not shown remains unchanged)*

~~C405.2.4~~ **C405.2.5 Exterior lighting controls.** *(Portions of text not shown remains unchanged)*

Add new definitions as follows:

SECTION C202 GENERAL DEFINITIONS

TIME SWITCH CONTROL. An automatic control device or system that controls lighting or other loads, including switching off, based on time schedules.

OCCUPANT SENSOR CONTROL. An automatic control device or system that detects the presence or absence of people within an area and causes lighting, equipment, or appliances to be regulated accordingly.

DAYLIGHT RESPONSIVE CONTROL. A device or system that provides automatic control of electric light levels based on the amount of daylight in a space.

Reason:

1. An extensive reorganization of C405.2 is proposed to improve readability and clarify use cases
2. For C405.2 Exceptions:
 - a. According to the IBC, all interior stairways and corridors are elements of the means of egress. The original intent of this language may have been to exempt corridors and stairways which are part of an exit as defined by the IBC, but the way the code is currently written it also exempts exit access and exit discharge components, i.e. the entire building. Exceptions 1 and 2 are moved here from deleted former Section C405.2.1.1.
 - b. Emergency egress lighting does not seem to be exempt from controls requirements in the current code, but it needs to be.
3. For C405.2.1.1.3: The way the code is currently structured most users probably would not realize that a manual switch is always required, even with automatic-on occupancy sensors.
4. Former Section C405.2.2 is proposed to be moved and split into two sections: Sections C405.2.1 and C405.2.1.1. The requirements under proposed new Section C405.2.1.1 have been itemized for clarity. Note that the requirement for occupant

sensor controls in “other spaces 300 square feet or less” is extremely broad and will encompass all of the lighting on smaller projects. For example, this is applicable to sleeping units, dwelling units, etc.

5. For C405.2.2 Exceptions:
 - a. The current code does not offer an exception for dwelling units. Dwelling units that are not exempt from all of 405.2 are required to comply with the requirements for automatic controls and light reduction controls.
 - b. The exception that is currently in the code is for “lighting” that is intended for continuous operation, not for “spaces”. This is an important distinction, because it allows light fixtures that are intended for night lighting of unoccupied spaces to be left off the automatic control system (like retail stores for security reasons, where select lights might be left on all night long. The current code does not offer a blanket exemption for continuously operational emergency egress “night” lighting. Under current code, all emergency egress lighting that is not located in a corridor or stairwell must have a manual control device for override, even though it does not need to be automatically controlled.
6. For C405.2.2.1 Exceptions: Exception 2 is derived from 2012 IECC Section C405.2.1.2, which this proposal deletes. Storerooms and restrooms should not be in this list because they are required to be provided with occupant sensor controls
7. For C405.2.2.3 Manual Controls, these additions Refer to C405.2.1.1 and C405.2.2.1 in these two sections.

Cost Impact: This code change proposal will not increase the cost of construction.

CE288-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.2-EC-IVERSON.doc

CE289 – 13

C405.2.1.1

Proponent: Jack Bailey, One Lux Studio, representing International Association of Lighting Designers
(jbailey@oneluxstudio.com)

Revise as follows:

C405.2.1.1 Interior lighting controls. Each area enclosed by walls or floor-to-ceiling partitions shall have at least one manual control for the lighting serving that area. The required controls shall be located within the area served by the controls or be a remote switch that identifies the lights served and indicates their status.

Exceptions:

1. Areas designated as security or emergency areas that need to be continuously lighted.
2. Lighting in stairways or corridors that are exits or exit discharge ~~elements of the means of egress.~~

Reason: According to the IBC 2012, all interior stairways and corridors are elements of the means of egress (most are exit access components). This makes the current code language redundant and confusing.

Most users of the code interpret this exception to apply only to stairways and corridors that are part of exits, and this was probably the original intention of the language. Interior exit discharge elements are unusual, but are allowed by IBC 2012 Section 1027.1.

The proposed change will make this section of the code technically correct and consistent with other ICC family codes.

Cost Impact: This code change proposal will increase the cost of construction.

CE289-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.2.1.1-EC-BAILEY.doc

CE290 – 13

C405.2.2

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C405.2.2 Additional lighting controls. Each area that is required to have a manual control shall also have controls that meet the requirements of Sections C405.2.2.1, C405.2.2.2 and C405.2.2.3.

Exception: Additional lighting controls need not be provided in the following spaces:

1. *Sleeping units.*
2. Spaces where patient care is directly provided.
3. Spaces where an automatic shutoff would endanger occupant safety or security.
4. Lighting intended for continuous operation
5. Shop and laboratory classrooms.

Reason: Currently, lighting controls are required in shop and laboratory classrooms. These spaces are similar to spaces where patient care is directly provided, however there are instances (in a classroom setting) where lighting controls are not needed, but no patient care is being provided. This exception is consistent with ANSI/ASHRAE/IES Standard 90.1.

Cost Impact: The code change proposal will increase the cost of construction.

CE290-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.2.2-EC-FERGUSON.doc

CE291 – 13

C405.2.2.1

Proponent: Tim Nogler, Washington State Building Code Council (tim.nogler@des.wa.gov)

Revise as follows:

C405.2.2.1 Automatic time switch controls devices. Automatic time switch controls shall be installed to control lighting in all areas of the building.

Exceptions:

1. Emergency egress lighting does not need to be controlled by an automatic time switch.
2. Lighting in spaces controlled by occupancy sensors does not need to be controlled by automatic time switch controls.

~~The~~ Automatic time switch controls ~~device~~ shall comply with the following:

1. Have a minimum 7 day clock;
2. Be capable of being set for 7 different day types per week;
3. Incorporate an automatic holiday "shut-off" feature, which turns off all controlled lighting loads for at least 24 hours and then resumes normally scheduled operations.
4. Have program back-up capabilities, which prevent the loss of program and time settings for at least 10 hours, if power is interrupted; and
5. Include an override switch ~~device~~ that complies with the following:
 - 5.1. The override switch shall be in a readily accessible location;
 - 5.2. The override switch shall be located where the lights controlled by the switch are visible; or the switch shall provide a mechanism which announces the area controlled by the switch;
 - 5.3. The override switch shall permit manual operation;
 - 5.4. The override switch, when initiated, shall permit the controlled lighting to remain on for a maximum of 2 hours; and
 - 5.5. Any individual override switch shall control the lighting for a maximum area of 5,000 square feet (465 m²).

Exception: Within malls, arcades, auditoriums, single tenant retail spaces, industrial facilities and arenas:

1. The time limit shall be permitted to exceed 2 hours provided the override switch is a captive key device; and
2. The area controlled by the override switch is permitted to exceed 5,000 square feet (465 m²), but shall not exceed 20,000 square feet (1860 m²).

Reason: These additional details clarify that a 7-day clock and holiday override features are required. This prevents lights from automatically turning on during weekends and holidays if not needed, and allows customization for unique schedules that require lighting earlier or later than usual on certain days, without keeping lights on for those extra hours on the other days of the week. The word "devices" is unnecessary and deleted for consistency in the language.

Washington State's experience has been that the power-loss memory feature is invaluable in restoring normal operations after a brief power interruption, at little extra cost.

Cost Impact: The code change proposal will increase the cost of construction.

CE291-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.2.2.1-EC-NOGLER.doc

CE292 – 13

C405.2.2.2

Proponent: Tim Nogler, Washington State Building Code Council (tim.nogler@des.wa.gov)

Revise as follows:

C405.2.2.2 Occupancy sensors. Occupancy sensors shall be installed in all classrooms, conference/meeting rooms, employee lunch and break rooms, private offices, restrooms, warehouse spaces, storage rooms and janitorial closets, and other spaces 300 square feet (28 m²) or less enclosed by floor-to-ceiling height partitions. These automatic control devices shall be installed to automatically turn off lights within 30 minutes of all occupants leaving the space, and shall either be manual on or shall be controlled to automatically turn the lighting on to not more than 50 percent power.

Exception: Full automatic-on controls shall be permitted to control lighting in public corridors, stairways, restrooms, primary building entrance areas and lobbies, and areas where manual-on operation would endanger the safety or security of the room or building occupants

Reason: This provision adds warehouses to the list of areas requiring occupancy sensors for lighting control. Since most areas in a warehouse are unoccupied most of the time, while other spaces are in use, the savings on lighting energy are substantial. This has been an integral part of the Washington State Energy Code for many years.

Cost Impact: The code change proposal will increase the cost of construction.

CE292-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.2.2.2-EC-NOGLER.doc

CE293 – 13

C405.2.2.2, C405.2.2.2.1 (NEW), C405.2.2.2.2 (NEW)

Proponent: Glenn Heinmiller, Lam Partners, representing International Association of Lighting Designers, (glenn@lampartners.com). James Edelson, New Buildings Institute.

Revise as follows:

C405.2.2.2 Occupancy sensors controls. Occupancy sensors shall be installed to control lights in accordance with C405.2.2.2.1 and C405.2.2.2.2. These automatic control devices shall be installed to automatically turn off lights within 30 minutes of all occupants leaving the space, and shall either be manual-on or shall be controlled to automatically turn the lighting on to not more than 50 percent power.

Exception: Full automatic-on controls shall be permitted to control lighting in:

1. Public corridors,
2. Stairways,
3. Restrooms,
4. Primary building entrance areas and lobbies,
5. Parking garages,
6. Warehouses,
7. Areas where manual-on operation would endanger the safety or security of the room or building occupants.

C405.2.2.2.1. Occupancy sensors for 100 percent load control. Occupancy sensors shall be installed to control 100 percent of the connected lighting load in:

1. Classrooms/lecture/training rooms,
2. Conference/meeting ~~rooms~~/multi-purpose rooms,
3. Copy/print rooms,
4. Lounges,
5. Employee lunch and-break rooms,
6. Private offices,
7. Restrooms,
8. Storage rooms, ~~and~~
9. Janitorial closets,
10. Laboratory classrooms,
11. Locker rooms,
12. Other spaces 300 square feet (28 m²) or less enclosed by floor-to-ceiling height partitions.

C405.2.2.2.2. Occupancy sensors for 50 percent load control. Occupancy sensors shall be installed to control not less than 50 percent of the connected lighting load in:

1. Enclosed stairways,
2. Parking garages,
3. Warehouses.

Reason: Occupancy sensors are the automatic control type that leads to the most energy savings. This proposal requires the use of occupancy sensors in certain additional space types where occupancy sensors can be used effectively. The space type names are consistent with the space type names used for determination of lighting power density. The phrase "to control lights" is added to make it clear that the sensors not only have to be installed, but have to function. The section has been reformatted in list format for clarity.

Cost Impact: This code change proposal will increase the cost of construction if occupancy sensors would not already be specified for the space types not currently in the code.

CE293-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.2.2.2-EC-HEINMILER.doc

CE294 – 13

C202, Figure C405.1 (NEW), Figure C405.2 (NEW), C405.2.2.3, C405.2.2.3.1 (NEW), C405.2.2.3.2 (NEW), C405.2.2.3.3 (NEW), Figure C405.3 (NEW), Figure C405.4 (NEW)

Proponent: Jack Bailey, One Lux Studio, representing International Association of Lighting Designers (jbailey@oneluxstudio.com), Jim Edelson, New Buildings Institute (jim@newbuildings.org)

Revise as follows:

~~C405.2.2.3 Daylight zone control.~~ ~~Daylight zones shall be designed such that lights in the daylight zone are controlled independently of general area lighting and are controlled in accordance with either Section C405.2.2.3.1 or Section C405.2.2.3.2. Each daylight control zone shall not exceed 2,500 square feet (232 m²). Contiguous daylight zones adjacent to vertical fenestration are allowed to be controlled by a single controlling device provided that they do not include zones facing more than two adjacent cardinal orientations (i.e., north, east, south, west). Daylight zones under skylights more than 15 feet (4572 mm) from the perimeter shall be controlled separately from daylight zones adjacent to vertical fenestration.~~

~~**Exception:** Daylight zones enclosed by walls or ceiling-height partitions and containing two or fewer light fixtures are not required to have a separate switch for general area lighting.~~

C405.2.2.3 Daylight responsive controls. Daylight responsive controls complying with Section C405.2.2.3.1 shall be provided to control the electric lights within *daylight zones* in the following spaces:

1. Spaces with a total of more than 150 watts of *general lighting* within sidelight *daylight zones* complying with Section C405.2.2.3.2. *General lighting* does not include lighting that is required to have specific application control in accordance with Section C405.2.3.
2. Spaces with a total of more than 150 watts of *general lighting* within toplight *daylight zones* complying with Section C405.2.2.3.3.

Exceptions: Daylight responsive controls are not required for the following:

1. Spaces in health care facilities where patient care is directly provided.
2. Dwelling units and sleeping units.
3. Lighting that is required to have specific application control in accordance with Section C405.2.3.

C405.2.2.3.1 Daylight responsive control function. Where required, *daylight responsive controls* shall be provided within each space for control of lights in that space and shall comply with all of the following:

1. Lights in toplight *daylight zones* in accordance with Section C405.2.2.3.3 shall be controlled independently of lights in sidelight *daylight zones* in accordance with Section C405.2.2.3.2;
2. *Daylight responsive controls* within each space shall be configured so that they can be calibrated from within that space by authorized personnel;
3. Calibration mechanisms shall be *readily accessible*;
4. When located in offices, classrooms, laboratories, and library reading rooms, *daylight responsive controls* shall dim lights continuously from full light output to 10 percent of full light output or lower;
5. *Daylight responsive controls* shall be capable of a complete shut off of all controlled lights; and
6. Lights in sidelight *daylight zones* in accordance with Section C405.2.2.3.2 facing different cardinal orientations (i.e. within 45 degrees of due north, east, south, west) shall be controlled independently of each other.

Exception: Up to 150 watts of lighting in each space is permitted to be controlled together with lighting in a daylight zone facing a different cardinal orientation.

C405.2.2.3.2 Sidelight daylight zone. The sidelight *daylight zone* is the floor area adjacent to vertical *fenestration* which complies with all of the following:

1. Where the *fenestration* is located in a wall, the *daylight zone* shall extend laterally to the nearest full height wall, or up to 1.0 times the height from the floor to the top of the *fenestration*, and longitudinally from the edge of the fenestration to the nearest full height wall, or up to 2 feet (610 mm), whichever is less, as indicated in Figure C405.1;
2. Where the *fenestration* is located in a rooftop monitor, the *daylight zone* shall extend laterally to the nearest obstruction that is taller than 0.7 times the ceiling height, or up to 1.0 times the height from the floor to the bottom of the *fenestration*, whichever is less, and longitudinally from the edge of the *fenestration* to the nearest obstruction that is taller than 0.7 times the ceiling height, or up to 0.25 times the height from the floor to the bottom of the *fenestration*, whichever is less, as indicated in Figures C405.2 and C405.3;
3. The area of the *fenestration* is at least 24 square feet;
4. The distance from the *fenestration* to any building or geological formation which would block access to daylight is greater than the height from the bottom of the *fenestration* to the top of the building or geologic formation; and
5. Where located in existing buildings, the *visible transmittance* of the *fenestration* is no less than 0.25.

C405.2.2.3.3 Toplight daylight zone. The topline *daylight zone* is the floor area underneath a roof *fenestration* assembly which complies with all of the following:

1. The *daylight zone* shall extend laterally and longitudinally beyond the edge of the roof *fenestration* assembly to the nearest obstruction that is taller than 0.7 times the ceiling height, or up to 0.7 times the ceiling height, whichever is less, as indicated in Figure C405.4;
2. No building or geological formation blocks direct sunlight from hitting the roof *fenestration* assembly at the peak solar angle on the summer solstice; and
3. Where located in existing buildings, the product of the *visible transmittance* of the roof *fenestration* assembly and the area of the rough opening of the roof fenestration assembly, divided by the area of the daylight zone is no less than 0.008.

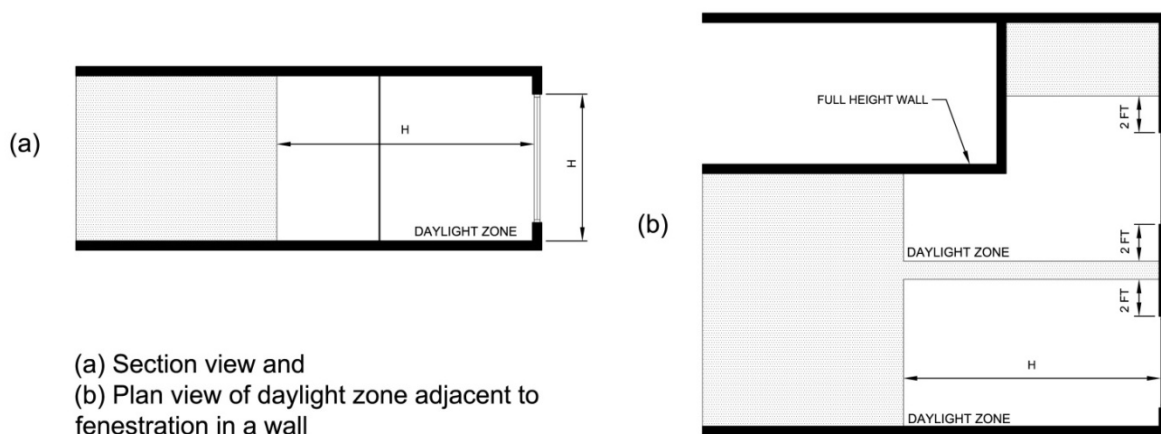
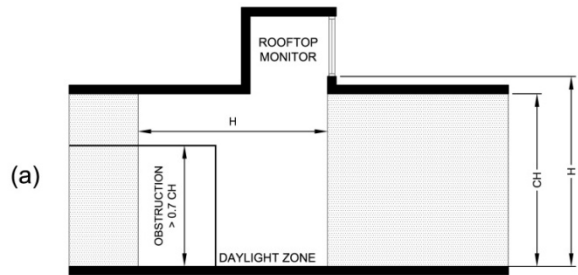


FIGURE C405.1
DAYLIGHT ZONE ADJACENT TO FENESTRATION IN A WALL



(a) Section view and
(b) Plan view of daylight zone under a rooftop monitor

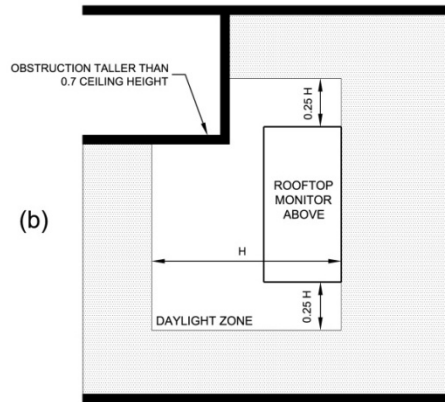
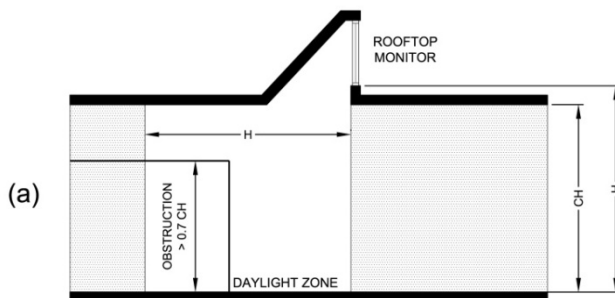


FIGURE C405.2
DAYLIGHT ZONE UNDER A ROOFTOP MONITOR



(a) Section view and
(b) Plan view of daylight zone under a rooftop monitor

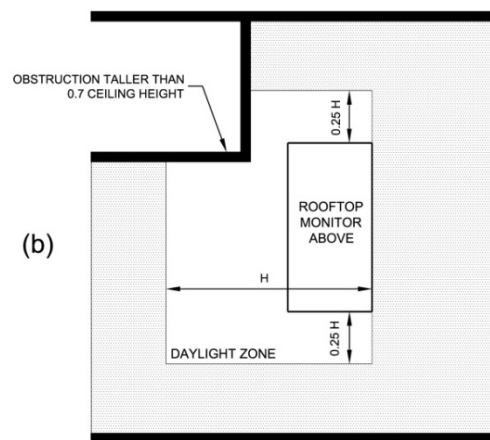
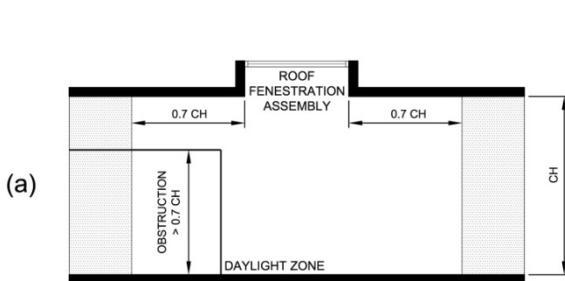


FIGURE C405.3
DAYLIGHT ZONE UNDER A SLOPED ROOFTOP MONITOR



(a) Section view and
(b) Plan view of daylight zone under a roof fenestration assembly

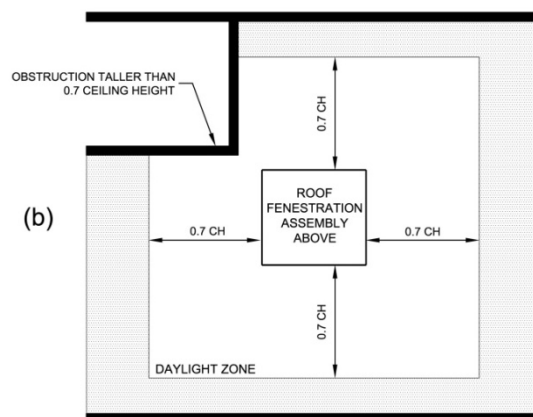


FIGURE C405.4
DAYLIGHT ZONE UNDER A ROOF FENESTRATION ASSEMBLY

Revise definitions as follows:

SECTION C202 GENERAL DEFINITIONS

DAYLIGHT RESPONSIVE CONTROL. A device or system that provides automatic control of electric light levels based on the amount of daylight in a space.

DAYLIGHT ZONE. That portion of a building's interior floor area that is illuminated by natural light.

- ~~1. **Under skylights.** The area under skylights whose horizontal dimension, in each direction, is equal to the skylight dimension in that direction plus either the floor-to-ceiling height or the dimension to a ceiling height opaque partition, or one-half the distance to adjacent skylights or vertical fenestration, whichever is least.~~
- ~~2. **Adjacent to vertical fenestration.** The area adjacent to vertical fenestration which receives daylight through the fenestration. For purposes of this definition and unless more detailed analysis is provided, the daylight zone depth is assumed to extend into the space a distance of 15 feet (4572 mm) or to the nearest ceiling height opaque partition, whichever is less. The daylight zone width is assumed to be the width of the window plus 2 feet (610 mm) on each side, or the window width plus the distance to an opaque partition, or the window width plus one-half the distance to adjacent skylight or vertical fenestration, whichever is least.~~

Reason: This proposal would replace the provisions in the code related to control of electric lights in daylight zones. It would not alter any of the envelope provisions in the code, nor would it set any minimum requirements for fenestration. The proposed changes are needed for two reasons:

1. The existing IECC code language is technically inadequate and confusing, and
2. There is a tremendous untapped potential for energy savings in buildings just by turning off electric lights in daylit spaces.

Inadequate and Confusing Language in 2012 IECC

1. The code describes all sidelight daylight zones as being 15 feet deep, regardless of whether the window is 5 feet high or 50 feet high. Lighting controls will not function properly if the daylight zone size is wrong, and the 15 foot depth requirement in the current code is actually an impediment to successful implementation of daylight responsive controls. New definitions that are based on the geometry of the building are proposed, and diagrams are provided to make the code easier to use. The proposed diagrams are modified slightly from the diagrams published in the 2012 IGCC, and if this proposal is approved these modifications should be proposed for the IGCC diagrams as well.
2. The code provides no clear guidance about the daylight zone associated with a rooftop monitor. This proposal clearly describes the daylight zone associated with rooftop monitors.
3. Small windows, windows with low-VT glass, and windows which are overshadowed by adjacent buildings are common in urban areas with older building stock. Daylight responsive controls should not be required in situations where they will be ineffective. The current code does not provide exceptions for these situations, but the proposed language does.
4. The code requires that separate control be provided for lights in each daylight zone. On facades where windows are spaced more than 4 feet apart, each window establishes a separate daylight zone, and hence a separate lighting control zone. This adds unnecessary cost and complexity to the lighting controls. The proposed daylight responsive control requirements in Section 405.2.2.3.1 resolve this issue and clarify which lights can be grouped together for control in a more sensible way.
5. The code allows step-switching in offices, laboratories, classrooms, and reading rooms, where we know this is objectionable to occupants. This proposal would require dimming in those areas, while still allowing less costly switching systems to be used in other areas.
6. The code is not specific enough about how daylight responsive controls should be required to function. An owner, developer, designer, or builder who looks for the lowest first-cost solution that meets the current code will likely end up with a lighting control system that doesn't work. The proposed Section 405.2.2.3.1 would establish minimum requirements for these systems to function properly. The code is not a design guideline, but it should prevent obvious shortcuts which subvert the intent of the code.

Additional Energy Savings from Daylight Responsive Controls

The IECC requires that daylight responsive controls only be provided in buildings following the prescriptive path which fail to meet certain fenestration requirements. This is obviously a very limited requirement, as most lighting installations are completed as part of alterations to existing buildings that do not include envelope alterations.

This proposal would require that daylight responsive controls be provided whenever more than 150 watts of lighting is installed in an area which receives effective daylight. Necessary exceptions are included for lighting in dwelling units, sleeping units, health care, etc. The 150 watt threshold was found to be cost effective by PNNL and HMG in research done to support the ASHRAE 90.1 Committee. If approved, this proposal would align the stringency of the lighting control requirements in the IECC with those of ASHRAE / ANSI / IESNA Standard 90.1 – 2013, but would still leave the IECC less stringent than California Title 24 – 2013.

Lighting in commercial buildings is responsible for 38% of electricity consumption in commercial buildings nationally. As a portion total energy use, lighting is the largest individual use of energy, accounting for one fifth (20%) of the combined energy total. This occurs despite the fact that many buildings have ample access to a free light source – daylight. A recent meta-analysis report

on lighting controls in commercial buildings (Lighting Controls in Commercial Buildings, Williams, Atkins et al, 2012) estimated a 28% average lighting energy savings potential for buildings that incorporated daylighting strategies.

Guidelines published by NBI (<http://patternguide.advancedbuildings.net>) show that there are multiple ways to provide high quality daylight in most buildings. In addition to many energy code entities, almost every voluntary rating system has been increasing their reliance on daylighting to reduce energy consumption in commercial buildings. This proposal ensures that the IECC incorporates the energy saving priority that if sufficient daylight is available, then controls should be included to turn off the electric lights.

Cost Impact: The code change proposal will increase the cost of construction.

CE294_-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.2.2.3 (NEW)-EC-BAILEY-EDELSON

CE295 – 13

C405.2.2.3, C405.2.2.3.1

Proponent: Tim Nogler, Washington State Building Code Council (tim.nogler@des.wa.gov)

Revise as follows:

C405.2.2.3 Daylight zone control. Daylight zones shall be designed such that lights in the daylight zone are controlled independently of general area lighting and are controlled in accordance with either ~~Section C405.2.2.3.1~~ or Section C405.2.2.3.2. Each daylight control zone shall not exceed 2,500 square feet (232 m²). Contiguous daylight zones adjacent to vertical fenestration are allowed to be controlled by a single controlling device provided that they do not include zones facing more than two adjacent cardinal orientations (i.e., north, east, south, west). Daylight zones under skylights more than 15 feet (4572 mm) from the perimeter shall be controlled separately from daylight zones adjacent to vertical fenestration. The controls shall:

1. Control only luminaires within the daylit area.
2. Incorporate time-delay circuits to prevent cycling of light level changes of less than three minutes.

Exception: Daylight zones enclosed by walls or ceiling height partitions and containing two or fewer light fixtures are not required to have a separate switch for general area lighting.

~~**C405.2.2.3.1 Manual daylighting controls.** Manual controls shall be installed in daylight zones unless automatic controls are installed in accordance with Section C405.2.2.3.2.~~

Reason: This proposal mandates the use of daylight controls in daylight zones.

Daylighting cannot save any energy unless the presence of daylight can automatically turn lights off, and the absence of light can turn them back on again. Time clocks, even when set to track daylight hours, cannot accommodate variables such as cloud cover or use of blinds, and thus are likely to be overridden.

The two additional requirements are added based on Washington State's experience with this requirement.

Cost Impact: The code change proposal will increase the cost of construction.

CE295-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.2.2.3-EC-NOGLER.doc

CE296 – 13

C405.2.2.3, C405.2.2.3.1, C405.2.2.3.2

Proponent: Duane Jonlin, City of Seattle, representing City of Seattle, Department of Planning and Development (duane.jonlin@seattle.gov)

Revise as follows:

C405.2.2.3 Daylight zone control. Daylight zones shall be designed such that lights in the daylight zone are controlled independently of general area lighting and are controlled in accordance with ~~either Section C405.2.2.3.1 or Section C405.2.2.3.2.~~ Each daylight control zone shall not exceed 2,500 square feet (232 m²). Contiguous daylight zones adjacent to vertical fenestration are allowed to be controlled by a single controlling device provided that they do not include zones facing more than two adjacent cardinal orientations (i.e., north, east, south, west). Daylight zones under skylights more than 15 feet (4572 mm) from the perimeter shall be controlled separately from daylight zones adjacent to vertical fenestration. The daylight controls shall:

1. Control only luminaires within the daylit area.
2. Incorporate time-delay circuits to prevent cycling of light level changes of less than three minutes.

Exceptions:

- Daylight zones enclosed by walls or ceiling height partitions and containing two or fewer light fixtures are not required to have a separate switch for general area lighting.
- In restaurant and mercantile occupancies, light fixtures located less than 10 feet horizontally from vertical fenestration are not required to be controlled by daylight sensors where the fenestration adjoins a sidewalk or other outdoor pedestrian area.

~~**C405.2.2.3.1 Manual daylighting controls.** Manual controls shall be installed in daylight zones unless automatic controls are installed in accordance with Section C405.2.2.3.2.~~

~~**C405.2.2.3.2**~~ **C405.2.2.3.1 Automatic daylighting controls.** Set-point and other controls for calibrating the lighting control device shall be readily accessible.

Daylighting controls device shall be capable of automatically reducing the lighting power in response to available daylight by either one of the following methods:

- Continuous dimming using dimming ballasts and daylight-sensing automatic controls that are capable of reducing the power of general lighting in the daylit zone continuously to less than ~~35~~20 percent of rated power at maximum light output.
- Stepped dimming using multi-level switching and daylight-sensing controls that are capable of reducing lighting power automatically. The system shall provide a minimum of two control channels per zone and be installed in a manner such that at least one control step is between 50 percent and 70 percent of design lighting power and another control step is no greater than 35 percent of design power, and the system is capable of automatically turning the system off.

Reason: Daylighting doesn't save energy unless lights are turned down or off when daylight is strong enough. Reliance on staff or occupants to manually switch off the perimeter lights when the room is bright enough is not an effective strategy.

Exception #2: Retail and restaurant occupancies need passers-by to see that the business is open. If perimeter lights turn off during bright sun conditions, the interior can appear to be dark and unoccupied from the outside.

Cost Impact: The code change proposal will not increase the cost of construction.

CE296-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.2.2.3-EC-JONLIN.doc

CE297 – 13

C202 (NEW), C405.2.2.3.2, C405.2.2.3.3 (NEW)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C405.2.2.3.2 Automatic daylighting controls for sidelighting. Automatic daylighting controls for sidelighting shall be capable of automatically reducing the lighting power in response to available daylight by either one of the following methods: ~~Set-point and other controls for calibrating the lighting control device shall be readily accessible.~~

~~Daylighting controls device shall be capable of automatically reducing the lighting power in response to available daylight by either one of the following methods:~~

- ~~1. Continuous dimming using dimming ballasts and daylight-sensing automatic controls that are capable of reducing the power of general lighting in the daylight zone continuously to less than 35 percent of rated power at maximum light output.~~
- ~~2. Stepped dimming using multi-level switching and daylight-sensing controls that are capable of reducing lighting power automatically. The system shall provide a minimum of two control channels per zone and be installed in a manner such that at least one control step is between 50 percent and 70 percent of design lighting power and another control step is no greater than 35 percent of design power.~~
1. In any space where the combined input power of all general lighting completely or partially within the *primary sidelighted areas* is 150W or greater, the general lighting in the *primary sidelighted areas* shall be controlled by photocontrols.
2. In any space where the combined input power of all general lighting completely or partially within the *primary* and *secondary sidelighted areas* is 300W or greater the general lighting in the *primary sidelighted areas* and *secondary sidelighted areas* shall be controlled by photocontrols.

Exceptions:

1. *Primary sidelighted areas* where the top of the existing adjacent structures are twice as high above the windows as their distance away from the windows
2. Sidelighted areas where the total glazing area is less than 20 square feet
3. Retail spaces
3. The control system shall have the following characteristics:
 1. The calibration adjustments shall be readily accessible;
 2. At a minimum, general lighting in the *secondary sidelighted area* shall be controlled independently of the general lighting in the *primary sidelighted area*;
 3. The photocontrol shall reduce electric lighting in response to available daylight using continuous dimming or with at least one control point between 50 percent and 70 percent of design lighting power, a second control point between 20 percent and 40 percent of design lighting power, and a third control point that turns off all the controlled lighting.

C405.2.2.3.3 Automatic Daylighting Controls for Toplighting. In any space where the combined input power for all general lighting completely or partially within *daylight areas under skylights* and *daylight areas under roof monitors* is 150W or greater, general lighting in the daylight area shall be controlled by photocontrols having the following characteristics:

1. The calibration adjustments shall be readily accessible;

2. The photocontrol shall reduce electric lighting in response to available daylight using continuous dimming or with at least one control point that is between 50 percent and 70 percent of design lighting power, a second control point between 20 percent and 40 percent of design lighting power, and a third control point that turns off all the controlled lighting; and
3. General lighting in overlapping toplighted and sidelighted daylight areas shall be controlled together with general lighting in the *daylight area under skylights* or *daylight areas under roof monitors*.

Exceptions:

1. *Daylight areas under skylights* where it is documented that existing adjacent structures or natural objects block direct beam sunlight for more than 1500 daytime hours per year between 8 a.m. and 4 p.m.
2. Daylight areas where the skylight visible transmittance (VT) is less than 0.4.
3. Spaces within buildings in climate zone 8 where the input power of the general lighting within daylight areas is less than 200W.

Add new definitions as follows:

**SECTION C202
GENERAL DEFINITIONS**

DAYLIGHT AREA UNDER SKYLIGHTS. The *daylight area under skylights* is the combined daylight area under each skylight within a *space*. The daylight area under each skylight is bounded by the opening beneath the skylight, plus horizontally in each direction, the smaller of:

1. 70 percent of the ceiling height ($0.7 \times CH$), or
2. The distance to the front face of any opaque vertical obstruction where any part of the obstruction is farther away than 70 percent of the distance between the top of the obstruction and the ceiling ($0.7 \times [CH - OH]$), where CH = the height of the ceiling at the lowest edge of the skylight, and OH = the height to the top of the obstruction.

DAYLIGHT AREA UNDER ROOF MONITORS. The daylight area under roof monitors is the combined daylight area under each roof monitor within each space. The daylight area under each roof monitor is the product of

1. The width of the vertical fenestration above the ceiling level plus on each side, the smallest of the following:

- 1.1 2 feet;
- 1.2. The distance to any 60 in or higher vertical obstruction or;
- 1.3. The distance to the edge of any *primary sidelighted area*.

and

2. The smaller of the following horizontal distances inward from the bottom edge of the vertical fenestration:

- 2.1 The monitor sill height, MSH, (the vertical distance from the floor to the bottom edge of the monitor glazing), or
- 2.2 The distance to the front face of any opaque vertical obstruction where any part of the obstruction is farther away than the difference between the height of the obstruction and the monitor sill height (MSH-OH).

PRIMARY SIDELIGHTED AREA. The total primary sidelighted area is the combined primary sidelighted area within each space. Each primary sidelighted area is directly adjacent to vertical fenestration below the ceiling..

1. The primary sidelighted area width is the width of the vertical fenestration plus, on each side, the smaller of:

1.1 One half of the vertical fenestration head height (head height is the distance from the floor to the top of the glazing), or

1.2 The distance to any 5 feet or higher opaque vertical obstruction.

2. The primary sidelighted area depth is the horizontal distance perpendicular to the vertical fenestration which is the smaller of:

2.1. One vertical fenestration head height, or

2.2. The distance to any 5 feet or higher opaque vertical obstruction.

SECONDARY SIDELIGHTED AREA. The total secondary sidelighted area is the combined secondary sidelighted area within a space. Each secondary sidelighted area is directly adjacent to a *primary sidelighted area*.

1. The secondary sidelighted area width is the width of the vertical fenestration plus, on each side, the smaller of:

1.1 One half of the vertical fenestration head height, or

1.2 The distance to any 5 feet or higher opaque vertical obstruction.

2. The secondary sidelighted area depth is the horizontal distance perpendicular to the vertical fenestration which begins at the edge of the *primary sidelighted area* depth and ends at the smaller of:

2.1. One vertical fenestration head height, or

2.2. The distance to any 5 feet or higher opaque vertical obstruction.

Where the adjacent *primary sidelighted area* ends at a 5 feet or higher opaque vertical obstruction, there is no secondary sidelighted area beyond such obstruction.

Reason: This proposal adds daylighting control requirements that are consistent with the published requirements in addendum ay to ANSI/ASHRAE/IES Standard 90.1. Specifically, the revision changes the thresholds for applying daylighting controls to a wattage controlled basis that allows straightforward application and easy enforcement of the requirements. The requirement applies to more spaces in a building for additional energy savings, simplifies the delineation of daylight zones, and clarifies area calculations. These revisions are based on an extensive cost effectiveness analysis.

Cost Impact: The code change proposal will increase the cost of construction.

CE297-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.2.2.3.2-EC-FERGUSON.doc

CE298 – 13

C405.2.2.3.2

Proponent: Tim Nogler, Washington State Building Code Council (tim.nogler@des.wa.gov)

Revise as follows:

C405.2.2.3.2 Automatic daylighting controls. Set-point and other controls for calibrating the lighting control device shall be readily accessible.

Daylighting controls device shall be capable of automatically reducing the lighting power in response to available daylight by either one of the following methods:

1. Continuous dimming using dimming ballasts and daylight-sensing automatic controls that are capable of reducing the power of general lighting in the daylit zone continuously to less than ~~35~~ 20 percent of rated power at maximum light output.
2. Stepped dimming using multi-level switching and daylight-sensing controls that are capable of reducing lighting power automatically. The system shall provide a minimum of two control channels per zone and be installed in a manner such that at least one control step is between 50 percent and 70 percent of design lighting power and another control step is no greater than 35 percent of design power, and the system is capable of automatically turning the system off.

Reason: Ballasts capable of dimming to less than 20% of rated power are now commonly available, and such ballasts provide a much more subtle shift from the lowest setting to completely off. There is no reason for fixtures to remain on, even at low power, when daylight is filling the room. Allowing a full-off setting will mean that many fixtures will not turn on at all during summer hours, saving both lighting energy and cooling energy.

Cost Impact: The code change proposal will not increase the cost of construction.

CE298-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.2.2.3.2-EC-NOGLER.doc

CE299 – 13

C405.2.3

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C405.2.3 Specific application controls. Specific application controls shall be provided for the following:

1. Display and accent light shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space
2. Lighting in cases used for display case purposes shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.
3. Hotel and motel sleeping units and guest suites shall have a master control device at the main room entry that controls all permanently installed luminaires and switched receptacles that is capable of switching off all installed luminaires and switched receptacles within 20 minutes after all occupants leave the room.

Exception: Lighting and switched receptacles controlled by captive key systems.

4. Supplemental task lighting, including permanently installed under-shelf or under-cabinet lighting, shall have a control device integral to the luminaires or be controlled by a wall-mounted control device provided the control device is readily accessible.
5. Lighting for nonvisual applications, such as plant growth and food warming, shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.
6. Lighting equipment that is for sale or for demonstrations in lighting education shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.

Reason: For consistency with ASHRAE/IES 90.1. These revisions introduce automatic lighting control to guestroom type spaces for additional energy savings and allow captive key systems that provide similar savings control to also comply.

Cost Impact: The code change proposal will increase the cost of construction when lighting controls are required in parking garages.

CE299-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.2.3-EC-FERGUSON.doc

CE300 – 13

C405.2.3

Proponent: Andrei Moldoveanu, The National Electrical Manufacturers Association (NEMA) (and_moldoveanu@nema.org), David Collins, The Preview Group, representing American Institute of Architects (AIA)

Revise as follows:

C405.2.3 Specific application controls. Specific application controls shall be provided for the following:

1. Display and accent light shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.
2. Lighting in cases used for display case purposes shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.
3. ~~Hotel and motel~~ Lighting and switched receptacles in sleeping units and guest suites shall have a master control device at the main room entry that controls all permanently installed luminaires and switched receptacles be automatically controlled such that the power to the lighting and switched receptacles will be turned off within 30 minutes after all occupants leave the room.

Exception: Lighting and switched receptacles controlled by a captive key system.

4. Supplemental task lighting, including permanently installed under-shelf or under-cabinet lighting, shall have a control device integral to the luminaires or be controlled by a wall-mounted control device provided the control device is readily accessible.
5. Lighting for nonvisual applications, such as plant growth and food warming, shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.
6. Lighting equipment that is for sale or for demonstrations in lighting education shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.

Reason: Adoption of this proposal will save energy.

Cost Impact: The code change proposal will not increase the cost of construction.

CE300-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.2.3-EC-MOLDOVEANU.doc

CE301 – 13

C405.2.3

Proponent: Tim Nogler, Washington State Building Code Council (tim.nogler@des.wa.gov)

Revise as follows:

C405.2.3 Specific application controls. Specific application controls shall be provided for the following:

1. Display and accent light shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.
2. Lighting in cases used for display case purposes shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.
3. Hotel and motel sleeping units and guest suites shall have a master control device at the main room entry that controls all permanently installed luminaires and switched receptacles.
4. Supplemental task lighting, including permanently installed under-shelf or under-cabinet lighting, shall have a control device integral to the luminaires or be controlled by a wall-mounted control device provided the control device is readily accessible.
5. Lighting for nonvisual applications, such as plant growth and food warming, shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.
6. Lighting equipment that is for sale or for demonstrations in lighting education shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.
7. Luminaires serving the *exit* access and providing the means of egress illumination required by Section 1006.1 of the *International Building Code*, including luminaires that function as both normal and emergency means of egress illumination, shall be controlled by a combination of listed emergency relays and occupancy sensors, or a signal from another building control system, that automatically turns off the lighting when the areas served by that illumination are unoccupied.

Exception. Means of egress illumination serving the *exit* access that does not exceed 0.05 watts per square foot of building area is exempt from this requirement.

Reason: This provision requires the egress lighting in the *exit* access (only) to be controlled either by occupancy sensors or the building automatic time clock system, so that those lights will turn off along with all of the other general area lighting when the floor is unoccupied. These lights will still turn on with emergency power when normal power is lost.

The egress lighting governed by this rule typically consists of fixtures that do double duty as normal and emergency lighting. An exception is provided to allow a small number of fixtures to remain on 24/7 where needed to prevent total blackout.

Cost Impact: The code change proposal will increase the cost of construction.

CE301-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.2.3-EC-NOGLER.doc

CE302 – 13

C405.2.3

Proponent: Duane Jonlin, City of Seattle, representing City of Seattle Department of Planning and Development (duane.jonlin@seattle.gov)

Revise as follows:

C405.2.3 Specific application controls. Specific application controls shall be provided for the following:

1. Display and accent light shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.
2. Lighting in cases used for display case purposes shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.
3. Hotel and motel sleeping units and guest suites shall have a master control device at the main room entry that controls all permanently installed luminaires and switched receptacles.
4. Supplemental task lighting, including permanently installed under-shelf or under-cabinet lighting, shall have a control device integral to the luminaires or be controlled by a wall-mounted control device provided the control device is readily accessible.
5. Lighting for nonvisual applications, such as plant growth and food warming, shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.
6. Lighting equipment that is for sale or for demonstrations in lighting education shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.
7. Each stairway shall have one or more control devices to automatically reduce lighting power by not less than 50 percent when no occupants have been detected in the stairway for a period not exceeding 30 minutes, and restore lighting to full power when occupants enter the stairway. All portions of stairways shall remain illuminated to at least 1 footcandle (11 lux) at the walking surface when the lighting power is reduced.
8. Lighting in parking garages shall have one or more control devices to automatically reduce lighting power in any one controlled zone by not less than 50 percent when no occupants have been detected in that zone for a period not exceeding 30 minutes, and restore lighting to full power when occupants enter or approach the zone. Each lighting zone controlled by occupancy sensors shall be no larger than 7,200 square feet. Pedestrian occupancy sensors controlling any lighting zone are permitted to be configured to detect pedestrians no more than 30 feet outside of that zone. Vehicle occupancy sensors controlling any lighting zone are permitted to be configured to detect vehicles no more than 60 feet outside of that zone.

Reason: This provision allows stairs enclosures and parking garages lighting energy use to be reduced by half when unoccupied, then come back to full brightness when occupants enter those spaces. It provides a balance between safety, security and energy use. These measures are currently in force in Seattle.

Cost Impact: The code change proposal will increase the cost of construction.

CE302-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.2.3-EC-JONLIN.doc

CE303 – 13

C405.2.4

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Delete and substitute as follows:

~~**C405.2.4 Exterior lighting controls.** Lighting not designated for dusk-to-dawn operation shall be controlled by either a combination of a photosensor and a time switch, or an astronomical time switch. Lighting designated for dusk-to-dawn operation shall be controlled by an astronomical time switch or photosensor. All time switches shall be capable of retaining programming and the time setting during loss of power for a period of at least 10 hours.~~

C405.2.4 Exterior lighting controls. Exterior lighting shall be controlled by either an astronomical time switch or a photo sensor and a time switch. Time switches shall be capable of retaining programming and the time setting for at least 10 hours without power.

Exception: Lighting designed for dusk to dawn operation shall be permitted to have a photo sensor without a time switch.

Reason: This proposal simplifies the provisions covering exterior lighting controls in the code, to foster the ability to implement and verify compliance with the code.

Cost Impact: The code change proposal will not increase the cost of construction.

CE303-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.2.4 (NEW)-EC-WILLIAMS.doc

CE304 – 13

C405.2.4

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Delete and substitute as follows:

~~C405.2.4 Exterior lighting controls.~~ ~~Lighting not designated for dusk-to-dawn operation shall be controlled by either a combination of a photosensor and a time switch, or an astronomical time switch. Lighting designated for dusk-to-dawn operation shall be controlled by an astronomical time switch or photosensor. All time switches shall be capable of retaining programming and the time setting during loss of power for a period of at least 10 hours~~

C405.2.4 Exterior lighting controls. Lighting for exterior applications other than emergency lighting that is intended to be automatically off during building operation, lighting specifically required to meet health and life safety requirements or decorative gas lighting systems shall:

1. Be provided with a control that automatically turns off the lighting as a function of available daylight.
2. Where lighting the building façade or landscape the lighting shall have controls that automatically shut off the lighting as a function of dawn/dusk and a set opening and closing time.
3. Where not covered in Item 2 the lighting shall have controls configured to automatically reduce the connected lighting power by at least 30 percent from no later than 12 midnight to 6 a.m. or from one hour after business closing to one hour before business opening or during any period when no activity has been detected for a time of no longer than 15 minutes.

All time switches shall be able to retain programming and the time setting during loss of power for a period of at least ten hours.

Exception: Lighting for covered vehicle entrances or exits from buildings or parking structures where required for safety, security, or eye adaptation.

Reason: For consistency with ASHRAE/IES 90.1-2010. Section 9.4.1.7 of that document contains provisions for exterior lighting controls that differ from those in Section C405.2.4 of the IECC Commercial Provisions. As that standard is an alternative path to compliance with the IECC and there is a desire to maintain equivalency of the IECC with 90.1 this change is needed.

Cost Impact: The code change proposal will not increase the cost of construction.

CE304-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.2.4-EC-FERGUSON.doc

CE305 – 13

C405.2.5 (NEW)

Proponent: Tim Nogler, Washington State Building Code Council (tim.nogler@des.wa.gov)

Add new text as follows:

C405.2.5 Area controls. The maximum lighting power controlled from a single switch or automatic control shall not exceed that which is provided by a 20 ampere circuit loaded to not more than 80 percent. Where a master control is provided, individual switches shall retain the capability to function independently. Circuit breakers shall not be used as the sole means of switching.

Exception: Areas less than 5 percent of the floor area of a story for stories over 100,000 square feet in area need not comply with this section.

Reason: This code provision limits the area controlled by a single switch or a single occupancy sensor. At typical office lighting levels, the maximum area would be about 1,900 SF. A lone office worker in on a Saturday shouldn't have to turn on lights for the entire floor.

The exception allows factories and warehouses to be subdivided into larger lighting areas.

Cost Impact: The code change proposal will increase the cost of construction.

CE305-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.2.5 (NEW)-EC-NOGLER.doc

CE306 – 13

C405.2.5 (NEW)

Proponent: Eric Makela, Britt/Makela Group, Inc., representing Northwest Energy Codes Group
(eric@brittmakela.com)

Add new text as follows:

C405.2.5 Lighting in refrigerated display cases and walk-in coolers. Lighting in refrigerated display cases, and lights on glass doors installed on walk-in coolers and freezers shall be controlled by one of the following:

1. Automatic time switch controls to turn off lights during non-business hours.
2. Motion sensor controls on each case that reduce display case lighting power by not less than 50 percent within 30 minutes after the area near the case is vacated

Reason: The proposal reduces energy waste by reducing the power level of display lights in refrigerated display cases and glass doors in walk-in coolers during non-business hours and when the nearby area is not in use. Providing automatic controls ensures that lights not in use are automatically reduced in power by at least 50%. Reducing unnecessary lighting of refrigerated areas reduces energy used both for lighting and for the additional cooling load from added heat source. The language for the proposal is adapted from California Title 24-2013.

Cost Impact: The code change proposal will increase the cost of construction but will reduce the overall operating cost of the display case offsetting the first cost of the control.

CE306-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.2.5 (NEW)-EC-MAKELA.doc

CE307 – 13

C405.2.5 (New)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new text as follows:

C405.2.5 Lighting controls in parking garages. Parking garages shall comply with the provisions of Section C405.2.1 and C405.2.2. Lighting shall be provided with controls which are capable of automatically reducing the power supplied to each luminaire by not less than 30 percent after 30 minutes of inactivity in an area not greater than 36,000 square feet. Lighting for covered vehicle entrances to and exits from the garage shall be separately controlled and comply with of Section C405.2.4.

Luminaires within 20 feet of any perimeter wall that has a net opening to wall area ratio of at least 40 open and no exterior obstructions within 20 feet of the wall shall be provided with controls that will automatically adjust the lighting in response to available daylight.

Exceptions: Controls are not required for the following:

1. High-intensity discharge lamps not greater than 150 watts
2. induction lamps
3. Luminaires that illuminate daylight transitions zones without parking
4. Luminaires that illuminate ramps without parking.
5. Luminaires proximate to exterior walls.

Reason: For consistency with ASHRAE/IES 90.1-2010. Section 9.4.1.3 of that document contains provisions for lighting controls in parking garages and no such provisions exist in the IECC Commercial Provisions. As that standard is an alternative path to compliance with the IECC and there is a desire to maintain equivalency of the IECC with 90.1 this change is needed.

Cost Impact: The code change proposal will increase the cost of construction when lighting controls are required in parking garages.

CE307-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.2.5 (NEW)-EC-FERGUSON.doc

CE308 – 13

C405.3

Proponent: Glenn Heinmiller, Lam Partners, representing International Association of Lighting Designers (glenn@lampartners.com)

Delete without substitution as follows:

~~C405.3 Tandem wiring (Mandatory).~~ ~~The following luminaires located within the same area shall be tandem wired:~~

- ~~1. Fluorescent luminaires equipped with one, three or odd-numbered lamp configurations, that are recess-mounted within 10 feet (3048 mm) center-to-center of each other.~~
- ~~2. Fluorescent luminaires equipped with one, three or any odd-numbered lamp configuration that are pendant or surface-mounted within 1 foot (305 mm) edge-to-edge of each other.~~

Exceptions:

- ~~1. Where electronic high-frequency ballasts are used.~~
- ~~2. Luminaires on emergency circuits.~~
- ~~3. Luminaires with no available pair in the same area.~~

Reason: Simplify the code by removing an obsolete provision. This provision refers to obsolete magnetic ballast technology and no longer serves any purpose. Electronic ballasts are now used for all fluorescent luminaires, and since luminaires with electronic ballasts are exempt, then this provision would never apply and is pointless. It was removed from the 2010 version of Standard 90.1 for these reasons.

Cost Impact: The code change proposal will not increase the cost of construction.

CE308-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.3-EC-HEINMILLER.doc

CE309 – 13

C405.5.1

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C405.5.1 Total connected interior lighting power. The total connected interior lighting power (~~watts~~) shall be ~~the sum of the watts of all interior lighting equipment as determined in accordance with Sections C405.5.1.1 through C405.5.1.4~~ determined in accordance with Equation 4-6.

$$TCLP = [SL + LV + LTPB + Other]$$

(Equation 4-6)

where:

TCLP = total connected lighting power (watts)

SL = labeled wattage of luminaires for screw in lamps

LV = wattage of the transformer supplying low-voltage lighting

LTPB = wattage of line-voltage lighting tracks and plug-in busways as the specified wattage of the luminaires but at least 30 W/lin. ft. (100 W/lin m), or the wattage limit of the system's circuit breaker, or the wattage limit of other permanent current limiting devices on the system

Other = the wattage of all other luminaires and lighting sources not covered above and associated with interior lighting verified by data supplied by the manufacturer or other approved sources.

Exceptions:

1. The connected power associated with the following lighting equipment is not included in calculating total connected lighting power.
 - 1.1. Professional sports arena playing field lighting.
 - 1.2. *Sleeping unit* lighting in hotels, motels, boarding houses or similar buildings.
 - 1.3. Emergency lighting automatically off during normal building operation.
 - 1.4. Lighting in spaces specifically designed for use by occupants with special lighting needs including the visually impaired visual impairment and other medical and age-related issues.
 - 1.5. Lighting in interior spaces that have been specifically designated as a registered interior historic landmark.
 - 1.6. Casino gaming areas.
2. Lighting equipment used for the following shall be exempt provided that it is in addition to general lighting and is controlled by an independent control device:
 - 2.1. Task lighting for medical and dental purposes.
 - 2.2. Display lighting for exhibits in galleries, museums and monuments.
3. Lighting for theatrical purposes, including performance, stage, film production and video production.
4. Lighting for photographic processes.
5. Lighting integral to equipment or instrumentation and is installed by the manufacturer.
6. Task lighting for plant growth or maintenance.
7. Advertising signage or directional signage.
8. In restaurant buildings and areas, lighting for food warming or integral to food preparation equipment.
9. Lighting equipment that is for sale.
10. Lighting demonstration equipment in lighting education facilities.
11. Lighting *approved* because of safety or emergency considerations, inclusive of exit lights.
12. Lighting integral to both open and glass-enclosed refrigerator and freezer cases.

13. Lighting in retail display windows, provided the display area is enclosed by ceiling-height partitions.
14. Furniture mounted supplemental task lighting that is controlled by automatic shutoff.

Reason: The provisions in Section C405.5.1 deal with the determination of a value for the actual connected interior lighting power in a building that is more appropriately addressed as an equation. This proposal simplifies the provisions associated with connected interior lighting power to present as an equation what is now text that guides how the connected lighting power is calculated. The objective of this proposal is to simplify the code to foster implementation and compliance verification.

Cost Impact: The code change proposal does not increase the cost of construction.

CE309-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.5.1 #1-EC-WILLIAMS.doc

CE310 – 13

C405.5.1, C405.5.3 (NEW), Table C405.5.2(1), Table C405.5.2(2)

Proponent: Glenn Heinmiller, Lam Partners, representing International Association of Lighting Designers (glenn@lampartners.com)

Revise as follows:

C405.5.1 Total connected interior lighting power. The total connected interior lighting power (watts) shall be the sum of the watts of all interior lighting equipment as determined in accordance with Sections C405.5.1.1 through C405.5.1.4.

Exceptions:

1. The connected power associated with the following lighting equipment is not included in calculating total connected lighting power.
 - 1.1. Professional sports arena playing field lighting.
 - 1.2. Sleeping unit lighting in hotels, motels, boarding houses or similar buildings, provided that the lighting complies with Section R404.1.
 - 1.3. Emergency lighting automatically off during normal building operation.
 - 1.4. Lighting in spaces specifically designed for use by occupants with special lighting needs including the visually impaired visual impairment and other medical and age-related issues.
 - 1.5. Lighting in interior spaces that have been specifically designated as a registered interior historic landmark.
 - 1.6. Casino gaming areas.
 - 1.7. Mirror lighting in dressing rooms.

(Portions of text not shown remains unchanged)

C405.5.3 Additional interior lighting power. Where using the Space-by-Space Method, an increase in the interior lighting power allowance is permitted for specific lighting functions. Additional power shall be permitted only where the specified lighting is installed and automatically controlled, separately from the general lighting, to be turned off during nonbusiness hours. This additional power shall be used only for the specified luminaires and shall not be used for any other purpose. An increase in the interior lighting power allowance is permitted in the following cases:

1. For spaces in which lighting is specified to be installed in addition to the general lighting for the purpose of decorative appearance or for highlighting art or exhibits, provided that the additional lighting power shall not exceed 1.0 W/ft² of such spaces.

TABLE C405.5.2(1)
INTERIOR LIGHTING POWER ALLOWANCES: BUILDING AREA METHOD

BUILDING AREA TYPE	LPD (w/ft2)
Automotive facility	0.9 <u>0.80</u>
Convention center	4.2 <u>1.01</u>
Courthouse	4.2 <u>1.01</u>
Dining: bar lounge/leisure	4.3 <u>1.01</u>
Dining: cafeteria/fast food	4.4 <u>0.9</u>

BUILDING AREA TYPE	LPD (w/ft2)
Dining: family	4.6 <u>0.95</u>
Dormitory	4.0 <u>0.57</u>
Exercise center	4.0 <u>0.84</u>
Fire station	0.8 <u>0.67</u>
Gymnasium	4.1 <u>0.94</u>
Health care clinic	4.0 <u>0.90</u>
Hospital	4.2 <u>1.05</u>
Hotel/ Motel	4.0 <u>0.87</u>
Library	4.3 <u>1.19</u>
Manufacturing facility	4.3 <u>1.17</u>
Motel	4.0
Motion picture theater	4.2 <u>0.76</u>
Multifamily	0.7 <u>0.51</u>
Museum	4.1 <u>1.02</u>
Office	0.9 <u>0.82</u>
Parking garage	0.3 <u>0.21</u>
Penitentiary	4.0 <u>0.81</u>
Performing arts theater	4.6 <u>1.39</u>
Police station	4.0 <u>0.87</u>
Post office	4.1 <u>0.87</u>
Religious building	4.3 <u>1.0</u>
Retail	4.4 <u>1.26</u>
School/University	4.2 <u>0.87</u>
Sports arena	4.1 <u>0.91</u>
Town hall	4.1 <u>0.89</u>
Transportation	4.0 <u>0.70</u>
Warehouse	0.6 <u>0.66</u>

BUILDING AREA TYPE	LPD (w/ft2)
Workshop	4.4 <u>1.19</u>

TABLE C405.5.2(2)
INTERIOR LIGHTING POWER ALLOWANCES:
SPACE-BY-SPACE METHOD

COMMON SPACE-BY-SPACE TYPES	LPD (w/ft2)
Atrium - First that is < 40 feet in height	0.03 per ft. in total height ht.
Atrium - Above that is > 40 feet in height	<u>0.40</u> + 0.02 per ft. in total height ht.
Audience/seating area - permanent For auditorium For performing arts theater For motion picture theater	0.9 <u>0.63</u> 2.6 <u>2.43</u> 4.2 <u>1.14</u>
Classroom/lecture/training	4.30 <u>1.24</u>
Conference/meeting/multipurpose	4.2 <u>1.23</u>
<u>Copy/Print room</u>	<u>0.72</u>
Corridor/transition	0.7 <u>0.66</u>
<u>Computer Room</u>	<u>1.71</u>
Dining area Bar/lounge/leisure dining Family dining area <u>Cafeteria/Fast Food Dining</u>	4.40 <u>1.07</u> 4.40 <u>0.89</u> <u>0.65</u>
Dressing/fitting room in performing arts theater	4.1 <u>0.61</u>
Electrical/mechanical	4.10 <u>0.42</u>
<u>Emergency Vehicle Garage</u>	<u>0.56</u>
Food preparation	4.20 <u>1.21</u>
Laboratory for classrooms	4.3 <u>1.43</u>
Laboratory for medical/industrial/research	4.8 <u>1.81</u>
<u>Laundry/Washing area</u>	<u>0.60</u>
<u>Loading Dock (interior)</u>	0.47
Lobby	4.10 <u>0.90</u>
Lobby for performing arts theater	3.3 <u>2.00</u>
Lobby for motion picture theater	4.0 <u>0.59</u>
<u>Lobby - elevator</u>	<u>0.64</u>
<u>Lobby for Hotel</u>	<u>1.06</u>
Locker room	0.80 <u>0.75</u>
Lounge/ recreation <u>Breakroom</u>	0.8 <u>0.73</u>
Office- enclosed	4.1 <u>1.11</u>

Office- open plan	1.0 <u>0.98</u>
<u>Pharmacy Area</u>	<u>1.68</u>
Restroom	1.0 <u>0.98</u>
Sales area	1.6 ^a <u>1.44</u>
Stairway	0.70 <u>0.69</u>
Storage	0.8 <u>0.63</u>
<u>Vehicular Maintenance Area</u>	<u>0.67</u>
Workshop	1.60 <u>1.59</u>
BUILDING SPECIFIC SPACE-BY-SPACE TYPES	
Courthouse/police station/penitentiary	
Courtroom	1.90 <u>1.72</u>
Confinement cells	1.1 <u>0.81</u>
Judge chambers	1.3
Penitentiary audience seating	0.5 <u>0.28</u>
Penitentiary classroom	1.3 <u>1.34</u>
Penitentiary dining	1.1 <u>0.96</u>
Automotive service/repair	0.70
Bank/office- banking activity area	1.5 <u>1.01</u>
Dormitory living quarters <u>bedrooms</u>	1.10 <u>0.38</u>
Gymnasium/fitness center	
Fitness <u>Exercise</u> area	0.9 <u>0.72</u>
Gymnasium audience/seating	0.40 <u>0.65</u>
Playing area	1.40 <u>1.2</u>
Healthcare clinic/hospital	
Corridors/transition	1.00 <u>0.99</u>
Exam/treatment	1.7 <u>1.66</u>
Emergency	2.70
Public and staff lounge	0.80
Medical supplies	1.40 <u>0.74</u>
Nursery	0.9 <u>0.88</u>
Nurse station	1.00 <u>0.71</u>
Physical therapy	0.90 <u>0.91</u>
Patient room	0.70 <u>0.62</u>
Pharmacy	1.20
Radiology/imaging	1.3 <u>1.51</u>
Operating room	2.20 <u>2.48</u>
Recovery	1.2 <u>1.15</u>
Lounge/Breakroom	0.8 <u>0.92</u>
Laundry - washing	0.60
Hotel	
Dining area	<u>1.30</u>
Guest rooms	1.10
Hotel lobby	2.10
Highway lodging dining	1.20
Highway lodging guest rooms	1.10

Library	
Stacks	1.70 <u>1.71</u>
Card file and cataloging	1.40
Reading area	1.20 <u>1.06</u>
Manufacturing	
Corridors/transition	0.40 <u>0.41</u>
Detailed manufacturing	1.3 <u>1.29</u>
Equipment room	1.0 <u>0.74</u>
Extra high bay (>50-foot floor-ceiling height)	
High bay (25-- 50-foot floor-ceiling height)	1.1 <u>1.05</u>
Low bay(< 25-foot floor-ceiling height)	
	1.20 <u>1.23</u>
	1.2 <u>1.19</u>
Museum	
General exhibition	1.00 <u>1.05</u>
Restoration	1.70 <u>1.02</u>
Parking garage - garage areas	0.2 <u>0.19</u>
Convention center	
Exhibit space	1.50 <u>1.45</u>
Audience/seating area	0.90 <u>0.82</u>
Fire stations	
Engine room	0.80
Fire Station Sleeping Quarters	0.30 <u>0.22</u>
Post office Sorting area	0.9 <u>0.94</u>
Religious building	
Fellowship hall	0.60 <u>0.64</u>
Audience seating	2.40 <u>1.53</u>
Worship pulpit/choir	2.40 <u>1.53</u>
Retail	
Dressing/fitting area	0.9 <u>0.71</u>
Mall concourse	1.6 <u>1.10</u>
Sales area	1.6 <u>1.59</u>
Sports arena	
Audience seating	0.4 <u>0.43</u>
Court sports Playing area - Class 4	0.7 <u>1.20</u>
Court sports Playing area - Class 3	1.2 <u>1.80</u>
Court sports Playing area - Class 2	1.9 <u>2.40</u>
Court sports Playing area - Class 1	3.0 <u>3.68</u>
Ring sports area	2.7
Transportation	
Air/train/bus baggage area	1.00 <u>0.53</u>
Airport concourse	0.60 <u>0.36</u>
Terminal - ticket counter	1.50 <u>0.80</u>
Warehouse	
Fine material storage small hand-carried items	1.40 <u>0.95</u>
Medium/bulky material, <u>palletized items</u>	0.60 <u>0.58</u>

(Portions of Table not shown remain unchanged)

Reason: The purpose of this change is to adjust the lighting power density allowances to the best available values. "Best" means values and methodology for determining allowances that will lead to high energy-efficiency while still allowing high-quality lighting and sufficient light levels. We believe that the best source for these values are the models maintained by Pacific Northwest National Lab (PNNL) for the DOE in support of ASHRAE/IES Standard 90.1 development. Recently the models were updated to account for some changes in recommended light levels in the new Lighting Handbook, 10th Edition from the Illuminating Engineering Society (IES). Additionally several new space types were added and some space types renamed or removed for clarity. Also, the Building Area Method values were based on a larger data set with 56% additional representative buildings.

Additional explanation of proposed changes by section:

Exception 1.2 to C405.5.1, (Sleeping Unit exception to lighting power limits)

Sleeping Units should be subject to the same requirements as Dwelling Units and residential buildings covered by Chapter 4 [RE].

Add exception for Mirror Lighting in Dressing Rooms.

Because this exception is in Standard 90.1, we assume that the LPD for Dressing/Fitting Room space types was developed with mirror lighting excluded. Without this exception the LPD limit for Dressing Rooms would be too low.

Add "Additional Interior Lighting Power" section.

This provision is an integral part of the space-by-space method. IECC-2012 already includes the additional power for retail as a footnote to the LPD table. The proposal adds the special allowance for decorative lighting and lighting for art and exhibits. IECC-2012 is missing this allowance, which is why some of the LPD values in IECC-2012 for some space types are higher than 90.1-2010. This allowance is a "use it or lose it" addition that can only be used for certain types of lighting. This provision gives the designer more flexibility but should not result in significant increase or decrease in stringency. The proposed new space-by-space LPD values were developed with the understanding that this additional allowance is available to the designer. The LPDs would not be valid for many space types without this additional allowance.

Revise Building Area Method LPDs (Table C405.5.2(1))

As mentioned above, these proposed values are from current PNNL models. These values were published in the public review draft of Addendum "co" to ASHRAE/IES Standard 90.1.

Revise Space-by-space Method LPDs (Table C405.5.2(2))

As mentioned above, these proposed values and space types are from current PNNL models. These values were published in the public review draft of Addendum "bh" to ASHRAE/IES Standard 90.1. The formatting and the ordering of space types that is in the IECC-2012 table were changed as little as possible. In order to accommodate the new space types, and the renaming or removal of a few space types, some rearrangement was necessary.

Cost Impact: The code change proposal will not increase the cost of construction.

CE310-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.5.1 #1-EC-HEINMILLER.doc

CE311 – 13

Table C405.5.2(1), Table C405.5.2(2)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

**TABLE C405.5.2(1)
INTERIOR LIGHTING POWER ALLOWANCES:
BUILDING AREA METHOD**

BUILDING AREA TYPE^a	LPD (w/ft²)
Automotive facility	0.9 <u>0.82</u>
Convention center	1.2 <u>1.08</u>
Courthouse	1.2 <u>1.05</u>
Dining: bar lounge/leisure	1.3 <u>0.99</u>
Dining: cafeteria/fast food	1.4 <u>0.90</u>
Dining: family	1.6 <u>0.89</u>
Dormitory	1.0 <u>0.61</u>
Exercise center	1.0 <u>0.88</u>
Fire station	0.8 <u>0.71</u>
Gymnasium	1.4 <u>1.00</u>
Health care clinic	1.0 <u>0.87</u>
Hospital	1.2 <u>1.21</u>
Hotel	1.0 <u>1.00</u>
Library	1.3 <u>1.18</u>
Manufacturing facility	1.3 <u>1.11</u>
Motel	1.0 <u>0.88</u>
Motion picture theater	1.2 <u>0.83</u>
Multifamily	0.7 <u>0.60</u>
Museum	1.4 <u>1.06</u>
Office	0.9
Parking garage	0.3 <u>0.25</u>
Penetentiary Penitentiary	1.0 <u>0.97</u>
Performing arts theater	1.6 <u>1.39</u>
Police station	1.0 <u>0.96</u>
Post office	1.4 <u>0.87</u>
Religious building	1.3 <u>1.05</u>
Retail	1.4 <u>1.40</u>
School/university	1.2 <u>0.99</u>

BUILDING AREA TYPE ^a	LPD (w/ft ²)
Sports arena	1.40.78
Town hall	1.40.92
Transportation	1.00.77
Warehouse	0.60.66
Workshop	1.41.20

a In cases where both a general building area type and a specific building area type are listed, the specific building area type shall apply.

TABLE C405.5.2(2)
INTERIOR LIGHTING POWER ALLOWANCES:
SPACE-BY-SPACE METHOD

COMMON SPACE-BY-SPACE TYPES	LPD (w/ft ²)
Atrium — First 40 feet in height	0.03 per ft. ht.
Atrium — Above 40 feet in height	0.02 per ft. ht.
Audience/seating area — permanent	
— For auditorium	0.9
— For performing arts theater	2.6
— For motion picture theater	1.2
— Classroom/lecture/training	1.30
— Conference/meeting/multipurpose	1.2
— Corridor/transition	0.7
Dining area	
— Bar/lounge/leisure dining	1.40
— Family dining area	1.40
Dressing/fitting room performing arts theater	1.1
Electrical/mechanical	1.10
Food preparation	1.20
Laboratory for classrooms	1.3
Laboratory for medical/industrial/research	1.8
Lobby	1.10
Lobby for performing arts theater	3.3
Lobby for motion picture theater	1.0
Locker room	0.80
Lounge recreation	0.8
Office — enclosed	1.1
Office — open plan	1.0
Restroom	1.0
Sales area	1.6 ^a

COMMON SPACE-BY-SPACE TYPES	LPD (w/ft²)
Stairway	0.70
Storage	0.8
Workshop	1.60
Courthouse/police station/penitentiary	
— Courtroom	1.90
— Confinement cells	1.1
— Judge chambers	1.30
— Penitentiary audience seating	0.5
— Penitentiary classroom	1.3
— Penitentiary dining	1.1
BUILDING SPECIFIC SPACE-BY-SPACE TYPES	
Automotive — service/repair	0.70
Bank/office — banking activity area	1.5
Dormitory living quarters	1.10
Gymnasium/fitness center	
— Fitness area	0.9
— Gymnasium audience/seating	0.40
— Playing area	1.40
Healthcare clinic/hospital	
— Corridors/transition	1.00
— Exam/treatment	1.70
— Emergency	2.70
— Public and staff lounge	0.80
— Medical supplies	1.40
— Nursery	0.9
— Nurse station	1.00
— Physical therapy	0.90
— Patient room	0.70
— Pharmacy	1.20
— Radiology/imaging	1.3
— Operating room	2.20
— Recovery	1.2
— Lounge/recreation	0.8
— Laundry — washing	0.60
Hotel	
— Dining area	1.30
— Guest rooms	1.10
— Hotel lobby	2.10
— Highway lodging dining	1.20
— Highway lodging guest rooms	1.10
Library	
— Stacks	1.70
— Card file and cataloguing	1.10
— Reading area	1.20

COMMON SPACE-BY-SPACE TYPES	LPD (w/ft ²)
Manufacturing	
—Corridors/transition	0.40
—Detailed manufacturing	1.3
—Equipment room	1.0
—Extra high bay (> 50-foot floor-ceiling height)	1.1
—High bay (25—50-foot floor-ceiling height)	1.20
—Low bay (< 25-foot floor-ceiling height)	1.2
Museum	
—General exhibition	1.00
—Restoration	1.70
Parking garage—garage areas	0.2
Convention center	
—Exhibit space	1.50
—Audience/seating area	0.90
Fire stations	
—Engine room	0.80
—Sleeping quarters	0.30
Post office	
—Sorting area	0.9
Religious building	
—Fellowship hall	0.60
—Audience seating	2.40
—Worship pulpit/choir	2.40
Retail	
—Dressing/fitting area	0.9
—Mall concourse	1.6
—Sales area	1.6 ^a
Sports arena	
—Audience seating	0.4
—Court sports area—Class 4	0.7
—Court sports area—Class 3	1.2
—Court sports area—Class 2	1.9
—Court sports area—Class 1	3.0
—Ring sports area	2.7
Transportation	
—Air/train/bus baggage area	1.00
—Airport concourse	0.60
—Terminal—ticket counter	1.50
Warehouse	
—Fine material storage	1.40
—Medium/bulky material	0.60

For SI: 1 foot = 304.8 mm, 1 watt per square foot = 11 W/m².

- a. Where lighting equipment is specified to be installed to highlight specific merchandise in addition to lighting equipment specified for general lighting and is switched or dimmed on circuits different from the circuits for general lighting, the smaller of the actual wattage of the lighting equipment installed specifically for merchandise, or additional lighting power as determined below shall be added to the interior lighting power determined in accordance with this line item:

Calculate the additional lighting power as follows:

$$\text{Additional Interior Lighting Power Allowance} = 500 \text{ watts} + (\text{Retail Area 1} \times 0.6 \text{ W/ft}^2) + (\text{Retail Area 2} \times 0.6 \text{ W/ft}^2) + (\text{Retail Area 3} \times 1.4 \text{ W/ft}^2) + (\text{Retail Area 4} \times 2.5 \text{ W/ft}^2).$$

where:

Retail Area 1 ——— = The floor area for all products not listed in Retail Area 2, 3 or 4.

Retail Area 2 —=The floor area used for the sale of vehicles, sporting goods and small electronics.
 Retail Area 3 —=The floor area used for the sale of furniture, clothing, cosmetics and artwork.
 Retail Area 4 —=The floor area used for the sale of jewelry, crystal and china.

Exception: Other merchandise categories are permitted to be included in Retail Areas 2 through 4 above, provided that justification documenting the need for additional lighting power based on visual inspection, contrast, or other critical display is approved by the authority having jurisdiction.

Table C405.5.2(2) Lighting Power Density Allowances Using the Space-by-Space Method		
Common Space Types¹	LPD watts/sq.ft	RCR Threshold
Audience Seating Area		
... in an auditorium	0.63	6
... in a convention center	0.82	4
... in a gymnasium	0.65	6
... in a motion picture theater	1.14	4
... in a penitentiary	0.28	4
... in a performing arts theater	2.43	8
... in a religious building	1.53	4
... in a sports arena	0.43	4
... otherwise	0.43	4
Atrium		
... that is ≤ 40' in height	0.03 per foot in total height	NA
... that is > 40' in height	0.40 + 0.02 per foot in total height	NA
Banking Activity Area	1.01	6
Breakroom (See Lounge/Breakroom)		
Classroom/Lecture Hall/Training Room		
... in a penitentiary	1.34	4
... otherwise	1.24	4
Conference/Meeting/Multipurpose Room	1.23	6
Confinement Cells	0.81	6
Copy/Print Room	0.72	6
Corridor²		
... in an Assisted Living Facility (and used primarily by residents) ³	0.92	Width < 8'
... in a hospital	0.79	Width < 8'
... in a manufacturing facility	0.41	Width < 8'
... otherwise	0.66	Width < 8'
Courtroom	1.72	6
Computer Room	1.71	4
Dining Area		
... in a penitentiary	0.96	6
... in an Assisted Living Facility (and used primarily by residents) ³	1.90	4
... in Bar/Lounge or Leisure Dining	1.07	4
... in Cafeteria or Fast Food Dining	0.65	4
... in Family Dining	0.89	4
... otherwise	0.65	4
Electrical/Mechanical Room	0.42	6
Emergency Vehicle Garage	0.56	4
Food Preparation Area	1.21	6
Guest Room	0.47	6

Laboratory		
... in or as a classroom	1.43	6
... otherwise	1.81	6
Laundry/Washing Area	0.60	4
Loading Dock, Interior	0.47	6
Lobby		
... in an Assisted Living Facility (and used primarily by residents) ³	1.80	4
... for an elevator	0.64	6
... in a hotel	1.06	4
... in a motion picture theater	0.59	4
... in a performing arts theater	2.00	6
... otherwise	0.90	4
Locker Room	0.75	6
Lounge/Breakroom		
... in a healthcare facility	0.92	6
... otherwise	0.73	4
Office		
... enclosed	1.11	8
... open plan	0.98	4
Parking Area, Interior	0.19	4
Pharmacy Area	1.68	6
Restroom		
... in an Assisted Living Facility (and used primarily by residents) ³	1.21	8
... otherwise	0.98	8
Sales Area⁴	1.59	6
Seating Area, General	0.54	4
Stairwell	0.69	10
Storage Room	0.63	6
Vehicular Maintenance Area	0.67	4
Workshop	1.59	6

1 - In cases where both a common space type and a building area specific space type are listed, the building area specific space type shall apply

2 - In corridors, the extra LPD allowance is permitted when the width of the corridor is less than 8' and is not based on the RCR

3 - An 'Assisted Living Facility' is a residential facility, for people with special needs or disabilities, that provides help with everyday tasks such as bathing, dressing, and taking medication.

4 - For accent lighting, see Section 9.6.2(b)

Building Type Specific Space Types	LPD watts/sq.ft	RCR Threshold
Assisted Living Facility³		
... in a chapel (used primarily by residents)	2.21	4
... in a recreation room (used primarily by residents)	2.41	6
Automotive (See Vehicular Maintenance Area above)		
Convention Center - Exhibit Space	1.45	4
Dormitory - Living Quarters	0.38	8
Fire Station - Sleeping Quarters	0.25 0.22	6
Gymnasium/Fitness Center		
... in an Exercise Area	0.72	4
... in a Playing Area	1.20	4
Healthcare Facility		
... in an Exam/Treatment Room	1.66	8
... in an Imaging Room	1.51	6
... in a Medical Supply Room	0.74	6

... in a Nursery	0.88	6
... in a Nurse's Station	0.71	6
... in an Operating Room	2.48	6
... in a Patient Room	0.62	6
... in a Physical Therapy Room	0.91	6
... in a Recovery Room	1.15	6
Library		
... in a Reading Area	1.06	4
... in the Stacks	1.71	4
Manufacturing Facility		
... in a detailed manufacturing area	1.29	4
... in an Equipment Room	0.74	6
... in an Extra High Bay Area (> 50' floor-to-ceiling height)	1.05	4
... in a High Bay Area (25-50' floor-to-ceiling height)	1.23	4
... in a Low Bay Area (< 25' floor-to-ceiling height)	1.19	4
Museum		
... in a General Exhibition Area	1.05	6
... in a Restoration Room	1.02	6
Performing Arts Theater - Dressing Room	0.61	6
Post Office - Sorting Area	0.94	4
Religious Buildings		
... in a Fellowship Hall	0.64	4
... in a Worship/Pulpit/Choir Area	1.53	4
Retail Facilities		
... in a Dressing/Fitting Room	0.71	8
... in a Mall Concourse	1.10	4
Sports Arena - Playing Area		
... for a Class I facility	3.68	4
... for a Class II facility	2.40	4
... for a Class III facility	1.80	4
... for a Class IV facility	1.20	4
Transportation Facility		
... in a baggage/carousel Area	0.53	4
... in an Airport Concourse	0.36	4
... at a Terminal Ticket Counter	0.80	4
Warehouse - Storage Area		
...for medium to bulky, palletized items	0.58	4
... for smaller, hand-carried items ⁵	0.95	6
5 - sometimes referred to as a 'Picking Area'.		

Reason: This proposal modifies the Space-by-space lighting power density (LPD) table:

1. LPDs have been adjusted to account for changes to recommended light levels as published in the new, 10th Edition of the IES Lighting Handbook. Some values have gone up while others have gone down. As an average, the changed LPDs dropped 6%.
2. Three new space types have been added in response to user requests: (i) Copy/Print Rooms, (ii) Loading Docks, Interior and (iii) Computer rooms.
3. Also in response to user requests, new space types for Assisted Living Facilities were added including corridor, dining area, lobby, restroom, chapel and recreation room. In all cases these modified LPDs are restricted to those spaces that are used primarily by the residents.
4. Some space types were renamed for consistency.
5. Some table footnotes were added to provide more specific direction.

Cost Impact: The code change proposal will increase the cost of construction.

CE311-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.5.2-EC-FERGUSON.doc

CE312 – 13

C405.5.1

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C405.5.1 Total connected interior lighting power. The total connected interior lighting power (watts) shall be the sum of the watts of all interior lighting equipment as determined in accordance with Sections C405.5.1.1 through C405.5.1.4

Exceptions:

1. The connected power associated with the following lighting equipment is not included in calculating total connected lighting power.
 - 1.1. Professional sports arena playing field lighting.
 - 1.2. Lighting in ~~sleeping units~~ ~~lighting in hotels, motels, boarding houses or similar buildings.~~
 - 1.3. Emergency lighting automatically off during normal building operation.
 - 1.4. Lighting in spaces specifically designed for use by occupants with special lighting needs including the visually impaired visual impairment and other medical and age-related issues.
 - 1.5. Lighting in interior spaces that have been specifically designated as a registered interior historic landmark.
 - 1.6. Casino gaming areas.
2. Lighting equipment used for the following shall be exempt provided that it is in addition to general lighting and is controlled by an independent control device:
 - 2.1. Task lighting for medical and dental purposes.
 - 2.2. Display lighting for exhibits in galleries, museums and monuments.
3. Lighting for theatrical purposes, including performance, stage, film production and video production.
4. Lighting for photographic processes.
5. Lighting integral to equipment or instrumentation and is installed by the manufacturer.
6. Task lighting for plant growth or maintenance.
7. Advertising signage or directional signage.
8. In restaurant buildings and areas, lighting for food warming or integral to food preparation equipment.
9. Lighting equipment that is for sale.
10. Lighting demonstration equipment in lighting education facilities.
11. Lighting *approved* because of safety or emergency considerations, inclusive of exit lights.
12. Lighting integral to both open and glass-enclosed refrigerator and freezer cases.
13. Lighting in retail display windows, provided the display area is enclosed by ceiling-height partitions.
14. Furniture mounted supplemental task lighting that is controlled by automatic shutoff.

Reason: This proposal simplifies the exception to the interior lighting power in sleeping units. The definition of sleeping unit is such that there is no further need to delineate the building type in which the sleeping unit is located. In fact, the delineation suggests there are others that are not "similar" to hotels, motels, and boarding houses where the exception would not apply (e.g., dormitories).

Cost Impact: The code change proposal does not increase the cost of construction.

CE312-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.5.1 #2-EC-WILLIAMS.doc

CE313 – 13

C405.5.1

Proponent: Vickie Lovell, InterCode Inc., representing the National Greenhouse Manufacturers Association (Vickie@intercodeinc.com)

Revise as follows:

C405.5.1 Total connected interior lighting power. The total connected interior lighting power (watts) shall be the sum of the watts of all interior lighting equipment as determined in accordance with Sections C405.5.1.1 through C405.5.1.4.

Exceptions:

1. The connected power associated with the following lighting equipment is not included in calculating total connected lighting power.
 - 1.1. Professional sports arena playing field lighting.
 - 1.2. *Sleeping unit* lighting in hotels, motels, boarding houses or similar buildings.
 - 1.3. Emergency lighting automatically off during normal building operation.
 - 1.4. Lighting in spaces specifically designed for use by occupants with special lighting needs including the visually impaired visual impairment and other medical and age-related issues.
 - 1.5. Lighting in interior spaces that have been specifically designated as a registered interior historic landmark.
 - 1.6. Casino gaming areas.
2. Lighting equipment used for the following shall be exempt provided that it is in addition to general lighting and is controlled by an independent control device:
 - 2.1. Task lighting for medical and dental purposes.
 - 2.2. Display lighting for exhibits in galleries, museums and monuments.
3. Lighting for theatrical purposes, including performance, stage, film production and video production.
4. Lighting for photographic processes.
5. Lighting integral to equipment or instrumentation and is installed by the manufacturer.
6. ~~Task~~ Lighting for plant growth or maintenance.
7. Advertising signage or directional signage.
8. In restaurant buildings and areas, lighting for food warming or integral to food preparation equipment.
9. Lighting equipment that is for sale.
10. Lighting demonstration equipment in lighting education facilities.
11. Lighting *approved* because of safety or emergency considerations, inclusive of exit lights.
12. Lighting integral to both open and glass-enclosed refrigerator and freezer cases.
13. Lighting in retail display windows, provided the display area is enclosed by ceiling-height partitions.
14. Furniture mounted supplemental task lighting that is controlled by automatic shutoff.

Reason: "Task" in Webster's Dictionary is defined as a "usually assigned piece of work often to be finished within a certain time", or "something hard or unpleasant that has to be done", neither of which can be applied to plant growth or maintenance. Webster's dictionary doesn't contain the phrase "task lighting" and there is no definition in the code. The application of this section of the code as written to any specific lighting in a greenhouse is completely subjective, and inconsistent.

"Lighting for plant growth or maintenance" is adequate to describe the type of lighting that is exempt from the lighting requirements of this code.

Cost Impact: The code change proposal will not increase the cost of construction.

CE313-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.5.1-EC-LOVELL.doc

CE314 – 13

C405.5.1

Proponent: Glenn Heinmiller, Lam Partners, representing International Association of Lighting Designers (glenn@lampartners.com)

Revise as follows:

C405.5.1 Total connected interior lighting power. The total connected interior lighting power (watts) shall be the sum of the watts of all interior lighting equipment as determined in accordance with Sections C405.5.1.1 through C405.5.1.4.

Exceptions:

- 11. Lighting *approved* because of safety or emergency considerations, ~~inclusive of exit lights.~~
- 15. Exit signs.

(Portions of text not shown remains unchanged)

Reason: This change provides clarification to the code.

"Exit lights" is not an industry standard term and it is not clear what it means. It was likely meant to indicate exit signs, which should be a separate exception. Exit signs are a separate exception in Standard 90.1.

Cost Impact: The code change proposal will not increase the cost of construction.

CE314-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.5.1 #2-EC-HEINMILLER.doc

CE315 – 13

C405.5.1.4

Proponent: Tim Nogler, Washington State Building Code Council (tim.nogler@des.wa.gov)

Revise as follows:

C405.5.1.4 Line-voltage lighting track and plug-in busway. The wattage for line-voltage lighting tracks and plug-in busways shall be:

1. The specified wattage of the luminaires included in the system with a minimum of ~~30~~ 50 W/lin ft. (~~98~~ 162 W/lin. m);
2. The wattage limit of the system's circuit breaker; or
3. The wattage limit of other permanent current limiting devices on the system.

Reason: A recent study has shown that track lighting is typically loaded with 50 Watts per lineal foot, much more than the 30 W/LF in the current code.

Cost Impact: The code change proposal will increase the cost of construction.

CE315-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.5.1.4-EC-NOGLER.doc

CE316 – 13

C405.5.2.1 (NEW), C405.5.2.2 (NEW), Table C405.5.2(2)

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C405.5.2 Interior lighting power. The total interior lighting power allowance (watts) is determined according to Table C405.5.2(1) using the Building Area Method, or Table C405.5.2(2) using the Space-by-Space Method, for all areas of the building covered in this permit.

C405.5.2.1 Building area method. For the Building Area Method, the interior lighting power allowance is the floor area for each building area type listed in Table C405.5.2(1) times the value from Table C405.5.2(1) for that area. For the purposes of this method, an “area” shall be defined as all contiguous spaces that accommodate or are associated with a single building area type as listed in Table C405.5.2(1). Where this method is used to calculate the total interior lighting power for an entire building, each building area type shall be treated as a separate area.

C405.5.2.2 Space by space method. For the Space-by-Space Method, the interior lighting power allowance is determined by multiplying the floor area of each space times the value for the space type in Table C405.5.2(2) that most closely represents the proposed use of the space, and then summing the lighting power allowances for all spaces. Tradeoffs among spaces are permitted.

Exception: Additional lighting installed to highlight specific merchandise is permitted in accordance with the following:

1. The highlight lighting is switched or dimmed on circuits different from the circuits for general lighting.
2. The allowed lighting power shall be the smaller of the following:
 - 2.1. The actual wattage of the lighting equipment installed specifically for the merchandise;
or
 - 2.2. The additional lighting determined in accordance with Equation 4-7.

$$\text{ARSA} = 500 \text{ watts} + (\text{Retail Area 1} \times 0.6 \text{ W/ft}^2) + (\text{Retail Area 2} \times 0.6 \text{ W/ft}^2) + (\text{Retail Area 3} \times 1.4 \text{ W/ft}^2) + (\text{Retail Area 4} \times 2.5 \text{ W/ft}^2). \quad \text{(Equation 4-7)}$$

where:

ARSA = Additional interior retail sale lighting power allowance

Retail Area 1 = The floor area for all products not listed in Retail Area 2, 3 or 4.

Retail Area 2 = The floor area used for the sale of vehicles, sporting goods and small electronics.

Retail Area 3 = The floor area used for the sale of furniture, clothing, cosmetics and artwork.

Retail Area 4 = The floor area used for the sale of jewelry, crystal and china

Other merchandise categories are permitted to be included in Retail Areas 2 through 4 above, provided that justification documenting the need for additional lighting power based on visual inspection, contrast, or other critical display is *approved* by the code official.

3. The additional power determined in Item 2, shall be added to the interior lighting power determined for sales areas in Table C 405.5.2(2)

TABLE C405.5.2(2) INTERIOR LIGHTING POWER ALLOWANCES: SPACE-BY-SPACE METHOD

(Portions of Table not shown remain unchanged)

- a. Where lighting equipment is specified to be installed to highlight specific merchandise in addition to lighting equipment specified for general lighting and is switched or dimmed on circuits different from the circuits for general lighting, the smaller of the actual wattage of the lighting equipment installed specifically for merchandise, or additional lighting power as determined below shall be added to the interior lighting power determined in accordance with this line item.

Calculate the additional lighting power as follows:

Additional Interior Lighting Power Allowance = 500 watts + (Retail Area 1 × 0.6 W/ft²) + (Retail Area 2 × 0.6 W/ft²) + (Retail Area 3 × 1.4 W/ft²) + (Retail Area 4 × 2.5 W/ft²).

where:

Retail Area 1 = The floor area for all products not listed in Retail Area 2, 3 or 4.

Retail Area 2 = The floor area used for the sale of vehicles, sporting goods and small electronics.

Retail Area 3 = The floor area used for the sale of furniture, clothing, cosmetics and artwork.

Retail Area 4 = The floor area used for the sale of jewelry, crystal and china

Exception: Other merchandise categories are permitted to be included in Retail Areas 2 through 4 above, provided that justification documenting the need for additional lighting power based on visual inspection, contrast, or other critical display is approved by the authority having jurisdiction.

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

: The existing footnote a is an exception to the table. It is unusual in its format and distinctly different in its format from the typical format of International Codes. The footnote is a very important allowance for retail sales establishments. The footnote is also unusual in that it contains an equation as well as an exception to the equation.

The proposal does 3 things:

1. It moves the retail lighting exception from being a footnote at the end of a long table to a more prominent position in the text of the code directing the code users to the tables.
2. It reformats the provision into a series of items which more clearly specify the requirements and limits of the exception. It allows the equation to be numbered as all equations in the IECC are numbered.
3. It replaces the 'exception within the exception' to being a portion of the criteria – and properly identifies the code official as the person who will approve the additional display lighting.

Cost Impact: The code change proposal will not increase the cost of construction. The proposal is editorial in nature and will not affect the cost of construction.

CE316-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.5.2.1 (NEW)-EC-THOMPSON-SEHPCAC

CE317 – 13

C405.5.3 (New), Table C405.5.2(2)

Proponent: Glenn Heinmiller, Lam Partners, representing International Association of Lighting Designers (glenn@lampartners.com)

Revise as follows:

C405.5.3 Additional interior lighting power. Where using the Space-by-Space Method, an increase in the interior lighting power allowance is permitted for specific lighting functions. Additional power shall be permitted only where the specified lighting is installed and automatically controlled, separately from the general lighting, to be turned off during nonbusiness hours. This additional power shall be used only for the specified luminaires and shall not be used for any other purpose. An increase in the interior lighting power allowance is permitted in the following case:

1. For lighting equipment to be installed in sales areas specifically to highlight merchandise, the additional lighting power shall be determined in accordance with Equation 4-X

$$\text{Additional Interior Lighting Power Allowance} = 500 \text{ watts} + (\text{Retail Area 1} \times 0.6 \text{ W/ft}^2) + (\text{Retail Area 2} \times 0.6 \text{ W/ft}^2) + (\text{Retail Area 3} \times 1.4 \text{ W/ft}^2) + (\text{Retail Area 4} \times 2.5 \text{ W/ft}^2). \quad \text{Equation 4-x}$$

where:

Retail Area 1 = The floor area for all products not listed in Retail Area 2, 3 or 4.

Retail Area 2 = The floor area used for the sale of vehicles, sporting goods and small electronics.

Retail Area 3 = The floor area used for the sale of furniture, clothing, cosmetics and artwork.

Retail Area 4 = The floor area used for the sale of jewelry, crystal and china.

Exception: Other merchandise categories are permitted to be included in Retail Areas 2 through 4 above, provided that justification documenting the need for additional lighting power based on visual inspection, contrast, or other critical display is *approved* by the code official.

TABLE C405.5.2(2)
INTERIOR LIGHTING POWER ALLOWANCES:
SPACE-BY-SPACE METHOD

(Portions of table not shown remain unchanged)

- a. Where lighting equipment is specified to be installed to highlight specific merchandise in addition to lighting equipment specified for general lighting and is switched or dimmed on circuits different from the circuits for general lighting, the smaller of the actual wattage of the lighting equipment installed specifically for merchandise, or additional lighting power as determined below shall be added to the interior lighting power determined in accordance with this line item.

Calculate the additional lighting power as follows:

$$\text{Additional Interior Lighting Power Allowance} = 500 \text{ watts} + (\text{Retail Area 1} \times 0.6 \text{ W/ft}^2) + (\text{Retail Area 2} \times 0.6 \text{ W/ft}^2) + (\text{Retail Area 3} \times 1.4 \text{ W/ft}^2) + (\text{Retail Area 4} \times 2.5 \text{ W/ft}^2).$$

where:

Retail Area 1 = The floor area for all products not listed in Retail Area 2, 3 or 4.

Retail Area 2 = The floor area used for the sale of vehicles, sporting goods and small electronics.

Retail Area 3 = The floor area used for the sale of furniture, clothing, cosmetics and artwork.

Retail Area 4 = The floor area used for the sale of jewelry, crystal and china.

Exception: Other merchandise categories are permitted to be included in Retail Areas 2 through 4 above, provided that justification documenting the need for additional lighting power based on visual inspection, contrast, or other critical display is *approved* by the authority having jurisdiction.

Reason: Adds clarity to the code. The provision is too lengthy for a footnote. Formula has been properly listed. "Authority having jurisdiction" changed to "code official".

Cost Impact: The code change proposal will not increase the cost of construction.

CE317-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.5.3 (NEW)-EC-HEINMILLER rev.doc

CE318 – 13

C405.6

Proponent: Tim Nogler, Washington State Building Code Council (tim.nogler@des.wa.gov)

Revise as follows:

C405.6 Exterior lighting (Mandatory). Where the power for exterior lighting is supplied through the energy service to the building, all exterior lighting, ~~other than low-voltage landscape lighting,~~ shall comply with Sections C405.6.1 and C405.6.2.

Exception: Where *approved* because of historical, safety, signage or emergency considerations.

Reason: There is no reason that low-voltage landscape lighting should be excluded from the total exterior lighting power allowance. In many applications, the contribution of multiple low-voltage fixtures is substantial.

Cost Impact: The code change proposal will not increase the cost of construction.

CE318-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.6-EC-NOGLER.doc

CE319 – 13

C405.6, C405.6.1, C405.6.2

Proponent: Glenn Heinmiller, Lam Partners, International Association of Lighting Designers
(glenn@lampartners.com)

Revise as follows:

C405.6 Exterior lighting (Mandatory). Where the power for exterior lighting is supplied through the energy service to the building, all exterior lighting, ~~other than low-voltage landscape lighting~~, shall comply with Sections ~~C405.6.1 and~~ C405.6.2.

Exception: Where *approved* because of historical, safety, signage or emergency considerations.

~~**C405.6.1 Exterior building grounds lighting.** All exterior building grounds luminaires that operate at greater than 100 watts shall contain lamps having a minimum efficacy of 60 lumens per watt unless the luminaire is controlled by a motion sensor or qualifies for one of the exceptions under Section C405.6.2.~~

C405.6.2 Exterior building lighting power. The total exterior lighting power allowance for all exterior building applications is the sum of the base site allowance plus the individual allowances for areas that are to be illuminated and are permitted in Table C405.6.2(2) for the applicable lighting zone. Tradeoffs are allowed only among exterior lighting applications listed in Table C405.6.2(2), Tradable Surfaces section. The lighting zone for the building exterior is determined from Table C405.6.2(1) unless otherwise specified by the local jurisdiction. ~~Exterior lighting for all applications (except those included in the exceptions to Section C405.6.2) shall comply with the requirements of Section C405.6.1.~~

Exception: Lighting used for the following exterior applications is exempt where equipped with a control device independent of the control of the nonexempt lighting:

1. Specialized signal, directional and marker lighting associated with transportation;
2. Advertising signage or directional signage;
3. Integral to equipment or instrumentation and is installed by its manufacturer;
4. Theatrical purposes, including performance, stage, film production and video production;
5. Athletic playing areas;
6. Temporary lighting;
7. Industrial production, material handling, transportation sites and associated storage areas;
8. Theme elements in theme/amusement parks; and
9. Used to highlight features of public monuments and registered historic landmark structures or buildings.

Reason: Simplify the code without reducing stringency.

C405.6 -The exemption of "low-voltage landscape lighting" makes no sense and adds unnecessary complexity. This exemption is not in Standard 90.1.

C405.6.1 This is an obsolete and redundant provision that should have been removed from IECC when the lighting power density method was introduced for exterior lighting. The provision adds no value to the code and increases complexity.

Cost Impact: The code change proposal will not increase the cost of construction.

CE319-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.6-EC-HEINMILLER.doc

CE320 – 13

Table C405.6.2(1)

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

TABLE C405.6.2(1)
EXTERIOR LIGHTING ZONES

LIGHTING ZONE	DESCRIPTION
1	Developed areas of national parks, state parks, forest land, and rural areas
2	Areas predominantly consisting of residential zoning, neighborhood business districts, light industrial with limited nighttime use and residential mixed use areas
3	All other areas <u>not classified as lighting zone 1, 2 or 4.</u>
4	High-activity commercial districts in major metropolitan areas as designated by the local land use planning authority

Reason: This proposal clarifies the exterior lighting zone requirements to indicate that Zone 3 includes all areas that are not classified as lighting Zone 1, 2, or 4. The new language clarifies the meaning of "other areas." The objective of this proposal is to clarify the code to foster implementation and compliance verification.

Cost Impact: The code change proposal will not increase the cost of construction.

CE320-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

C405.6.2(1)T-EC-WILLIAMS.doc

CE321 – 13

Table C405.6.2(2)

Proponent: Jack Bailey, One Lux Studio, representing International Association of Lighting Designers
(jbailey@oneluxstudio.com)

Revise as follows:

TABLE C405.6.2(2)
INDIVIDUAL LIGHTING POWER ALLOWANCES FOR BUILDING EXTERIORS

		LIGHTING ZONES			
		Zone 1	Zone 2	Zone 3	Zone 4
Base Site Allowance (Base allowance is usable in tradable or nontradable surfaces.)		500 W	600 W	750 W	1300 W
Tradable Surfaces (Lighting power densities for uncovered parking areas, building grounds, building entrances and exits, canopies and overhangs and outdoor sales areas are tradable.)	Uncovered Parking Areas				
	Parking areas and drives	0.04 W/ft ²	0.06 W/ft ²	0.10 W/ft ²	0.13 W/ft ²
	Building Grounds				
	Walkways less than 10 feet wide	0.7 W/linear foot	0.7 W/linear foot	0.8 W/linear foot	1.0 W/linear foot
	Walkways 10 feet wide or greater, plaza areas special feature areas	0.14 W/ft ²	0.14 W/ft ²	0.16 W/ft ²	0.2 W/ft ²
	Stairways	0.75 W/ft ²	1.0 W/ft ²	1.0 W/ft ²	1.0 W/ft ²
	Pedestrian tunnels	0.15 W/ft ²	0.15 W/ft ²	0.2 W/ft ²	0.3 W/ft ²
	Building Entrances and Exits				
	Main entries	20 W/linear foot of door width	20 W/linear foot of door width	30 W/linear foot of door width	30 W/linear foot of door width
	Other doors	20 W/linear foot of door width	20 W/linear foot of door width	20 W/linear foot of door width	20 W/linear foot of door width
	Entry canopies	0.25 W/ft ²	0.25 W/ft ²	0.4 W/ft ²	0.4 W/ft ²
	Sales Canopies				
	Free-standing and attached	0.6 W/ft ²	0.6 W/ft ²	0.8 W/ft ²	1.0 W/ft ²
	Outdoor Sales				
	Open areas (including vehicle sales lots)	0.25 W/ft ²	0.25 W/ft ²	0.5 W/ft ²	0.7 W/ft ²

	Street frontage for vehicle sales lots in addition to "open area" allowance	No allowance	10 W/linear foot	10 W/linear foot	30 W/linear foot
Nontradable Surfaces (Lighting power density calculations for the following applications can be used only for the specific application and cannot be traded between surfaces or with other exterior lighting. The following allowances are in addition to any allowance otherwise permitted in the "Tradable Surfaces" section of this table.)	Building facades	No allowance	0.1 W/ft ² for each illuminated wall or surface or 2.5 W/linear foot for each illuminated wall or surface length <u>0.075 W/ft² of gross above-grade wall area</u>	0.15 W/ft ² for each illuminated wall or surface or 3.75 W/linear foot for each illuminated wall or surface length <u>0.113 W/ft² of gross above-grade wall area</u>	0.2 W/ft ² for each illuminated wall or surface or 5.0 W/linear foot for each illuminated wall or surface length <u>0.15 W/ft² of gross above-grade wall area</u>
	Automated teller machines and night depositories	270 W per location plus 90 W per additional ATM per location	270 W per location plus 90 W per additional ATM per location	270 W per location plus 90 W per additional ATM per location	270 W per location plus 90 W per additional ATM per location
	Entrances and gatehouse inspection stations at guarded facilities	0.75 W/ft ² of covered and uncovered area	0.75 W/ft ² of covered and uncovered area	0.75 W/ft ² of covered and uncovered area	0.75 W/ft ² of covered and uncovered area
	Loading areas for law enforcement, fire, ambulance and other emergency service vehicles	0.5 W/ft ² of covered and uncovered area	0.5 W/ft ² of covered and uncovered area	0.5 W/ft ² of covered and uncovered area	0.5 W/ft ² of covered and uncovered area
	Drive-up windows/doors	400 W per drive-through	400 W per drive-through	400 W per drive-through	400 W per drive-through
	Parking near 24-hour retail entrances	800 W per main entry	800 W per main entry	800 W per main entry	800 W per main entry

For SI: 1 foot = 304.8 mm, 1 watt per square foot = W/0.0929 m².

Reason:

How do you calculate the area of illuminated wall or surface? This sounds straightforward, but in many cases it is not. Consider the following examples:

1. Low wattage uplights are installed at the bottom of a 20-story building. By the time the light gets to the third or fourth floor it is not perceptible. What is the illuminated wall area? The entire 20-story façade, since some infinitesimally small amount of light reaches the top? Or only that portion of the façade that receives perceptible light? Perceptible to whom - the code official or the designer?
2. Lighting is proposed for the TV antenna at the top of a high-rise building (antennas are common on very tall buildings like the Freedom Tower in New York City). The antenna is an open space frame. How do you calculate the surface area?
3. Lights are integrated into a building façade to light directly out away from the building (this is common on casinos). No building façade surface area is illuminated. What is the lighting power allowance? Does the code only allow illumination of building surfaces, but not direct-view lighting applications?

In all of these examples the code is unclear and unenforceable.

This proposal would substitute the term "gross above-grade wall area" instead of "illuminated wall or surface area". "Gross above-grade wall area" already has to be determined to show compliance with the fenestration provisions in C402.3 and is a much more readily understood term.

To avoid making the code less efficient, lower W/ft² values are proposed for Table C405.6.2. These values are 75% of current code values, which means that a building which has lighting on 75% of its' above-grade wall area will get the same allowance as

under current code. A building which has less than 75% of its' façade lighted will get a larger allowance than under current code, and a building which has more than 75% of its' façade lighted will get a smaller allowance than under current code.

Cost Impact: The code change proposal will not increase the cost of construction

CE321-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.6.2(2)T-EC-BAILEY.doc

CE322 – 13

C405.7

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C405.7 Electrical energy consumption (mandatory). ~~In buildings having individual~~ Every dwelling units, ~~provisions shall be made to determine the electrical energy consumed by each tenant by separately metering individual dwelling units in Use Group R-2 buildings shall have a separate electrical meter.~~

Reason: This proposal simplifies the electrical metering requirements to indicate that the dwelling units in Use Group R-2 buildings must be separately metered. The intent is to apply to R-2 buildings and there is no need to indicate in the code the reason for the criterion; only what is required. This will simplify the code to foster implementation and compliance verification.

Cost Impact: The code change proposal does not increase the cost of construction.

CE322-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.7-EC-WILLIAMS.doc

CE323 – 13

C405.7, C405.7.1 (NEW), C405.7.2 (NEW)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C405.7 Electrical energy consumption (Mandatory). ~~In buildings having individual dwelling units, provisions shall be made to determine the electrical energy consumed by each tenant by separately metering individual dwelling units. Meters, metering devices or other provisions shall be installed capable of determining the electrical energy consumed by and within the building in accordance with this section.~~

C405.7.1 Multi-family residential buildings. In buildings having individual dwelling units, provisions shall be made to determine the electrical energy consumed within each dwelling unit by separately metering individual dwelling units.

C405.7.2 Buildings other than multi-family residential buildings. Metering devices capable of measuring electrical energy use shall be provided for the total electrical energy system, HVAC systems, interior lighting systems, exterior lighting systems and receptacle circuits in each building and, for other than shared systems, each separate tenancy within the building. The measurement devices shall have the capability to record electrical energy use at least every 15 minutes and report that use on at least an hourly, daily, monthly and annual basis and retain the recorded data at least 36 months.

Exceptions: Metering devices are not required for the following spaces and systems:

1. Buildings less than 10,000 square feet in net floor area.
2. Individual tenant spaces less than 5,000 square feet in net floor area.
3. Dwelling units
4. Residential buildings with less than 10,000 square feet of common area.
5. Critical and equipment branches covered in the Article 517 of NFPA 70

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has been revised with respect to energy metering. The change ensures continued consistency between the IECC and standard 90.1-2010. It retains the current provisions in the IECC for multi-family residential buildings and then includes electrical metering provisions for other building types and occupancies.

Cost Impact: The code change proposal will increase the cost of construction when monitoring devices are required.

CE323-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.7-EC-FERGUSON.doc

CE324 – 13

C405.8 (NEW), C405.8.1 (NEW), Table C405.8.1 (NEW), Chapter 5

Proponent: Jim Edelson, New Buildings Institute (jedelson@comcast.net)

Add new text as follows:

C405.8 Energy distribution design and load type segregation (mandatory). Energy distribution systems within, on or adjacent to and serving a building shall be designed such that each circuit or panel supplies only one end-use category listed in Table 405.8.1. The end-use category served by each distribution system shall be clearly designated on the energy distribution system with the load served, and adequate space shall be provided for installation of energy measurement equipment or other data collection devices to measure their energy use. The energy distribution system shall be designed to facilitate the collection of data for each of the load types.

Exceptions:

1. Not more than 5 percent of the segregated load for each of the categories listed in Table 405.8.1 is permitted to be from a load not within that category.
2. Critical and Equipment Branches of Article 517 of NFPA 70 are not required to meet the requirements of this section.
3. Buildings where the load types in listed in Table 405.8.1 are measured separately through the installation of equipment in accordance with Section C405.8.1 are not required to meet the requirements of this section.
4. Individual tenant spaces having a floor area not greater than 2500 square feet and equipped with one or more source meters in accordance with Section C405.8.1 are not required to meet the requirements of this section.

**TABLE 405.8.1
ENERGY USE CATEGORIES**

<u>Load Category</u>	<u>Description of energy use</u>
<u>Total HVAC system</u>	<u>Heating, cooling and ventilation including, but not limited to fans, pumps, boilers, chillers and water heating. Energy used by 120 volt equipment, or 208/120 volt equipment that is located in a building where the main service is 480/277 volt power, is permitted to be excluded from Total HVAC system.</u>
<u>Interior lighting</u>	<u>Lighting systems located within the <i>building</i>.</u>
<u>Exterior lighting</u>	<u>Lighting systems located on the <i>building site</i> but not within the <i>building</i>.</u>
<u>Plug loads</u>	<u>Devices, appliances and equipment connected to convenience receptacle outlets</u>
<u>Process loads</u>	<u>Any single load not included in a HVAC, lighting, or plug load category that exceeds 5 percent of the peak connected load of the whole building including, but not limited to data centers, manufacturing equipment and commercial kitchens.</u>
<u>Building operations and other miscellaneous loads</u>	<u>The remaining loads not included elsewhere in this table including, but not limited to, vertical transportation systems, automatic doors, motorized shading systems, ornamental fountains, ornamental fireplaces, swimming pools, in-ground spas, and snow-melt systems.</u>

C405.8.1 Meters. Meters and other measurement devices shall be configured to automatically communicate energy data to a data acquisition system. Lighting, HVAC, or other building systems that can monitor their energy consumption are permitted instead of meters. The meters, measurement devices, or building systems that monitor their energy consumption shall have a tested accuracy of +/-5 percent.

Add new standard to Chapter 5 as follows:

NFPA

70-11 National Electrical Code

Reason: Measurement of the energy consumption of the different kinds of loads in a building is a powerful diagnostic and benchmarking tool. The diagnostic value of segregated loads is being demonstrated in a growing number of energy modeling and management tools.

Segregating loads at the circuit and panel level provides the significant advantage that it makes the load types capable of being easily and less expensively metered or measured in the future. Through segregating the loads in the building's energy distribution infrastructure, the primary load types of a building can be monitored with only a handful of measurement devices. Permanent measurement or metering devices can be added later, or temporary devices can be installed for a short period of diagnostics and/or benchmarking.

For example, a campus of buildings in Seattle had plans for two nearly identical buildings, one mostly constructed and the other in the design phase. There was a desire for more information about the plug loads in the buildings, so the decision was made to sub-meter just that load type. The first building's energy distribution infrastructure had been designed without load-type segregation in mind, so measuring just the plug loads would have required 104 sub-meters. Since the other building was still in the design phase, its energy infrastructure was designed so that the plug loads would be segregated from the other building loads resulting in the need for only 4 sub-meters. The change in design to the system resulted in a minimal cost impact, but the reduction in the number of meters required resulted in significant cost savings.

Cost Impact: The code change proposal will not increase the cost of construction.

CE324-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.8 (NEW)-EC-EDELSON.doc

CE325 – 13

C405.8 (NEW)

Proponent: Andrei Moldoveanu, National Electrical Manufacturers Association (NEMA) (and_moldoveanu@nema.org), Jim Edelson, New Buildings Institute (NBI) (jedelson@comcast.net)

Add new text as follows:

C405.8 Energy monitoring (Mandatory). Buildings with a gross conditioned floor area over 25,000 square feet shall comply with Sections C405.8.1 through C405.8.5. Buildings shall be equipped to measure, monitor, record and report energy consumption data for each energy source and end use category.

Exception: Individual tenant spaces are not required to comply with this section provided the space has its own utility services and meters and provided it has less than 5000 square feet of conditioned floor area.

C405.8.1 Energy type metering. For each energy type listed in Table 405.8.1, meters, or other measurement devices, shall collect energy data for the whole building.

Exceptions:

1. Energy type metering is not required where end-use metering, as described in Section C405.8.3, for an energy type accounts for all usage of that energy type within a building, and the data acquisition system totals the energy delivered to the building or separately-metered portion of the building.
2. Solid fuels including but not limited to, coal, firewood or wood pellets that are delivered via mobile transportation do not require metering.

TABLE 405.8.1
ENERGY TYPE CATEGORIES

Type category	Description of energy type
Electrical Energy	Electrical energy supplied to the building or building site..
Gas and liquid fuel supply energy	Gas and liquid fuel supplied to the building or building site..
District Energy	This category shall include all net energy extracted from district steam systems, district chilled water loops, district hot water systems, or other energy sources serving multiple buildings, and supplied to the building or building site.
On-site renewable energy	This category shall include all energy generated from <i>on-site renewable energy</i> and supplied to the building or building site.

C405.8.2 End-use metering. Meters or other measurement devices shall be provided to collect energy use data for each end-use category listed in Table 405.8.2. These meters shall collect data for the whole building or for each separately metered portion of the building where permitted by the Exception to Section C405.8. Where multiple meters are used to measure any end-use category, the data acquisition system shall total all of the energy used by that category.

Exceptions:

1. HVAC and water heating equipment serving only an individual dwelling unit does not require end-use metering.
2. End-use metering is not required for fire pumps, stairwell pressurization fans or any system that operates only during testing or emergency.

- 3.. End use metering is not required for an individual tenant space having a floor area not greater than 2500 square feet where a dedicated source meter complying with Section C405.8.3 is provided.
4. Not more than 5 percent of the measured load for each of the categories listed in Table 405.8.2 is permitted to be from a load not within that category.

TABLE 405.8.2
ENERGY USE CATEGORIES

<u>Load Category</u>	<u>Description of energy use</u>
<u>Total HVAC system</u>	<u>Heating, cooling and ventilation including, but not limited to fans, pumps, boilers, chillers and water heating. Energy used by 120 volt equipment, or by 208/120 volt equipment that is located in a building where the main service is 480/277 volt power, is permitted to be excluded from Total HVAC system energy use.</u>
<u>Interior lighting</u>	<u>Lighting systems located within the <i>building</i>.</u>
<u>Exterior lighting</u>	<u>Lighting systems located on the <i>building site</i> but not within the <i>building</i>.</u>
<u>Plug loads</u>	<u>Devices, appliances and equipment connected to convenience receptacle outlets</u>
<u>Process loads</u>	<u>Any single load that is not included in a HVAC, lighting, or plug load category and that exceeds 5 percent of the peak connected load of the whole building including, but not limited to data centers, manufacturing equipment and commercial kitchens.</u>
<u>Building operations and other miscellaneous loads</u>	<u>The remaining loads not included elsewhere in this table including, but not limited to, vertical transportation systems, automatic doors, motorized shading systems, ornamental fountains, ornamental fireplaces, swimming pools, in-ground spas, and snow-melt systems.</u>

C405.8.3 Meters. Meters and other measurement devices required by Section C405.8 shall be configured to automatically communicate energy data to a data acquisition system. Lighting, HVAC, or other building systems that can monitor their energy consumption are permitted instead of meters. The meters, measurement devices, or building systems that monitor their energy consumption shall have a tested accuracy of +/-5 percent or better. All required metering systems and equipment shall provide at least hourly data that is fully integrated into a data acquisition and display system in accordance with Section C405.8.4 and Section C405.8.5.

C405.8.4 Data acquisition system. A data acquisition system shall have the capability to store the data from the required meters and other sensing devices for a minimum of 36 months. For each energy supply and end use category required by Sections C405.8.2 and C405.8.3, it shall provide real-time energy consumption data and logged data for any hour, day, month or year.

C405.8.5 Graphical energy report. For each building subject to Sections C405.8.1 and C405.8.2, a permanent and readily accessible reporting mechanism shall be provided in the building that is accessible by building operation and management personnel. The reporting mechanism shall be capable of graphically displaying the energy consumption for each end-use category specified in Section C405.8.2 by the hour, day, month and year for the previous 36 months.

Reason: This proposal saves energy by providing actionable and timely energy consumption data to building owners and operators. For large buildings, this data is further broken out by the major sub-systems (HVAC, lighting, process loads, and plug loads). Estimates in available literature of the energy savings to be expected from metering and monitoring systems vary from 2% to 15%. The effectiveness of each system depends on owners and facility managers observing and acting upon the data provided. Additionally, the 2013 versions of ASHRAE Std. 90.1 and California Title 24 will be requiring energy monitoring.

Cost Impact: The code change proposal will not increase the cost of construction.

CE325-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF
C405.8 (NEW)-EC-EDELSON-MOLDOVEANU.doc				

CE326 – 13

C405.8 (NEW)

Proponent: Wayne Stoppelmoor, Schneider Electric (wayne.stoppelmoor@schneider-electric.com)

Add new text as follows:

C405.8 Energy monitoring (Mandatory). Buildings with a gross conditioned floor area over 25,000 square feet shall comply with Section C405.8.1 through C405.8.5. Buildings shall be equipped to measure, monitor, record and report energy consumption data for each end-use category required by Section C405.8.2.

Exception: Individual tenant spaces are not required to comply with this section provided the space has its own utility services and meters and has less than 5,000 square feet of conditioned floor area.

C405.8.1 Electrical energy metering. For electrical energy, including all electrical energy supplied to the building and its associated site, including but limited to site lighting, parking, recreational facilities, and other areas that serve the building and its occupants, meters or other measurement devices shall be provided to collect energy consumption data for each end-use category required by Section C405.8.2.

C405.8.2 End-use metering categories. Meters or other measurement devices shall be provided to collect energy use data for each end-use category listed in Table 405.8.1. These meters shall have the capability to collect energy consumption data for the whole building or for each separately metered portion of the building. Where multiple meters are used to measure any end-use category, the data acquisition system shall total all of the energy used by that category. Not more than 5 percent of the measured load for each of the end-use categories listed in Table 405.8.1 is permitted to be from a load not within that category.

Exceptions:

1. HVAC and water heating equipment serving only an individual dwelling unit does not require end-use metering.
2. End-use metering is not required for fire pumps, stairwell pressurization fans or any system that operates only during testing or emergency.
3. End-use metering is not required for an individual tenant space having a floor area not greater than 2,500 square feet where a dedicated source meter complying with Section C405.8.3 is provided.

**TABLE 405.8.1
ENERGY USE CATEGORIES**

Load Category	Description of energy use
<u>Total HVAC system</u>	<u>Heating, cooling and ventilation including, but not limited to fans, pumps, boilers, chillers and water heating. Energy used by 120 volt equipment, or by 208/120 volt equipment that is located in a building where the main service is 480/277 volt power, is permitted to be excluded from Total HVAC system energy use.</u>
<u>Interior lighting</u>	<u>Lighting systems located within the building.</u>
<u>Exterior lighting</u>	<u>Lighting systems located on the building site but not within the building.</u>
<u>Plug loads</u>	<u>Devices, appliances and equipment connected to convenience receptacle outlets</u>
<u>Process loads</u>	<u>Any single load that is not included in a HVAC, lighting, or plug load category and that exceeds 5 percent of the peak connected load of the whole building including, but not limited to data centers, manufacturing equipment and commercial kitchens.</u>
<u>Building operations and other miscellaneous loads</u>	<u>The remaining loads not included elsewhere in this table including, but not limited to, vertical transportation systems, automatic doors, motorized shading systems, ornamental fountains, ornamental fireplaces, swimming pools, in-ground spas, and snow-melt systems.</u>

C405.8.3 Meters. Meters or other measurement devices required by this section shall be configured to automatically communicate energy consumption data to the data acquisition system required by Section C405.8.4. Source meters shall be allowed to be any digital-type meter. Lighting, HVAC, or other building systems that can monitor their energy consumption shall be permitted instead of meters. Current sensors shall be permitted, provided that they have a tested accuracy of +/-2 percent. Required metering systems and equipment shall have the capability to provide at least hourly data that is fully integrated into the data acquisition system and graphical energy report in accordance with Sections C405.8.4 and C405.8.5.

C405.8.4 Data acquisition system. A data acquisition system shall have the capability to store the data from the required meters and other sensing devices for a minimum of 36 months. The data acquisition system shall have the capability to store real-time energy consumption data and provide hourly, daily, monthly, and yearly logged data for each end-use category required by Section C405.8.2.

C405.8.5 Graphical energy report. A permanent and readily accessible reporting mechanism shall be provided in the building that is accessible by building operation and management personnel. The reporting mechanism shall have the capability to graphically provide the energy consumption for each end-use category required by Section C405.8.2 at least every hour, day, month and year for the previous 36 months.

Reason: This proposal saves energy by providing actionable and timely energy consumption data to building owners and operators. For large buildings, this data is further broken out by the major sub-systems (HVAC, lighting, process loads, and plug loads). Estimates in available literature of the energy savings to be expected from metering and monitoring systems vary from 2% to 15%. The effectiveness of each system depends on owners and facility managers observing and acting upon the data provided. Additionally, the 2013 version of ASHRAE Std. 90.1 and several state energy codes will be requiring energy monitoring.

Cost Impact: This requirement will cause a modest increase to the cost of construction. However, such increase in cost will be recovered in a short period of time due to the decreased energy consumed in the building.

CE326-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.8 (NEW)-EC-STOPPELMOOR.doc

CE327 – 13

C405.8 (NEW)

Proponent: Andrei Moldoveanu, National Electrical Manufacturers Association (NEMA) (and_moldoveanu@nema.org), Jim Edelson, New Buildings Institute (NBI)

Revise as follows:

C405.8 Energy Monitoring (Mandatory). Buildings with a gross conditioned floor area over 25,000 ft² shall comply with Sections C405.8.1 through C405.8.6. Buildings shall be equipped to measure, monitor, record and report energy consumption data for each energy source and end use category.

Exception: Tenant spaces within buildings if the tenant space has its own utility services and utility meters and is less than 5,000 square feet gross conditioned floor area.

C405.8.1 Alternate metering methods. Where approved by the building official, energy use metering systems may differ from those required by this section, provided that they are permanently installed and that the source energy measurement, end use category energy measurement, data storage and report have similar accuracy to and are at least as effective in communicating actionable energy use information to the building management and users, as those required by this section.

C405.8.2 Energy type metering. For each energy type listed in sections C405.8.2.1 through C405.8.2.4, meters shall collect data for the whole building.

Exceptions:

1. Energy type metering is not required where end-use metering, as describe in section C405.8.3, for an energy type accounts for all usage of that energy type within a building, and the data acquisition system totals the energy delivered to the building or separately-metered portion of the building.
2. Solid fuels such as coal, firewood or wood pellets that are delivered via mobile transportation do not require metering.
3. Up to 5 percent of the measured load for each of the categories described in sections C405.8.3.1 through C405.8.3.3 shall be allowed to be from any other loads.

C405.8.2.1 Electrical energy. This category shall include all electrical energy supplied to the building.

C405.8.2.2 Gas and liquid fuel supply energy. This category shall include all natural gas, fuel oil, propane and other gas or liquid fuel energy supplied to the building.

C405.8.2.3 District energy. This category shall include all net energy extracted from district steam systems, district chilled water loops, district hot water systems, or other energy sources serving multiple buildings, and supplied to the building.

C405.8.2.4 Site-generated renewable energy. This category shall include all energy generated from on-site solar, wind, geothermal, tidal or other natural sources, and supplied to the building.

C405.8.3 End-use metering. Meters shall be provided to collect energy use data for each end-use category listed in sections C405.8.3.1 through C405.8.3.5. These meters shall collect data for the whole building or for each separately metered portion of the building where permitted by the Exception to Section C405.8. Multiple meters may be used for any end-use category, provided that the data acquisition system totals all of the energy used by that category.

Exceptions:

1. HVAC and water heating equipment serving only an individual dwelling unit does not require end-use metering.
2. Separate metering is not required for fire pumps, stairwell pressurization fans or other life safety systems that operate only during testing or emergency.
3. End use metering is not required for individual tenant spaces not exceeding 2,500 square feet in floor area when a dedicated source meter meeting the requirements of Section C405.8.4 is provided for the tenant space.

C405.8.3.1 HVAC system total energy use. This category shall include all energy used to heat, cool, and provide ventilation to the building including, but not limited to, fans, pumps, boiler energy, chiller energy and hot water.

Exceptions:

1. All 120 volt equipment.
2. 208/120 volt equipment in a building where the main service is 480/277 volt power.

C405.8.3.2 Interior lighting system total energy use. This category shall include all interior lighting.

C405.8.3.3 Exterior lighting system total energy use. This category shall include all exterior lighting that is powered through the energy service to the building.

C405.8.3.4 Plug loads. This category shall include all energy use by devices, appliances and equipment connected to convenience receptacle outlets.

C405.8.3.5 Process loads. Process or other loads not covered in C405.8.3.1 through C405.8.3.3 that exceed 5% of the total energy use of the whole building.

C405.8.4 Meters. Meters and other measurement devices required by Section C405.8 shall be configured to automatically communicate energy data to a data acquisition system. Source meters may be any digital-type meters. Current sensors or flow meters are allowed for end use metering, provided that they have a tested accuracy of +/-2 percent. All required metering systems and equipment shall provide at least hourly data that is fully integrated into the data acquisition and display system per the requirements of Section C405.8.

C405.8.5 Data acquisition system. A data acquisition system shall store the data from the required meters and other sensing devices for a minimum of 36 months. For each energy supply and end use category required by C405.8.2 and C405.8.3, it shall provide real-time energy consumption data and logged data for any hour, day, month or year.

C405.8.6 Graphical energy report. For each building subject to Section C405.8.2 and C405.8.3, a permanent and readily accessible reporting mechanism shall be provided in the building that is accessible by building operation and management personnel. The reporting mechanism shall be capable of graphically displaying the energy consumption for each end-use category specified in C405.8.3 by the hour, day, month and year for the previous 36 months.

Reason: This proposal saves energy by providing actionable and timely energy consumption data to building owners and operators. For large buildings, this data is further broken out by the major sub-systems (HVAC, lighting, process loads, and plug loads). Estimates in available literature of the energy savings to be expected from metering and monitoring systems vary from 2% to 15%. The effectiveness of each system depends on owners and facility managers observing and acting upon the data provided. Additionally, the 2013 version of ASHRAE Std. 90.1 and several state energy codes will be requiring energy monitoring.

Cost Impact: The code change proposal will not increase the cost of construction.

CE327-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

CE328 – 13

C405.8 (NEW), C405.8.1 (NEW), C405.8.2 (NEW)

Proponent: Jim Edelson, New Buildings Institute (jedelson@comcast.net), Eric Makela, Britt/Makela Group, Inc., representing Northwest Energy Codes Group (eric@brittmakela.com)

Add new text as follows:

C405.8 Requirements for solar-ready energy systems (Mandatory). In climates zones 1 through 6, infrastructure shall be provided within the building and space shall be allocated on the roof for future installation of on-site renewable energy systems. The infrastructure and allocated roof space shall be capable of accommodating an energy system with a minimum rating of 3.7 W/ft² or 13 Btu/h·ft² (40 W/m²) multiplied by the total roof area in square feet (m²) and shall comply with Section C405.8.2. Compliance with this section shall be documented as specified in Section C405.8.1.

Exceptions:

1. The portion of the total roof area shaded during the peak sun angle on the summer solstice by natural objects, permanent features of the building or by permanent features of adjacent buildings can be excluded from the total roof area for the purposes of this section.
2. Buildings incorporating an on-site renewable energy systems with a minimum rating of 3.7 W/ft² or 13 Btu/h·ft² (40 W/m²) multiplied by the total roof area in square feet (m²) do not have to meet the requirements of this section.
3. Buildings with four or more stories do not have to meet the requirements of this section.
4. Additions, alterations and repairs to existing buildings do not have to meet the requirements of this section.

C405.8.1 Documentation. Construction documents shall show allocated space and pathways for installation of on-site solar energy systems and associated infrastructure. Documents shall indicate a pathway for one of the following:

1. A pathway for routing of conduit from the roof or alternate reserved space to the main electrical service panel.
2. A pathway for routing of plumbing from the roof or alternate reserved space to the water-heating system.

C405.8.2 Building service for renewable systems. For solar electric the main electrical service panel shall have a minimum busbar rating sufficient to accommodate the power supply from the system and shall have a reserved space to allow for the installation of a double pole circuit breaker for a future solar electric installation. The reserved space shall be positioned at the opposite (load) end from the input feeder location or main circuit location and shall be permanently labeled with "For Solar Electric".

Reason: This proposal provides for the option of installing a future on-site renewable energy system. Design alternatives for renewable systems are generally most plentiful and at the lowest cost at the time of new construction. As the cost of solar energy systems continues to fall, a building's value can be enhanced by providing for the future installation of on-site renewable systems if they are not installed at the time of new construction.

The technical requirements in the proposal are based on values from Title 24 and ASHRAE 189.1 - 2008. The 3-story limitation in this proposal matches the broadest height exclusion in Title 24. The climate zone limits generally follow the annual insolation level of 4 kwh per square meter (source: NREL Flat Plate PV Solar Radiation map). The minimum equipment size ratings are based on ASHRAE 189.1.

The 2011 CASE study for the Title 24 solar-ready measure states: "The proposed code change does not require equipment installation nor does it have any incremental maintenance costs. The only costs associated with the measure are design costs. Initially designers will need to familiarize themselves with the solar-ready requirement, but over time design will become streamlined and the costs will be minimal.

Cost savings from retrofits will result when photovoltaic or solar water heating equipment is easily interconnected with the building electrical or plumbing systems. Installing PV or SWH systems on solar-ready buildings (as defined in the recommended code language) could reduce the installed cost of the system by as much as 10 percent."

Cost Impact: The code change proposal will not increase the cost of construction.

CE328-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.8 (NEW)-EC-EDELSON-MAKELA.doc

CE329 – 13

C405.8 (NEW), Table C405.8 (NEW)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C405.8 Electrical transformers (Mandatory). Electric transformers shall meet the minimum efficiency requirements of Table C405.8 as tested and rated in accordance with the test procedure listed in DOE 10 CFR 431. The efficiency shall be verified through certification under an approved certification program or, where no certification program exists, the equipment efficiency ratings shall be supported by data furnished by the transformer manufacturer.

Exceptions: The following transformers are exempt:

1. Transformers that meet the Energy Policy Act of 2005 exclusions based on the DOE 10 CFR 431 definition of special purpose applications.
2. Transformers that meet the Energy Policy Act of 2005 exclusions that are not to be used in general purpose applications based on information provided in DOE 10 CFR 431
3. Transformers that meet the Energy Policy Act of 2005 exclusions with multiple voltage taps where the highest tap is at least 20 percent more than the lowest tap.
4. Drive transformers
5. Rectifier transformers
6. Auto-transformers
7. Uninterruptible power system transformers
8. Impedance transformers
9. Regulating transformers
10. Sealed and nonventilating transformers
11. Machine tool transformer
12. Welding transformer
13. Grounding transformer
15. Testing transformer

TABLE C405.8
Minimum Nominal Efficiency Levels for 10 CFR 431 Low Voltage Dry-Type Distribution Transformers

Single Phase Transformers		Three Phase Transformers	
kVA^a	Efficiency (%)^b	kVA^a	Efficiency (%)^b
15	97.7	15	97.0
25	98.0	30	97.5
37.5	98.2	45	97.7
50	98.3	75	98.0
75	98.5	112.5	98.2
100	98.6	150	98.3
167	98.7	225	98.5
250	98.8	300	98.6
333	98.9	500	98.7
		750	98.8
		1000	98.9

a. kiloVolt-Amp rating.

b. Nominal efficiencies shall be established in accordance with the DOE 10 CFR 431 test procedure for low voltage dry-type transformers.

Add new definitions as follows:

LOW VOLTAGE DRY-TYPE DISTRIBUTION TRANSFORMER: A transformer that is air-cooled, does not use oil as a coolant, has an input voltage less than or equal to 600 Volts, and is rated for operation at a frequency of 60 Hertz

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has been revised with respect to electric low-voltage dry-type transformer efficiency provisions, an issue that is not currently addressed in the IECC Commercial Provisions. The change ensures continued consistency between the IECC and standard 90.1-2010/2013 and addresses an important component associated with improving building energy efficiency.

Cost Impact: The code change proposal will increase the cost of construction.

CE329-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.8 (NEW)-EC-FERGUSON.doc

CE330 – 13

C202 (NEW), C405.8 (NEW)

Proponent: Duane Jonlin, City of Seattle representing City of Seattle Department of Planning and Development (duane.jonlin@seattle.gov)

Add new text as follows:

C405.8 Controlled receptacles. At least 50 percent of all 125 volt 15- and 20-ampere receptacles installed in private offices, open offices or classrooms, including those installed in modular partitions and modular office workstation systems, shall be controlled receptacle circuits. In rooms larger than 200 square feet, a controlled receptacle shall be located within 12 inches of each uncontrolled receptacle. Controlled receptacles shall be visibly differentiated from standard receptacles and shall be controlled by one of the following automatic control devices:

1. An occupant sensor that turns receptacle power off when no occupants have been detected for 30 minutes, or
2. 2. A time-of-day operated control device that turns receptacle power off at specific programmed times and can be programmed separately for each day of the week. An independent program schedule shall be provided for areas no larger than 25,000 square feet but not more than one floor. The device shall be capable of being overridden for periods of up to two hours by a timer accessible to occupants. Any individual override switch shall control the controlled receptacles for a maximum area of 5,000 square feet (465 m²). Override switches for controlled receptacles are permitted to control the lighting for the same area.

Exception: Receptacles designated for specific equipment requiring 24-hour operation, for building maintenance functions or for safety or security equipment are not required to be controlled by an automatic control device and are not required to be located adjacent to a controlled receptacle.

Add new definitions as follows:

SECTION C202 GENERAL DEFINITIONS

AUTOMATIC CONTROL DEVICE. A device capable of automatically turning loads off and on without manual intervention.

CONTROLLED RECEPTACLE. An electrical receptacle that is controlled by an automatic control device.

Reason: Office equipment represents approximately 20 % of commercial building electrical use, and the trend is for this use to increase over time. This proposal would make two sets of receptacles available to occupants, so that continuous power is available for equipment that requires it, while other elements such as monitors, desk lamps and copy machines can be automatically shut down during night and weekend hours. Studies done for the California Energy Commission demonstrate that the potential energy savings from such control systems are substantial, with simple paybacks between 3 and 8 years for large offices.

Cost Impact: The code change proposal will increase the cost of construction.

CE330-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.8 (NEW)-EC-JONLIN.doc

CE331 – 13

C405.8 (NEW), Table C405.8(1) (NEW), Table C405.8(2) (NEW), C405.8(3) (NEW), Table C405.8(4) (NEW), Chapter 5

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C405.8 Electrical motors (Mandatory). Electric motors shall meet the minimum efficiency requirements of Tables C405.8 (1) through C405.8 (4) when tested and rated in accordance with the DOE 10 CFR 431. The efficiency shall be verified through certification under an approved certification program or, where no certification program exists, the equipment efficiency ratings shall be supported by data furnished by the motor manufacturer.

Table C405.8 (1)
Minimum Nominal Full-Load Efficiency for 60 HZ NEMA General Purpose Electric Motors
(Subtype I) Rated 600 Volts or Less (Random Wound)^a

	Open Drip-Proof Motors			Totally Enclosed Fan-Cooled Motors		
Number of Poles ⇒	2	4	6	2	4	6
Synchronous Speed (RPM)	3600	1800	1200	3600	1800	1200
Motor Horsepower						
<u>1</u>	<u>77.0</u>	<u>85.5</u>	<u>82.5</u>	<u>77.0</u>	<u>85.5</u>	<u>82.5</u>
<u>1.5</u>	<u>84.0</u>	<u>86.5</u>	<u>86.5</u>	<u>84.0</u>	<u>86.5</u>	<u>87.5</u>
<u>2</u>	<u>85.5</u>	<u>86.5</u>	<u>87.5</u>	<u>85.5</u>	<u>86.5</u>	<u>88.5</u>
<u>3</u>	<u>85.5</u>	<u>89.5</u>	<u>88.5</u>	<u>86.5</u>	<u>89.5</u>	<u>89.5</u>
<u>5</u>	<u>86.5</u>	<u>89.5</u>	<u>89.5</u>	<u>88.5</u>	<u>89.5</u>	<u>89.5</u>
<u>7.5</u>	<u>88.5</u>	<u>91.0</u>	<u>90.2</u>	<u>89.5</u>	<u>91.7</u>	<u>91.0</u>
<u>10</u>	<u>89.5</u>	<u>91.7</u>	<u>91.7</u>	<u>90.2</u>	<u>91.7</u>	<u>91.0</u>
<u>15</u>	<u>90.2</u>	<u>93.0</u>	<u>91.7</u>	<u>91.0</u>	<u>92.4</u>	<u>91.7</u>
<u>20</u>	<u>91.0</u>	<u>93.0</u>	<u>92.4</u>	<u>91.0</u>	<u>93.0</u>	<u>91.7</u>
<u>25</u>	<u>91.7</u>	<u>93.6</u>	<u>93.0</u>	<u>91.7</u>	<u>93.6</u>	<u>93.0</u>
<u>30</u>	<u>91.7</u>	<u>94.1</u>	<u>93.6</u>	<u>91.7</u>	<u>93.6</u>	<u>93.0</u>
<u>40</u>	<u>92.4</u>	<u>94.1</u>	<u>94.1</u>	<u>92.4</u>	<u>94.1</u>	<u>94.1</u>
<u>50</u>	<u>93.0</u>	<u>94.5</u>	<u>94.1</u>	<u>93.0</u>	<u>94.5</u>	<u>94.1</u>
<u>60</u>	<u>93.6</u>	<u>95.0</u>	<u>94.5</u>	<u>93.6</u>	<u>95.0</u>	<u>94.5</u>
<u>75</u>	<u>93.6</u>	<u>95.0</u>	<u>94.5</u>	<u>93.6</u>	<u>95.4</u>	<u>94.5</u>
<u>100</u>	<u>93.6</u>	<u>95.4</u>	<u>95.0</u>	<u>94.1</u>	<u>95.4</u>	<u>95.0</u>
<u>125</u>	<u>94.1</u>	<u>95.4</u>	<u>95.0</u>	<u>95.0</u>	<u>95.4</u>	<u>95.0</u>
<u>150</u>	<u>94.1</u>	<u>95.8</u>	<u>95.4</u>	<u>95.0</u>	<u>95.8</u>	<u>95.8</u>
<u>200</u>	<u>95.0</u>	<u>95.8</u>	<u>95.4</u>	<u>95.4</u>	<u>96.2</u>	<u>95.8</u>
<u>250</u>	<u>95.0</u>	<u>95.8</u>	<u>95.4</u>	<u>95.8</u>	<u>96.2</u>	<u>95.8</u>
<u>300</u>	<u>95.4</u>	<u>95.8</u>	<u>95.4</u>	<u>95.8</u>	<u>96.2</u>	<u>95.8</u>
<u>350</u>	<u>95.4</u>	<u>95.8</u>	<u>95.4</u>	<u>95.8</u>	<u>96.2</u>	<u>95.8</u>

<u>400</u>	<u>95.8</u>	<u>95.8</u>	<u>95.8</u>	<u>95.8</u>	<u>96.2</u>	<u>95.8</u>
<u>450</u>	<u>95.8</u>	<u>96.2</u>	<u>96.2</u>	<u>95.8</u>	<u>96.2</u>	<u>95.8</u>
<u>500</u>	<u>95.8</u>	<u>96.2</u>	<u>96.2</u>	<u>95.8</u>	<u>96.2</u>	<u>95.8</u>

a Nominal efficiencies shall be established in accordance with DOE 10 CFR 431.

Table C405.8 (2)
Minimum Nominal Full-Load Efficiency of *General Purpose Electric Motors (Subtype II)* and all
Design B motors greater than 200 horsepower^a

Open Drip-Proof Motors					Totally Enclosed Fan Cooled Motors			
Number of Poles ==>	2	4	6	8	2	4	6	8
Synchronous Speed (RPM)==>	3600	1800	1200	900	3600	1800	1200	900
Motor Horsepower								
<u>1</u>	<u>NR</u>	<u>82.5</u>	<u>80.0</u>	<u>74.0</u>	<u>75.5</u>	<u>82.5</u>	<u>80.0</u>	<u>74.0</u>
<u>1.5</u>	<u>82.5</u>	<u>84.0</u>	<u>84.0</u>	<u>75.5</u>	<u>82.5</u>	<u>84.0</u>	<u>85.5</u>	<u>77.0</u>
<u>2</u>	<u>84.0</u>	<u>84.0</u>	<u>85.5</u>	<u>85.5</u>	<u>84.0</u>	<u>84.0</u>	<u>86.5</u>	<u>82.5</u>
<u>3</u>	<u>84.0</u>	<u>86.5</u>	<u>86.5</u>	<u>86.5</u>	<u>85.5</u>	<u>87.5</u>	<u>87.5</u>	<u>84.0</u>
<u>5</u>	<u>85.5</u>	<u>87.5</u>	<u>87.5</u>	<u>87.5</u>	<u>87.5</u>	<u>87.5</u>	<u>87.5</u>	<u>85.5</u>
<u>7.5</u>	<u>87.5</u>	<u>88.5</u>	<u>88.5</u>	<u>88.5</u>	<u>88.5</u>	<u>89.5</u>	<u>89.5</u>	<u>85.5</u>
<u>10</u>	<u>88.5</u>	<u>89.5</u>	<u>90.2</u>	<u>89.5</u>	<u>89.5</u>	<u>89.5</u>	<u>89.5</u>	<u>88.5</u>
<u>15</u>	<u>89.5</u>	<u>91.0</u>	<u>90.2</u>	<u>89.5</u>	<u>90.2</u>	<u>91.0</u>	<u>90.2</u>	<u>88.5</u>
<u>20</u>	<u>90.2</u>	<u>91.0</u>	<u>91.0</u>	<u>90.2</u>	<u>90.2</u>	<u>91.0</u>	<u>90.2</u>	<u>89.5</u>
<u>25</u>	<u>91.0</u>	<u>91.7</u>	<u>91.7</u>	<u>90.2</u>	<u>91.0</u>	<u>92.4</u>	<u>91.7</u>	<u>89.5</u>
<u>30</u>	<u>91.0</u>	<u>92.4</u>	<u>92.4</u>	<u>91.0</u>	<u>91.0</u>	<u>92.4</u>	<u>91.7</u>	<u>91.0</u>
<u>40</u>	<u>91.7</u>	<u>93.0</u>	<u>93.0</u>	<u>91.0</u>	<u>91.7</u>	<u>93.0</u>	<u>93.0</u>	<u>91.0</u>
<u>50</u>	<u>92.4</u>	<u>93.0</u>	<u>93.0</u>	<u>91.7</u>	<u>92.4</u>	<u>93.0</u>	<u>93.0</u>	<u>91.7</u>
<u>60</u>	<u>93.0</u>	<u>93.6</u>	<u>93.6</u>	<u>92.4</u>	<u>93.0</u>	<u>93.6</u>	<u>93.6</u>	<u>91.7</u>
<u>75</u>	<u>93.0</u>	<u>94.1</u>	<u>93.6</u>	<u>93.6</u>	<u>93.0</u>	<u>94.1</u>	<u>93.6</u>	<u>93.0</u>
<u>100</u>	<u>93.0</u>	<u>94.1</u>	<u>94.1</u>	<u>93.6</u>	<u>93.6</u>	<u>94.5</u>	<u>94.1</u>	<u>93.0</u>
<u>125</u>	<u>93.6</u>	<u>94.5</u>	<u>94.1</u>	<u>93.6</u>	<u>94.5</u>	<u>94.5</u>	<u>94.1</u>	<u>93.6</u>
<u>150</u>	<u>93.6</u>	<u>95.0</u>	<u>94.5</u>	<u>93.6</u>	<u>94.5</u>	<u>95.0</u>	<u>95.0</u>	<u>93.6</u>
<u>200</u>	<u>94.5</u>	<u>95.0</u>	<u>94.5</u>	<u>93.6</u>	<u>95.0</u>	<u>95.0</u>	<u>95.0</u>	<u>94.1</u>
<u>250</u>	<u>94.5</u>	<u>95.4</u>	<u>95.4</u>	<u>94.5</u>	<u>95.4</u>	<u>95.0</u>	<u>95.0</u>	<u>94.5</u>
<u>300</u>	<u>95.0</u>	<u>95.4</u>	<u>95.4</u>	<u>NR</u>	<u>95.4</u>	<u>95.4</u>	<u>95.0</u>	<u>NR</u>
<u>350</u>	<u>95.0</u>	<u>95.4</u>	<u>95.4</u>	<u>NR</u>	<u>95.4</u>	<u>95.4</u>	<u>95.0</u>	<u>NR</u>
<u>400</u>	<u>95.4</u>	<u>95.4</u>	<u>NR</u>	<u>NR</u>	<u>95.4</u>	<u>95.4</u>	<u>NR</u>	<u>NR</u>
<u>450</u>	<u>95.8</u>	<u>95.8</u>	<u>NR</u>	<u>NR</u>	<u>95.4</u>	<u>95.4</u>	<u>NR</u>	<u>NR</u>
<u>500</u>	<u>95.8</u>	<u>95.8</u>	<u>NR</u>	<u>NR</u>	<u>95.4</u>	<u>95.8</u>	<u>NR</u>	<u>NR</u>

a Nominal efficiencies shall be established in accordance with DOE 10 CFR 431.

NR—No requirement

Table C405.8 (3)
Minimum Average Full Load Efficiency for Polyphase *Small Electric Motors*^a

<u>Open Motors</u>			
<u>Number of Poles</u>	<u>2</u>	<u>4</u>	<u>6</u>
<u>==></u>			
<u>Synchronous Speed (RPM)</u>	<u>3600</u>	<u>1800</u>	<u>1200</u>
<u>Motor Horsepower</u>			
<u>0.25</u>	<u>65.6</u>	<u>69.5</u>	<u>67.5</u>
<u>0.33</u>	<u>69.5</u>	<u>73.4</u>	<u>71.4</u>
<u>0.50</u>	<u>73.4</u>	<u>78.2</u>	<u>75.3</u>
<u>0.75</u>	<u>76.8</u>	<u>81.1</u>	<u>81.7</u>
<u>1</u>	<u>77.0</u>	<u>83.5</u>	<u>82.5</u>
<u>1.5</u>	<u>84.0</u>	<u>86.5</u>	<u>83.8</u>
<u>2</u>	<u>85.5</u>	<u>86.5</u>	<u>N/A</u>
<u>3</u>	<u>85.5</u>	<u>86.9</u>	<u>N/A</u>

^a Average full load efficiencies shall be established in accordance with 10 CFR 431.

Table C405.8 (4)
Minimum Average Full Load Efficiency for Capacitor-Start Capacitor-Run and Capacitor-Start Induction-Run Small Electric Motors^a

<u>Open Motors</u>			
<u>Number of Poles</u>	<u>2</u>	<u>4</u>	<u>6</u>
<u>==></u>			
<u>Synchronous Speed (RPM)</u>	<u>3600</u>	<u>1800</u>	<u>1200</u>
<u>Motor Horsepower</u>			
<u>0.25</u>	<u>66.6</u>	<u>68.5</u>	<u>62.2</u>
<u>0.33</u>	<u>70.5</u>	<u>72.4</u>	<u>66.6</u>
<u>0.50</u>	<u>72.4</u>	<u>76.2</u>	<u>76.2</u>
<u>0.75</u>	<u>76.2</u>	<u>81.8</u>	<u>80.2</u>
<u>1</u>	<u>80.4</u>	<u>82.6</u>	<u>81.1</u>
<u>1.5</u>	<u>81.5</u>	<u>83.8</u>	<u>N/A</u>
<u>2</u>	<u>82.9</u>	<u>84.5</u>	<u>N/A</u>
<u>3</u>	<u>84.1</u>	<u>N/A</u>	<u>N/A</u>

^a Average full load efficiencies shall be established in accordance with 10 CFR 431.

Add new definitions as follows:

GENERAL PURPOSE ELECTRIC MOTOR (SUBTYPE I): A motor which is designed in standard ratings with either:

1. Standard operating characteristics and standard mechanical construction for use under usual service conditions, such as those specified in NEMA MG1, paragraph 14.02, "Usual Service Conditions," and without restriction to a particular application or type of application; or
2. Standard operating characteristics or standard mechanical construction for use under unusual service conditions, such as those specified in NEMA MG1, paragraph 14.03, "Unusual Service Conditions," or for a particular type of application, and which can be used in most general purpose applications.

General purpose electric motors (subtype I) are constructed in NEMA T-frame sizes, or IEC metric equivalent, starting at 143T.

GENERAL PURPOSE ELECTRIC MOTOR (SUBTYPE II). A motor incorporating the design elements of a general purpose electric motor (subtype I) that is configured as one of the following:

1. A U-frame motor
2. A Design C motor
3. A close-coupled pump motor
4. A footless motor
5. A vertical, solid-shaft, normal-thrust motor (as tested in a horizontal configuration)
6. An 8-pole motor (900 rpm)
7. A polyphase motor with voltage of not more than 600 volts (other than 230 or 460 volts)

SMALL ELECTRIC MOTOR. A general purpose, alternating current, single speed induction motor.

Add new standard to Chapter 5 as follows:

DOE

10 CFR 431 Subpart B, App B, Uniform Test Method for Measuring Nominal Full Load Efficiency of Electric Motors.

NEMA National Electrical Manufacturers Association
 1300 North 17th Street, Suite 1752
 Rosslyn, VA 22209

MG1-2011 Motors and Generators.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has been revised with respect to electric motor efficiency provisions, an issue not currently addressed in the IECC Commercial Provisions. The change ensures continued consistency between the IECC and standard 90.1-2010 and addresses an important component associated with improving building energy efficiency.

Cost Impact: The code change proposal will increase the cost of construction.

CE331-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.8-EC-FERGUSON.doc

CE332 – 13

C405.8 (NEW), C405.8.1 (NEW)

Proponent: Lee Kranz, City of Bellevue, WA, representing Washington Association of Building Officials Technical Code Development (WABO TCD)

Add new text as follows:

C405.8 Variable speed escalators and moving walks. Escalators and moving walks shall be capable of reducing their operating speed to no more than 15 feet per minute when no passengers have been detected for a period of time not exceeding three times the amount of time required to transfer a passenger between landings.

Exception: A power factor controller that reduces operating voltage in response to light loading conditions is permitted to be provided in place of the variable speed function.

C405.8.1 Regenerative drive. An escalator designed either for one-way down operation only or for reversible operation shall have a variable frequency regenerative drive that supplies electrical energy to the building electrical system when the escalator is loaded with passengers whose combined weight exceeds 750 pounds.

Reason: This proposal will result in reduced energy use and longer equipment life due to reduced wear and tear during the hours on standby mode or light loading conditions. These escalator controls have been standard in Canada, Europe and most of Asia for many years. The 2010 ANSI/ASME A17.1 safety standard for elevators and escalators now allows use of escalators and moving walks with “sleep mode” for reducing speed during unoccupied periods and provides for their safe operation. Sensors detect approaching passengers and bring the escalator or walk up to full speed before the passenger steps on. The 750-pound threshold for activation of the regenerative drive is derived from the 5-passenger threshold mentioned in manufacturers’ literature (5 passengers x 150# = 750).

Energy savings:

The energy consumed by a typical pair of escalators is approximately 24,000 – 36,000 kWh per year, and the predicted energy savings ranges between 25% and 60%. The higher figure applies to escalators that have bursts of usage at wide intervals, as occurs with performing arts or transportation facilities. The lower figure would apply where usage is scattered throughout the day, as in shopping malls or office buildings. Annual savings per pair of escalators would equate to an energy cost savings of \$600 - \$2,140. The installed cost of escalators would typically increase by 1% - 4%, although one major manufacturer now includes these capabilities as standard for all escalators.

Cost Impact: The code change proposal will increase the cost of construction.

CE332-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405.8-EC-KRANZ.doc

CE333 – 13

C405 (NEW), C405.1 (NEW), C405.2 (NEW), Chapter 5

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new text as follows:

C405 Vertical and horizontal transportation systems and equipment. Vertical and horizontal transportation systems and equipment shall comply with this section.

C405.1 Elevator cabs. For the luminaires in each elevator cab, not including signals and displays, the sum of the lumens divided by the sum of the watts shall be no less than 35 lumens per watt. Ventilation fans in elevators that do not have their own air conditioning system shall not consume more than 0.33 watts/cfm at the maximum rated speed of the fan. Controls shall be provided that will de-energize ventilation fans and lighting systems when the elevator is stopped, unoccupied and with its doors closed for over 15 minutes.

C405.2 Escalators and moving walks. Escalators and moving walks shall comply with ASME A17.1/CSA B44 and shall have automatic controls configured to reduce speed to the minimum permitted speed in accordance with ASME A17.1/CSA B44 or applicable local code when not conveying passengers.

Add new standard to Chapter 5 as follows:

ASME

ASME/A17.1/CSA B44-2010 Safety Code for Elevators and Escalators

Reason: Energy is used in lighting and ventilating elevators when in operation and when not in operation. ASHRAE/IES Standard 90.1-2010, which is adopted by reference in the IECC Commercial Provisions, contains provisions to reduce the amount of energy used by elevators. This change ensures consistency between the IECC Commercial Provisions and standard 90.1 and owners/developers who choose to comply with standard 90.1 via the IECC are afforded this opportunity to save energy and reduce their operating costs.

Cost Impact: The code change proposal will increase the cost of construction if controls for ventilation on fans and systems are required.

CE333-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405 (NEW) #1-EC-FERGUSON.doc

CE334 – 13

C405 (NEW), Chapter 5

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new text as follows:

C405 Escalators and moving walks. Escalators and moving walks shall comply with ASME A17.1/CSA B44 and shall have the capability to automatically reduce to the minimum permitted speed in ASME A17.1/CSA B44 when not conveying passengers.

Add new standard to Chapter 5 as follows:

ASME

ASME/A17.1/CSA B44-2010 Safety Code for Elevators and Escalators

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has been revised to address energy efficiency opportunities available through automatic reduction in rate of travel when not being used. The change ensures continued consistency between the IECC and standard 90.1-2010 and through reference to ASME A17.1/CSA B44, which is adopted by reference in the IBC, ensures consistency within the ICC International Codes.

Cost Impact: The code change proposal will increase the cost of construction.

CE334-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C405 (NEW) #2-EC-FERGUSON.doc

CE335 – 13

C406.1, C406.2, C406.3, C406.3.1

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C406.1 Requirements. Buildings shall comply with at least one of the following:

1. ~~More efficient HVAC equipment performance~~ in accordance with Section C406.2.
2. ~~Reduced efficient lighting power density system~~ in accordance with Section C406.3.
3. On-site supply of renewable energy in accordance with Section C406.4.

C406.2 ~~More efficient HVAC performance equipment~~. Equipment shall meet the minimum efficiency requirements of Tables C406.2.(1) through C406.2(7) in addition to the requirements in Section C403. This section shall only be used where the equipment efficiencies in Tables C406.2(1) through C406.2(7) are greater than the equipment efficiencies listed in Table C403.2.3(1) through 403.2.3(7) for the equipment type.

C406.3 ~~Efficient lighting system~~ Reduced lighting power density. ~~Whole building lighting power density (Watts/sf) shall comply with the requirements of Section C406.3.1.~~

C406.3.1 ~~Reduced lighting power density~~. The total interior lighting power (watts) of the building shall ~~be determined not exceed by using the reduced whole building interior lighting power in the sum of the results from multiplying the appropriate values in Table C406.3 times by the floor area for the each building area types. For the purposes of this option the determination of areas and their application to each building type shall be in accordance with Section C405.5.2.~~

Reason: This proposal simplifies and clarifies the provisions associated with additional energy efficiency options packages. The objective of this proposal is to clarify and simplify the code to foster implementation and compliance verification. The intent of the HVAC package option is to install more efficient HVAC equipment than provided for in the minimum code. The intent of the lighting package option is to reduce the allowable LPD in Table C405.5.2(1) by a set amount. The proposed revisions convey more clearly what is intended. There are provisions in Section C405.5.2 affecting the calculation that still apply and should be referenced to ensure the code is consistent between the base code and this package option with respect to how the floor area for each building or building type is determined and applied.

Cost Impact: The code change proposal will not increase the cost of construction.

CE335-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C406.1-EC-WILLIAMS.doc

CE336 – 13

C406.1.1 (NEW)

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

SECTION C406

ADDITIONAL EFFICIENCY PACKAGE OPTIONS

C406.1 Requirements. Buildings shall comply with at least one of the following:

1. Efficient HVAC Performance in accordance with Section C406.2.
2. Efficient Lighting System in accordance with Section C406.3.
3. On-Site Supply of Renewable Energy in accordance with Section C406.4.

C406.1.1. Tenant spaces. Except where an entire building is in compliance with Section C406.4, individual tenant spaces shall comply with either Section C406.2 or Section C406.3. ~~unless documentation can be provided that demonstrates compliance with Section C406.4 for the entire building~~

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

The proposal is a reformat of the second paragraph to clarify how it should be applied. The phrasing 'unless documentation can be provided that demonstrates compliance' is unnecessary language within an International Code. Such phrases are redundant with the purposes and intent of Chapter C1 – Administration. All code compliance is documented by submitted plans and inspections. The intent of this section is to allow tenant spaces to be evaluated or approved on a space by space basis unless the building has already found to comply.

Cost Impact: The code change proposal will not increase the cost of construction. The proposal is editorial in nature and will not affect the cost of construction.

CE336-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C406.1.1 (NEW)-EC-THOMPSON-SEHPCAC

CE337 – 13

C202 (NEW), C406.1, C406.2, Table C406.2(1), Table C406.2(2), Table C406.2(3), Table C406.2(4), Table C406.2(5), Table C406.2(6), Table C406.2(7), C406.3, C406.4, C406.5 (NEW), C406.6 (NEW), C406.8 (NEW), C406.8.1 (NEW)

Proponent: Eric Makela, Britt/Makela Group, Inc., representing Northwest Energy Codes Group (eric@brittmakela.com), Jim Edelson, New Buildings Institute

Revise as follows:

C406.1 Requirements. Buildings shall comply with at least one of the following:

1. More efficient HVAC equipment performance in accordance with Section C406.2.
2. Reduced efficient lighting power density system in accordance with Section C406.3.
3. Enhanced lighting controls in accordance with Section C406.4
4. On-site supply of renewable energy in accordance with Section C406.5.
5. Provision of a dedicated outdoor air system for certain HVAC equipment in accordance with Section C406.6.
6. High efficiency service water heating in accordance with Section C406.8.

C406.2. More efficient HVAC equipment performance. Equipment shall exceed the minimum efficiency requirements listed in Tables C403.2.3(1) through 403.2.3(7) by 10 percent in addition to the requirements of Section C403. Where multiple performance requirements are provided, the equipment shall exceed all requirements by 10 percent. *Variable refrigerant flow systems* shall exceed the energy efficiency provisions of ANSI/ASHRAE/IES 90.1 by 10 percent. Equipment not listed in Tables C403.2.3(1) through 403.2.3(7) shall be limited to 10 percent of the total building system capacity.

TABLE C406.2(1)
UNITARY AIR CONDITIONERS AND CONDENSING UNITS, ELECTRICALLY OPERATED,
EFFICIENCY REQUIREMENTS

EQUIPMENT TYPE	SIZE CATEGORY	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY ^a	
			CLIMATE ZONES 1–5	CLIMATE ZONES 6–8
Air conditioners, air-cooled	< 65,000 Btu/h	Split system	15.0 SEER 12.5 EER	14 SEER 12 EER
		Single package	15.0 SEER 12.0 EER	14.0 SEER 11.6 EER
	≥ 65,000 Btu/h and < 240,000 Btu/h	Split system and single package	12.0 EER ^b 12.54 IEER ^b	11.5 EER ^b 12.0 IEER ^b
	≥ 240,000 Btu/h and < 760,000 Btu/h	Split system and single package	10.8 EER ^b 11.3 IEER ^b	10.5 EER ^b 11.0 IEER ^b
	≥ 760,000 Btu/h	—	10.2 EER ^b 10.7 IEER ^b	9.7 EER ^b 10.2 IEER ^b
Air conditioners, water and evaporatively cooled	—	Split system and single package	14.0 EER	14.0 EER

For SI: 1 British thermal unit per hour = 0.2931 W.

a. IEERs are only applicable to equipment with capacity modulation.

b. Deduct 0.2 from the required EERs and IPLVs for units with a heating section other than electric resistance heat.

TABLE C406.2(2)
UNITARY AND APPLIED HEAT PUMPS, ELECTRICALLY OPERATED, EFFICIENCY REQUIREMENTS

EQUIPMENT TYPE	SIZE CATEGORY	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY ^a	
			CLIMATE ZONES 1-5	CLIMATE ZONES 6-8
Air cooled (Cooling mode)	< 65,000 Btu/h	Split system	15.0 SEER, 12.5 EER	14.0 SEER, 12.0 EER
		Single package	15.0 SEER, 12.0 EER	14.0 SEER 11.6 EER
	≥ 65,000 Btu/h and < 240,000 Btu/h	Split system and single package	12.0 SEER, 12.4 EER	11.5 EER ^b , 12.0 IEER ^b
	≥ 240,000 Btu/h	Split system and single package	12.0 SEER, 12.4 EER	10.5 EER ^b , 10.5 IEER ^b
Water sources (Cooling mode)	< 135,000 Btu/h	85°F entering water	14.0 EER	14.0 EER
Air cooled (Heating mode)	< 65,000 Btu/h (Cooling capacity)	Split system	9.0 HSPF	8.5 HSPF
		Single package	8.5 HSPF	8.0 HSPF
	≥ 65,000 Btu/h and < 135,000 Btu/h (Cooling capacity)	47°F db/43°F wb -outdoor air	3.4 COP	3.4 COP
		17°F db/15°F wb -outdoor air	2.4 COP	2.4 COP
	≥ 135,000 Btu/h (Cooling capacity)	47°F db/43°F wb -outdoor air	3.2 COP	3.2 COP
		77°F db/15°F wb -outdoor air	2.1 COP	2.1 COP
Water sources (Heating mode)	< 135,000 Btu/h (Cooling capacity)	70°F entering water	4.6 COP	4.6 COP

For SI: °C = [(°F) - 32] / 1.8, 1 British thermal unit per hour = 0.2931 W.

db = dry-bulb temperature, °F; wb = wet-bulb temperature, °F.

a. IEERs and Part load rating conditions are only applicable to equipment with capacity modulation.

b. Deduct 0.2 from the required EERs and IPLVs for units with a heating section other than electric resistance heat.

TABLE C406.2(3)
PACKAGED TERMINAL AIR CONDITIONERS AND PACKAGED TERMINAL HEAT PUMPS

EQUIPMENT TYPE	SIZE CATEGORY	MINIMUM EFFICIENCY
Air conditioners and heat pumps (cooling mode)	< 7,000 Btu/h	11.9 EER
	7,000 Btu/h and < 10,000 Btu/h	11.3 EER
	10,000 Btu/h and ≤ 13,000 Btu/h	10.7 EER
	> 13,000 Btu/h	9.5 EER

TABLE C406.2(4)
WARM AIR FURNACES AND COMBINATION WARM AIR FURNACES/AIR-CONDITIONING UNITS, WARM AIR DUCT FURNACES AND UNIT HEATERS, EFFICIENCY REQUIREMENTS

EQUIPMENT TYPE	SIZE CATEGORY (INPUT)	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY	TEST PROCEDURE
Warm air furnaces, gas fired ^a	<225,000 Btu/h	—	For Climate Zones 1 and 2 -NR	DOE 10 CFR Part 430 or ANSI Z21.47
			For Climate Zones 3 and 4 90 AFUE or 90 E_t^e	
			For Climate Zones 4—8 92 AFUE or 92 E_t^e	
	≥225,000 Btu/h	Maximum capacity	90% E_c^b	ANSI Z21.47
Warm air furnaces, oil fired ^a	<225,000 Btu/h	—	For Climate Zones 1 and 2 -NR	DOE 10 CFR Part 430 or UL 727
			For Climate Zones 3—8 85 AFUE or 85 E_t^e	
	≥225,000 Btu/h	Maximum capacity	85% E_t^b	UL 727
Warm air duct furnaces, gas fired ^a	All capacities	Maximum capacity	90% E_c	ANSI Z83.8
Warm air unit heaters, gas fired	All capacities	Maximum capacity	90% E_c	ANSI Z83.8
Warm air unit heaters, oil fired	All capacities	Maximum capacity	90% E_c	UL 731

For SI: 1 British thermal unit per hour = 0.2931 W.

E_t = Thermal efficiency. E_c = Combustion efficiency (100 percent less flue losses).

a. Efficient furnace fan: Fossil fuel furnaces in climate zones 3 to 8 shall have a furnace electricity ratio not greater than 2 percent and shall include a manufacturer's designation of the furnace electricity ratio.

b. Units shall also include an IID (intermittent ignition device), have jacket losses not exceeding 0.75 percent of the input rating, and have either power venting or a flue damper. A vent damper is an acceptable alternative to a flue damper for those furnaces where combustion air is drawn from the conditioned space.

c. Where there are two ratings for units not covered by NAECA (3-phase power or cooling capacity greater than or equal to 65,000 Btu/h [19 kW]), units shall be permitted to comply with either rating.

TABLE C406.2(5)
BOILER, EFFICIENCY REQUIREMENTS

EQUIPMENT TYPE	FUEL	SIZE CATEGORY	TEST PROCEEDURE	MINIMUM EFFICIENCY
Steam	Gas	<300,000 Btu/h	DOE 10 CFR Part 430	83% AFUE
		≥300,000 Btu/h and ≥2.5 m Btu/h	DOE 10 CFR Part 431	81% E_t
		≥2.5 m Btu/h		82% E_c
	Oil	<300,000 Btu/h	DOE 10 CFR Part 430	85% AFUE
		≥300,000 Btu/h and ≥2.5 m Btu/h	DOE 10 CFR Part 431	83% E_t
		≥2.5 m Btu/h		84% E_c
Hot water	Gas	<300,000 Btu/h	DOE 10 CFR Part 430	97% AFUE
		≥300,000 Btu/h and ≥2.5 m Btu/h	DOE 10 CFR Part 431	97% E_t
		≥2.5 m Btu/h		94% E_c

	Oil	< 300,000 Btu/h	DOE 10 CFR Part 430	90% AFUE
		> 300,000 Btu/h and > 2.5 m Btu/h	DOE 10 CFR Part 431	88% E_t
		> 2.5 m Btu/h		87% E_e

For SI: 1 British thermal unit per hour = 0.2931 W.

E_t = Thermal efficiency. E_e = Combustion efficiency (100 percent less flue losses).

**TABLE C406.2(6)
CHILLERS—EFFICIENCY REQUIREMENTS**

EQUIPMENT TYPE	SIZE CATEGORY	UNITS	MINIMUM EFFICIENCY ^a (I-P)				Test Procedure ^b
			Path A		Path B ^c		
			Full Load	IPLV	Full Load	IPLV	
Air-cooled chillers with condenser, electrically operated	< 150 tons	EER	10.000	12.500	NA	NA	AHRI 550/590 ^f
	≥ 150 tons	EER	10.000	12.750	NA	NA	
Air-cooled without condenser, electrical operated	All capacities	EER	Condenserless units shall be rated with matched condensers				AHRI 550/590 ^f
Water-cooled, electrically operated, positive displacement (reciprocating)	All capacities	kw/ton	Reciprocating units required to comply with water-cooled positive displacement requirements				AHRI 550/590 ^f
Water-cooled electrically operated, positive displacement	< 75 tons	kw/ton	0.780	0.630	0.800	0.600	AHRI 550/590 ^f
	≥ 75 tons and < 150 tons	kw/ton	0.775	0.615	0.790	0.586	
	≥ 150 tons and < 300 tons	kw/ton	0.680	0.580	0.718	0.540	
	≥ 300 tons	kw/ton	0.620	0.540	0.639	0.490	
Water-cooled electrically operated, centrifugal ^d	< 150 tons	kw/ton	0.634	0.596	0.639	0.450	AHRI 550/590 ^f
	≥ 150 tons and < 300 tons	kw/ton	0.634	0.596	0.639	0.450	
	≥ 300 tons and < 600 tons	kw/ton	0.576	0.549	0.600	0.400	
	≥ 600 tons	kw/ton	0.570	0.539	0.590	0.400	
Air-cooled absorption single effect ^e	All capacities	COP	0.600	NR	NA	NA	AHRI 560
Water-cooled absorption single effect ^e	All capacities	COP	0.700	NR	NA	NA	
Absorption double effect indirect-fired	All capacities	COP	1.000	1.050	NA	NA	
Absorption double effect direct-fired	All capacities	COP	1.000	1.000	NA	NA	

For SI: 1 Ton = 3516 W.

NA = Not applicable and cannot be used for compliance. NR = No minimum requirements.

a. Compliance with this standard can be obtained by meeting the minimum requirements of Path A or Path B. However both the full load and IPLV shall be met to fulfill the requirements of Path A and Path B.

b. Chapter 6 of the referenced standard contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.

c. Path B is intended for applications with significant operating time at part load. All Path B machines shall be equipped with demand limiting capable controls.

d. The chiller equipment requirements do not apply for chillers used in low-temperature applications where the design leaving fluid temperature is greater than 40°F.

e. Only allowed to be used in heat recovery applications.

f. Packages that are not designed for operation at ARI Standard 550/590 test conditions (and, thus, cannot be tested to meet the requirements of Table C-3) of 44°F leaving chilled-water temperature and 85°F entering condenser-water temperature with 3 gpm/ton condenser-water flow shall have maximum full-load kW/ton and NPLV ratings adjusted using the following equation:

— Adjusted maximum full load kW/ton rating = (full load kW/ton from Table C-3)/ K_{adj}

— Adjusted maximum NPLV rating = (IPLV from Table C-3)/ K_{adj}

—where:

$$K_{adj} = 6.174722 - 0.303668(X) + 0.00629466(X)^2 - 0.000045780(X)^3$$

$$X = DT_{std} + LIFT \text{ (°F)}$$

$$DT_{std} = [(24 + (\text{full load kW/ton from Table C-3}) \times 6.83)] / \text{flow (°F)}$$

$$\text{Flow} = \text{condenser water flow (gpm)} / \text{cooling full load capacity (tons)}$$

$$LIFT = CEWT - CLWT \text{ (°F)}$$

$$CEWT = \text{full load entering condenser water temperature (°F)}$$

$$CLWT = \text{full load leaving chilled water temperature (°F)}$$

—The adjusted full load and *NPLV* values are only applicable over the following full load design ranges:

—Minimum leaving chilled water temperature: 38°F

—Maximum condenser entering water temperature: 102°F

—Condenser water flow: 1 to 6 gpm/ton

$$X \geq 39^\circ\text{F and } \leq 60^\circ\text{F}$$

TABLE C406.2(7)
ABSORPTION CHILLERS—EFFICIENCY REQUIREMENTS

EQUIPMENT TYPE	MINIMUM EFFICIENCY FULL LOAD COP (IPLV)
Air cooled, single effect	0.60, allowed only in heat recovery applications
Water cooled, single effect	0.70, allowed only in heat recovery applications
Double effect—direct fired	1.0 (1.05)
Double effect—indirect fired	1.20

C406.3 Reduced lighting power density. The total interior lighting power (watts) of the building shall be determined by using 90 percent of the lighting power values in Table C405.5.2(1)~~the reduced whole building interior lighting power in Table C406.3 times the floor area of the building types or by using 90 percent of the interior lighting power allowance calculated by the Space by Space method in section C405.5.2.~~

C406.4 Enhanced digital lighting controls. Interior lighting in the building shall have the following enhanced lighting controls which shall be located, scheduled, and operated in accordance with Section C405.2.2.

1. Luminaires shall be capable of continuous dimming.
2. Luminaires shall be capable of being addressed individually. Where individual addressability is not available for the luminaire class type, a controlled group of no more than 4 luminaires shall be allowed.
3. No more than 8 luminaires shall be controlled together in a *daylight zone*.
4. Fixtures shall be controlled through a digital control system that includes the following function:
 - 1.1. Control reconfiguration based on digital addressability
 - 1.2. Load shedding
 - 1.3. Individual user control of overhead general illumination in open offices
 - 1.4. Occupancy sensors shall be capable of being reconfigured through the digital control system.
5. Construction documents shall include submittal of a Sequence of Operations, including a specification outlining each of the functions in Item 4 of Section C406.4.
6. Functional testing of lighting controls shall comply with Section 408.

~~C406.4~~ **C406.5 On-site renewable energy** Total minimum ratings of on-site renewable energy systems shall comply with one of the following:

1. Provide not less than 1.75 btu's, or not less than 0.50 watts, per square foot of conditioned floor area.

2. Provide not less than 3 percent of the energy used within the building for building mechanical and service water heating equipment and lighting regulated in Chapter 4;

C406.6 Dedicated outdoor air system. Buildings covered by Section C403.4 shall be equipped with an independent ventilation system designed to provide no less than the minimum 100 percent outdoor air to each individual occupied space as specified by the *International Mechanical Code*, to each individual occupied space. The ventilation system shall be capable of total energy recovery. The HVAC system shall include supply-air temperature controls that automatically reset the supply-air temperature in response to representative building loads, or to outdoor air temperatures. The controls shall reset the supply air temperature at least 25 percent of the difference between the design supply-air temperature and the design room air temperature.

C406.7 Reduced energy use in service water heating. Buildings shall be of the following types to use this compliance method:

1. Group R-1, Boarding houses, Hotels or motels;
2. Group I-2, Hospitals, mental hospitals, and nursing homes;
3. Group A-2, Restaurants and Banquet halls or buildings containing food preparation areas;
4. Group F, Laundries;
5. Group R-2 Buildings with residential occupancies;
6. Group A-3 Health clubs and spas; or
7. Buildings showing a service hot water load of 10 percent or more of total building energy loads as shown with an energy analysis as described in Section C407.

C406.7.1 Load fraction. The building service water heating system shall have one or more of the following that are sized to provide at least 60 percent of hot water requirements, or sized to provide 100 percent of hot water requirements if the building must otherwise comply with Section C403.4.6:

1. Waste heat recovery from service hot water, heat recovery chillers, building equipment, process equipment, or a combined heat and power system.
2. Solar water heating systems.

Add new definition as follows:

SECTION C202 GENERAL DEFINITIONS

VARIABLE REFRIGERANT FLOW SYSTEM. An engineered direct expansion (DX) refrigerant system that incorporates a common condensing unit, at least one variable capacity compressor, a distributed refrigerant piping network to multiple indoor fan heating and cooling units each capable of individual zone temperature control, through integral zone temperature control devices and common communications network. Variable refrigerant flow utilizes three or more steps of control on common inter-connecting piping.

Reason: This proposal increases the number of optional packages in the IECC from three to six for compliance with Section C406, in addition to the modeling options available both in Section 507 of the IECC and the Energy Cost Budget method of ASHRAE 90.1. The purpose of this section is to provide flexibility for compliance, and to recognize that all buildings may not be able to meet higher levels of efficiency in today's prescriptive model codes without providing options. The specifications included in the six approximately equal energy packages were based on preliminary modeling done by New Buildings Institute.

HVAC

The equipment tables have been removed and replaced with a requirement for a 10% increase in efficiency over the base requirements. This will ensure that the HVAC equipment efficiency levels contained in this section provide the necessary energy savings over equipment efficiencies contained in Section C403. This will allow the base efficiencies to be increased in future code cycles without needing to make corresponding changes to Section C406. The proposed option limits the use of heating and cooling equipment not listed in the C403 tables to no more than 10% of the total building capacity. This would allow some systems, e.g. electric resistance heat, to be used in a limited capacity for the proposed project and still allow the code user to use this option. Under the 2012 IECC all systems must comply with the equipment efficiency requirements.

LPD

The LPD tables have been removed and replaced with a requirement for a 10% increase in efficiency over the base requirements for whole building or space-by-space. This will ensure that the LPD levels contained in this section provide the necessary energy

savings over the LPDs contained in Section C405. This will allow the base efficiencies to be increased in future code cycles without needing to make corresponding changes to Section C406. The 2012 IECC Additional Package Options only allowed whole building LPDs to be used. This proposal allows the use of space-by-space LPDs to provide more flexibility to the code user thereby increasing the viability of this option. The values proposed in this section are similar to those included as part of ASHRAE Standard 189.1.

The renewable option has not been modified from the 2012 IECC and provides three straightforward compliance approaches: electricity generation, thermal collection, and a calculation method for any type or combination of energy production. A path to include purchase of renewable power or credits was carefully considered, but not included based on concerns regarding verification and permanence of the transaction after the certificate of occupancy has been issued.

The Dedicated Outdoor Air System package is based on technical specifications from the 50% Technical Support Documents of the Pacific Northwest National Lab. The measure requires that adequate quantity of outside air is delivered separately to spaces in the buildings while employing 100% energy recovery. This reduces the need for excess outdoor air or supply air, and uses less energy for terminal reheating.

The Enhanced Lighting Controls Package provides a non-LPD lighting alternative package requires a digital control system to allow continuous dimming and a significant level of controllability on individual luminaires, or groups of no more than eight luminaires.

The Service Water Heating Package language is modified from similar language in the IgCC and the 2012 North Carolina commercial code. The requirements for use of waste energy to heat service hot water are in excess of what is otherwise required in Section C403 of the IECC, when applicable. Solar thermal water heating systems may also be used. This package is independent of the package offered in Section C406.5 since only one package is required for compliance with Section 406 in total.

Cost Impact: The code change proposal will not increase the cost of construction.

CE337-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C406.1-EC-EDELSON-MAKELA.doc

CE338 – 13

Table C406.2(5)

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

TABLE C406.2(5)
BOILER EFFICIENCY REQUIREMENTS

EQUIPMENT TYPE	FUEL	SIZE CATEGORY	TEST PROCEEDURE	MINIMUM EFFICIENCY
Steam	Gas	< 300,000 Btu/h	DOE 10 CFR Part 430	83% AFUE
		> 300,000 Btu/h and > 2.5 m Btu/h	DOE 10 CFR Part 431	81% E_t
		>2.5 m Btu/h		82% E_c
	Oil	< 300,000 Btu/h	DOE 10 CFR Part 430	85% AFUE
		> 300,000 Btu/h and > 2.5 m Btu/h	DOE 10 CFR Part 431	83% E_t
		>2.5 m Btu/h		84% E_c
Hot water	Gas	< 300,000 Btu/h	DOE 10 CFR Part 430	97% <u>94%</u> AFUE
		> 300,000 Btu/h and > 2.5 m Btu/h	DOE 10 CFR Part 431	97% <u>89%</u> E_t
		>2.5 m Btu/h		94% <u>91%</u> E_c
	Oil	< 300,000 Btu/h	DOE 10 CFR Part 430	90% AFUE
		> 300,000 Btu/h and > 2.5 m Btu/h	DOE 10 CFR Part 431	88% E_t
		>2.5 m Btu/h		87% E_c

For SI: 1 British thermal unit per hour = 0.2931 W.

E_t = Thermal efficiency. E_c = Combustion efficiency (100 percent less flue losses).

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

Reasons for this specific proposal:

This table was originally intended to match the State of Massachusetts Stretch Code values. State of Massachusetts modified their boiler figures below even the AEDG levels due to push-back and local study. MA. went with ASHRAE 189.1 levels. State of NY is following this same path and using the MA. efficiency figures for their adoption of 2012 IECC.

This proposal does not reduce the intended efficiency levels for Section 406: the levels will remain at least 10% over the current federal minimum efficiency standards through 2018.

There are no updates at the EERE or ASHRAE web sites available to show that federal minimum efficiency levels will change for this equipment prior to the release of the 2018 IECC. Some sources point to possible updates in 2020 for some boiler types, but unable to confirm at EERE (US DOE) or via Federal Register. Unlike residential furnaces (effective May 1, 2013), residential (under 300 MBH) boilers efficiencies were not updated in the latest ASHRAE 90.1

The proposal is to correct the tables to a useable and adoptable set of figures. Boiler efficiencies raise nearly 20% above federal minimums. Intent of Section C406 was for an average 10% efficiency increase. Gas-fired hot water boilers singled out for much higher efficiency improvement than oil-fired or steam boilers.

Boilers at these efficiencies are nearly non-existent. The I-B-R listed equipment can be found at the following link (<http://www.ahridirectory.org/ahridirectory/pages/cblr/defaultSearch.aspx>) and the table can list all units by efficiency. An Excel file with efficiencies can be exported for review. Old I=B=R certification listings no longer available at AHRI web site. (Can furnish as an attachment).

NOTATION TO INCLUDED DOCUMENTS:

- I=B=R listing & Massachusetts Stretch code supplement.
- For the 97% AFUE, there are only 7 boilers manufactured listed at this efficiency, by only 5 manufacturers that can prove efficiency (Energy Star). Need to list standard for testing/proof of ratings: big issue with "claims" of efficiency. http://www.energystar.gov/index.cfm?fuseaction=find_a_product.showProductGroup&pgw_code=BO
- For 97% E_t, there are only the following (I=B=R certified product directory; nothing new from AHRI/GAMA):
 - 1 Buderus unit (not the series of boilers)
 - 1 RayPak model series
 - RBl: One unit (not the series of boilers)
 - Viessman: 5 of 6 units
- For 94% E_c, Large units >2.5 Million: Only two manufacturers
 - 1 Buderus model line (3 sizes)
 - 1 Viessmann model line (many sizes)

Cost Impact: The change will not increase the cost of construction, but may reduce it by making more equipment available to meet the requirement.

CE338-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C406.2(5)T-EC-THOMPSON-SEHPCAC

CE339 – 13

C406.2, Table C406.2(7)

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C406.2 Efficient HVAC performance. Equipment shall meet the minimum efficiency requirements of Tables C406.2(1) through ~~C406.2(7)~~ C406.2(6) in addition to the requirements in Section C403. This section shall only be used where the equipment efficiencies in Tables C406.2(1) through ~~C406.2(7)~~ C406.2(6) are greater than the equipment efficiencies listed in Table C403.2.3(1) through ~~403.2.3(7)~~ 403.2.3(6) for the equipment type.

TABLE C406.2(7)
ABSORPTION CHILLERS EFFICIENCY REQUIREMENTS

EQUIPMENT TYPE	MINIMUM EFFICIENCY FULL LOAD COP (IPLV)
Air cooled, single effect	0.60, allowed only in heat recovery applications
Water cooled, single effect	0.70, allowed only in heat recovery applications
Double effect – direct fired	1.0 (1.05)
Double effect – indirect fired	1.20

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

Reasons for this specific proposal:

Absorption chillers for air cooled, single effect and water cooled, single effect, absorption double effect indirect fired, and absorption double effect direct fired are listed in both Tables C406.2(6) and C406.2(7). The data is the same in the tables except for double effect- indirect fired minimum efficiency full load COP (IPLV) requirements. The data shown in Table C406.2(6) is correct and agrees with ASHRAE 90.1. Delete Table C406.2(7) as data is in Table C406.2(6). Revise Section C406.2 as it references Table C406.2(7) and it is deleted. This will resolve the overlap in the two tables regulating 'absorption chillers.'

Cost Impact: The code change proposal will not increase the cost of construction. The proposal is editorial in nature and will have no impact on the cost of construction.

CE339-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

C406.2(7)T-EC-THOMPSON-SEHPCAC

CE340 – 13

C406.3, Table C406.3, C406.3.1

Proponent: Glenn Heinmiller, Lam Partners, representing International Association of Lighting Designers (glen@lampartners.com)

Revise as follows:

C406.3 ~~Efficient lighting system.~~ Whole building lighting power density (Watts/sf) shall comply with the requirements of Section C406.3.1. **Reduced lighting power density.** The lighting power allowance shall be 90 percent of the lighting power allowance determined according to Section C405.5.2.

C406.3.1 ~~Reduced lighting power density.~~ The total interior lighting power (watts) of the building shall be determined by using the reduced whole building interior lighting power in Table C406.3 times the floor area for the building types.

**TABLE C406.3
REDUCED INTERIOR LIGHTING POWER**

Reason: Simplify and clarify the code. Allow proper design flexibility without reducing stringency.

As currently written, this option only allows the use of Building Area Method lighting power densities according to the values in table C406.3, which are 10% below base code. This prevents the designer from using the space-by-space method to determine the lighting power allowance for this additional efficiency option. This proposal simply requires a 10% reduction in the lighting power from what is allowed in base code. It does not change stringency and it simplifies the code. Also it means that whenever the base code LPD values are updated, no changes to this option will need to be made. No table will need to be revised.

Cost Impact: The code change proposal will not increase the cost of construction.

CE340-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C406.3-EC-HEINMILLER.doc

CE341 – 13

C406.3.1

Proponent: David Handwork, Arkansas State University

Revise as follows:

C406.3.1 Reduced lighting power density. The total interior lighting power (watts) of the building shall be determined by using the reduced whole building interior lighting power in Table C406.3 times the floor area for the building types. Conversion of existing spaces to lighting power densities recommended in Table 406.6 shall be permitted to follow a program acceptable to the authority having jurisdiction.

Reason: While a supporter of all practical energy conservation concepts, the education facilities industry needs to see scalable conformity options as bright line language in this code.

Cost Impact: This code change proposal will not increase the cost of construction. Granting Owners more scalable options regarding lighting retrofits generally reduces costs.

CE341-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C406.3.1-EC-HANDWORK.doc

CE342 – 13

C407.2

Proponent: Tim Nogler, Washington State Building Code Council (tim.nogler@des.wa.gov)

Revise as follows:

C407.2 Mandatory requirements. Compliance with this section requires that the criteria of Sections C402.4, C403.2, C404 and C405 be met.

The permit application for projects utilizing this method shall include in one submittal all building and mechanical construction documents and all information necessary to verify that the building envelope and mechanical design for the project corresponds with the annual energy analysis. Where credit is proposed to be taken for lighting energy savings, an electrical permit application shall also be submitted and approved prior to the issuance of the permit. Where credit is proposed to be taken for energy savings from other components, construction details for those components shall be submitted with the permit application. Otherwise, components of the project that would not be approved as part of a permit application shall be modeled the same in both the proposed building and the *standard reference design* and shall comply with the requirements of this code.

Reason: This proposal addresses a common problem for building officials, that various portions of the construction are submitted under different permits at different times, whereas the document review staff needs to evaluate the entire "total building performance" with all information provided.

Cost Impact: The code change proposal will not increase the cost of construction.

CE342-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C407.2-EC-NOGLER.doc

CE343 – 13

C407.2, C407.2.1 (NEW)

Proponent: Brian Dean, ICC International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; Bill Prindle, Energy Efficient Codes Coalition; and Don Vigneau, Northeast Energy Efficiency Partnerships.

Revise as follows:

C407.2 Mandatory requirements. Compliance with this section requires that the criteria of Sections C402.4, C403.2, C404, ~~and C405~~ and C407.2.1 be met.

C407.2.1 Maximum fenestration U-factor and SHGC for compliance based on total building performance (Mandatory). For buildings complying with Section C407, the area-weighted average U-factor permitted for products within each fenestration product category listed in Table C402.3 shall not exceed the applicable U-factor specified in Table C402.3 by more than 25 percent. For buildings complying with Section C407, the area-weighted average SHGC permitted for products within each fenestration product category listed Table C402.3 shall not exceed the applicable SHGC specified in Table C402.3 by more than 50 percent.

Reason: The purpose of the proposed code change is to establish new maximum trade-off limits for fenestration under the commercial performance path. This proposal imports, from the residential *IECC* provisions, an effective backstop on fenestration trade-offs that has been in the *IECC* since 2004, but with some additional modifications and improvements. This new provision will ensure that modern, highly efficient commercial buildings are required to have at least moderately efficient windows:

- New section C407.2.1 would ensure that whenever the simulated performance alternative is used, the windows on a weighted average basis will meet a reasonable level of efficiency (no worse than 25% greater U-factor and 50% greater SHGC than the prescriptive requirements).
- The main difference between this new commercial section and the existing residential trade-off backstop is that the proposed provision would cap trade-offs at a percentage of the U-factor and SHGC requirements as they change over time rather than setting specific maximum values (we are also proposing to change the residential provision to the same approach).
- This approach will allow the cap to slide up or down to match future changes to the U-factor and SHGC requirements, while still ensuring that buildings are designed and constructed with windows that fall within a reasonable range of efficiency.

The fenestration trade-off limits currently found in the residential chapter of the *IECC* are simple, mandatory measures that ensure all new buildings contain high-quality, cost-effective windows that save energy, provide reasonable comfort, resist condensation in colder climates and block unwanted solar gain in warmer climates. Without the protection of this backstop, fenestration values could be traded away to levels unacceptable in modern building practice. Given the improvements to window efficiency brought about by the 2012 *IECC* and our nation's high priority for energy efficiency, this proposal is a common-sense extension of an effective code requirement.

- **Simple compliance.** The residential fenestration maximums are effective and easy to understand. These requirements have been successfully applied for the last several years. All states that have already adopted the 2006, 2009, and 2012 *IECC* have adopted these maximums to residential construction. On the residential side, they are also already seamlessly built into compliance software such as the Department of Energy's REScheck. The same approach would work for commercial building compliance software.
- **Flexible standard.** The area-weighted average approach embodied in the fenestration maximums allows considerable flexibility for the use of decorative glass, glass block, and other fenestration products, while maintaining a baseline performance for the building's overall glazing. In short, not all products are required to individually meet the maximum values; only the area-weighted average of all products in the building are required to meet the maximum values specified in this code provision.
- **Quality windows, energy savings and peak demand savings nationwide.** The fenestration maximums encourage the use of cost-effective energy-efficient windows nationwide. Because good windows reduce energy consumption both during peak cooling times in the summer months and during peak heating hours in the winter months, such windows can help reduce the strain on the electric grid and natural gas pipeline system and delay the need to build expensive peaking facilities. By reducing the trade-off of efficient windows for other measures, the maximums will better capture the benefits of blocking solar gain and providing reasonable insulating value such as peak reduction, reduced cooling system sizes and year-round comfort. Consumers will also enjoy the reduced costs that come with economies of scale and market transformation.
- **More comfortable buildings and less energy use.** Incremental changes in window efficiency can have a huge impact on occupant comfort because even the most efficient windows are, at best, still only the equivalent of about an R-3 wall in the winter. Moreover, unlike the opaque wall, even the best fenestration allows substantial summer solar heat gain into

the conditioned space. Hot spots created by high solar gain in the summer and/or cold or drafty glass in the winter months can force an occupant to adjust the thermostat to compensate. A good window will provide reasonable insulating value, keeping occupants more comfortable during the coldest months. Similarly, windows with low SHGC will protect against hot spots and occupant discomfort, and will make it less likely that occupants will need to adjust the thermostat and use more energy.

For a more detailed discussion of the benefits of good fenestration, see the section on the benefits of efficient windows on the website of the Efficient Windows Collaborative -- <http://www.efficientwindows.org/benefits.cfm>. The fenestration maximums have served an important role in ensuring residential energy efficiency for many years. We recommend that the fenestration maximums in the residential chapter of the *IECC* be duplicated, with the appropriate modifications, in the commercial chapter of the *IECC*.

Cost Impact: The code change proposal will not increase the cost of construction.

CE343-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C407.2-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE-VIGNEAU.doc

CE344 – 13

C407.3.1 (NEW), Chapter 5

Proponent: Mark Nowak, M. Nowak Consulting, LLC, representing Steel Framing Alliance

Add new text as follows:

C407.3.1 Alternative to proposed design. A representative building as described in NREL/TP-5500-46861 or other representative buildings approved by the code official shall be permitted to be used in lieu of the actual building design.

Add new standard to Chapter 5 as follows:

DOE

NREL/TP-5500-46861-11 Commercial Reference Building Models of the National Building Stock

Reason: This proposal will simplify the implementation of the code by allowing a representative building to be used for compliance rather than the actual building. Designers will only need to build a model for the representative building for a given climate zone. Likewise, simulation tool developers would be able to provide the buildings in library files for users. However, it will still leave the designer the option to comply with the actual propose building.

This represents a significant deviation from past and current practice but it is a logical step for the IECC to take. Given that the representative buildings are the basis for the current prescriptive requirements, they should be permitted to be used repeatedly for building design and compliance. This approach would allow the development of multiple prescriptive solutions equivalent to those in the code without cluttering up the code with pages of additional text.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, DOE-NREL/TP-5500-46861-2011 Commercial Reference Building Models of the National Building Stock, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

CE344-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C407.3.1 (NEW)-EC-NOWAK.doc

CE345 – 13

C407.4.1, C407.6

Proponent: Tim Nogler, Washington State Building Code Council (tim.nogler@des.wa.gov)

Revise as follows:

C407.4.1 Compliance report. ~~Compliance software tools shall generate~~ Permit submittals shall include a report that documents that the *proposed design* has annual energy costs less than or equal to the annual energy costs of the *standard reference design*. The compliance documentation shall include the following information:

1. Address of the building;
2. An inspection checklist documenting the building component characteristics of the *proposed design* as *listed* in Table C407.5.1(1). The inspection checklist shall show the estimated annual energy consumption for both the *standard reference design* and the *proposed design*;
3. Name of individual completing the compliance report; and
4. Name and version of the compliance software tool.

C407.6 Calculation software tools. Calculation procedures used to comply with this section shall be software tools capable of calculating the annual energy consumption of all building elements that differ between the *standard reference design* and the *proposed design* and shall include the following capabilities.

- ~~1. Computer generation of the *standard reference design* using only the input for the *proposed design*. The calculation procedure shall not allow the user to directly modify the building component characteristics of the *standard reference design*.~~
- ~~2. 1. Building operation for a full calendar year (8,760 hours).~~
- ~~3. 2. Climate data for a full calendar year (8,760 hours) and shall reflect *approved* coincident hourly data for temperature, solar radiation, humidity and wind speed for the building location.~~
- ~~4. 3. Ten or more thermal zones.~~
- ~~5. 4. Thermal mass effects.~~
- ~~6. 5. Hourly variations in occupancy, illumination, receptacle loads, thermostat settings, mechanical ventilation, HVAC equipment availability, service hot water usage and any process loads.~~
- ~~7. 6. Part-load performance curves for mechanical equipment.~~
- ~~8. 7. Capacity and efficiency correction curves for mechanical heating and cooling equipment.~~
- ~~9. 8. Printed *code official* inspection checklist listing each of the *proposed design* component characteristics from Table C407.5.1(1) determined by the analysis to provide compliance, along with their respective performance ratings (e.g., *R*-value, *U*-factor, SHGC, HSPF, AFUE, SEER, EF, etc.).~~

Reason: The proposal addresses the issue that no existing software tools are capable of meeting the requirements described in this section. If the language remains as written, the Total Building Performance path cannot be used.

This correction maintains a complete performance path for compliance with the Code, which promotes innovation and flexibility in design and construction.

Cost Impact: The code change proposal will not increase the cost of construction.

CE345-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C407.4.1-EC-NOGLER.doc

CE346 – 13

Table C407.5.1(1), Chapter 5

Proponent: Robert A. Zabcik, P.E., NCI Building Systems, Inc., representing Cool Metal Roofing Coalition

Revise as follows:

TABLE C407.5.1(1) SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSAL DESIGNS		
BUILDING COMPONENT CHARACTERISTICS	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Roofs	Type: Insulation entirely above deck	As proposed
	Gross Area: same as proposed	As proposed
	U-factor: from Table C402.1.2	As proposed
	Solar absorbance: 0.75 <u>Solar Reflectance: 0.25</u>	As proposed three-year aged solar reflectance^e
	Emittance: 0.90	As proposed three-year aged thermal emittance^e

e. Aged solar reflectance and thermal emittance shall be determined in accordance with CRRC-1.

(Portions of Table not shown remain unchanged)

Add new standard to Chapter 5 as follows:

CRRC Cool Roof Rating Council
1610 Harrison St
Oakland, CA 94612

CRRC-1-2012 CRRC-1 Standard

Reason: The use of initial values of solar reflectance (SR) and thermal emittance (TE) for computer modeling as opposed to three-year aged values is not representative of real-world conditions. Weathering of most roofing materials greatly changes the SR and to a lesser degree, the TE, as documented by Lawrence Berkeley and Oak Ridge National Laboratories. The California Energy Commission (CEC) Title 24 Building Energy Efficiency Standards has addressed this issue very effectively since 2005. By using 3-year aged SR and TE values, a more realistic modeling result is obtained; one that represents the performance of the roofing material during the life of the material rather than at the time of installation. The Cool Roof Rating Council (CRRC) has simultaneously developed the CRRC-1 standard to rigorously qualify the test procedures used to measure SR and TE, as well as the aging process. Thus, referencing the CRRC-1 standard is much more thorough than simply referencing the ASTM test methods used to measure SR and TE directly. The CRRC has recently been ANSI accredited to develop standards, further adding credibility. The change from solar absorbance to SR was made simply to make the nomenclature of Table C407.5.1(1) consistent with that of CRRC-1 and is based on numerical conversion; it does NOT represent a change in performance of the IECC.

It should be noted that ASHRAE made a similar change in the performance modeling requirements in Standard 90.1, Appendix G in 2010. 90.1 also provides default SR and TE values of 0.3 and 0.9 for SR and TE respectively. That approach could be taken here as well should the committee be concerned that aged data might not be readily available. However, since aged values for SR and TE are required in so many other standards nationwide, that data is generally available and there are aging formulas that modify the SR value based on curve fits. Such a formula has been used in the California Energy Commission (CEC) Building Energy Efficiency Standards since 2005.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, CRRC-1-2012 – CRRC-1 Standard, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

CE346-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C407.5.1(1)T-EC-ZABCIK.doc

CE347 – 13

Table C407.5.1(1)

Proponent: Dr. Thomas D. Culp, Birch Point Consulting LLC, representing the Glazing Industry Code Committee (culp@birchpointconsulting.com)

Revise as follows:

TABLE C407.5.1(1)
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT CHARACTERISTICS	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Space use classification	Same as proposed	The space use classification shall be chosen in accordance with Table C405.5.2 for all areas of the building covered by this permit. Where the space use classification for a building is not known, the building shall be categorized as an office building.
Roofs	Type: Insulation entirely above deck Gross area: same as proposed <i>U</i> -factor: from Table C402.1.2 Solar absorptance: 0.75 Emittance: 0.90	As proposed As proposed As proposed As proposed As proposed
Walls, above-grade	Type: Mass wall if proposed wall is mass; otherwise steel-framed wall Gross area: same as proposed <i>U</i> -factor: from Table C402.1.2 Solar absorptance: 0.75 Emittance: 0.90	As proposed As proposed As proposed As proposed As proposed
Walls, below-grade	Type: Mass wall Gross area: same as proposed <i>U</i> -Factor: from Table C402.1.2 with insulation layer on interior side of walls	As proposed As proposed As proposed
Floors, above-grade	Type: joist/framed floor Gross area: same as proposed <i>U</i> -factor: from Table C402.1.2	As proposed As proposed As proposed
Floors, slab-on-grade	Type: Unheated <i>F</i> -factor: from Table C402.1.2	As proposed As proposed
<u>Opaque</u> Doors	Type: Swinging Area: Same as proposed <i>U</i> -factor: from Table C402.2	As proposed As proposed As proposed

BUILDING COMPONENT CHARACTERISTICS	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
<u>Glazing Vertical</u> <u>Fenestration other than</u> <u>Opaque Doors</u>	Area 1. The proposed glazing area; where the proposed glazing area is less than 40 percent of above-grade wall area. 2. 40 percent of above-grade wall area; where the proposed glazing area is 40 percent or more of the above-grade wall area. U-factor: from Table C402.3 SHGC: from Table C402.3 except that for climates with no requirement (NR) SHGC = 0.40 shall be used External shading and PF: None	As proposed As proposed As proposed As proposed
Skylights	Area 1. The proposed skylight area; where the proposed skylight area is less than 3 percent of gross area of roof assembly. 2. 3 percent of gross area of roof assembly; where the proposed skylight area is 3 percent or more of gross area of roof assembly U-factor: from Table C402.3 SHGC: from Table C402.3 except that for climates with no requirement (NR) SHGC = 0.40 shall be used.	As proposed As proposed As proposed
Lighting, interior	The interior lighting power shall be determined in accordance with Table C405.5.2. Where the occupancy of the building is not known, the lighting power density shall be 1.0 Watt per square foot (10.73 W/m ²) based on the categorization of buildings with unknown space classification as offices.	As proposed
Lighting, exterior	The lighting power shall be determined in accordance with Table C405.6.2(2). Areas and dimensions of tradable and nontradable surfaces shall be the same as proposed.	As proposed
Internal gains	Same as proposed	Receptacle, motor and process loads shall be modeled and estimated based on the space use classification. All end-use load components within and associated with the building shall be modeled to include, but not be limited to, the following: exhaust fans, parking garage ventilation fans, exterior building lighting, swimming pool heaters and pumps, elevators, escalators, refrigeration equipment and cooking equipment.
Schedules	Same as proposed	Operating schedules shall include hourly profiles for daily operation and shall account for variations between weekdays, weekends, holidays and any seasonal operation. Schedules shall model the time-dependent variations in occupancy, illumination, receptacle loads, thermostat settings, mechanical ventilation, HVAC equipment availability, service hot water usage and any process loads. The schedules shall be typical of the proposed building type as determined by the designer and approved by the jurisdiction.
Mechanical ventilation	Same as proposed	As proposed, in accordance with Section C403.2.5.
Heating systems	Fuel type: same as proposed design	As proposed

BUILDING COMPONENT CHARACTERISTICS	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
	Equipment type ^a : from Tables C407.5.1(2) and C407.5.1(3)	As proposed
	Efficiency: from Tables C403.2.3(4) and C403.2.3(5)	As proposed
	Capacity ^b : sized proportionally to the capacities in the proposed design based on sizing runs, and shall be established such that no smaller number of unmet heating load hours and no larger heating capacity safety factors are provided than in the proposed design.	As proposed
Cooling systems	Fuel type: same as proposed design	As proposed
	Equipment type ^c : from Tables C407.5.1(2) and C407.5.1(3)	As proposed
	Efficiency: from Tables C403.2.3(1), C403.2.3(2) and C403.2.3(3)	As proposed
	Capacity ^b : sized proportionally to the capacities in the proposed design based on sizing runs, and shall be established such that no smaller number of unmet cooling load hours and no larger cooling capacity safety factors are provided than in the proposed design.	As proposed
	Economizer ^d : same as proposed, in accordance with Section C403.4.1.	As proposed
Service water heating	Fuel type: same as proposed	As proposed
	Efficiency: from Table C404.2	As proposed
	Capacity: same as proposed	
	Where no service water hot water system exists or is specified in the proposed design, no service hot water heating shall be modeled.	As proposed

- a. Where no heating system exists or has been specified, the heating system shall be modeled as fossil fuel. The system characteristics shall be identical in both the standard reference design and proposed design.
- b. The ratio between the capacities used in the annual simulations and the capacities determined by sizing runs shall be the same for both the standard reference design and proposed design.
- c. Where no cooling system exists or no cooling system has been specified, the cooling system shall be modeled as an air-cooled single-zone system, one unit per thermal zone. The system characteristics shall be identical in both the standard reference design and proposed design.
- d. If an economizer is required in accordance with Table C403.3.1(1), and if no economizer exists or is specified in the proposed design, then a supply air economizer shall be provided in accordance with Section C403.4.1.

Reason: This corrects the terminology in the performance path table to be consistent with the rest of the chapter. "Doors" can include both glazed and opaque doors, but the intent was clearly meant to be opaque doors, since it is referring to only the U-factor in Table C402.2. It is then unclear where to put glazed doors. This proposal clarifies the three fenestration rows as "opaque doors", "vertical fenestration other than opaque doors", and "skylights".

Cost Impact: This proposal will not increase the cost of construction.

CE347-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

C407.5.1T-EC-CULP.doc

CE348 – 13

Table C407.5.1(1)

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

TABLE C407.5.1(1)
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT CHARACTERISTICS	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Cooling systems	Fuel type: same as proposed design	As proposed
	Equipment type ^c : from Tables C407.5.1(2) and C407.5.1(3)	As proposed
	Efficiency: from Tables C403.2.3(1), C403.2.3(2) and C403.2.3(3)	As proposed
	Capacity ^b : sized proportionally to the capacities in the proposed design based on sizing runs, and shall be established such that no smaller number of unmet cooling load hours and no larger cooling capacity safety factors are provided than in the proposed design.	As proposed
	Economizer ^d : same as proposed, in accordance with Section C403.4.4 <u>C403.3.1</u> .	As proposed

(Portions of Table not shown remain unchanged)

- Where no heating system exists or has been specified, the heating system shall be modeled as fossil fuel. The system characteristics shall be identical in both the standard reference design and proposed design.
- The ratio between the capacities used in the annual simulations and the capacities determined by sizing runs shall be the same for both the standard reference design and proposed design.
- Where no cooling system exists or no cooling system has been specified, the cooling system shall be modeled as an air-cooled single-zone system, one unit per thermal zone. The system characteristics shall be identical in both the standard reference design and proposed design.
- If an economizer is required in accordance with Table C403.3.1(1), and if no economizer exists or is specified in the proposed design, then a supply air economizer shall be provided in the reference design in accordance with Section ~~C403.4.4~~ C403.3.1.

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

In the 2009 code this footnote refers to a section of the code that addressed supply air economizers in Complex HVAC systems. Now it refers to a section that regulates water economizers in complex HVAC systems. Unless water economizers are 'supply air economizers – the footnote is referring to a section that doesn't address the same topic. The table and footnote are corrected to show that if a building is required to have an economizer, yet the proposed design does not have an economizer, the baseline building shall be designed with an air-side economizer (not water-side). Air economizer is the baseline code. This appears to have been a modeling requirement for several code cycles: IECC and Standard 90.1 do not to allow water-side economizer as the baseline (standard reference) model when no economizer is included in the proposed design case model. If a water-side economizer is included in the proposed design, then there is a 1:1 comparison of water-side in the baseline reference and proposed design. (Please note that if SEHPCAC proposal E20A is approved this proposed change to a reference to Section C403.3.1 will also correlate with the revised provisions.)

Cost Impact: The code change proposal will not increase the cost of construction. The change is editorial in nature. It will not increase the cost of construction.

CE348-13

Public Hearing: Committee: AS AM D

Assembly:

ASF

AMF

DF

C407.5.1(1)T-EC-THOMPSON-SEHPCAC

CE349 – 13

C407.6.3 (NEW)

Proponent: Tim Nogler, Washington State Building Code Council (tim.nogler@des.wa.gov)

Add new text as follows:

C407.6.3 Exceptional calculation methods. When the simulation program does not model a design, material, or device of the *proposed design*, an exceptional calculation method shall be used where approved by the *code official*. Where there are multiple designs, materials, or devices that the simulation program does not model, each shall be calculated separately and exceptional savings determined for each. At no time shall the total exceptional savings constitute more than half of the difference between the baseline building performance and the proposed building performance. All applications for approval of an exceptional method shall include:

1. Step-by-step documentation of the exceptional calculation method performed detailed enough to reproduce the results;
2. Copies of all spreadsheets used to perform the calculations;
3. A sensitivity analysis of energy consumption when each of the input parameters is varied from half to double the value assumed;
4. The calculations shall be performed on a time step basis consistent with the simulation program used;
5. The performance rating calculated with and without the exceptional calculation method.

Reason: It is not unusual for the design team to want to claim credit for an energy-efficiency measure that the hourly energy analysis software is not capable of directly modeling. Consequently, designers would submit simple hand-calculations as an “add-on” to the complex calculations made by the hourly energy analysis software. This is an important challenge because it does not make sense to treat hand-calculations as comparable to those coming from sophisticated hourly energy analysis software. It is not uncommon to see designs where a single energy-efficiency measure was being proposed to make up for multiple shortfalls in the proposed design.

ASHRAE/IESNA Standard 90.1, Appendix G, Section G2.5, Exceptional Calculation Methods, has been updated and expanded in the 2010 version. The updated language from ASHRAE/IESNA Standard 90.1-2010 addresses this issue. This will provide guidance to designers and modelers, as well as to building department staff. The result should be more consistent implementation of the annual energy analysis compliance option.

Cost Impact: The code change proposal will not increase the cost of construction.

CE349-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C407.6.3 (NEW)-EC-NOGLER.doc

CE350 – 13

C408

Proponent: Richard Grace, Fairfax County Government, representing The Virginia Plumbing and Mechanical Inspectors Association, The Virginia Building Code Officials Association
(Richard.Grace@fairfaxcounty.gov)

Revise as follows:

~~Section C408~~ APPENDIX A SYSTEM COMMISSIONING

~~C408.1~~ AC 101.1 General. This ~~section~~ appendix covers the commissioning of the building mechanical systems in Section C403 and electrical power and lighting systems in Section C405.

~~C408.2~~ AC 101.2 Mechanical systems commissioning and completion requirements. Prior to passing the final mechanical inspection, the *registered design professional* shall provide evidence of mechanical systems *commissioning* and completion in accordance the provisions of this ~~section~~. appendix. Construction document notes shall clearly indicate provisions for *commissioning* and completion requirements in accordance with this ~~section~~ appendix and are permitted to refer to specifications for further requirements. Copies of all documentation shall be given to the owner and made available to the *code official* upon request in accordance with Sections ~~C408.2.4 and C408.2.5~~ AC101.2.4 and AC101.2.5

Exception: The following systems are exempt from the commissioning requirements:

1. Mechanical systems in buildings where the total mechanical equipment capacity is less than 480,000 Btu/h (140 690 W) cooling capacity and 600,000 Btu/h (175 860 W) heating capacity.
2. Systems included in Section C403.3 that serve dwelling units and sleeping units in hotels, motels, boarding houses or similar units.

~~C408.2.1~~ AC 101.2.1 Commissioning plan. A *commissioning plan* shall be developed by a *registered design professional* or approved *agency* and shall include the following items:

1. A narrative description of the activities that will be accomplished during each phase of commissioning, including the personnel intended to accomplish each of the activities.
2. A listing of the specific equipment, appliances or systems to be tested and a description of the tests to be performed.
3. Functions to be tested, including, but not limited to calibrations and economizer controls.
4. Conditions under which the test will be performed. At a minimum, testing shall affirm winter and summer design conditions and full outside air conditions.
5. Measurable criteria for performance.

~~C408.2.2~~ AC 101.2.2 Systems adjusting and balancing. HVAC systems shall be balanced in accordance with generally accepted engineering standards. Air and water flow rates shall be measured and adjusted to deliver final flow rates within the tolerances provided in the product specifications. Test and balance activities shall include air system and hydronic system balancing.

~~C408.2.2.1~~ AC 101.2.2.1 Air systems balancing. Each supply air outlet and *zone* terminal device shall be equipped with means for air balancing in accordance with the requirements of Chapter 6 of the *International Mechanical Code*. Discharge dampers are prohibited on constant volume fans and variable volume fans with motors 10 hp (18.6 kW) and larger. Air systems shall be balanced in a manner to first

minimize throttling losses then, for fans with system power of greater than 1 hp (0.74 kW), fan speed shall be adjusted to meet design flow conditions.

Exception: Fans with fan motors of 1 hp (0.74 kW) or less.

C408.2.2.2 AC 101.2.2.2 Hydronic systems balancing. Individual hydronic heating and cooling coils shall be equipped with means for balancing and measuring flow. Hydronic systems shall be proportionately balanced in a manner to first minimize throttling losses, then the pump impeller shall be trimmed or pump speed shall be adjusted to meet design flow conditions. Each hydronic system shall have either the capability to measure pressure across the pump, or test ports at each side of each pump.

Exceptions:

1. Pumps with pump motors of 5 hp (3.7 kW) or less.
2. Where throttling results in no greater than five percent of the nameplate horsepower draw above that required if the impeller were trimmed.

C408.2.3 AC 101.2.3 Functional performance testing. Functional performance testing specified in Sections ~~C408.2.3.1 through C408.2.3.3~~ AC101.2.3.1 through AC101.2.3.3 shall be conducted.

C408.2.3.1 AC 101.2.3.1 Equipment. Equipment functional performance testing shall demonstrate the installation and operation of components, systems, and system-to-system interfacing relationships in accordance with approved plans and specifications such that operation, function, and maintenance serviceability for each of the commissioned systems is confirmed. Testing shall include all modes and *sequence of operation*, including under full-load, part-load and the following emergency conditions:

1. All modes as described in the *sequence of operation*;
2. Redundant or *automatic* back-up mode;
3. Performance of alarms; and
4. Mode of operation upon a loss of power and restoration of power.

Exception: Unitary or packaged HVAC equipment listed in Tables C403.2.3(1) through C403.2.3(3) that do not require supply air economizers.

C408.2.3.2 AC101.2.3.2 Controls. HVAC control systems shall be tested to document that control devices, components, equipment, and systems are calibrated, adjusted and operate in accordance with approved plans and specifications. Sequences of operation shall be functionally tested to document they operate in accordance with *approved* plans and specifications.

C408.2.3.3 AC 101.2.3.3 Economizers. Air economizers shall undergo a functional test to determine that they operate in accordance with manufacturer's specifications.

C408.2.4 AC 101.2.4 Preliminary commissioning report. A preliminary report of commissioning test procedures and results shall be completed and certified by the *registered design professional* or *approved agency* and provided to the building owner. The report shall be identified as "Preliminary Commissioning Report" and shall identify:

1. Itemization of deficiencies found during testing required by this ~~section~~ appendix that have not been corrected at the time of report preparation.
2. Deferred tests that cannot be performed at the time of report preparation because of climatic conditions.
3. Climatic conditions required for performance of the deferred tests.

C408.2.4.1 AC 101.2.4.1 Acceptance of report. *Buildings*, or portions thereof, shall not pass the final mechanical inspection until such time as the *code official* has received a letter of transmittal from the *building* owner acknowledging that the *building* owner has received the Preliminary Commissioning Report.

C408.2.4.2 AC 101.2.4.2 Copy of report. The *code official* shall be permitted to require that a copy of the Preliminary

C408.2.5 AC 101.2.5 Documentation requirements. The *construction documents* shall specify that the *documents* described in this section be provided to the *building owner* within 90 days of the date of receipt of the *certificate of occupancy*.

C408.2.5.1 AC 101.2.5.1 Drawings. Construction documents shall include the location and performance data on each piece of equipment.

C408.2.5.2 AC 101.2.5.2 Manuals. An operating and maintenance manual shall be provided and include all of the following:

1. Submittal data stating equipment size and selected options for each piece of equipment requiring maintenance.
2. Manufacturer's operation manuals and maintenance manuals for each piece of equipment requiring maintenance, except equipment not furnished as part of the project. Required routine maintenance actions shall be clearly identified.
3. Name and address of at least one service agency.
4. HVAC controls system maintenance and calibration information, including wiring diagrams, schematics, and control sequence descriptions. Desired or field-determined setpoints shall be permanently recorded on control drawings at control devices or, for digital control systems, in system programming instructions.
5. A narrative of how each system is intended to operate, including recommended setpoints.

C408.2.5.3 AC 101.2.5.3 System balancing report. A written report describing the activities and measurements completed in accordance with Section C408.2.2: AC 101.2.2.

C408.2.5.4 AC 101.2.5.4 Final commissioning report. A report of test procedures and results identified as "Final Commissioning Report" shall be delivered to the building owner and shall include:

1. Results of functional performance tests.
2. Disposition of deficiencies found during testing, including details of corrective measures used or proposed.
3. Functional performance test procedures used during the commissioning process including measurable criteria for test acceptance, provided herein for repeatability.

Exception: Deferred tests which cannot be performed at the time of report preparation due to climatic conditions.

C408.3 AC 101.3 Lighting system functional testing. Controls for automatic lighting systems shall comply with Section C408.3: AC101.3.

C408.3.1 AC 101.3.1 Functional testing. Testing shall ensure that control hardware and software are calibrated, adjusted, programmed and in proper working condition in accordance with the construction documents and manufacturer's installation instructions. The construction documents shall state the party who will conduct the required functional testing. Where required by the code official, an approved party independent from the design or construction of the project shall be responsible for the functional testing and shall provide documentation to the code official certifying that the installed lighting controls meet the provisions of Section C405.

Where occupant sensors, time switches, programmable schedule controls, photosensors or daylighting controls are installed, the following procedures shall be performed:

1. Confirm that the placement, sensitivity and time-out adjustments for occupant sensors yield acceptable performance.
2. Confirm that the time switches and programmable schedule controls are programmed to turn the lights off.
3. Confirm that the placement and sensitivity adjustments for photosensor controls reduce electric light based on the amount of usable daylight in the space as specified.

Reason: We are not opposed to commissioning, in fact we fully support the concept. What we are opposed to is including language into a code that is not enforceable, inconsistent, or is written in such a way that enforcement will place a burden on building owners when occupancy permits are held up based on incomplete commissioning reports. There are many examples of this contained within this code change.

(1) C408.2 – **“Prior to passing the final mechanical inspection, the registered design professional shall provide evidence of mechanical systems commissioning and completion according to the provisions of this section.”** First off, this language suggests that only a registered design professional is permitted to provide such evidence, even if a licensed, Class A contractor designed the project. Second,

(2) 503.2.9.1 – **“Copies of all documentation shall be given to the owner.”** We do not agree with language included in the code that requires a code official to verify contractual issues between an owner and their agents, designers, or contractors.

(3) 503.2.9.1.2 – **“All HVAC systems shall be balanced in accordance with generally accepted engineering standards.”** “Shall be” is positive, enforceable language, however “generally accepted” is so open ended that consistency between any two individuals will be virtually impossible.

(4) 503.2.9.2 – **“shall not be issued a final certificate of occupancy”**. This section states that a certificate of occupancy shall not be issued without receiving a letter from the owner stating that they have received the Preliminary Commissioning Report. Why should the owner of a building be penalized in such a harsh manner for a procedure that can obviously be conducted after occupancy.

(5) 503.2.9.3 – **“shall require that within 90 days after the date of final certificate of occupancy”**. This section requires the code official to go back to the building owner after issuing the certificate of occupancy and verify that the building owner was provided with drawings, manuals, system balancing report, and the final commissioning report. Wow! After the certificate of occupancy is issued, the International Energy Conservation Code is no longer applicable to the building or building owner. I truly do not understand how this is going to work. What gives the code official the authority to verify and comply with this code section? What recourse does a code official have if the documentation is not provided to the building owner? Is the certificate of occupancy voided and the building occupants forced to vacate? After the certificate of occupancy is issued, the IECC is no longer applicable. The applicable code after the certificate of occupancy is issued is the Property Maintenance Code.

Cost Impact: This code change proposal will not increase the cost of construction.

CE350-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C408-EC-GRACE.doc

CE351 – 13

C408.2, C408.2.1, C408.2.2.1, C408.2.2.2, C408.3.1

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

SECTION C408 SYSTEM COMMISSIONING

C408.1 General. This section covers the commissioning of the building mechanical systems in Section C403 and electrical power and lighting systems in Section C405.

C408.2 Mechanical systems commissioning and completion requirements. Prior to passing the final mechanical inspection, the *registered design professional or approved agency* shall provide evidence of mechanical systems *commissioning* and completion in accordance the provisions of this section.

Construction document notes shall clearly indicate provisions for *commissioning* and completion requirements in accordance with this section and are permitted to refer to specifications for further requirements. Copies of all documentation shall be given to the owner and made available to the *code official* upon request in accordance with Sections C408.2.4 and C408.2.5.

Exception: The following systems are exempt from the commissioning requirements:

1. Mechanical systems in buildings where the total mechanical equipment capacity is less than 480,000 Btu/h (140 690 W) cooling capacity and 600,000 Btu/h (175 860 W) heating capacity.
2. Systems included in Section C403.3 that serve dwelling units and sleeping units in hotels, motels, boarding houses or similar units.

C408.2.1 Commissioning plan. A *commissioning plan* shall be developed by a *registered design professional* or *approved agency* and shall include the following items:

1. A narrative description of the activities that will be accomplished during each phase of commissioning, including the personnel intended to accomplish each of the activities.
2. A listing of the specific equipment, appliances or systems to be tested and a description of the tests to be performed.
3. Functions to be tested, including, but not limited to calibrations and economizer controls.
4. Conditions under which the test will be performed. ~~At a minimum,~~ Testing shall affirm winter and summer design conditions and full outside air conditions.
5. Measurable criteria for performance.

C408.2.2 Systems adjusting and balancing. HVAC systems shall be balanced in accordance with generally accepted engineering standards. Air and water flow rates shall be measured and adjusted to deliver final flow rates within the tolerances provided in the product specifications. Test and balance activities shall include air system and hydronic system balancing.

C408.2.2.1 Air systems balancing. Each supply air outlet and *zone* terminal device shall be equipped with means for air balancing in accordance with the requirements of Chapter 6 of the *International Mechanical Code*. Discharge dampers are prohibited on constant volume fans and variable volume fans with motors 10 hp (18.6 kW) and larger. Air systems shall be balanced in a manner to first minimize throttling losses then, for fans with system power of greater than 1 hp (0.74 kW), fan speed shall be adjusted to meet design flow conditions.

Exception: Fans with fan motors of 1 hp (0.74 kW) or less are not required to be provided with a means for air balancing.

C408.2.2.2 Hydronic systems balancing. Individual hydronic heating and cooling coils shall be equipped with means for balancing and measuring flow. Hydronic systems shall be proportionately balanced in a manner to first minimize throttling losses, then the pump impeller shall be trimmed or pump speed shall be adjusted to meet design flow conditions. Each hydronic system shall have either the capability to measure pressure across the pump, or test ports at each side of each pump.

Exceptions: The following equipment are not required to be equipped with means for balancing or measuring flow:

1. Pumps with pump motors of 5 hp (3.7 kW) or less.
2. Where throttling results in no greater than five percent of the nameplate horsepower draw above that required if the impeller were trimmed.

C408.2.3 Functional performance testing. Functional performance testing specified in Sections C408.2.3.1 through C408.2.3.3 shall be conducted.

C408.2.3.1 Equipment. Equipment functional performance testing shall demonstrate the installation and operation of components, systems, and system-to-system interfacing relationships in accordance with approved plans and specifications such that operation, function, and maintenance serviceability for each of the commissioned systems is confirmed. Testing shall include all modes and *sequence of operation*, including under full-load, part-load and the following emergency conditions:

1. All modes as described in the *sequence of operation*;
2. Redundant or *automatic* back-up mode;
3. Performance of alarms; and
4. Mode of operation upon a loss of power and restoration of power.

Exception: Unitary or packaged HVAC equipment listed in Tables C403.2.3(1) through C403.2.3(3) that do not require supply air economizers.

C408.2.3.2 Controls. HVAC control systems shall be tested to document that control devices, components, equipment, and systems are calibrated, adjusted and operate in accordance with approved plans and specifications. Sequences of operation shall be functionally tested to document they operate in accordance with *approved* plans and specifications.

C408.2.3.3 Economizers. Air economizers shall undergo a functional test to determine that they operate in accordance with manufacturer's specifications.

C408.2.4 Preliminary commissioning report. A preliminary report of commissioning test procedures and results shall be completed and certified by the *registered design professional* or *approved agency* and provided to the building owner. The report shall be identified as "Preliminary Commissioning Report" and shall identify:

1. Itemization of deficiencies found during testing required by this section that have not been corrected at the time of report preparation.
2. Deferred tests that cannot be performed at the time of report preparation because of climatic conditions.
3. Climatic conditions required for performance of the deferred tests.

C408.2.4.1 Acceptance of report. *Buildings*, or portions thereof, shall not pass the final mechanical inspection until such time as the *code official* has received a letter of transmittal from the *building owner* acknowledging that the *building owner* has received the Preliminary Commissioning Report.

C408.2.4.2 Copy of report. The *code official* shall be permitted to require that a copy of the Preliminary Commissioning Report be made available for review by the *code official*.

C408.2.5 Documentation requirements. The *construction documents* shall specify that the documents described in this section be provided to the *building owner* within 90 days of the date of receipt of the *certificate of occupancy*.

C408.2.5.1 Drawings. *Construction documents* shall include the location and performance data on each piece of equipment.

C408.2.5.2 Manuals. An operating and maintenance manual shall be provided and include all of the following:

1. Submittal data stating equipment size and selected options for each piece of equipment requiring maintenance.
2. Manufacturer's operation manuals and maintenance manuals for each piece of equipment requiring maintenance, except equipment not furnished as part of the project. Required routine maintenance actions shall be clearly identified.
3. Name and address of at least one service agency.
4. HVAC controls system maintenance and calibration information, including wiring diagrams, schematics, and control sequence descriptions. Desired or field-determined setpoints shall be permanently recorded on control drawings at control devices or, for digital control systems, in system programming instructions.
5. A narrative of how each system is intended to operate, including recommended setpoints.

C408.2.5.3 System balancing report. A written report describing the activities and measurements completed in accordance with Section C408.2.2.

C408.2.5.4 Final commissioning report. A report of test procedures and results identified as "Final Commissioning Report" shall be delivered to the building owner and shall include:

1. Results of functional performance tests.
2. Disposition of deficiencies found during testing, including details of corrective measures used or proposed.
3. Functional performance test procedures used during the commissioning process including measurable criteria for test acceptance, provided herein for repeatability.

Exception: Deferred tests which cannot be performed at the time of report preparation due to climatic conditions.

C408.3 Lighting system functional testing. Controls for automatic lighting systems shall comply with Section C408.3.

C408.3.1 Functional testing. Testing shall ensure that control hardware and software are calibrated, adjusted, programmed and in proper working condition in accordance with the construction documents and manufacturer's installation instructions. The construction documents shall state the party who will conduct the required functional testing. Where required by the code official, an approved party independent from the design or construction of the project shall be responsible for the functional testing and shall provide documentation to the code official certifying that the installed lighting controls meet the provisions of Section C405. Where occupant sensors, time switches, programmable schedule controls, photosensors or daylighting controls are installed, the following procedures shall be performed:

1. Confirmation that the placement, sensitivity and time-out adjustments for occupant sensors yield acceptable performance.
2. Confirmation that the time switches and programmable schedule controls are programmed to turn the lights off.

3. Confirmation that the placement and sensitivity adjustments for photosensor controls reduce electric light based on the amount of usable daylight in the space as specified.

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

The changes proposed are intended to accomplish consistency between IECC and IgCC commissioning provisions; to clarify the application of various exceptions, and consistency of phrasing and terminology. If the changes to the IECC are approved, a companion change will be submitted by the SEHPCAC for 2014.

Specific changes are:

- C408.2.1 – Replaces the 'as a minimum in item 4 with a new item 6 which makes it clear that the registered design professional should include other elements in the commissioning plan beyond the listed 5 where the designer sees such is appropriate.
- C408.2.2.1 – Provides a complete sentence for the exception. As the preceding paragraph has multiple requirements, it is essential that the exception clearly state the provisions which are 'excepted'.
- C408.2.2.2 – Completes the exceptions; clarifies what is being 'excepted'.
- C408.3.1 – A grammatical clean-up. The lead in text states that 'the following procedures shall be performed'. The text of the 3 listed items are commands, not procedures.

Cost Impact: The code change proposal will not increase the cost of construction. The proposal is editorial in nature and will not affect the cost of construction.

CE351-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C408.2-EC-THOMPSON-SEHPCAC

CE352 – 13

C408.2

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C408.2 Mechanical systems commissioning and completion requirements. Prior to ~~passing~~ the final mechanical inspection, the *registered design professional* shall provide evidence of mechanical systems *commissioning* and completion in accordance the provisions of this section.

Construction document notes shall clearly indicate provisions for *commissioning* and completion requirements in accordance with this section and are permitted to refer to specifications for further requirements. Copies of all documentation shall be given to the owner and made available to the *code official* upon request in accordance with Sections C408.2.4 and C408.2.5.

Exception: The following systems are exempt from the commissioning requirements:

1. Mechanical systems in buildings where the total mechanical equipment capacity is less than 480,000 Btu/h (140 690 W) cooling capacity and 600,000 Btu/h (175 860 W) heating capacity.
2. Systems included in Section C403.3 that serve dwelling units and sleeping units in hotels, motels, boarding houses or similar units

Reason: The current code requires something to be done in advance of a future event. The registered design professional can only provide something either prior to an inspection or after passage of the inspection. This proposal clarifies the order in which commissioning events take place, to clarify the code to foster implementation and compliance verification.

Cost Impact: The code change proposal does not increase the cost of construction.

CE352-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C408.2-#1-EC-WILLIAMS.doc

CE353 – 13

C408.2

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C408.2 Mechanical systems commissioning and completion requirements. Prior to passing the final mechanical inspection, the *registered design professional* shall provide evidence of mechanical systems *commissioning* and completion in accordance the provisions of this section.

Construction document notes shall clearly indicate provisions for *commissioning* and completion requirements in accordance with this section and are permitted to refer to specifications for further requirements. Copies of all documentation shall be given to the owner and made available to the *code official* upon request in accordance with Sections C408.2.4 and C408.2.5.

Exceptions: The following systems are exempt ~~from the commissioning requirements:~~

1. Mechanical systems in buildings where the total mechanical equipment capacity is less than 480,000 Btu/h (140 690 W) cooling capacity and 600,000 Btu/h (175 860 W) heating capacity.
2. Systems included in Section C403.3 that serve individual dwelling units and sleeping units ~~in hotels, motels, boarding houses or similar units~~

Reason: This proposal simplifies and clarifies the exceptions to required mechanical systems commissioning. The objective of this proposal is to clarify the code to foster implementation and compliance verification. It is also not necessary in an exception to re-state the topic in the parent section to which the exception applies. The term "sleeping unit" is defined in the code so the delineation of where such units may or may not occur is not needed and is confusing. The intent, regardless of the type of building in which they are located, is that the systems serving individual sleeping units need not be commissioned. The word "individual" is added so that complex central systems serving multiple sleeping units would not be exempt from commissioning.

Cost Impact: The code change proposal will not increase the cost of construction.

CE353-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C408.2 #2-EC-WILLIAMS.doc

CE354 – 13

C408.2.2.1

Proponent: Amanda Hickman, InterCode Incorporated, representing AMCA International
(Amanda@InterCodeinc.com)

Revise as follows:

C408.2.2.1 Air system balancing. Each supply air outlet and *zone* terminal device shall be equipped with means for air balancing in accordance with the requirements of Chapter 6 of the *International Mechanical Code*. Discharge dampers used for air system balancing are prohibited on constant volume fans and variable volume fans with motors 10 hp (18.6 kW) and larger. Air systems shall be balanced in a manner to first minimize throttling losses then, for fans with system power of greater than 1 hp (0.74 kW), fan speed shall be adjusted to meet design flow conditions.

Exception: Fans with fan motors of 1 hp (0.74 kW) or less.

Reason: Discharge dampers are often used to shield a building area from rain and snow when the fan is not operating. In these situations, dampers use no energy when the fan is off and a minuscule amount of energy when the fan is running.

The added language provides clarity to this section and ensures that the restriction on discharge dampers only applies to those used for air balancing purposes. Disallowing discharge dampers altogether would constitute a restriction and energy loss while the fan is running.

Cost Impact: This proposal will not increase the cost of construction.

CE354-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C408.2.2.1-EC-HICKMAN.doc

CE355 – 13

C408.2.4.1

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C408.2.4.1 Acceptance of report. *Buildings*, or portions thereof, shall not be considered acceptable for a final inspection pursuant to Section C104.3 ~~pass the final mechanical inspection until such time as the~~ *code official* has received a letter of transmittal from the *building* owner acknowledging that the *building* owner has received the Preliminary Commissioning Report.

Reason: This proposal revises the commissioning provision so that buildings cannot be considered for a final inspection (e.g., do not pass the mechanical inspection) until the owner indicates in writing they have the required commissioning report. This clarifies the code through the reference section for final inspections and eliminates unneeded language “such time as”.

Cost Impact: The code change proposal will not increase the cost of construction.

CE355-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C408.2.4.1-EC-WILLIAMS.doc

CE356 – 13

C408.2.5.2

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C408.2.5.2 Manuals. An operating and maintenance manual shall be provided and include all of the following:

1. Submittal data stating equipment size and selected options for each piece of equipment requiring maintenance.
2. Manufacturer's operation manuals and maintenance manuals for each piece of equipment requiring maintenance, except equipment not furnished as part of the project. Required routine maintenance actions shall be clearly identified.
3. Name and address of at least one service agency.
4. HVAC controls system maintenance and calibration information, including wiring diagrams, schematics, and control sequence descriptions. Desired or field-determined setpoints shall be permanently recorded on control drawings at control devices or, for digital control systems, in system programming instructions.
5. Submittal data indicating all selected options for each piece of lighting equipment and lighting controls.
6. Operation and maintenance manuals for each piece of lighting equipment. Required routine maintenance actions, cleaning and recommended relamping shall be clearly identified.
7. A schedule for inspecting and recalibrating all lighting controls.
8. A narrative of how each system is intended to operate, including recommended setpoints.

Reason: The current requirements for manuals seems specific to HVAC documentation. This proposal adds additional language for the documentation, maintenance, and inspection of lighting equipment and controls. These requirements are consistent with ANSI/ASHRAE/IES Standard 90.1

Cost Impact: The code change proposal will increase the cost of construction.

CE356-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C408.2.5.2-EC-FERGUSON.doc

CE357– 13

C408.3.1

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C408.3.1 Functional testing. Testing shall ensure that control hardware and software are calibrated, adjusted, programmed and in proper working condition in accordance with the construction documents and manufacturer's installation instructions. ~~The construction documents shall state the party who will conduct the required functional testing.~~ Where required by the code official, an approved party individual independent from the design or construction of the project shall be responsible for the functional testing and shall provide documentation to the code official certifying that the installed lighting controls meet the provisions of Section C405.

Where occupant sensors, time switches, programmable schedule controls, photosensors or daylighting controls are installed, the following procedures shall be performed:

1. Confirm that the placement, sensitivity and time-out adjustments for occupant sensors yield acceptable performance.
 - 1.1. For projects with up to seven occupancy sensors, all occupancy sensors shall be tested
 - 1.2. For projects with more than seven the following shall be verified:
 - 1.2.1. Status indicator (as applicable) operates correctly
 - 1.2.2. The controlled lights turn off or down to the permitted level within the required time.
 - 1.2.3. For auto-on occupant sensors, the lights do turn on to the permitted level when someone enters the space.
 - 1.2.4. For manual on sensors, the lights turn on only when manually activated
 - 1.2.5. The lights are not incorrectly turned on by movement in nearby areas or by HVAC operation
2. Confirm that the time switches and programmable schedule controls are programmed to turn the lights off.
3. Confirm that all control devices for daylight controls have been properly located, field-calibrated, and set for design set points and threshold light levels. All daylight control devices shall only be readily accessible to authorized personnel. ~~the placement and sensitivity adjustments for photosensor controls reduce electric light based on the amount of usable daylight in the space as specified.~~

Reason: For consistency with ASHRAE/IES 90.1. These revisions add more specific requirements to the functional testing of lighting controls for the common controls required by the standard and adds some clarification to the description of entities allowed to perform the testing and verification.

Cost Impact: The code change proposal will increase the cost of construction when lighting controls are required in parking garages.

CE357-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C408.3.1-EC-FERGUSON.doc

CE358 – 13

C408.4 (NEW), C408.4.1 (NEW), C408.4.1.1 (NEW), C408.4.1.2 (NEW), C4038.4.1.3 (NEW)

Proponent: Tim Nogler, Washington State Building Code Council (tim.nogler@des.wa.gov)

Add new text as follows:

C408.4 Service water heating systems commissioning and completion requirements. Service water heating equipment and controls shall comply with Section 408.4. Construction document notes shall clearly indicate provisions for *commissioning* and completion requirements in accordance with this section and are permitted to refer to specifications for further requirements.

Exception: The following systems are exempt from the commissioning requirements:

1. Service water heating systems in buildings where the largest service water heating system capacity is less than 200,000 Btu/h (58 562 W) and where there are no pools or inground permanently installed spas.

C408.4.1 Functional performance testing. Functional performance testing specified in Sections C408.4.1.1 through C408.4.1.3 shall be conducted. Written procedures which clearly describe the individual systematic test procedures, the expected systems' response or acceptance criteria for each procedure, the actual response or findings, and any pertinent discussion shall be followed. Testing shall affirm operation with the system under 50 percent water heating load.

C408.4.1.1 Equipment. Equipment functional performance testing shall demonstrate the installation and operation of components, systems, and system-to-system interfacing relationships in accordance with approved plans and specifications such that operation, function, and maintenance serviceability for each of the commissioned systems is confirmed. Testing shall include all modes and *sequence of operation*, including under full-load, part-load and the following emergency conditions:

1. Redundant or *automatic* back-up mode;
2. Performance of alarms; and
3. Mode of operation upon a loss of power and restoration of power.

C408.4.1.2 Controls. Service water heating controls shall be tested to document that control devices, components, equipment, and systems are calibrated, adjusted and operate in accordance with approved plans and specifications. Sequences of operation shall be functionally tested to document they operate in accordance with *approved plans and specifications*.

C408.4.1.3 Pools and spas. Service water heating equipment, time switches, and heat recovery equipment which serve pools and inground permanently installed spas shall undergo a functional test to determine that they operate in accordance with manufacturer's specifications.

Reason: Large water heating systems (over 200,000 Btu/h) require some fundamental testing of their full sequence of operation and their recovery to normal operations after various emergency conditions. This additional commissioning is inexpensive and provides potential for significant long-term energy savings. Pools and in-ground spas are included, to ensure that their heaters, time switches and heat recovery systems are functioning properly.

Cost Impact: The code change proposal will increase the cost of construction.

CE358-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C408.4 (NEW) #2-EC-NOGLER.doc

CE359 – 13

C408.4 (NEW), C408.4.1 (NEW), C409 (NEW)

Proponent: Tim Nogler, Washington State Building Code Council (tim.nogler@des.wa.gov)

Add new text as follows:

C408.4 Metering system commissioning. Energy metering systems required by Section 409 shall comply with Section 408.5 and be included in the commissioning process required by Section 408.1. Construction documents shall clearly indicate provisions for *commissioning* in accordance with section 408 and are permitted to refer to specifications for further requirements.

C408.4.1 Functional testing. Functional testing shall be conducted by following written procedures which clearly describe the individual systematic test procedures, the expected systems' response or acceptance criteria for each procedure, the actual response or findings, and any pertinent discussion. Functional testing shall document that energy source meters, energy end-use meters, the energy metering data acquisition system, and required energy consumption display are calibrated, adjusted and operate in accordance with approved plans and specifications. Testing shall confirm that:

1. The metering system devices and components work properly under low and high load conditions
2. The metered data is delivered in a format that is compatible with the data collection system
3. The energy display is accessible to building operation and management personnel
4. The energy display meets code requirements regarding views required in Section 409.4.3. The display shows energy data in identical units (e.g. kWh).

SECTION C409

ENERGY METERING AND ENERGY CONSUMPTION MANAGEMENT

C409.1 General. Buildings with a gross conditioned floor area greater than 50,000 square feet shall comply with Section C409. Buildings shall be equipped to measure, monitor, record and display energy consumption data for each energy source and end use category per the provisions of this section, to enable effective energy management.

Exceptions:

1. Tenant spaces within buildings where the tenant space has its own utility services and utility meters and the space is less than 25,000 square feet gross conditioned floor area.
2. Buildings in which there is no gross conditioned floor area greater than 25,000 square feet, including building common area, that is served by its own utility services and utility meters.

C409.1.2 Alternate metering methods. Where approved by the code official, energy use metering systems are permitted to differ from those required by this section, provided that they are permanently installed and that the source energy measurement, end use category energy measurement, data storage and data display have similar accuracy to and are at least as effective in communicating actionable energy use information to the building management and users, as those required by this section.

C409.1.2 Conversion factor. Any threshold stated in kW shall include the equivalent BTU/heating and cooling capacity of installed equipment at a conversion factor of 3,412 BTU per kW at 50 percent demand.

C409.2 Energy source metering. Buildings shall have a meter at each energy source. For each energy supply source listed in Sections C409.2.1 through C409.2.4, meters shall be capable of collecting data for the whole building, or for each separately metered portion of the building where permitted by the Exceptions to Section C409.1.

Exceptions:

1. Energy source metering is not required where end use metering for an energy source accounts for all usage of that energy type within a building, and the data acquisition system accurately totals the energy delivered to the building or separately-metered portion of the building.
2. Solid fuels such as coal, firewood or wood pellets that are delivered via mobile transportation do not require metering.

C409.2.1 Electrical energy. Metering shall be provided for electrical energy supplied to the building and its associated site, including site lighting, parking, recreational facilities, and other areas that serve the building and its occupants.

C409.2.2 Gas and liquid fuel supply energy. Metering shall be provided for natural gas, fuel oil, propane and other gas or liquid fuel energy supplied to the building and site.

C409.2.3 District energy. Metering shall be provided for net energy extracted from district steam systems, district chilled water loops, district hot water systems, or other energy sources serving multiple buildings.

C409.2.4 Site-generated renewable energy. Metering shall be provided for net energy generated from on-site solar, wind, geothermal, tidal or other natural sources.

C409.3 End-use metering. Meters shall be provided to collect energy use data for each end-use category listed in Sections C409.3.1 and C409.3.2. Meters shall be capable of collecting data for the whole building or for each separately metered portion of the building where permitted by the Exceptions to Section C409.1. Multiple meters are permitted to be used for any end-use category, provided that the data acquisition system totals all of the energy used by that category.

Exceptions:

1. HVAC and water heating equipment serving only an individual dwelling unit does not require end-use metering.
2. Separate metering is not required for fire pumps, stairwell pressurization fans or other life safety systems that operate only during testing or emergency.
3. End use metering is not required for individual tenant spaces not greater than 2,500 square feet in floor area where a dedicated source meter meeting the requirements of Section C409.4.1 is provided for the tenant space.

C409.3.1 HVAC system energy use. Submetering shall be provided for energy including electrical, gas, liquid fuel, district steam and district chilled water that is used by boilers, chillers, pumps, fans and other equipment used to provide space heating, space cooling, dehumidification and ventilation to the building, but not including energy that serves process loads, water heating or miscellaneous loads as defined in Section C409.3. Multiple HVAC energy sources, such as gas, electric and steam, are not required to be summed together.

Exceptions:

1. 120 volt equipment.
2. 208/120 volt equipment in a building where the main service is 480/277 volt power.

C409.3.2 Water heating energy use. Submetering shall be provided for energy used for heating of domestic and service hot water, but not energy used for space heating.

Exception: Water heating energy use less than 50 kW does not require end-use metering.

C409.4 Meters. Meters and other measurement devices required by Section C409 shall be configured to automatically communicate energy data to a data acquisition system. Source meters are permitted to be any digital-type meters. Current sensors or flow meters are allowed for end use metering, provided that they have a tested accuracy of plus or minus 2 percent. Required metering systems and equipment shall provide at least hourly data that is fully integrated into the data acquisition and display system per the requirements of Section C409.

C409.5 Data acquisition system. The data acquisition system shall be capable of storing the data from meters and other sensing devices for a minimum of 36 months. For each energy supply and end use category required by Sections C409.2 and C409.3, it shall provide real-time energy consumption data and logged data for any hour, day, month or year.

C409.6 Energy display. For each building subject to Section C409, either a permanent, readily accessible and visible display, or a web page or other electronic document accessible to building management or to a third-party energy data analysis service shall be provided in the building accessible by building operation and management personnel. The display shall be capable of graphically displaying the current energy consumption rate for each whole building energy source, plus each end use category, as well as the average and peak values for any day, week or year.

C409.7 Commissioning. The entire system shall be commissioned in accordance with Section C408.5. Deficiencies found during testing shall be corrected and re-tested and the commissioning report shall be updated to confirm that the entire metering and data acquisition and display system is fully functional.

C409.8 Existing buildings that were constructed subject to the requirements of this Section. Where new or replacement systems or equipment are installed in an existing building that was constructed subject to the requirements of this Section, metering shall be provided for such new or replacement systems or equipment so that their energy use is included in the corresponding end-use category defined in Section C409.2. This includes systems or equipment added in conjunction with additions or alterations to existing buildings.

C409.8.1 Additions. For existing buildings smaller than 50,000 square feet that were subject to the requirements of this section, where an addition increases the total conditioned floor area by more than 50 percent of the existing building area and causes the total building conditioned floor area to exceed 50,000 square feet, metering and data acquisition systems shall be provided for the new additions over 25,000 square feet in accordance with the requirements of Sections C409.2 and C409.3.

Reason: Energy metering is a critical tool to achieve actual energy savings in buildings. This proposal comes from the State of Washington amendments to the 2012 IECC. Washington state adopted section 409 energy metering based on based on input from energy conservation experts, and experience implementing the metering systems in high performance buildings.

Use of "advanced meters" with a data acquisition and display system, rather than standard utility meters, provides several opportunities for energy savings. This is why the 2013 Edition of ASHRAE 90.1 will have metering requirements, the EPA 2005 requires extensive metering retrofits for existing federal buildings, the Department of Defense requires metering for almost all new construction and alteration projects, LEED provides credits for continuous metering, and ASHRAE Standard 189.1 mandates extensive metering and sub-metering. The DOE Metering Best Practices Guide, Table 8.1, estimates typical savings from metering to be 5% - 15% with more extensive savings sometimes realized. (Elsewhere in the Guide a more conservative estimate of 2% - 10% is cited.) Specific benefits include

- Advanced metering & sub-metering provides automatic benchmarking of building energy use patterns
- Allows comparison of actual energy use for new buildings to modeled energy use
- Advanced metering and Sub-metering will decrease building energy use
 - A recent study in the Puget Sound area showed that more than half of all economizers are not functioning correctly. In most cases, the building owners are not aware of this condition.
- Advanced metering allows building managers to track energy use over time.
 - Data trending provided in the dashboard shows how the building is doing compared to other time periods.
 - Allows building managers to detect system malfunctions and incorrect control settings

Cost Impact: The code change proposal will increase the cost of construction.

CE359-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C408.4 (NEW)- #1-EC-NOGLER.doc

CE360 – 13

C409 (NEW)

Proponent: Duane Jonlin, City of Seattle, representing City of Seattle Department of Planning and Development (duane.jonlin@seattle.gov)

Add new text as follows:

SECTION C409

ENERGY CONSUMPTION MANAGEMENT

C409.1 General. Buildings with a gross conditioned floor area larger than 20,000 square feet shall comply with Section C409. Buildings shall be equipped to measure, monitor, record and display energy consumption data for each energy supply and end use category in accordance with this section.

Exceptions:

1. Spaces of less than 10,000 square feet gross conditioned floor area, occupied by one tenant and served by independent utility services and utility meters .
2. Building common areas totaling less than 10,000 square feet gross conditioned floor area and served by independent utility services and utility meters.

C409.2 Energy supply metering. Buildings shall have a meter at each energy supply source. For each energy supply source listed in Sections C409.2.1 through C409.2.4, meters shall be capable of collecting data for the whole building or for each separately metered portion of the building.

Exceptions:

1. Energy supply source metering is not required where end use metering for an energy source accounts for all usage of that energy type within a building, and the data acquisition system accurately totals the energy delivered to the building or separately-metered portion of the building.
2. Solid fuels, including, but not limited to, coal, firewood or wood pellets that are delivered via mobile transportation do not require metering.

C409.2.1 Electrical energy. Meters shall collect data for electrical energy supplied to the building and its associated site, including site lighting, parking, recreational facilities, and other areas that serve the building and its occupants.

C409.2.2 Gas and liquid fuel supply energy. Meters shall collect data for natural gas, fuel oil, propane and other gas or liquid fuel energy supplied to the building and site.

C409.2.3 District energy. Meters shall collect data for net energy extracted from district steam systems, district chilled water loops, district hot water systems, or other energy sources serving multiple buildings.

C409.2.4 Site-generated renewable energy. Meters shall collect data for net energy generated from on-site solar, wind, geothermal, tidal or other natural sources.

C409.3 End-use metering. Meters shall be provided to collect energy use data for each end-use category listed in Sections C409.3.1 through C409.3.5. These meters shall be capable of collecting data for the whole building or for each separately metered portion of the building other than those subject to the exceptions to Section C409.1. Multiple meters are permitted to be used for any end-use category, provided that the data acquisition system totals all of the energy used by that category. Thresholds stated in kW shall include the equivalent BTU/h heating and cooling capacity of installed equipment at a conversion factor of 3,412 BTU per kW at 50 percent demand.

Exceptions:

1. End-use metering is not required for HVAC and water heating equipment serving only an individual dwelling unit.
2. Separate metering is not required for fire pumps, stairway pressurization fans or other life safety systems that operate only during testing or emergency.
3. End use metering is not required for individual tenant spaces not exceeding 2,500 square feet in floor area when a dedicated supply meter meeting the requirements of Section C409.4.1 is provided for the tenant space.
4. Not more than 5 percent of the total connected load of any of the end-use metering categories in Sections C409.3.1 through C409.3.7 is permitted to be excluded from that end-use data collection.
5. Not more than 5 percent of the total connected load of any of the end-use metering categories in Sections C409.3.1 through C409.3.7 is permitted to consist of loads not part of that category.

C409.3.1 HVAC system energy use. Meters shall collect energy use data for electrical, gas, liquid fuel, district steam and district chilled water that is used by equipment used to provide space heating, space cooling, dehumidification and ventilation to the building, but not including energy that serves process loads or water heating. Multiple HVAC energy sources, such as gas, electric and steam, are not required to be summed together.

Exceptions:

1. 120 volt equipment is not required to be included in the HVAC system metering.
2. 208/120 volt equipment in a building where the main service is 480/277 volt power is not required to be included in the HVAC system metering.

C409.3.2 Water heating energy use. Meters shall collect energy use data for heating of domestic and service hot water, but not energy used for space heating.

Exception: Water heating energy loads less than 50 kVA do not require end-use metering.

C409.3.3 Lighting system energy use. Meters shall collect data for energy used by interior and exterior lighting, but not including plug-in task lighting.

C409.3.4 Plug load system energy use. Meters shall collect data for energy used by appliances, computers, plugged-in task lighting, and other equipment and devices, but not including vertical transportation equipment or equipment covered by other end-use metering categories listed in C409.3.

Exception: Where the total capacity of plug load circuits is less than 50 kVA, end-use metering is not required.

C409.3.5 Process load system energy use. Meters shall collect data for energy used by any non-building process load (e.g. nonresidential refrigeration and cooking, industrial equipment).

Exception: Process load energy use less than 50 kVA does not require end-use metering.

C409.4 Measurement devices, data acquisition system and energy display. Each building or separately metered portion of a building shall provide measurement devices, a data acquisition system and an energy display in accordance with this section.

C409.4.1 Measurement devices. Meters and other measurement devices shall be configured to automatically communicate energy data to a data acquisition system. Digital-type meters are permitted to be used as supply source meters. Current sensors or flow meters are allowed for end use metering.

provided that they have a tested accuracy of plus or minus 2 percent. Required metering systems and equipment shall provide at least hourly data that is fully integrated into the data acquisition and display systems required by Section C409.4.

C409.4.2 Data acquisition system. The data acquisition system shall be capable of storing the data from the required meters and other sensing devices for a minimum of 36 months. For each energy supply and end use category required by Sections C409.2 and C409.3, the data acquisition system shall provide real-time energy consumption data and logged data for every hour, day, month or year.

C409.4.3 Energy display. For each building subject to Section C409, either a permanent, readily accessible and visible display, or a web page or other electronic document accessible to building management or to a third-party energy data analysis service shall be provided for the building and shall be accessible to building operation and management personnel. The display shall be capable of graphically displaying the current energy consumption rate for each whole building energy supply, plus each end use category, as well as the average and peak values for every day, week and year.

C409.5 Metering for existing buildings. Where new or replacement systems or equipment are installed in an existing building that was constructed subject to the requirements of Section C409, metering shall be provided for such new or replacement systems or equipment so that their energy use is included in the corresponding end-use category defined in Section C409.3.

Reason: The energy code is approaching a limit to the ability to control energy use solely through design and construction. Increasingly, savings will need to come from the informed use and operation of our buildings, for which end-use metering is a fundamental building block. This proposal is developed based on Seattle's experience implementing a metering code during the 2009 code cycle. It segregates out basic energy use categories to facilitate visualization of patterns and evaluate the impact of changes.

Advanced metering displays save significant energy by providing building owners and managers the tools to monitor and manage energy usage. Use of "advanced meters" rather than standard utility meters provides multiple opportunities for energy savings:

- Benchmarking and data trending of building energy use patterns, so that anomalies are easily detectable
- Comparison of actual energy use of new building systems to modeled energy use
- Evaluating the impact of changes and interventions
- Identifying and correcting system malfunctions

The DOE Metering Best Practices Guide, Table 8.1, estimates typical savings from metering to be 5% - 15% with more extensive savings sometimes realized. EPA 2005 requires extensive metering retrofits for existing federal buildings, the Department of Defense requires metering for almost all new construction and alteration projects, LEED provides credits for continuous metering, and ASHRAE Standard 189.1 mandates extensive metering and sub-metering.

Cost Impact: The code change proposal will increase the cost of construction.

CE360-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C409 (NEW)-EC-JONLIN.doc

CE361 – 13

C202 (NEW), C410 (NEW)

Proponent: Duane Jonlin, City of Seattle, representing City of Seattle Department of Planning and Development (duane.jonlin@seattle.gov)

Add new text as follows:

C410.1 General. A solar zone shall be provided for buildings which are five stories or less in height above grade plane, and shall be located on the roof of the building or elsewhere on the site. The solar zone shall comply with Sections C410.2 through C410.8 and the International Fire Code.

Exceptions:

1. A solar zone is not required where the solar exposure of the building's roof area is less than 75 percent of that of an unobstructed area in the same location, as measured by one of the following:
 - 1.1. Incident solar radiation expressed in kWh/ft²-yr using typical meteorological year (TMY) data
 - 1.2. Annual sunlight exposure expressed in cumulative hours per year using TMY data
 - 1.3. Shadow studies indicating that the area is more than 25 percent in shadow, on September 21 at 10am, 11am, 12pm, 1pm, and 2pm solar
2. Subject to the approval of the code official, buildings with extensive rooftop equipment that would make full compliance with this section impractical shall be permitted to provide a smaller solar zone than that required by Section C410.3.

C410.2 Minimum area. The minimum area of the solar zone shall be determined in accordance with Section C410.2.1 or C410.2.2, whichever results in the smaller area.

C410.2.1 Percentage of roof area. An area equal to 40 percent of the roof area calculated as the horizontally-projected gross roof area less the area covered by skylights, occupied roof decks and planted areas.

C410.2.2 Percentage of electrical service size. The electrical service size shall be the rated capacity of the total of all electrical services to the building, and the required solar zone size shall be based upon 10 peak watts of PV per square foot for 20 percent of the size of the electrical service.

C410.3 Obstructions. The solar zone shall be free of pipes, vents, ducts, HVAC equipment, skylights and other obstructions, except those serving PV or SWH systems within the solar zone. PV and SHW systems are permitted to be installed within the solar zone.

C410.4 Shading. Any existing or new object on the building or site that is located south, east, or west of the solar zone shall be set back from the solar zone a distance at least two times its height above the roof surface. Such objects include but are not limited to taller portions of the building itself, parapets, chimneys, antennas, signage, rooftop equipment, trees and roof plantings. The solar zone shall not be located on a roof slope greater than 2:12 that faces within 45° of true north.

C410.5 Non-contiguous area. The solar zone is permitted to be comprised of smaller separated sub-zones. Each subzone shall be at least 5 feet wide in the narrowest dimension.

C410.6 Access. Areas contiguous to the solar zone shall provide access pathways and provisions for emergency smoke ventilation as required by the International Fire Code.

C410.7 Structural integrity. Where the *solar zone* is on the roof of the building or another structure on the site, the as-designed dead load and live load for the *solar zone* shall be clearly marked on the construction documents, and shall accommodate future PV or SHW arrays at an assumed dead load of 5 pounds per square foot in addition to other required live and dead loads. For PV systems, a location for inverters shall be designated either within or adjacent to the solar zone, with a minimum area of 2 square feet for each 1000 square feet of solar zone area, and shall accommodate an assumed dead load of 175 pounds per square foot.

C410.8 PV or SWH interconnection provisions. Buildings shall provide for the future interconnection of either a PV system in accordance with Section C410.2.8.1 or an SWH system in accordance with Section C410.2.8.2.

C410.2.8.1 PV interconnection. A capped roof penetration sleeve shall be provided in the vicinity of the future inverter, sized to accommodate the future PV system conduit. Interconnection of the future PV system shall be provided for at the main service panel, either ahead of the service disconnecting means or at the end of the bus opposite the service disconnecting means, in one of the following forms:

1. A space for the mounting of a future overcurrent device, sized to accommodate the largest standard rated overcurrent device that is less than 20 percent of the bus rating; or
2. Lugs sized to accommodate conductors with an ampacity of at least 20 percent of the bus rating, to enable the mounting of an external overcurrent device for interconnection.

The electrical construction documents shall indicate the following:

1. Solar zone boundaries and access pathways;
2. Location for future inverters and metering equipment; and
3. Route for future wiring between the PV panels and the inverter, and between the inverter and the main service panel.

C410.2.8.2 SWH interconnection. Two capped pipe tees shall be provided upstream of the domestic water heating equipment to provide plumbing interconnections between a future SWH system and the domestic water heating system. Two roof penetration sleeves shall be provided in the vicinity of the solar zone, capable of accommodating supply and return piping for a future SWH system.

The plumbing construction documents shall indicate the following:

1. Solar zone boundaries and access pathways;
2. Location for future hot water storage tanks; and
3. Route for future piping between the solar zone and the plumbing interconnection point, following the shortest feasible pathway.

Add new definition as follows:

SECTION C202 GENERAL DEFINITIONS

SOLAR ZONE. A clear area or areas reserved solely for current and future installation of photovoltaic or solar hot water systems.

Reason: The cost of photovoltaic and solar water heating systems has declined markedly in recent years, but at this point they are still only marginally cost-effective. However, their cost continues to decline, and this rule will prepare our new building stock to easily install such systems at an appropriate time. As energy costs rise and solar generation costs decline, a point will be reached where large solar energy systems are a viable investment. This rule brings that date closer in time by clearing away any physical impediments to future installation.

The rule requires an unobstructed "solar zone" for most non-residential buildings of five stories or less, either 40 percent of the building's roof area, or an area large enough to generate 20% of the building's electricity.

Example: A building with a 10,000 SF total roof area, 1,000 SF skylight area, and a 400 Amp, 240 volt single phase electrical service is required to provide a solar zone area of the smaller of the following:

1. $[40\% \times (10,000 \text{ SF roof area} - 1,000 \text{ SF skylights})] = 3,600 \text{ SF}$, or
 2. $[400 \text{ Amp} \times 240 \text{ Volts} \times 20\% / 10 \text{ watts per SF}] = 1,920 \text{ SF}$
- Therefore, a solar zone of 1,920 square feet is required

The solar zone requires a dedicated pathway for future connection to the electrical or water heating system, and may also be located above carports, canopies, or elsewhere on the building or site. Exemptions are provided for roofs that are extensively shaded or congested with equipment.

Cost Impact: The code change proposal will increase the cost of construction.

CE361-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C410 (NEW)-EC-JONLIN.doc

2013 PROPOSED CHANGES TO THE INTERNATIONAL ENERGY CONSERVATION CODE- RESIDENTIAL PROVISIONS

INTERNATIONAL COMMERCIAL ENERGY CONSERVATION CODE - RESIDENTIAL COMMITTEE

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TENTATIVE ORDER OF DISCUSSION 2013 PROPOSED CHANGES TO THE INTERNATIONAL ENERGY CONSERVATION CODE – RESIDENTIAL

The following is the tentative order in which the proposed changes to the code will be discussed at the public hearings. Proposed changes which impact the same subject have been grouped to permit consideration in consecutive changes.

Proposed change numbers that are indented are those which are being heard out of numerical order. Indentation **does not** necessarily indicate that one change is related to another. Proposed changes may be grouped for purposes of discussion at the hearing at the discretion of the chair. Note that some Residential Energy Changes may not be included on this list as they are being heard by another committee. Please consult the Cross Index of Proposed Changes. Note also that RE1-RE9 are moved to later in the hearing order to all grouping consideration of proposed changes to Chapters 1 and 3 near the beginning of the the consideration of Chapters 1 and 3 of the IECC-Commercial Provisions.

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RE13-13	RE49-13	RE85-13	CE49-13 Part III
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RE16-13	RE51-13	CE46-13 Part II	RE124-13
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RE17-13	RE53-13	RE89-13	RE126-13
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RE167-13	ADM53-13 Part III
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RE169-13	ADM30-13 Part III
RE170-13	ADM47-13 Part III
RE171-13	CE39-13 Part II
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RE1– 13

R101.4.3 (IRC N1101.3)

Proponent: Brenda A. Thompson, Clark County Development Services, Las Vegas NV, representing ICC Sustainability, Energy & High Performance Building Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

R101.4.3 (N1101.3) Additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

Exception: The following need not comply provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
4. Construction where the existing roof, wall or floor cavity is not exposed.
5. Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.
- ~~6. Replacement of existing doors that separate conditioned space from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a conditioned space from the exterior shall not be removed.~~
- ~~7. 6.~~ Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.
- ~~8. 7.~~ Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

It is inappropriate to have item 6 in the existing building provisions of the Residential IECC. Chapter 4(RE) has no provisions requiring a vestibule or revolving door in a residential building. Even if such were provided in an existing residential building, the code shouldn't require keeping a feature not required by the code for new construction of a like building.

Cost Impact: The change will not increase the cost of construction.

RE1-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R101.4.3-EC-THOMPSON-SEHPCAC.doc

RE2 – 13

R102.1.2 (NEW) (IRC N1101.8), Chapter 5 (IRC Chapter 44)

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

Add new text as follows:

R102.1.2 (N1101.8) HERS score compliance. Buildings with a certificate of compliance stating the building complies with the HERS scores in Table R102.1.2 shall be considered in compliance with this code. The certificate of compliance shall be from an approved source.

TABLE 102.1.2 (N1101.8)
REQUIRED HERS SCORES BY CLIMATE ZONE AND HOUSING CHARACTERISTICS

<u>Climate Zone</u>	<u>Building Characteristics</u>	<u>Maximum Score</u>
<u>TBD</u>	<u>TBD</u>	<u>TBD</u>

Add new standard to Chapter 5 as follows:

Residential Energy Services Network, Inc.
P.O. Box 4561
Oceanside, CA 92052-4561

RESNET

RESNET PDS 301-01- 2013 RESNET Mortgage Industry National Home Energy Rating Standards.

Reason: The draft RESNET standard is out for public review now. While it is not ready for reference, the standard may be upgraded to where it can be referenced. If the proprietary nature of the proposed standard was resolved, the score was revised to be based on energy as calculated by the IECC, and other comments were resolved, then the RESNET infrastructure could be an asset in demonstrating code compliance. This is a placeholder for that possibility in this code cycle.

Cost Impact: This code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, RESNET PDS 301-01- 2013 RESNET Mortgage Industry National Home Energy Rating Standards with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

RE2-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R102.1.2-EC-CONNER.doc

RE3 – 13

R103.2 (IRC N1101.8)

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

Revise as follows:

R103.2 (N1101.8) Information on construction documents. Construction documents shall be drawn to scale upon suitable material. Electronic media documents are permitted to be submitted when *approved* by the *code official*. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, systems and equipment as herein governed. Details shall include, but are not limited to, as applicable, insulation materials and their *R*-values; fenestration *U*-factors and SHGCs; area-weighted *U*-factor and SHGC calculations; mechanical system design criteria; mechanical and service water heating system and equipment types, sizes and efficiencies; ~~economizer description~~; equipment and systems controls; ~~fan motor horsepower (hp) and controls~~; duct sealing, duct and pipe insulation and location; ~~lighting fixture schedule with wattage and control narrative~~; and air sealing details.

Reason: Commercial requirements don't belong in residential.

Cost Impact: The code change proposal will not increase the cost of construction.

RE3-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R103.2-EC-CONNER.doc

RE4 – 13

R103.2 (IRC N1101.8), R202 (NEW) (IRC N1101.9), Table R402.1.1 (IRC Table N1102.1.1), Table R402.1.3 (IRC Table N1102.1.3)

Proponent: Meg Waltner, Natural Resources Defense Council, representing self (mwaltner@nrdc.org)

Revise as follows:

R103.2 (N1101.8) Information on construction documents. Construction documents shall be drawn to scale upon suitable material. Electronic media documents are permitted to be submitted when *approved* by the *code official*. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, systems and equipment as herein governed. Details shall include, but are not limited to, as applicable, cardinal directions; insulation materials and their *R*-values; fenestration *U*-factors and SHGCs; area-weighted *U*-factor and SHGC calculations; mechanical system design criteria; mechanical and service water heating system and equipment types, sizes and efficiencies; economizer description; equipment and systems controls; fan motor horsepower (hp) and controls; duct sealing, duct and pipe insulation and location; lighting fixture schedule with wattage and control narrative; and air sealing details.

**TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT^a**

CLIMATE ZONE	FENESTRATION <i>U</i> -FACTOR ^b	SKYLIGHT ^b <i>U</i> -FACTOR	GLAZED FENESTRATION SHGC ^{b, e, i}	CEILING <i>R</i> -VALUE	WOOD FRAME WALL <i>R</i> -VALUE	MASS WALL <i>R</i> -VALUE ⁱ	FLOOR <i>R</i> -VALUE	BASEMENT ^c WALL <i>R</i> -VALUE	SLAB ^d <i>R</i> -VALUE & DEPTH	CRAWL SPACE ^e WALL <i>R</i> -VALUE
1	NR	0.75	<u>0.20/0.25</u>	30	13	3/4	13	0	0	0
2	0.40 <u>0.35</u>	0.65	<u>0.20/0.25</u>	38	13	4/6	13	0	0	0
3	0.35	0.55	<u>0.20/0.25</u>	38	20 or 13+5 ^h	8/13	19	5/13 ^f	0	5/13
4 except Marine	0.35 <u>0.20</u>	0.55	0.40	49	20 or 13+5 ^h	8/13	19	10 /13	10, 2 ft	10/13
5 and Marine 4	0.32 <u>0.20</u>	0.55	NR	49	20 or 13+5 ^h	13/17	30 ^g	15/19	10, 2 ft	15/19
6	0.32 <u>0.20</u>	0.55	NR	49	20+5 or 13+10 ^h	15/20	30 ^g	15/19	10, 4 ft	15/19
7 and 8	0.32 <u>0.20</u>	0.55	NR	49	20+5 or 13+10 ^h	19/21	38 ^g	15/19	10, 4 ft	15/19

For SI: 1 foot = 304.8 mm.

- R*-values are minimums. *U*-factors and SHGC are maximums. When insulation is installed in a cavity which is less than the label or design thickness of the insulation, the installed *R*-value of the insulation shall not be less than the *R*-value specified in the table.
- The fenestration *U*-factor column excludes skylights. The SHGC column applies to all glazed fenestration. Exception: Skylights may be excluded from glazed fenestration SHGC requirements in Climate Zones 1 through 3 where the SHGC for such skylights does not exceed 0.30.
- "15/19" means R-15 continuous insulation on the interior or exterior of the home or R-19 cavity insulation at the interior of the basement wall. "15/19" shall be permitted to be met with R-13 cavity insulation on the interior of the basement wall plus R-5 continuous insulation on the interior or exterior of the home. "10/13" means R-10 continuous insulation on the interior or exterior of the home or R-13 cavity insulation at the interior of the basement wall.
- R-5 shall be added to the required slab edge *R*-values for heated slabs. Insulation depth shall be the depth of the footing or 2 feet, whichever is less in Climate Zones 1 through 3 for heated slabs.
- There are no SHGC requirements in the Marine Zone.
- Basement wall insulation is not required in warm-humid locations as defined by Figure R301.1 and Table R301.1.
- Or insulation sufficient to fill the framing cavity, R-19 minimum.
- First value is cavity insulation, second is continuous insulation or insulated siding, so "13+5" means R-13 cavity insulation plus R-5 continuous insulation or insulated siding. If structural sheathing covers 40 percent or less of the exterior, continuous insulation

R-value shall be permitted to be reduced by no more than R-3 in the locations where structural sheathing is used – to maintain a consistent total sheathing thickness.

i. The second R-value applies when more than half the insulation is on the interior of the mass wall.

j. The second SHGC applies when the home's *west-facing glazing area* is less than or equal to 10% of the home's total glazed fenestration area.

**TABLE R402.1.3 (N1102.1.3)
EQUIVALENT U-FACTORS^a**

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT U-FACTOR	CEILING U-FACTOR	FRAME WALL U-FACTOR	MASS WALL U-FACTOR ^b	FLOOR U-FACTOR	BASEMENT WALL U-FACTOR	CRAWL SPACE WALL U-FACTOR
1	0.50	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.40 0.35	0.65	0.030	0.082	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.057	0.098	0.047	0.091 ^c	0.136
4 except Marine	0.35 0.20	0.55	0.026	0.057	0.098	0.047	0.059	0.065
5 and Marine 4	0.32 0.20	0.55	0.026	0.057	0.082	0.033	0.050	0.055
6	0.32 0.20	0.55	0.026	0.048	0.060	0.033	0.050	0.055
7 and 8	0.32 0.20	0.55	0.026	0.048	0.057	0.028	0.050	0.055

a. Nonfenestration U-factors shall be obtained from measurement, calculation or an approved source.

b. When more than half the insulation is on the interior, the mass wall U-factors shall be a maximum of 0.17 in Climate Zone 1, 0.14 in Climate Zone 2, 0.12 in Climate Zone 3, 0.087 in Climate Zone 4 except Marine, 0.065 in Climate Zone 5 and Marine 4, and 0.057 in Climate Zones 6 through 8.

c. Basement wall U-factor of 0.360 in warm-humid locations as defined by Figure R301.1 and Table R301.1.

Add new definitions as follows:

VERTICAL GLAZING. Glazing other than skylights.

WEST-FACING GLAZING AREA. The area of *vertical glazing* facing between 45 degrees south of west and 30 degrees north of west, inclusive.

Reason: According to the attached analysis prepared by the Department of Energy, the proposed U-factor and SHGC reductions are cost effective. Cost-effective measures should be included in the IECC as a measure of sound energy policy and to protect consumers from unnecessarily high future energy costs.

Window U-factor and SHGC

Description

Heat gain through windows is characterized by the Solar Heat Gain Co-efficient (SHGC) and the heat lost through windows is characterized by the heat transfer coefficient (U-factor). For this concept, U-factors lower than the 2012 IECC code requirements are simulated in the colder climate zones and SHGCs lower than the 2012 IECC code requirements are simulated in the warmer climate zones.

IECC Climate Zone	2012 IECC window requirements U-factor SHGC	Windows considered in this concept U-factor SHGC
1	NR 0.25	NR 0.2
2	0.40 0.25	0.35 0.2
3	0.35 0.25	0.35 0.2
4 except marine	0.35 0.40	0.20 0.40
5 & 4-marine	0.32 NR	0.20 NR
6	0.32 NR	0.20 NR
7 & 8	0.32 NR	0.20 NR

Energy Cost Savings

Figure 1 below shows energy cost savings for each climate zone.

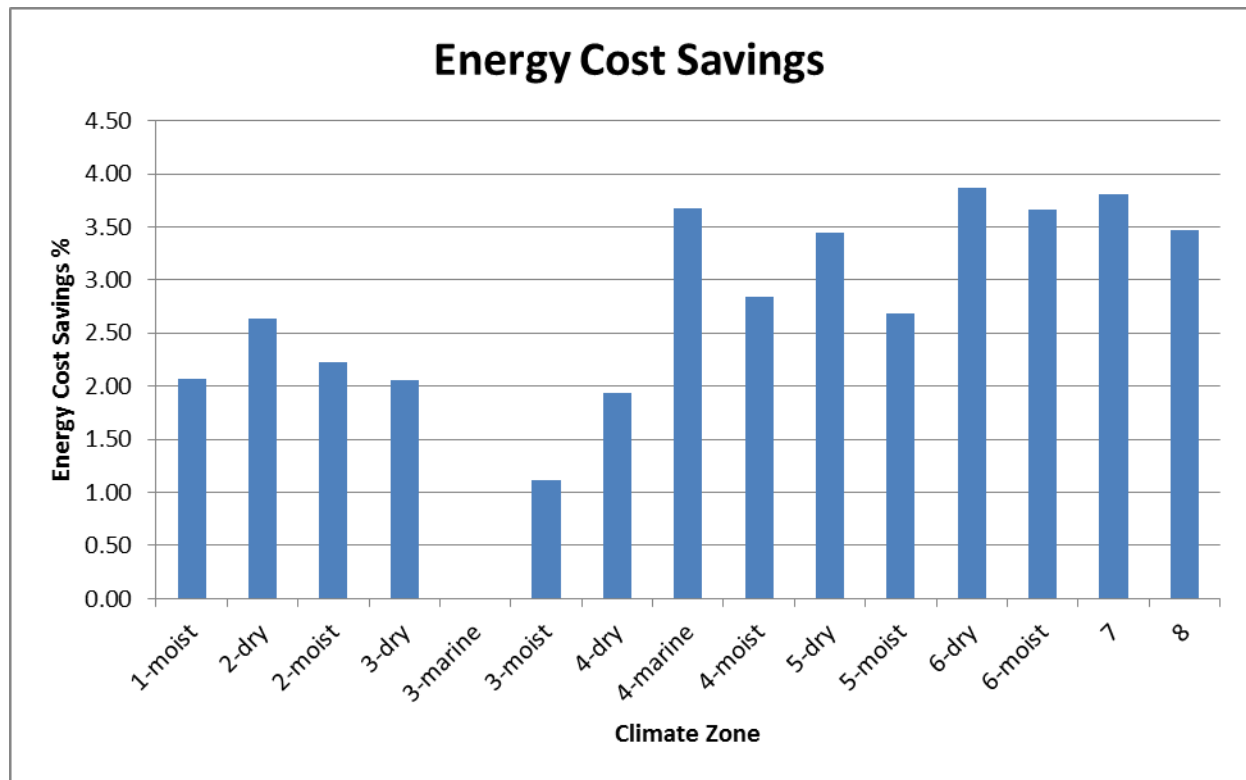


Figure 1: Energy Cost Savings for the concept over the 2012 IECC code

Cost Effectiveness

The cost for windows with lower SHGC is based on the Building Component Community Cost database (BC3)¹. The cost for windows with SHGC 0.2 is extrapolated from cost for windows with SHGC 0.28 and 0.25. The cost for R-5 (U=0.2 Btu/hr-ft²-F) windows is derived from DOE's High Efficiency Windows Volume Purchase Initiative². This initiative has a target incremental cost of \$4/ft² for R-5 windows over EnergyStar windows. According to manufacturer data collected, two manufacturers had incremental costs of approximately \$2/sf and two others had a cost of around \$4/sf. It is expected that by the time the 2015 IECC is adopted by states, market transformation will drive down the cost of R-5 windows. We have assumed an incremental cost of \$2/sf for these reasons. EnergyStar requires a U of 0.32 in colder climates so the additional cost of going from U 0.35 in climate zone 4 to the EnergyStar level of U 0.32 is taken into account while calculating the incremental cost of R-5 windows. Table 1 below summarizes incremental costs used in this analysis. These costs are material costs alone and it is assumed that the installation cost will remain the same for all windows.

The lifetime of windows is assumed to be equal to the period of analysis - 30 years.

Table 1: Window costs used in this analysis

SHGC	Window Cost (\$/ea) ³	U-factor	Window Cost (\$/sf) ⁴
0.28	287.20	0.35	34.62
0.25	289.21	0.32	35.09

¹ http://bc3.pnnl.gov/wiki/index.php/Main_Page

² DOE R-5 windows initiative.

³ For 24"x42" vinyl casement windows from the BC3 database

⁴ http://bc3.pnnl.gov/wiki/images/f/fa/Residential_Report.pdf

0.2	292.56*	0.32 -> 0.2	2.00
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*indicates extrapolated values

These costs are adjusted using location multipliers specified in Table 2 below, to generate incremental costs by state. State specific fuel costs are used in this analysis as specified in Table 3. Figure 2 shows Life Cycle Cost for this measure, by Climate Zone.

Additional Analysis and discussion

Low SHGC windows are usually tinted and there are concerns that they may have limited acceptance among home owners on account of aesthetics. While we are unaware of any surveys or studies supporting this claim, we understand that this may be a valid concern. Additional analyses were conducted to evaluate an alternative of maintaining the SHGC at the 2012 IECC level and limiting the amount of glazing facing west to yield similar energy savings as would result from using windows with lower SHGC.

DOE's analyses indicate that an appropriate limit on **west facing glazing is 10% of the total glazed fenestration area of the home**. There are multiple ways of achieving this limit: the extra glazing on the west facing wall can be moved to adjacent walls; west facing glazing area can be reduced; or the house can be re-oriented favorably. The cost for all the above approaches would be negligible if they are implemented at the design stage. Reducing glazing area may even reduce the first cost associated with the measure. As such, DOE assumed that all these approaches are zero-cost fixes and hence, cost-effective

Table 2: Cost multipliers by State

Location	State	Climate Zone	Moisture Regime	multiplier
Miami	FL	1	moist	0.884
Phoenix	AZ	2	dry	0.928
Houston	TX	2	moist	0.837
El Paso	TX	3	dry	0.837
San Francisco	CA	3	marine	1.142
Memphis	TN	3	moist	0.863
Albuquerque	NM	4	dry	0.903
Salem	OR	4	marine	1.038
Baltimore	MD	4	moist	0.956
Boise	ID	5	dry	0.918
Chicago	IL	5	moist	1.069
Helena	MT	6	dry	0.936
Burlington	VT	6	moist	0.933
Duluth	MN	7	moist	1.06
Fairbanks	AK	8	moist	1.336

Table 3: Fuel Costs by State

Location	State	Climate Zone	Moisture Regime	Electricity-winter (\$/kWh)	Electricity-summer (\$/kWh)	Gas (\$/thm)	Oil (\$/MBtu)
Miami	FL	1	moist	0.117	0.117	1.532	23.7
Phoenix	AZ	2	dry	0.099	0.117	1.306	23.7
Houston	TX	2	moist	0.11	0.12	0.814	23.7
El Paso	TX	3	dry	0.11	0.12	0.814	23.7
San Francisco	CA	3	marine	0.149	0.156	0.943	23.7
Memphis	TN	3	moist	0.095	0.095	0.862	23.7
Albuquerque	NM	4	dry	0.099	0.116	0.791	23.7
Salem	OR	4	marine	0.091	0.092	1.174	23.7

Baltimore	MD	4	moist	0.134	0.151	1.039	23.7
Boise	ID	5	dry	0.078	0.084	0.869	23.7
Chicago	IL	5	moist	0.108	0.122	0.717	23.7
Helena	MT	6	dry	0.091	0.096	0.795	23.7
Burlington	VT	6	moist	0.158	0.155	1.433	23.13
Duluth	MN	7	moist	0.103	0.108	0.833	23.7
Fairbanks	AK	8	moist	0.166	0.171	0.839	23.7

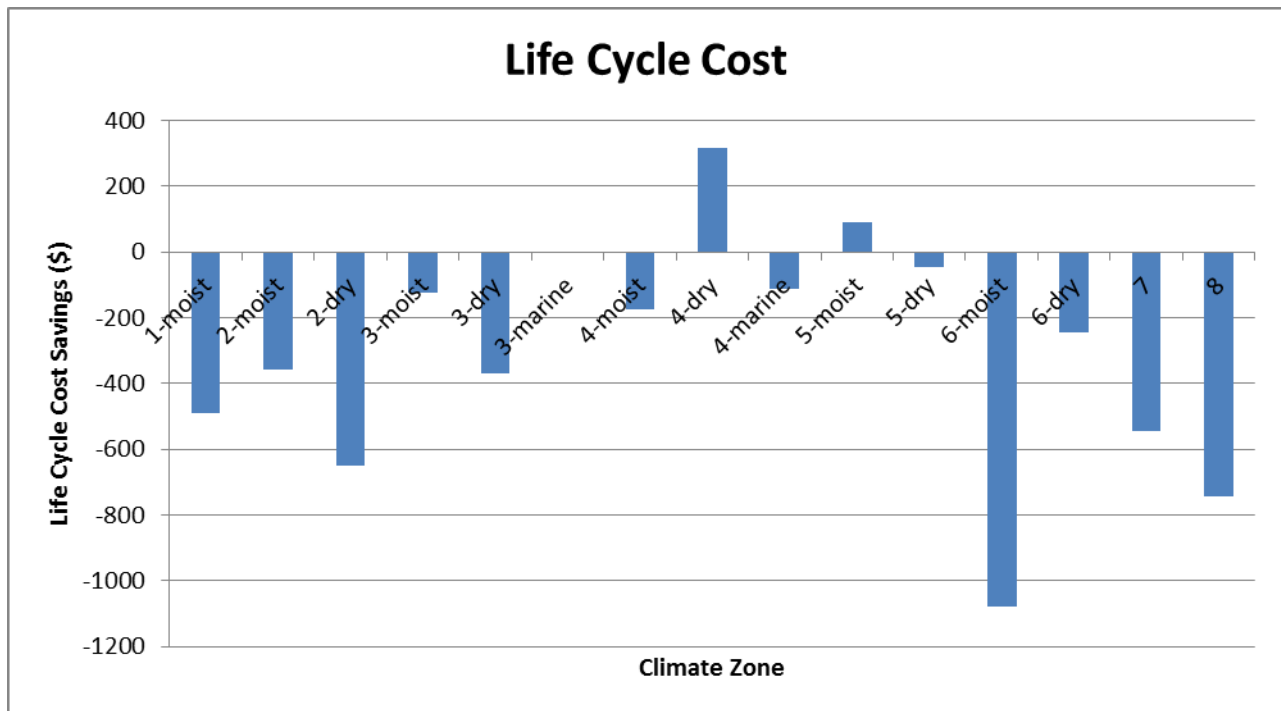


Figure 2: Life Cycle Cost for the concept over the 2012 IECC. Negative values indicate savings.

Cost Impact: The code change proposal will increase the cost of construction.

RE4-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R103.2-EC-WALTNER.doc

RE5 – 13

R202 (IRC N1101.9)

Proponent: Shaunna Mozingo, City of Cherry Hills Village, representing Colorado Chapter of ICC, Inc.
(smozingo@coloradocode.net)

Delete without substitution as follows:

IECC SECTION R202 (IRC N1101.9) GENERAL DEFINITIONS

ENTRANCE DOOR. ~~Fenestration products used for ingress, egress and access in nonresidential buildings, including, but not limited to, exterior entrances that utilize latching hardware and automatic closers and contain over 50 percent glass specifically designed to withstand heavy use and possibly abuse.~~

Reason: Within the definition itself it clarifies that we are only talking about entrance doors in nonresidential buildings, thus this definition should not be located in the residential chapter.

When the IECC was split up and new chapters 1-3 were created for both the residential and the commercial portions of the code some things were brought over into the commercial chapters that belonged only to residential and vice versa. It becomes necessary now to clean up these very separate and distinct chapters so that those who may be new to the energy code and were not aware of the previous combined versions of chapters 1-3 will not be confused by things that were brought forward by mistake.

Cost Impact: This code change proposal will not increase the cost of construction.

RE5-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R202-ENTRANCE DOOR-EC-MOZINGO.doc

RE6 – 13

R202 (NEW) (IRC N1101.9 (NEW))

Proponent: Matt Dobson, representing the Vinyl Siding Institute (mdobson@vinylsiding.org)

Add new definition as follows:

IECC SECTION R202 (IRC N1101.9) GENERAL DEFINITIONS

INSULATED SIDING. An insulated cladding with manufacturer-installed insulating material as an integral part of the cladding product having a minimum R-value of R-2, based on testing in accordance with ASTM C1363.

Reason: This definition will help building officials and energy specialists/raters understand how to qualify insulated siding as home insulation. It includes language similar to the definition of insulated vinyl siding in ASTM D7793 and uses insulated sheathing's R-value threshold in the current energy code.

This is a general definition that can be applied to any insulated siding, regardless of the material. It will provide direction to manufacturers of these products that want to properly test their products and qualify them as home insulation.

By setting a minimum R-value threshold for qualification and stating the test method that must be used for insulation, it provides a clear path for evaluation and code acceptance when a cladding system is classified as insulation.

This testing is done using ASTM C1363 (hot box) as specified by the rules for home insulation in Federal Trade Commission regulation 16 CFR Part 460 and as referenced in the energy code under section R303.1.4. The test protocol has been reviewed and deemed to be in the spirit of the rule, 16 CFR Part 460, by the Federal Trade Commission. The test methodology for insulated siding has been accepted and published as a part of the ENERGY STAR Version 3 program for new construction.

There have been questions about how the R-value of insulated siding will be impacted by air movement or wind. As specified in ASTM D7793, insulated vinyl siding is tested under ASTM C1363 without any special sealing of joints or laps, just as it would be installed in the field. ASTM C1363 includes a wind of specified velocity as part of test. Although the primary purpose of this wind is to remove the effect of the boundary air film, it also provides an opportunity for air to circulate into or behind the siding. The R-value reported for the test thus includes the effect of this wind and any reduction in insulating performance due to entry of air.

As part of the development of test methodology for insulated vinyl siding, a variety of profile types were tested both unsealed (as installed) and with all joints and laps sealed. A comparison of the results shows that there is indeed a reduction in R-value of up to about 25% for the unsealed configuration, but that the remaining R-value is still substantial. Below is a sample of the results of this study which show products end R-value in sealed and unsealed configurations. Per ASTM D7793, the R-value reported for insulated vinyl siding must be determined through testing in an unsealed, as-installed configuration.

Product	Lock Style	Wind Config	Sealing	R-value
Single 7	Standard Lock	Perpendicular	Sealed	2.52
		Perpendicular	Unsealed	2.12
		Perpendicular	Unsealed	2.13
		Perpendicular	Unsealed	2.13
		Perpendicular	Unsealed	2.16
Quad 4.5	Standard Lock	Perpendicular	Sealed	3.27
		Perpendicular	Unsealed	2.56
		Perpendicular	Unsealed	2.57
		Perpendicular	Unsealed	2.57
		Perpendicular	Unsealed	2.63
		Perpendicular	Unsealed	2.53
		Parallel Bottom	Sealed	2.85
		Parallel Bottom	Unsealed	2.65
		Parallel-Top	Sealed	2.85
		Parallel-Top	Unsealed	2.55

Double 6	Standard Lock	Perpendicular	Sealed	2.86
		Perpendicular	Unsealed	2.34
		Perpendicular	Unsealed	2.33
		Perpendicular	100% Unsealed	2.34
		Parallel Bottom	Sealed	2.75
		Parallel Bottom	Unsealed	2.45
		Parallel-Top	Sealed	2.75
		Parallel-Top	Unsealed	2.55
A: Double 6	Stack Lock	Perpendicular	Sealed	3.74
		Perpendicular	Unsealed	2.03
		Perpendicular	Sealed	3.54
		Perpendicular	Unsealed	2.69
		Parallel Bottom	Sealed	3.35
		Parallel Bottom	Unsealed	2.65
		Parallel-Top	Sealed	3.35
		Parallel-Top	Unsealed	2.75
B: Double 6	Stack Lock	Perpendicular	Sealed	3.11
		Perpendicular	Unsealed	1.97
Double 4.5	Standard Lock	Perpendicular	Sealed	3.13
		Perpendicular	Unsealed	2.32

A complete copy of this report and be viewed here by going to
http://www.vinylsiding.org/ABOUTSIDING/insulated/Summary_of_VSI_R-value_Testing.pdf.

For more information about insulated siding, go to www.insulatedsiding.info.

Cost Impact: This change have minimal cost impact as many products on the market are certified and tested using this methodology.

EC6-13

Public Hearing: Committee:
Assembly:

AS
ASF

AM
AMF

D
DF

R202-INSULATED SIDING (NEW)-EC-DOBSON

RE7 – 13

R302.1 (IRC N1101.11)

Proponent: Jerry Anderson, City of Overland Park, KS, representing self (anderson@opkansas.org)

Revise as follows:

R302.1 (N1101.11) Interior design conditions. The interior design temperatures used for heating and cooling load calculations shall be in accordance with ACCA Manual J. ~~a maximum of 72[°]F (22[°]C) for heating and minimum of 75[°]F (24[°]C) for cooling.~~

Reason: The purpose of this code change is to allow some flexibility in design conditions. There is no valid reason for the code to specify exact temperatures for interior design. Interior design conditions are all about comfort. The 72 degree temperature for heating and the 75 degree temperature for cooling are simply design temps where most people are comfortable, but comfort is dependent on physical attributes of individuals (age, sex, weight, metabolism, etc). If someone wishes to design a home or residential facility with different design conditions they should be allowed to do so. For example a group home being constructed for the elderly in accordance with the IRC provisions may wish to have different interior design temperatures for heating. The standard would allow for different design temperatures because it views the 72 degree and 75 degree marks as target values.

Cost Impact: The code change proposal will not increase the cost of construction.

RE7-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R302.1-EC-ANDERSON.doc

RE8 – 13

R202 (NEW) (IRC N1101.9 (NEW)), R304 (NEW) (IRC N1102.16 (NEW))

Proponent: Chris Mathis, Mathis Consulting Company, representing self

Add new text as follows:

R304 (N1102.16) SOLAR READY ZONE.

R304.1 (N1102.16.1) General. All new detached one- and two-family dwellings, and multiple single family dwellings having roofs oriented between 110 degrees and 270 degrees of true north shall comply with sections R304.2 through R304.8.

R304.2 (N1102.16.2) Mandatory construction document requirements for solar ready zone. Construction documents for new detached one- and two-family dwellings, and multiple single family dwellings having roofs oriented between 110 degrees and 270 degrees of true north shall indicate the *solar ready zone*.

R304.3 (N1102.16.3) Solar ready zone area. The total *solar ready zone* area shall be no less than 300 square feet exclusive of mandatory access or set back areas required by the *International Fire Code*. New detached one- and two-family dwellings, and multiple single family dwellings with three stories or more and with a total floor area less than or equal to 2000 square feet shall have a *solar ready zone* area no less than 150 square feet. The *solar ready zone* shall be comprised of areas that have no dimension less than five feet and are no less than 80 square feet exclusive of mandatory access or set back areas as required by the *International Fire Code*.

Exceptions:

1. New buildings with a permanently installed on-site renewable energy system.
2. Roof areas in shade more than 70 percent of the time.

R304.4 (N1102.16.4) Obstructions. *Solar ready zones* shall be free from obstructions, including but not limited to vents, chimneys, and roof mounted equipment.

R304.5 (N1102.16.5) Roof load documentation. The structural design loads for roof dead load and roof live load shall be clearly indicated on the construction documents.

R304.6 (N1102.16.6) Interconnection pathway. Construction documents shall indicate the installed pathways for conduit, pre-wiring, pre-plumbing, or plumbing chase from the *solar ready zone* to the electrical service panel or service hot water system.

R304.7 (N1102.16.7) Electrical service reserved space. The main electrical service panel shall have a minimum busbar rating of 200 amps, shall have reserved space to allow installation of a dual pole circuit breaker for future solar electric installation, and shall be labeled "For Future Solar Electric". The reserved space shall be positioned at the opposite (load) end from the input feeder location or main circuit location.

Exception: Building projects with installed pre-plumbing or plumbing chase from the *solar ready zone* to reserved space at the water heating system.

R304.8 (N1102.16.8) Construction documentation. A copy of the construction documents indicating the *solar ready zone* and other requirements of this section shall be posted near the electrical panel, water heater, or other conspicuous location in the building.

Add new definition as follows:

**IECC SECTION R202 (IRC N1101.9)
GENERAL DEFINITIONS**

SOLAR READY ZONE. A section or sections of the roof or building overhang designated and reserved for the future installation of a solar electric or solar thermal system.

Reason: This proposal is intended to support future potential improvements for detached one- and two-family dwellings, and multiple single family dwellings for solar electric and solar thermal systems. The proposed language follows similar language from code adoptions by local municipalities in Tucson, AZ, Boulder, CO, and from the 2013 California Title 24 building code.

This proposal is intended to identify the areas of a residential building roof, called the solar ready zone, for potential future installation of renewable energy systems. This proposal requires documenting necessary solar ready information on the plans, some of which may already be required in permit construction requirements. This proposal also requires the builder to post specific information about the home for use by the homeowner(s).

This proposal requires the installation of chase, conduit, pre wiring, or pre-plumbing. It does not require any specific physical orientation of the residential building. It does not require any increased load capacities for residential roofing systems. When considered at the time of design, this proposal needs not increase the cost of construction, though will add a small, recoverable cost in many cases.

The documentation of solar ready zones and roof load calculations (already performed during the design phase) will assist building departments, as well as any future solar contractors seeking to install renewable energy systems on the roof. The builder/designer is knowledgeable on the intricacies of each model and plan, and easily can identify unobstructed roof areas, as well as spaces where conduit, wiring, and plumbing can be routed from the roof to the respective utility areas. This will save building departments and solar designers time and effort when installing future solar systems.

Upfront costs of renewable energy systems frequently are the largest deterrent to installation. Without preparation at the time of construction, solar installation may not even be technically possible. If a homeowner wishes to install a solar energy system later, this preparation can save thousands of dollars in labor, installation, design, and integration of the solar system into the house. Solar ready design can decrease the payback period tremendously. This is critical as these systems continue to become more cost effective and incentives are more readily available. In the instance that the initial homeowner does not intend to install a solar system, making the building solar ready increases the resale value of the home and the cost can be recovered.

Many building departments have been mandated by local regulations to accelerate permits and inspections for solar installation. Having important information and documentation available to the building department, solar contractor, and homeowner will assist in supporting the accelerated working environment many municipalities have mandated.

The U.S. Department of Energy's (DOE) SunShot Initiative has set a goal to make solar energy cost competitive with other forms of energy by the end of the decade which will reduce installed costs of solar energy systems by about 75%. This initiative, combined with increased pressures on our energy supply and demand, will encourage and drive greater adoption of renewable energy systems on residential buildings.

Cost Impact: The code change proposal will increase the cost of construction.

RE8-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R304 (NEW)-EC-MATHIS.doc

RE9 – 13

R202 (NEW) (IRC N1101.9 (NEW)), R304 (NEW) (IRC N1101.16 (NEW))

Proponent: Jim Meyers, Southwest Energy Efficiency Project, representing Southwest Energy Efficiency Project

Add new text as follows:

SECTION R304 **SOLAR READY ZONE**

R304.1 General. (N1102.16.1) New detached one- and two-family dwellings, and multiple single family dwellings having roofs oriented between 110 degrees and 270 degrees of true north shall comply with Sections R304.2 through R304.8.

R304.2 (N1102.16.2) Construction document requirements for solar ready zone. Construction documents for new detached one- and two-family dwellings, and multiple single family dwellings having roofs oriented between 110 degrees and 270 degrees of true north shall indicate a *solar ready zone*.

R304.3 (N1102.16.3) Solar ready zone area. The total *solar ready zone* area shall be no less than 300 square feet exclusive of access or set back areas as required by the *International Fire Code*. New multiple single family dwellings three stories or more in height above grade plane and with a total floor area less than or equal to 2000 square feet shall have a *solar ready zone* area of not less than 150 square feet. The *solar ready zone* shall be comprised of areas not less than five feet in width and not less than 80 square feet exclusive of access or set back areas as required by the *International Fire Code*.

Exceptions:

1. New buildings with a permanently installed on-site renewable energy system.
2. Roof areas that are in shade more than 70 percent of the time.

R304.4 (N1102.16.4) Obstructions. *Solar ready zones* shall be free from obstructions, including but not limited to vents, chimneys, and roof mounted equipment.

R304.5 (N1102.16.5) Roof load documentation. The structural design loads for roof dead load and roof live load shall be clearly indicated on the construction documents.

R304.6 (N1102.16.6) Interconnection pathway. Construction documents shall indicate pathways for routing of conduit or plumbing from the *solar ready zone* to the electrical service panel or service hot water system.

R304.7 (N1102.16.7) Electrical service reserved space. The main electrical service panel shall have a reserved space to allow installation of a dual pole circuit breaker for future solar electric installation and shall be labeled "For Future Solar Electric". The reserved space shall be positioned at the opposite (load) end from the input feeder location or main circuit location.

R304.8 (N1102.16.8) Construction documentation certificate. A permanent certificate, indicating the *solar ready zone* and other requirements of this section, shall be posted near the electrical distribution panel, water heater or other conspicuous location by the builder or registered design professional.

Add new definition as follows:

IECC SECTION R202 (IRC N1101.9) **GENERAL DEFINITIONS**

SOLAR READY ZONE. A section or sections of the roof or building overhang designated and reserved for the future installation of a solar electric or solar thermal system.

Reason: This proposal is intended to support future potential improvements for detached one- and two-family dwellings, and multiple single family dwellings for solar electric and solar thermal systems. The proposed language follows similar language from code adoptions by local municipalities in Tucson, AZ, Boulder, CO, and from the 2013 California Title 24 building code.

This proposal is intended to identify the areas of a residential building roof, called the solar ready zone, for potential future installation of renewable energy systems. This proposal requires documenting necessary solar ready zone information on the plans, some of which may already be required in permit construction requirements. This proposal also requires the builder to post specific information about the home for use by the homeowner(s).

This proposal does not require the installation of conduit, pre wiring, or pre-plumbing. It does not require any specific physical orientation of the residential building. It does not require any increased load capacities for residential roofing systems. It does not require the redesign of plans.

The documentation of solar ready zones and roof load calculations (already performed during the design phase) will assist building departments as well as any future solar contractors seeking to install renewable energy systems on the roof. The builder/designer is knowledgeable on the intricacies of each model and plan and can easily identify unobstructed roof areas as well as spaces where conduit, wiring and plumbing can be routed from the roof to the respective utility areas. This will save building departments and solar designers' time and effort when installing future solar systems. If a homeowner wishes to install a solar energy system later, this documentation can save thousands of dollars in labor, installation, design and integration of the solar system into the house.

Many building departments have been mandated by local regulations to accelerate permits and inspections for solar installation. Having important information and documentation available to the building department, solar contractor and homeowner will assist in supporting the accelerated working environment many municipalities have mandated.

The U.S. Department of Energy's (DOE) SunShot Initiative has set a goal to make solar energy cost competitive with other forms of energy by the end of the decade which will reduce installed costs of solar energy systems by about 75%. This initiative, combined with increased pressures on our energy supply and demand, will encourage and drive greater adoption of renewable energy systems on residential buildings.

Cost Impact: The code change proposal will increase the cost of construction.

RE9-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R304 (NEW)-EC-MEYERS

RE10 – 13

R401.2 (IRC N1101.15), R402.4.1.2 (IRC N1102.4.1.2), R402.5 1 (IRC N1102.5.1), R403.2.2 (IRC N1103.2.2), R406 (NEW) (IRC N1106 (NEW))

Proponent: W. Ronald Burton, PTW Advisors, LLC., representing Leading Builders of America

Revise as follows:

R401.2 (N1101.2) Compliance. Projects shall comply with one of the following:

1. Sections identified as “mandatory” and with either sections identified as “prescriptive” or the performance approach in Section R405.
2. Optional Performance Compliance in Section R406.

R402.4.1.2 (N1102.4.1.2) Testing. The building or dwelling unit shall be tested and verified as having an air leakage rate of not exceeding 5 air changes per hour in Climate Zones 1 and 2, and 3 air changes per hour in Climate Zones 3 through 8. Testing shall be conducted with a blower door at a pressure of 0.2 inches w.g. (50 Pascals). Where required by the code official, testing shall be conducted by an approved third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the code official. Testing shall be performed at any time after creation of all penetrations of the building thermal envelope.

Exception: The air leakage rate in buildings complying with the Optional Performance Compliance in Section R406 shall not exceed 7 ACH50.

R402.5 (N1102.5) Maximum fenestration U-factor and SHGC (Mandatory). The area-weighted average maximum fenestration U-factor permitted using tradeoffs from Sections R402.1.4, ~~or~~ R405 or R406 shall be 0.48 in Climate Zones 4 and 5 and 0.40 in Climate Zones 6 through 8 for vertical fenestration, and 0.75 in Climate Zones 4 through 8 for skylights. The area-weighted average maximum fenestration SHGC permitted using tradeoffs from Section R405 or Section R406 in Climate Zones 1 through 3 shall be 0.50

R403.2.2 (N1103.2.2) Sealing (Mandatory). Ducts, air handlers, and filter boxes shall be sealed. Joints and seams shall comply with either the International Mechanical Code or International Residential Code, as applicable.

Exceptions:

1. Air-impermeable spray foam products shall be permitted to be applied without additional joint seals.
2. Where a duct connection is made that is partially inaccessible, three screws or rivets shall be equally spaced on the exposed portion of the joint so as to prevent a hinge effect.
3. Continuously welded and locking-type longitudinal joints and seams in ducts operating at static pressures less than 2 inches of water column (500 Pa) pressure classification shall not require additional closure systems.

Duct tightness shall be verified by either of the following:

1. Postconstruction test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 ft² (9.29 m²) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.

2. Rough-in test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 ft² (9.29 m²) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the system, including the manufacturer's air handler enclosure. All registers shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 3 cfm (85 L/min) per 100 ft² (9.29 m²) of conditioned floor area.

Exceptions:

1. Duct tightness test is not required if the air handler and all ducts are located within conditioned space.
2. Buildings complying with the Optional Performance Compliance in Section R406 shall have an air leakage rate not exceeding 8 cfm (226.6 L/min) for ducts located outside of conditioned space.

SECTION R406 (N1106)
OPTIONAL PERFORMANCE COMPLIANCE

R406.1 (N1106.1) Scope. This section establishes criteria for compliance using an optional energy performance analysis. Such analysis shall include only heating, cooling, and service water heating energy only.

R406.2 (N1106.2) Mandatory requirements. Compliance with Section R406 requires compliance with the mandatory provisions identified in Chapter 4 of this code. Supply and return ducts not completely inside the *building thermal envelope* shall be ~~insulated to a minimum of~~ provided with insulation having an R value of not less than R-6.

R406.3 (N1106.3) Performance-based compliance. For *residential buildings* complying with Section R406, compliance based on simulated energy performance requires that a proposed *residential building (proposed design)* be shown to have an annual energy cost that is less than or equal to 95% of the annual energy cost of a residence complying with sections of the residential provisions in Chapter 4 of this code identified as "mandatory" and configured as specified by the *standard reference design* in Table R406.4.2 (1) using the U-factor and SHGC-factors ~~the values in Table R406.4.2 (5)~~. The proposed design values shall not be greater than the U-factors specified in Table R406.4.2 (4) or the SHGC value specified in Table R406.4.2 (3). Energy prices shall be taken from ~~a source~~ an approved source ~~by the code official~~, such as the Department of Energy, Energy Information Administration's State Energy Price and Expenditure Report. Time-of-use pricing in energy cost calculations shall be required where required by the Code Official.

Exception: The energy use based on source energy expressed in Btu or Btu per square foot of *conditioned floor area* shall be alternatives to the energy cost. The source energy multiplier for electricity shall be 3.16. The source energy multiplier for fuels other than electricity shall be 1.1.

R406.4 (N1106.4) Documentation. Documentation of the software used for the performance design and the parameters for the building shall be in accordance with Sections R406.4.1 through R406.4.3.

R406.4.1 (N1106.4.1) Compliance software tools. Documentation verifying that the methods and accuracy of the compliance software tools conform to the provisions of this section shall be provided to the *code official*.

R406.4.2 (N1106.4.2) Compliance report. Compliance software tools shall generate a report that documents that the *proposed design* complies with Section R406.3. The compliance documentation shall include the following information:

1. Address or other identification of the residence;
2. An inspection checklist documenting the building component characteristics of the proposed design as listed in Table R406.4.2 (1). The inspection checklist shall show

results for both the *standard reference design* and the *proposed design*, and shall document all inputs entered by the user necessary to reproduce the results;

3. Name of individual completing the compliance report; and
4. Name and version of the compliance software tool.

406.4.2.1(N1106.4.2.1) Multiple orientations. Where an otherwise identical building model is offered in multiple orientations, documentation that the building meets the performance requirements in each of the four cardinal (north, east, south and west) orientations shall be acceptable for demonstration of compliance for any orientation.

R406.4.3 (N1106.4.3) Additional documentation. The *code official* shall be permitted to require the following documents:

1. Documentation of the building component characteristics of the *standard reference design*.
2. A certification signed by the builder providing the building component characteristics of the proposed design as given in Table R406.4.2 (1).
3. Documentation of the actual values used in the software calculations for the *proposed design*.

R406.5 (N1106.5) Calculation procedure. Calculations of the performance design shall be in accordance with Sections R406.5.1 and R406.5.2.

R406.5.1 (N1106.5.1) General. The *standard reference design* and *proposed design* shall be configured and analyzed using identical methods and techniques.

R406.5.2 (N1106.5.2) Residential building specifications. The *standard reference design* and *proposed design* shall be configured as specified by Table R406.4.2 (1).

R406.5.3 (N1106.5.3) Energy cost analysis. The annual energy cost of the *proposed design* shall be analyzed and compared to a design complying with sections of the residential provisions in Chapter 4 of this code identified as “mandatory” and configured as specified by the *standard reference design* in Table R406.4.2 (1) using the U-factor and SHGC-factors in *Table R406.4.2 (5)*.

R406.6 (N1106.6) Calculation software tools. Calculation software, where used, shall be in accordance with Sections R406.6.1 through R406.6.3.

R406.6.1 (N1106.6.1) Minimum capabilities. Calculation procedures used to comply with this section shall be software tools capable of calculating the annual energy consumption of all building elements that differ between a design complying with sections of the residential provisions in Chapter 4 of this code identified as “mandatory” and configured as specified by the *standard reference design* in Table R406.4.2 (1) using the U-factor and SHGC-factors in *Table R406.4.2 (5)* and the *proposed design* and shall include the following capabilities:

1. The calculation procedure shall not allow the user to directly modify the building component characteristics of the design complying with sections of the residential provisions in Chapter 4 of this code identified as “mandatory” and configured as specified in Table R406.4.2 (1) using the U-factor and SHGC-factors in *Table R406.4.2 (5)*.
2. Calculation of whole-building ~~.(as a single zone.)~~ sizing for the heating and cooling equipment in the *standard reference design* residence in accordance with Section R403.6.
3. Calculations that account for the effects of indoor and outdoor temperatures and part-load ratios on the performance of heating, ventilating and air-conditioning equipment based on climate and equipment sizing.

4. Printed *code official* inspection checklist listing each of the *proposed design* component characteristics from Table R406.4.2 (1) determined by the analysis to provide compliance, along with their respective performance ratings (such as R-value, U-factor, SHGC, HSPF, AFUE, SEER, EF, etc.).

R406.6.2 (N1106.6.2) Specific approval. Performance analysis tools meeting the applicable sections of Section R406 shall be approved. Approval of tools shall be based on meeting a specified threshold for a jurisdiction. The *code official* shall be permitted to approve tools for a specified application or limited scope.

R406.6.3 (N1106.6.3) Input values. When calculations require input values not specified by Sections R403, R404 and R406, those input values shall be taken from an approved source.

TABLE R406.4.2 (1) (N1106.4.2(1))
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
<u>Above-grade walls</u>	Type: mass wall if proposed wall is mass; otherwise wood frame. Gross area: same as proposed U-factor: from Table R406.4.2 (4) Solar absorptance = 0.75 Emittance = 0.90	As proposed As proposed As proposed ^a As proposed As proposed
<u>Basement and crawl space walls</u>	Type: same as proposed Gross area: same as proposed U-factor: from Table R406.4.2 (4), with insulation layer on interior side of walls.	As proposed As proposed As proposed ^a
<u>Above-grade floors</u>	Type: wood frame Gross area: same as proposed U-factor: from Table R406.4.2 (4)	As proposed As proposed As proposed ^a
<u>Ceilings</u>	Type: wood frame Gross area: same as proposed U-factor: from Table R406.4.2 (4)	As proposed As proposed As proposed ^a
<u>Roofs</u>	Type: composition shingle on wood sheathing Gross area: same as proposed Solar absorptance = 0.75 Emittance = 0.90	As proposed As proposed As proposed As proposed
<u>Attics</u>	Type: vented with aperture = 1 ft ² per 300 ft ² ceiling area	As proposed
<u>Foundations</u>	Type: same as proposed foundation wall area above and below grade and soil characteristics.	As proposed
<u>Doors</u>	Area: 40 ft ² Orientation: North U-factor: same as fenestration from Table R406.4.2 (4).	As proposed As proposed As proposed ^a
<u>Glazing^b</u>	Total area ^c = 15% of the conditioned floor area. Orientation: equally distributed to four cardinal compass orientations (N, E, S & W). U-factor: from Table R406.4.2 (4) SHGC: From Table R406.4.2 (3) except that for climates with no requirement (NR) SHGC = 0.40 shall be used. Interior shade fraction: Summer (all hours when cooling is required) = 0.70 Winter (all hours when heating is required) = 0.85 ^e External shading: none	As proposed As proposed As proposed ^d As proposed Same as <i>standard reference design</i> As proposed
<u>Skylights</u>	None	As proposed
<u>Thermally isolated sunrooms</u>	None	As proposed
<u>Air exchange rate</u>	Air leakage rate of 7 air changes per hour at a pressure of 0.2 inches w.g (50 Pa). The mechanical ventilation rate shall be in addition to the air leakage rate and the same as in the proposed design, but no greater than 0.01 x CFA + 7.5 x (N _{br} + 1) where: CFA = conditioned floor area N _{br} = number of bedrooms Energy recovery shall not be assumed for mechanical ventilation.	For residences that are not tested, the same air leakage rate as the <i>standard reference design</i> . For tested residences, the measured air exchange rate ^f . The mechanical ventilation rate ^g shall be in addition

		to the air leakage rate and shall be as proposed.
<u>Mechanical ventilation</u>	None, except where mechanical ventilation is specified by the proposed design, in which case: Annual vent fan energy use: $kWh/yr = 0.03942 \times CFA + 29.565 \times (N_{br} + 1)$ where: CFA = conditioned floor area N _{br} = number of bedrooms	As proposed
<u>Internal gains</u>	IGain = 17,900 + 23.8 x CFA + 4104 x N _{br} (Btu/day per dwelling unit)	Same as <i>standard reference design</i> .
<u>Internal mass</u>	An internal mass for furniture and contents of 8 pounds per square foot of floor area.	Same as <i>standard reference design</i> , plus any additional mass specifically designed as a thermal storage element ^b but not integral to the building envelope or structure.
<u>Structural mass</u>	For concrete or masonry floor slabs, 80% of floor area covered by R-2 carpet and pad, and 20% of floor directly exposed to room air. For concrete or masonry basement walls, as proposed, but with insulation required by Table R406.4.2 (3) located on the interior side of the walls. For other walls, for ceilings, floors, and interior walls, wood frame construction.	As proposed As proposed As proposed
<u>Heating systems</u> ^{i,i}	Fuel type: same as proposed design Efficiencies: Electric: air-source heat pump with prevailing federal minimum standards. Nonelectric furnaces: natural gas furnace with prevailing federal minimum standards. Nonelectric boilers: natural gas boiler with prevailing federal minimum standards. Capacity: sized in accordance with Section R403.6	As proposed As proposed ^m
<u>Cooling systems</u> ^{i,k}	Fuel type: Electric Efficiency: in accordance with prevailing federal minimum standards. Capacity: sized in accordance with Section R403.6.	As proposed
<u>Service water heating</u> ^{i,l}	Fuel type: same as proposed design Efficiency: in accordance with prevailing federal minimum standards. Use: Use: gal/day = 30 + (10 N _{br}) Tank temperature: 120°F	As proposed Same as <i>standard reference design</i> .
<u>Thermal distribution systems</u>	Duct outside the <i>building thermal envelope</i> shall be insulated to R-6 as required by Section R406.2. Untested distribution systems: DSE = 0.88 Tested ducts: Leakage rate to outside conditioned space as specified in Section R403.2.2. Duct location: Unconditioned attic Duct insulation: Per Section R403.2.1	Thermal distribution system efficiency shall be as tested to outside conditioned space or as specified in Table R406.4.2 (2) if not tested. As proposed As proposed
<u>Thermostat</u>	Type: Manual, cooling temperature setpoint = 75°F; Heating temperature setpoint = 72°F	As proposed

For SI: 1 square foot = 0.93 m², 1 British thermal unit = 1055 J, 1 pound per square foot = 4.88 kg/m², 1 gallon (U.S.) = 3.785 L, °C = (°F-32)/1.8, 1 degree = 0.79 rad.

a. If the total building thermal envelope UA (sum of U- factor times assembly area) is less than or equal to the total UA from using the U-factors in Table R406.4.2 (4) (multiplied by the same assembly area as in the proposed building), the building shall be considered to be in compliance with Table R406.4.2 (3). The UA calculation shall be performed using a method consistent with the ASHRAE Handbook of Fundamentals and shall include the thermal bridging effects of framing materials. The SHGC requirements shall be met in addition to UA compliance.

b. Glazing shall be defined as sunlight-transmitting fenestration, including the area of sash, curbing or other framing elements, that enclose conditioned space. Glazing includes the area of sunlight-transmitting fenestration assemblies in walls bounding conditioned basements. For doors where the sunlight-transmitting opening is less than 50 percent of the door area, the glazing area is the

sunlight transmitting opening area. For all other doors, the glazing area is the rough frame opening area for the door including the door and the frame.

c. For residences with conditioned basements, R-2 and R-4 residences and townhouses, the following formula shall be used to determine glazing area:

$$AF = As \times FA \times F$$

where:

AF = Total glazing area.

As = Standard reference design total glazing area.

FA = (Above-grade thermal boundary gross wall area)/(above-grade boundary wall area + 0.5 x below-grade boundary wall area).

F = (Above-grade thermal boundary wall area)/(above-grade thermal boundary wall area + common wall area) or 0.56, whichever is greater.

and where:

Thermal boundary wall is any wall that separates conditioned space from unconditioned space or ambient conditions.

Above-grade thermal boundary wall is any thermal boundary wall component not in contact with soil.

Below-grade boundary wall is any thermal boundary wall in contact with soil.

Common wall area is the area of walls shared with an adjoining dwelling unit.

L and CFA are in the same units.

d. The use of an area-weighted average of fenestration products satisfies the U-factor requirements. The use of an area-weighted average of fenestration products more than 50-percent glazed satisfies the SHGC requirements.

e. For fenestrations facing within 15 degrees (0.26 rad) of true south that are directly coupled to thermal storage mass, the winter interior shade fraction shall be permitted to be increased to 0.95 in the proposed design.

f. Where required by the code official, testing shall be conducted by an approved party. Hourly calculations as specified in the ASHRAE Handbook of Fundamentals, or the equivalent shall be used to determine the energy loads resulting from infiltration.

g. The combined air exchange rate for infiltration and mechanical ventilation shall be determined in accordance with Equation 43 of 2001 ASHRAE Handbook of Fundamentals, and the "Whole-house Ventilation" provisions of 2001 ASHRAE Handbook of Fundamentals, for intermittent mechanical ventilation.

h. Thermal storage element shall mean a component not part of the floors, walls or ceilings that is part of a passive solar system, and that provides thermal storage such as enclosed water columns, rock beds, or phase-change containers. A thermal storage element must shall be in the same room as fenestration that faces within 15 degrees (0.26 rad) of true south, or must shall be connected to such a room with pipes or ducts that allow the element to be actively charged.

i. For a proposed design with multiple heating, cooling or water heating systems using different fuel types, the applicable standard reference design system capacities and fuel types shall be weighted in accordance with their respective loads as calculated by accepted engineering practice for each equipment and fuel type present.

j. For a proposed design without a proposed heating system, a heating system with the prevailing federal minimum efficiency shall be assumed for both the standard reference design and proposed design.

k. For a proposed design home without a proposed cooling system, an electric air conditioner with the prevailing federal minimum efficiency shall be assumed for both the standard reference design and the proposed design.

l. For a proposed design with a nonstorage-type water heater, a 40-gallon storage-type water heater with the prevailing federal minimum energy factor for the same fuel as the predominant heating fuel type shall be assumed. For the case of a proposed design without a proposed water heater, a 40-gallon storage-type water heater with the prevailing federal minimum efficiency for the same fuel as the predominant heating fuel type shall be assumed for both the proposed design and standard reference design.

m. Energy savings resulting from specification of a natural gas furnace with minimum 90% AFUE in climate zones 4-8 shall not be utilized in calculating the annual energy cost of the proposed design.

TABLE R406.4.2 (2) (N1106.4.2(2))
DEFAULT DISTRIBUTION SYSTEM EFFICIENCIES FOR PROPOSED DESIGNS^a

DISTRIBUTION SYSTEM CONFIGURATION AND CONDITION	FORCED AIR SYSTEMS	HYDRONIC SYSTEMS ^b
Distribution system components located in unconditioned space		0.95
Untested distribution systems entirely located in conditioned space ^c	0.88	1
"Ductless" systems ^d	1	

For SI: 1 cubic foot per minute = 0.47 L/s, 1 square foot = 0.093m², 1 pound per square inch = 6895 Pa, 1 inch water gauge = 1250 Pa.

a. Default values given by this table are for untested distribution systems, which must still meet minimum requirements for duct system insulation.

b. Hydronic systems shall mean those systems that distribute heating and cooling energy directly to individual spaces using liquids pumped through closed-loop piping and that do not depend on ducted, forced airflow to maintain space temperatures.

c. Entire system in conditioned space shall mean that no component of the distribution system, including the air-handler unit, is located outside of the conditioned space.

d. Ductless systems shall be allowed to have forced airflow across a coil but shall not have any ducted airflow external to the manufacturer's air-handler enclosure.

TABLE R406.4.2(3) (N1106.4.2(3))
INSULATION AND FENESTRATION BASELINES BY COMPONENT^a

CLIMATE ZONE	FENESTRATION U-FACTOR ^b	SKYLIGHT ^b U-FACTOR	GLAZED FENESTRATION SHGC ^b	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE ^c	FLOOR R-VALUE	BASEMENT ^d WALL R-VALUE	SLAB ^e R-VALUE & DEPTH	CRAWL SPACE ^f WALL R-VALUE
1	1.2	0.75	0.30	30	13	3/4	13	0	0	0
2	0.65 ^g	0.75	0.30	30	13	4/6	13	0	0	0
3	0.50 ^g	0.65	0.30	30	13	5/8	19	5/13 ^h	0	5/13
4 except Marine	0.35	0.60	NR	38	13	5/10	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR ^h	38	20 or 13+5 ⁱ	13/17	30 ^j	10/13	10, 2 ft	10/13
6	0.35	0.60	NR	49	20 or 13+5 ⁱ	15/19	30 ^j	15/19	10, 4 ft	10/13
7 and 8	0.35	0.60	NR	49	21	19/21	38 ^j	15/19	10, 4 ft	10/13

For SI: 1 foot = 304.8 mm.

a. R-values are minimums. U-factors and SHGC are maximums. Insulation material used in layers, such as framing cavity insulation and insulating sheathing, shall be summed to compute the component R-value. The manufacturer's settled R-value shall be used for blown insulation. Computed R-values shall not include an R-value for other building materials or air films.

b. The fenestration U-factor column excludes skylights. The SHGC column applies to all glazed fenestration. The use of an area-weighted average of fenestration products more than 50-percent glazed satisfies the SHGC requirements.

c. The second R-value applies where more than half the insulation is on the interior of the mass wall.

d. "15/19" means R-15 continuous insulated sheathing on the interior or exterior of the home or R-19 cavity insulation at the interior of the basement wall. "15/19" is also met with R-13 cavity insulation on the interior of the basement wall plus R-5 continuous insulated sheathing on the interior or exterior of the home. "10/13" means R-10 continuous insulated sheathing on the interior or exterior of the home or R-13 cavity insulation at the interior of the basement wall.

e. R-5 shall be added to the required slab edge R-values for heated slabs. Insulation depth shall be the depth of the footing or 2 feet, whichever is less in Zones 1 through 3 for heated slabs.

f. For impact rated fenestration complying with Section R301.2.1.2 of the International Residential Code or Section 1609.1.2 of the International Building Code, the maximum U-factor shall be 0.75 in Zone 2 and 0.65 in Zone 3.

g. Basement wall insulation is not required in warm-humid locations as defined by Figure R301.1 and Table R301.1.

h. There are no SHGC requirements in the Marine Zone.

i. "13+5" means R-13 cavity insulation plus R-5 insulated sheathing. If structural sheathing covers 25 percent or less of the exterior, insulating sheathing is not required where structural sheathing is used. If structural sheathing covers more than 25 percent of exterior, structural sheathing shall be supplemented with insulated sheathing of at least R-2.

j. Or insulation sufficient to fill the framing cavity, R-19 minimum.

TABLE R406.4.2(4) (N1106.4.2(4))
EQUIVALENT U-FACTORS^{a,b,c}

CLIMATE ZONE	FENESTRATION U-FACTOR ^d	SKYLIGHT U-FACTOR	CEILING U-FACTOR	FRAME WALL U-FACTOR	MASS WALL U-FACTOR ^e	FLOOR U-FACTOR	BASEMENT WALL U-FACTOR	CRAWL SPACE WALL U-FACTOR
1	1.20	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.65	0.75	0.035	0.082	0.165	0.064	0.360	0.477
3	0.50	0.65	0.035	0.082	0.141	0.047	0.091 ^f	0.136
4 except Marine	0.35	0.60	0.030	0.082	0.141	0.047	0.059	0.065
5 and Marine 4	0.35	0.60	0.030	0.057	0.082	0.033	0.059	0.065
6	0.35	0.60	0.026	0.057	0.060	0.033	0.050	0.065
7 and 8	0.35	0.60	0.026	0.057	0.057	0.028	0.050	0.065

a. An assembly with a U-factor equal to or less than that specified in Table R406.4.2 (4) shall be permitted as an alternative to the R-value in Table R406.4.2 (3).

b. If the total building thermal envelope UA (sum of U-factor times assembly area) is less than or equal to the total UA resulting from using the U-factors in Table R406.4.2 (4) (multiplied by the same assembly area as in the proposed building), the building shall be considered in compliance with Table R406.4.2 (3). The UA calculation shall be done using a method consistent with the ASHRAE Handbook of Fundamentals and shall include the thermal bridging effects of framing materials. The SHGC requirements shall be met in addition to UA compliance.

c. Nonfenestration U-factors shall be obtained from measurement, calculation or an approved source.

d. The use of an area-weighted average of fenestration products satisfies the U-factor requirements.

e. When more than half the insulation is on the interior, the mass wall U-factors shall be a maximum of 0.17 in Zone 1, 0.14 in Zone

2. 0.12 in Zone 3, 0.10 in Zone 4 except Marine, and the same as the frame wall U-factor in Marine Zone 4 and Zones 5 through 8.
f. Basement wall U-factor of 0.360 in warm-humid locations as defined by Figure R301.1 and Table R301.1.

TABLE R406.4.2(5) (IRC N1106.4.2(5))
ENERGY COST COMPARISON U- AND SHGC-FACTORS^a

CLIMATE ZONE	FENESTRATION U-FACTOR	GLAZED FENESTRATION SHGC^b	SKYLIGHT U-FACTOR	CEILING U-FACTOR	FRAME WALL U-FACTOR	MASS WALL U-FACTOR^c	FLOOR U-FACTOR	BASEMENT WALL U-FACTOR	CRAWL SPACE WALL U-FACTOR
1	0.50	0.25	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.40	0.25	0.65	0.030	0.082	0.165	0.064	0.360	0.477
3	0.35	0.25	0.55	0.030	0.057	0.098	0.047	0.091 ^d	0.136
4 except Marine	0.35	0.40	0.55	0.026	0.057	0.098	0.047	0.059	0.065
5 and Marine	0.32	NR	0.55	0.026	0.057	0.082	0.033	0.050	0.055
6	0.32	NR	0.55	0.026	0.048	0.060	0.033	0.050	0.055
7 and 8	0.32	NR	0.55	0.026	0.048	0.057	0.028	0.050	0.055

a. Nonfenestration U-factors shall be obtained from measurement, calculation or an approved source.

b. The SHGC column applies to all glazed fenestration. Exception: Skylights are excluded from glazed fenestration SHGC requirements in Climate Zones 1 through 3 where the SHGC for such skylights does not exceed 0.30.

c. Where more than half the insulation is on the interior, the mass wall U-factors shall be not greater than 0.17 in Climate Zone 1, 0.14 in Climate Zone 2, 0.12 in Climate Zone 3, 0.087 in Climate Zone 4 except Marine, 0.065 in Climate Zone 5 and Marine 4, and 0.057 in Climate Zones 6 through 8.

d. Basement wall U-factor of 0.360 in warm-humid locations as defined by Figure R301.1 and Table R301.1.

Reason: This proposal provides a new alternative performance compliance path in the residential section of the IECC that results in much more energy efficient homes by providing greater flexibility and compliance options for builders and design professionals.

Specifically, the proposal adds a new Section R406 – Optional Performance Compliance - and modifies specific sections of the IECC to facilitate the use of this new performance alternative. With these proposed changes in place, users would have the option to comply as currently required using either the prescriptive or performance approach (Section 405) or they can choose to comply with the Optional Performance Compliance in Section R406. Choosing to comply with Section R406 would however result in a home that has an annual energy cost that is less than or equal to 95% of the annual energy cost of a home built in compliance with the current code. Put simply, this alternative path is more stringent than the current IECC because it results in homes that are 5% more energy efficiency than one built in compliance with the current code.

In order to make new Section R406 as easy to understand and use as possible, this section mirrors the format of the current Section R405 performance alternative. That includes the requirement to comply with the current “mandatory” requirements in Chapter 4. Of critical importance however, greater flexibility over the current performance alternative in Section R405 is achieved with the inclusion of much more robust compliance options in the procedures for configuring and analyzing the standard reference design and the proposed design as outlined in Table R406.4.2 (1). These more robust compliance options include the reintroduction of the HVAC equipment trade-offs that were a part of the IECC until they were eliminated in the 2009 edition. Elimination of the ability to take advantage of more efficient heating and cooling equipment has been one of the biggest factors in the lack of support the 2009 and 2012 editions of the IECC have received in the marketplace not only by home builders but by code officials and elected officials as well. It makes little sense to require extremely stringent envelope and other requirements while at the same time greatly discouraging the use of more efficient HVAC equipment. Either we want builders and designers to choose more efficient options or we don’t – and current IECC requirements send a clear message that we do not want to encourage the choice of more innovative and efficient heating and cooling systems. Section R406 compliance directly addresses this issue.

Additional compliance options in the new Optional Performance Compliance path include the ability to take advantage of designs with less glazing than the minimum percentage of glazing in the current performance alternative in Section R405. In addition, the calculation procedure in the new Section R406 includes the much more reasonable U-Factors and SHGC Factors from the 2009 IECC, while also requiring the annual energy cost of the proposed design to be 5% MORE efficient than a home built to the current IECC requirements. Again, the prescriptive path R- and U-Factor and SHGC tables in the current IECC are a major contributing factor in the lack of support, adoption and enforcement of the 2012 IECC. Those problems can be greatly alleviated by allowing builders and designers to have the maximum amount of flexibility in determining compliance with the code. That is especially true given that in exchange for the ability to design and build homes with proven market acceptance in more cost-effective ways, this proposal by a group of the largest U. S. home building companies who build over 80,000 homes in the U. S. each year would actually make the annual energy cost target even more stringent than currently required.

As previously discussed, the heart of this proposal is the new Optional Performance Compliance in Section R406. While large portions of Section R406 mirror the language in the current Section R405, specific sections deserve greater explanation.

- Section R406.2: this section mirrors the current R405.2 language, including the requirement that the “mandatory” provisions in Chapter 4 be met by designs complying with R406.
- Section R406.3: like the current Section R405.3, this section outlines the primary performance compliance concepts and includes the requirement for the annual energy cost of the proposed design to equal or be less than 95% of the annual energy cost of a home built to the current Chapter 4 requirements. This is accomplished by evaluating the annual energy cost of the proposed design versus compliance with the “mandatory” sections in Chapter 4 PLUS the U-Factors and

SHGC Factors found in the 2012 IECC (Tables R402.1.1 and R402.1.3) which are contained in Table R406.4.2 (5). Section R406.3 also references Table R406.4.2 (1) outlining the configuration and analysis of the proposed design using prescriptive requirements in the 2009 code.

- Sections R406.4 Documentation, R406.5 Calculation procedure, and R406.6 Calculation software tools mirror the requirements in the current Section R405 performance alternative.
- Table R406.4.2 (1) contains the standard reference and proposed design parameters for all building component elements.
- Tables R406.4.2 (4) and R406.4.2 (3) contain the insulation and fenestration baseline factors from the 2009 IECC used in the calculation based on the parameters in Table R406.4.2 (1).

Table R406.4.2 (5) contains the energy cost comparison U-Factors and SHGC factors used in calculating the annual energy cost of a home built in compliance with the current Chapter 4 requirements.

Cost Impact: The code change proposal will not increase the cost of construction.

RE10-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R401.2-EC-BURTON.DOC

RE11 – 13

R401.2 (IRC N1101.15)

Proponent: Don Surrena, CBO, representing National Association of Home Builders
(dsurrena@nahb.org)

Revise as follows:

R401.2 (N1101.15) Compliance. Projects shall comply with ~~Sections identified as “mandatory” and with either sections identified as “prescriptive” or the performance approach in Section R405. one of the following:~~

1. Sections R401 through R404 or;
2. Section R405 and the provisions of Sections R401 through R404 labeled “Mandatory” or
3. Approved computer software, worksheets or compliance manuals that also meet the provisions of Sections R401 through R404 labeled “Mandatory” and the intent of this code or;
4. Buildings certified as complying with the energy efficiency requirements of an above code program in accordance with Section R102.1.1.

Reason: This amendment clarifies the section. It also provides for alternative options such as industry rating programs or other programs to be recognized as complying with the IECC.

Cost Impact: The code change proposal will not increase the cost of construction.

RE11-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R401.2-EC-SURRENA

RE12 – 13

R401.2 (IRC N1101.15)

Proponent: Jeremiah Williams, representing U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

R401.2 (N1101.15) Compliance. Projects shall comply with Sections identified as “mandatory” and with either of the following: ~~sections identified as “prescriptive” or the performance approach in Section R405.~~

1. Sections identified as “prescriptive.”
2. Section R405.

Reason: The proposed change provides a clarification. The current wording in the code has led to some confusion as to whether the mandatory lighting provisions of Section R404 are required when a home complies via the performance path of Section R405.

Cost Impact: The code change proposal will not increase the cost of construction.

RE12-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R401.2-EC-WILLIAMS

RE13 – 13

R401.3 (IRC N1101.16)

Proponent: Brian Dean, Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition (Brian.Dean@icfi.com)

Revise as follows:

R401.3 (N1101.16) Certificate (Mandatory). A permanent certificate shall be completed and ~~shall be posted on or in the electrical distribution panel~~ by the builder or registered design professional at either an approved accessible location inside the building or electronically in an accessible certificate database maintained by an approved agency or the jurisdiction, with a permanent notification of the location of such record posted at an approved accessible location inside the building. A copy of the certificate shall also ~~be filed in the land records.~~ Where posted on the electrical distribution panel, tThe certificate shall not cover or obstruct the visibility of the circuit directory label, service disconnect label or other required labels. The certificate shall list the ~~predominant~~ R-values of insulation installed in or on ceiling/roof, walls, foundation (slab, ~~basement wall~~, crawlspace wall and/or floor) and ducts outside conditioned spaces; U-factors for fenestration and the solar heat gain coefficient (SHGC) of fenestration, and the results from any required duct system and building envelope air leakage testing done on the building. Where there is more than one value for each component category, the certificate shall list either all of the values with their associated areas or the area-weighted average value for that component category covering the largest area. The certificate shall list the types and efficiencies of heating, cooling and service water heating equipment. Where a gas-fired unvented room heater, electric furnace, or baseboard electric heater is installed in the residence, the certificate shall list “gas-fired unvented room heater,” “electric furnace” or “baseboard electric heater,” as appropriate. An efficiency level shall not be ~~listed~~ for gas-fired unvented room heaters, electric furnaces or electric baseboard heaters.

Reason: The purpose of this code change is to provide reasonable improvements to the certificate and alternatives to the current posting requirement that will meet the intent of the provision and improve the usability of the certificate. Specifically, the change will allow the certificate to be permanently posted at an accessible location other than the electrical panel, including the option of an electronic version that may be maintained off-site (with a permanent notice posted in the home). A copy of the certificate would also be required to be filed with the land record, where it can most easily be located in the future.

The proposal also clarifies that actual U-factors and R-values (or area-weighted averages) must be listed on the label. The current certificate requirement, which only includes listing the value for components “covering the largest area,” does not give enough useful information to future owners or occupants of the home who may be replacing or retrofitting components in the home. The proposed additional information for the certificate should already be well known by the builder or design professional at the time of construction, since it is required for code compliance, so there should be no significant additional work or cost associated with adding these details.

Cost Impact: The code change proposal will not increase the cost of construction.

RE13-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R401.3-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE

RE14 – 13

R401.3 (IRC N1101.16)

Proponent: Andrei Moldoveanu, representing National Electrical Manufacturers Association (NEMA)
(and_moldoveanu@nema.org)

R401.3 (N1101.16) Certificate (Mandatory). A permanent certificate shall be completed by the builder or registered design professional and posted on or in the electrical distribution panel a wall in the space where the furnace is located, a utility room, or an approved location inside the building ~~by the builder or registered design professional. The certificate shall not cover or obstruct the visibility of the circuit directory label, service disconnect label or other required labels.~~ The certificate shall list the predominant R-values of insulation installed in or on ceiling/roof, walls, foundation (slab, *basement wall*, crawlspace wall and/or floor) and ducts outside conditioned spaces; U-factors for fenestration and the solar heat gain coefficient (SHGC) of fenestration, and the results from any required duct system and building envelope air leakage testing done on the building. Where there is more than one value for each component, the certificate shall list the value covering the largest area. The certificate shall list the types and efficiencies of heating, cooling and service water heating equipment. Where a gasfired unvented room heater, electric furnace, or baseboard electric heater is installed in the residence, the certificate shall list “gas-fired unvented room heater,” “electric furnace” or “baseboard electric heater,” as appropriate. An efficiency shall not be *listed* for gas-fired unvented room heaters, electric furnaces or electric baseboard heaters.

Reason:

1. Certificates placed on or in the electrical distribution panel may become destroyed because of the location of the panel. Panels for many buildings in the Southwest portion of the United States are located outside of the building; thereby, causing certificates on or in these panels to become destroyed due to weather.
2. Safety. Additional printed material (such as the energy certificate) on electrical distribution panel makes it difficult to see the warning labels that are located on or in the panel.
3. Certificates located on or in the electrical panel are not very visible due to the location of the panels; thereby, rendering the certificate useless.

Cost Impact: The code change proposal will not increase the cost of construction.

RE14-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R401.3-EC-MOLDOVEANU

RE15 – 13

R401.3 (IRC N1101.16)

Proponent: Wayne Stoppelmoor, representing Schneider Electric

Revise as follows:

R401.3 (N1101.16) Certificate (Mandatory). A permanent certificate shall be completed by the builder or registered design professional and posted on or in the electrical distribution panel a wall in the space where the furnace is located, a utility room, or an approved location by the builder or registered design professional. ~~The certificate shall not cover or obstruct the visibility of the circuit directory label, service disconnect label or other required labels.~~ The certificate shall list the predominant Rvalues of insulation installed in or on ceiling/roof, walls, foundation (slab, *basement wall*, crawlspace wall and/or floor) and ducts outside conditioned spaces; U-factors for fenestration and the solar heat gain coefficient (SHGC) of fenestration, and the results from any required duct system and building envelope air leakage testing done on the building. Where there is more than one value for each component, the certificate shall list the value covering the largest area. The certificate shall list the types and efficiencies of heating, cooling and service water heating equipment. Where a gasfired unvented room heater, electric furnace, or baseboard electric heater is installed in the residence, the certificate shall list “gas-fired unvented room heater,” “electric furnace” or “baseboard electric heater,” as appropriate. An efficiency shall not be *listed* for gas-fired unvented room heaters, electric furnaces or electric baseboard heaters.

Reason:

1. Certificates placed on or in the electrical distribution panel may become destroyed because of the location of the panel. Panels for many buildings in the Southwest portion of the United States are located outside of the building; thereby, causing certificates on or in these panels to become destroyed due to weather.
2. Safety. Additional printed material (such as the energy certificate) on electrical distribution panel makes it difficult to see the warning labels that are located on or in the panel.
3. Certificates located on or in the electrical panel are not very visible due to the location of the panels; thereby, rendering the certificate useless.

Cost Impact: None

RE15-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R401.3-EC-STOPPELMOOR

RE16 – 13

R401.3 (IRC N1101.16)

Proponent: Brenda A. Thompson, Clark County Development Services, Las Vegas NV, representing ICC Sustainability, Energy & High Performance Building Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

R401.3 (N1101.16) Certificate (Mandatory). A permanent certificate shall be completed and posted ~~on or in the electrical distribution panel~~ by the builder or registered design professional at an approved location inside the building. ~~Where located on an electrical distribution panel,~~ the certificate shall not cover or obstruct the visibility of the circuit directory label, service disconnect label or other required labels. The certificate shall list the predominant *R* values of insulation installed in or on ceiling/roof, walls, foundation (slab, *basement wall*, crawlspace wall and/or floor) and ducts outside conditioned spaces; *U*-factors for fenestration and the solar heat gain coefficient (SHGC) of fenestration, and the results from any required duct system and building envelope air leakage testing done on the building. Where there is more than one value for each component, the certificate shall list the value covering the largest area. The certificate shall list the types and efficiencies of heating, cooling and service water heating equipment. Where a gasfired unvented room heater, electric furnace, or baseboard electric heater is installed in the residence, the certificate shall list “gas-fired unvented room heater,” “electric furnace” or “baseboard electric heater,” as appropriate. An efficiency shall not be *listed* for gas-fired unvented room heaters, electric furnaces or electric baseboard heaters.

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

Reasons for this specific proposal:

1. Certificates placed on or in the electrical distribution panel may become destroyed because of the location of the panel. Panels for many buildings in the Southwest portion of the United States are located outside of the building; thereby, causing certificates on or in these panels to become destroyed due to weather.
2. Safety. Additional printed material (such as the energy certificate) on electrical distribution panel makes it difficult to see the warning labels that are located on or in the panel.
3. Certificates located on or in the electrical panel are not very visible due to the location of the panels; thereby, rendering the certificate useless.
4. Certificates should be located where they are likely to survive over time. Perhaps that location is in a garage next to a water heater or furnace. However such arrangement is not universally common in design. Short of finding a universally acceptable location, the proposal requires the local building official to approve the locations appropriate for the local jurisdiction. The location should be an interior locations so that it isn't lost to weather induced deterioration.

Cost Impact: The proposal is editorial in nature and will not affect the cost of construction..

RE16-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R401.3-EC-THOMPSON-SEHPCAC

RE17– 13

R402.1 (IRC N1102.1), R402.1.1 (IRC N1102.1.1), Table 402.1.1 (IRC Table N1102.1.1) R402.1.2 (NEW) (IRC N1102.1.2 (NEW)), R402.1.2.1 (IRC N1102.1.2.1), R402.1.3 (IRC N1102.1.3), Table R402.1.3 (Table N1102.1.3), R402.1.4 (IRC N1102.1.4)

Proponent: Jay Crandell, P.E., ARES Consulting, representing Foam Sheathing Committee / American Chemistry Council (Jcrandell@aresconsulting.biz)

Revise as follows:

R402.1 (N1102.1) General (Prescriptive). The *building thermal envelope* shall meet the requirements of Sections R402.1.1, R402.1.2, or R402.1.3 based on the climate zone specified in Chapter 3. through R402.1.4.

R402.1.1 (N1102.1.1) Insulation and fenestration criteria U-factor method. ~~The *building thermal envelope* shall meet the requirements of Table R402.1.1. An assembly shall have a *U-factor* equal to or less than that specified in Table R402.1.1. In addition, glazed fenestration SHGC and the equivalent of slab insulation R-value and depth requirements in Table R402.1.2 shall be met. based on the climate zone specified in Chapter 3.~~

R402.1.2 (N1102.1.2) R-value method. As an alternative means of complying with Section R402.1.1, insulation R-values, slab insulation depth, Fenestration U-factors and SHGC requirements shall comply with Table R402.1.2. Alternatives to the R-value requirements in Table R402.1.2 shall comply with Section R402.1.1.

~~R402.1.2 (N1102.1.2)~~ R402.1.2.1 (N1102.1.2.1) R-value computation. Insulation materials used in layers to provide, such as framing, the cavity insulation component or and insulating sheathing continuous insulation component required by Section R402.1.2, shall be summed to compute the corresponding component R-value. The manufacturer's settled R-value shall be used for blown insulation. Computed R-values shall not include an R-value for other building materials or air films.

R402.1.3 (N1102.1.3) U-factor alternative. ~~An with a *U-factor* equal to or less than that specified in Table R402.1.3 shall be permitted as an alternative to the *R-value* in Table R402.1.1.~~

~~R402.1.4 (N1102.1.4)~~ R402.1.3 (N1102.1.3) Total UA method. ~~If t~~The total *building thermal envelope* UA (sum of *U-factor* times assembly area) is shall be less than or equal to the total UA resulting from using the *U-factors* in Table R402.1.2~~1~~ (multiplied by the same assembly area as in the proposed building), ~~the building shall be considered in compliance with Table R402.1.4.~~ The UA calculation shall be done using a method consistent with the ASHRAE *Handbook of Fundamentals* and shall include the thermal bridging effects of framing materials. The glazed fenestration SHGC and the equivalent of slab R-value and depth requirements in Table R402.1.2 shall be met in addition to UA compliance.

TABLE R402.1.1 (N1102.1.2) R402.1.2 (N1102.1.2) INSULATION AND FENESTRATION R-VALUE REQUIREMENTS BY COMPONENT^a

(Portions of Table not shown remain unchanged)

TABLE R402.1.3 (N1102.1.3) R402.1.1 (N1102.1.1) EQUIVALENT ASSEMBLY U-FACTORS REQUIREMENTS^a

(Portions of Table not shown remain unchanged)

Reason: This proposal provides a needed re-organization and clarification of insulation requirements for the building thermal envelope. One of the technical concerns driving this proposal is that there are variations in the levels of efficiency between the current U-factor and R-value requirements. This happens as accommodations are made for common product R-value and various building methods. There are other proposals that are attempting to address these issues. Also, the R-value table is based on an insulation component approach using nominal R-values and the parameters and assumptions necessary to determine an equivalent U-factor are not disclosed in the code and are subject to varying interpretations. It was for this reason that the code has intended that the U-factor table serve as a baseline for alternative insulation strategies. This proposal clarifies that intent. From a formatting perspective, the proposal clearly delineates three methods for compliance. First, it establishes the U-factor method as the primary basis and approach for energy efficiency requirements. Second, the “cook-book” R-value approach is retained as simple means of complying with the required U-factors, also clarifying that alternative R-value solutions shall comply with the U-factor method. Third, it retains the total UA method and makes some editorial improvements.

Cost Impact: The code change proposal will not increase the cost of construction.

RE17-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.1-EC-CRANDELL

RE18– 13

R402.1 (IRC N1102.1), R402.1.1 (NEW) (IRC N1102.1.1 (NEW))

Proponent: Michael D. Fischer, Kellen Company, representing the Center for the Polyurethanes Industry (mfischer@kellencompany.com)

Revise as follows:

R402.1 (N1102.1) General (Prescriptive). The *building thermal envelope* shall meet the requirements of Sections R402.1.1 through ~~R402.1.4~~, R402.1.5.

R402.1.1 (N1102.1.1) Vapor retarder. Wall assemblies in the *building thermal envelope* shall comply with the vapor retarder requirements of Section R702.7 of the *International Residential Code* or Section 1405.3 of the *International Building Code* as applicable.

Reason: The IRC contains detailed vapor retarder provisions that apply specified R-Values for continuous insulation for vapor and condensation control. It is important to ensure that compliance to the envelope requirements of the energy code are coordinated with other building code requirements. While such a cross-reference is not necessary for most building requirements, the vapor retarder provisions are the only place in the IRC that a specific thermal performance provision is called out. This proposal provides the necessary coordination.

Cost Impact: The proposal will not affect the cost of construction..

Note: If this change is approved, it would be shown in Chapter 11 of the IRC without the reference to the IBC as follows:

N1102.1.1 Vapor retarder. Wall assemblies in the *building thermal envelope* shall comply with the vapor retarder requirements of Section R702.7.

RE18-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.1.1 (NEW)-EC-FISCHER

RE19 – 13

Table R402.1.1 (IRC Table N1102.11), R401.2.3, (IRC Table N1102.1.3)

Proponent: Thomas S Zaremba, Roetzel & Andress, representing Pikington North America and AGC Glass Company North America (tzaremba@ralaw.com)

Revise as follows:

TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT^a

CLIMATE ZONE	FENESTRATION		SKYLIGHT ^b U-FACTOR	GLAZED FENESTRATION SHGC ^{b,e}	CEILING R- VALUE	WOOD FRAME WALL R- VALUE	MASS WALL R- VALUE ⁱ	FLOOR R- VALUE	BASEMENT ^c WALL R- VALUE	SLAB ^d R- VALUE & DEPTH	CRAWL SPACE WALL R- VALUE
	U- FACTOR ^b	GLAZED FENESTRATION SHGC ^{b,e}									
1	NR	≤ 0.25	0.75	0.25	30	13	¾	13	0	0	0
2	0.40	≤ 0.25	0.65	0.25	38	13	4/6	13	0	0	0
3	0.35	≤ 0.25	0.55	0.25	38	19	8/13	19	5/13 ⁱ	0	5/13
4 except Marine	0.35	≤ 0.40	0.55	0.40	49	19	8/13	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.32-0.25	NR	0.55	NR	49	30 ^g	13/17	30 ^g	15/19	10, 2 ft	15/19
	= 0.26	≥ 0.22									
	= 0.27	≥ 0.27									
	= 0.28	≥ 0.32									
	= 0.29	≥ 0.37									
	= 0.30	≥ 0.42									
6	0.32-0.25	NR	0.55	NR	49	30 ^g	15/20	30 ^g	15/19	10, 4 ft	15/19
	= 0.26	≥ 0.22									
	= 0.27	≥ 0.27									
	= 0.28	≥ 0.32									
	= 0.29	≥ 0.37									
	= 0.30	≥ 0.42									
7 and 8	0.32-0.25	NR	0.55	NR	49	30 ^g	19/21	38 ^g	15/19	10, 4 ft	15/19
	= 0.26	≥ 0.22									
	= 0.27	≥ 0.27									
	= 0.28	≥ 0.32									
	= 0.29	≥ 0.37									
	= 0.30	≥ 0.42									

For SI: 1 foot = 304.8 mm. 30

- a. R-values are minimums. Except as otherwise noted, U-factors and SHGC are maximums. When insulation is installed in a cavity which is less than the label or design thickness of the insulation, the installed R-value of the insulation shall not be less than the R-value specified in the table.

(Portions of Table not shown remain unchanged)

**TABLE R402.1.3 (N1102.1.3)
EQUIVALENT U-FACTORS^a**

CLIMATE ZONE	FENESTRATION U-FACTOR ^b	SKYLIGHT ^b U-FACTOR	CEILING U-FACTOR	FRAME WALL U-FACTOR	MASS WALL U-FACTOR ^b	FLOOR U-FACTOR	BASEMENT WALL U-FACTOR	CRAWL SPACE WALL U-FACTOR
1	0.50	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	0.082	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.057	0.098	0.047	0.091 ^c	0.136
4 except Marine	0.35	0.55	0.026	0.057	0.098	0.047	0.059	0.065
5 and Marine 4	0.32 0.25	0.55	0.026	0.057	0.082	0.033	0.050	0.055
6	0.32 0.25	0.55	0.026	0.048	0.060	0.033	0.050	0.055
7 and 8	0.32 0.25	0.55	0.026	0.048	0.057	0.028	0.050	0.055

(Portions of Table not shown remain unchanged)

Reason: In northern climate zones 5 through 8, this proposal would reduce the prescriptive U-factor to a maximum of 0.25, but provide 5 alternative, U-factor and SHGC combinations that all yield equivalent energy performance to windows having a 0.25 U-factor. Adopting this proposal will provide builders and homeowners with the flexibility of selecting from a number of different frame and glass types to achieve significantly greater energy savings. Such flexibility will also significantly increase the number of products capable of achieving code compliance, thus, increasing competition and, ultimately lowering the cost of compliance.

In 2008, the United States Department of Energy released the results of a regression model developed by Lawrence Berkley National Laboratories ("LBNL") revealing how changes in U-factor and SHGC affect aggregate energy consumption in northern climates. A detailed discussion of the model is found at <http://windows.lbl.gov/ESStar2008>. The LBNL model clearly shows that in northern climates, a 0.05 increase in SHGC produces the same energy benefits as a 0.01 decrease in U-factor. Accordingly, windows with incrementally 0.01 higher U-factors and 0.05 higher SHGCs all yield the same energy benefits.

Using the results of the LBNL regression model, this proposal establishes a prescriptive 0.25 U-factor in zones 5 through 8 and then takes U-factors up in 0.01 increments from 0.25 to 0.30 while simultaneously raising minimum SHGCs in 0.05 increments. All of the matching U-factors and SHGCs will yield energy performance equivalent to the prescriptive 0.25 U-factor.

The US Energy Star Program has already implemented the results of the LBNL model and uses the same types of energy equivalent trade-offs in northern climates. In fact, trade-offs like those in this proposal have been in use in the United States Energy Star Windows Program ever since April 7, 2009, when the Department of Energy issued its Version 5.0 criteria for Energy Star Windows, Doors and Skylights. Indeed, the 0.27 U-factor coupled with a 0.27 SHGC and a 0.28 U-factor coupled with a 0.32 SHGC in the current proposal match the most recent Energy Star trade-offs released by the Environmental Protection Agency (EPA) in its Version 6.0, Draft 1 Energy Star criteria dated July of 2012. In addition to being used in the United States, the Canadian Energy Star Program also reaches essentially the same trade-off results, by matching higher U-factors with higher SHGC values through the application of a formulation known as Energy Ratings, or ERs.

Achieving a 0.25 U-factor is technologically feasible using a double, not a triple, glazed assembly. In fact, all five (5) of the primary glass manufacturers in the United States, offer a low-e coated glass made specifically for use on the #4 surface (or the surface found inside the home) of a double glazed assembly. In the right frame, advent of #4 surface low-e products enable windows to achieve a 0.25 or lower U-factors using double glazed windows. This proposal builds on that technology and the methodology in use in the U.S. Energy Star Windows Program since 2009 of pairing U-factors with SHGCs to yield an energy performance equivalent to a prescriptive U-factor. In this proposal, U-factors are matched to SHGCs to yield the equivalent energy performance of a 0.25 U-factor.

This proposal, if adopted, will significantly increase builder and consumer choice, ultimately lower the costs of code compliance and significantly reduce the aggregate amount of energy consumed by homes in the United States.

Cost Impact: The code change proposal will increase the cost of construction.

RE19-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.1.1T#2-EC-ZAREMBA

RE20 – 13

Table R402.1.1 (IRC Table N1102.1.1), Table R402.1.3 (IRC Table N1102.1.3)

Proponent: Dr. Thomas D. Culp, Birch Point Consulting LLC, representing the Glazing Industry Code Committee
(culp@birchpointconsulting.com)

Revise as follows:

TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT^a

CLIMATE ZONE	FENESTRATION U-FACTOR ^b	SKYLIGHT U-FACTOR	GLAZED FENESTRATION SHGC ^{b,e}	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE ⁱ	FLOOR R-VALUE	BASEMENT ^c WALL R-VALUE	SLAB ^d R-VALUE & DEPTH	CRAWL SPACE ^c WALL R-VALUE
1	NR	0.75	0.25	30	13	3 / 4	13	0	0	0
2	0.40 ^j	0.65	0.25	38	13	4 / 6	13	0	0	0
3	0.35 ^j	0.55	0.25	38	20 or 13+5 ^h	8/13	19	5/13 ^f	0	5 / 13
4 except Marine	0.35	0.55	0.40	38	20 or 13+5 ^h	8 / 13	19	10 / 13	10, 2 ft	10/13
5 and Marine 4	0.32 0.25	0.55	NR	49	20 or 13+5 ^h	13 / 17	30 ^g	15/19	10,2ft	15/19
6	0.32 0.25	0.55	NR	49	20+5 or 13+5 ^h	15 / 20	30 ^g	15/19	10,4ft	15/19
7 and 8	0.32 0.25	0.55	NR	49	20+5 or 13+10 ^h	19 / 21	38 ^g	15/19	10,4ft	15/19

(Portions of Table not shown remain unchanged)

TABLE 402.1.3 (N1102.1.3)
EQUIVALENT U-FACTORS^a

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT U-FACTOR	CEILING U-FACTOR	FRAME WALL U-FACTOR	MASS WALL U-FACTOR ^b	FLOOR U-FACTOR	BASEMENT WALL U-FACTOR	CRAWL SPACE WALL U-FACTOR
1	NR	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	0.082	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.057	0.098	0.047	0.091 ^c	0.136

4 except Marine	0.35	0.55	0.030	0.057	0.098	0.047	0.059	0.065
5 and Marine 4	0.32 0.25	0.55	0.026	0.057	0.082	0.033	0.050	0.055
6	0.32 0.25	0.55	0.026	0.048	0.060	0.033	0.050	0.055
7 and 8	0.32 0.25	0.55	0.026	0.048	0.057	0.028	0.050	0.055

(Portions of Table not shown remain unchanged)

Reason: The purpose of this proposal is to provide the next step in energy efficiency for windows in the northern zones. Window technology has advanced in recent years, allowing multiple new options to achieve higher performance levels at reasonable cost. Specifically, a 0.25 U-factor can be achieved by triple glazing, but it may also be achieved in double glazing by using new high performance frames and spacers, or also by the using two low-e coatings. These "4th surface" low-e coatings are now available from all five of the primary glass manufacturers. While total window costs vary widely based on specific product, window manufacturer, and location, public cost data shows the incremental cost for adding a low-e coating is fairly consistent between \$0.25 to \$2 per ft². [1] A reasonable estimate of the incremental cost is \$1.50 per ft², or approximately \$30 per window. This is consistent with the estimate by D&R International for the Energy Star Windows program, which estimated the incremental cost for a 0.27 U-factor at \$34 per window. [2] For 12 different cities in zones 5-7, a RESFEN analysis estimates the energy savings at \$32-73 per year for a typical 2000 ft² home with 300 ft² of windows, with an average payback of 11 ± 3 years, not including any fuel price escalation or future decrease in low-e pricing. A cash flow or ROI analysis would show even more favorable results.

1. Derived from the ASHRAE 90.2 cost database for identical windows with low-e vs. clear glazing, with costs updated to 2011 basis. (See <http://bc3.pnnl.gov>, Economic Database in Support of ASHRAE 90.2, Research Project 1481 prepared by the NAB Research Center.)

Similarly, data for 6 mm commercial glazing shows a range of \$0-4 per ft², which is generally consistent since commercial glazing will be higher than residential. Derived from (a) CASE report for Nonresidential & High-Rise Residential Fenestration Requirements, California Building Energy Efficiency Standards, Sep 2011, and (b) draft Commercial Building Envelope Cost Data Collection, prepared for Pacific Northwest National Laboratory by Faithful & Gould, Dec 2011.

In some cases, a 4th surface low-e and a #2 double silver low-e are less expensive than just a #2 triple silver low-e alone, meaning there is no incremental cost.

2. *ENERGY STAR Program Windows, Doors, and Skylights, Version 6.0 Draft 1 Criteria and Analysis Report*, D&R International for the U.S. Department of Energy, July 2012.

Cost Impact: This proposal will increase the cost of construction.

RE20-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R402.1.1T#1-EC-CULP

RE21 – 13

Table R402.1.1 and R401.2.3, (IRC Table N1102.1.1, and N1102.1.3)

Proponent: Thomas S Zaremba, Roetzel & Andress, representing Pikington North America and AGC Glass Company North America (tzaremba@ralaw.com)

Revise as follows:

**TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT^a**

CLIMATE ZONE	FENES- TRATION <i>U</i> - FACTOR ^b	SKYLIGHT ^b <i>U</i> -FACTOR	GLAZED FENES- TRATION SHGC ^{b,e}	CEILING <i>R</i> - VALUE	WOOD FRAME WALL <i>R</i> - VALUE	MASS WALL <i>R</i> - VALUE ⁱ	FLOOR <i>R</i> - VALUE	BASEMENT ^c WALL <i>R</i> - VALUE	SLAB ^d <i>R</i> - VALUE AND DEPTH	CRAWL SPACE ^c WALL <i>R</i> - VALUE
1	NR	0.75	0.25	30	13	3/4	13	0	0	0
2	0.40	0.65	0.25	38	13	4/6	13	0	0	0
3	0.35	0.55	0.25	38	20 or 13+5 ^h	8/13	19	5/13 ^f	0	5/13
4 except Marine	0.35	0.55	0.40	49	20 or 13+5 ^h	8/13	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.32 0.25 ⁱ	0.55	NR	49	20 or 13+5 ^h	13/17	30 ^g	15/19	10, 2 ft	15/19
6	0.32 0.25 ⁱ	0.55	NR	49	20+5 or 13+10 ^h	15/20	30 ^g	15/19	10, 4 ft	15/19
7 and 8	0.32 0.25 ⁱ	0.55	NR	49	20+5 or 13+10	15/20	38	15/19	10, 4 ft	15/19

For SI: 1 foot = 304.8 mm.

- R*-values are minimums. *U*-factors and SHGC are maximums. When insulation is installed in a cavity which is less than the label or design thickness of the insulation, the installed *R*-value of the insulation shall not be less than the *R*-value specified in the table.
- The fenestration *U*-factor column excludes skylights. The SHGC column applies to all glazed fenestration. Exception: Skylights may be excluded from glazed fenestration SHGC requirements in Climate Zones 1 through 3 where the SHGC for such skylights does not exceed 0.30.
- "15/19" means R-15 continuous insulation on the interior or exterior of the home or R-19 cavity insulation at the interior of the basement wall. "15/19" shall be permitted to be met with R-13 cavity insulation on the interior of the basement wall plus R-5 continuous insulation on the interior or exterior of the home. "10/13" means R-10 continuous insulation on the interior or exterior of the home or R-13 cavity insulation at the interior of the basement wall.
- R-5 shall be added to the required slab edge *R*-values for heated slabs. Insulation depth shall be the depth of the footing or 2 feet, whichever is less in Climate Zones 1 through 3 for heated slabs.
- There are no SHGC requirements in the Marine Zone.
- Basement wall insulation is not required in warm-humid locations as defined by Figure R301.1 and Table R301.1.
- Or insulation sufficient to fill the framing cavity, R-19 minimum.

- h. First value is cavity insulation, second is continuous insulation or insulated siding, so “13+5” means R-13 cavity insulation plus R-5 continuous insulation or insulated siding. If structural sheathing covers 40 percent or less of the exterior, continuous insulation *R*-value shall be permitted to be reduced by no more than R-3 in the locations where structural sheathing is used – to maintain a consistent total sheathing thickness.
- i. The second *R*-value applies when more than half the insulation is on the interior of the mass wall.
- j. Dynamic glazing that is automatically controlled to modulate, in multiple steps, the amount of solar gain and light transmitted into the space shall be permitted to have a U-factor of 0.27.

TABLE R402.1.3 (N11002.1.3)^a
EQUIVALENT *U*-FACTORS

CLIMATE ZONE	FENESTRATION <i>U</i> -FACTOR	SKYLIGHT <i>U</i> -FACTOR	CEILING <i>U</i> -FACTOR	FRAME WALL <i>U</i> -FACTOR	MASS WALL <i>U</i> -FACTOR ^b	FLOOR <i>U</i> -FACTOR	BASEMENT WALL <i>U</i> -FACTOR	CRAWL SPACE WALL <i>U</i> -FACTOR
1	NR	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	0.082	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.057	0.098	0.047	0.091 ^c	0.136
4 except Marine	0.35	0.55	0.030	0.057	0.098	0.047	0.059	0.065
5 and Marine 4	0.32 0.25 ^d	0.55	0.026	0.057	0.082	0.033	0.050	0.055
6	0.32 0.25 ^d	0.55	0.026	0.048	0.060	0.033	0.050	0.055
7 and 8	0.32 0.25 ^d	0.55	0.026	0.048	0.057	0.028	0.050	0.055

- a. Nonfenestration *U*-factors shall be obtained from measurement, calculation or an approved source.
- b. When more than half the insulation is on the interior, the mass wall *U*-factors shall be a maximum of 0.17 in Climate Zone 1, 0.14 in Climate Zone 2, 0.12 in Climate Zone 3, 0.087 in Climate Zone 4 except Marine, 0.065 in Climate Zone 5 and Marine 4, and 0.057 in Climate Zones 6 through 8.
- c. Basement wall *U*-factor of 0.360 in warm-humid locations as defined by Figure R301.1 and Table R301.1.
- d. Dynamic glazing that is automatically controlled to modulate, in multiple steps, the amount of solar gain and light transmitted into the space shall be permitted to have a U-factor of 0.27.

Reason: Achieving a 0.25 *U*-factor is technologically feasible using a double, not a triple, glazed unit. In fact, all five (5) of the primary glass manufacturers in the United States, offer a low-e coated glass made specifically for use on the #4 surface (or the surface found inside the home) of a double glazed unit. In the right frame, advent of #4 surface low-e products enable windows to achieve a 0.25 or lower *U*-factor using double glazed windows.

While total window costs vary widely based on specific product, manufacturer, and location, public cost data indicates a cost of between \$0.25 to \$2 per ft² to add an additional low-e coating to the #4 surface of a double glazed assembly. Given the significant energy savings that will be achieved by reducing *U*-factor from its current level of 0.32 to 0.25 in these climate zones, consumers can reasonably expect a payback between 8 and 14 years (not including fuel price escalation or future decreases in low-e pricing).

An exception for dynamic glazing is included in this proposal. Dynamic glazing is designed primarily to provide adjustable solar heat gain control. While it can achieve good *U*-factors, a 0.25 may be just beyond its current reach without forcing it into triple glazed assemblies. Since dynamic glazing is so integral to ultimately moving to “zero energy homes,” its use should not be discouraged by a small *U*-factor differential in the prescriptive path.

Cost Impact: The code change proposal will increase the cost of construction.

RE21-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R402.1.1T#1-EC-ZAREMBA

RE22 – 13

Table R402.1.1 (IRC Table N1102.1.1)

Proponent: Dr. Thomas D. Culp, Birch Point Consulting LLC, representing the Glazing Industry Code Committee
(culp@birchpointconsulting.com)

Revise as follows:

TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT U-FACTOR	GLAZED FENESTRATION SHGC ^{b,e}	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE ⁱ	FLOOR R-VALUE	BASEMENT ^c WALL R-VALUE	SLAB ^d R-VALUE & DEPTH	CRAWL SPACE ^c WALL R-VALUE
1	NR	0.75	Max 0.25	30	13	3 / 4	13	0	0	0
2	0.40	0.65	Max 0.25	38	13	4 / 6	13	0	0	0
3	0.35	0.55	Max 0.25	38	20 or 13+5 ^h	8/13	19	5/13 ^f	0	5 / 13
4 except Marine	0.35	0.55	0.40	38	20 or 13+5 ^h	8 / 13	19	10 / 13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	Min 0.25 NR	49	20 or 13+5 ^h	13 / 17	30 ^g	15/19	10,2ft	15/19
6	0.32	0.55	Min 0.25 NR	49	20+5 or 13+5 ^h	15 / 20	30 ^g	15/19	10,4ft	15/19
7 and 8	0.32	0.55	Min 0.25 NR	49	20+5 or 13+10 ^h	19 / 21	38 ^g	15/19	10,4ft	15/19

For SI: 1 foot = 304.8 mm.

a. R-values are minimums. U-factors are maximums, and SHGC are maximums (“max”) or minimums (“min”) as noted. When insulation is installed in a cavity which is less than the label or design thickness of the insulation, the installed R-values of the insulation shall not be less than the R-value specified in the table.

(Portions of Table not shown remain unchanged)

Reason: The 2012 IECC made a significant change by lowering the maximum SHGC in zones 1-3 to 0.25. While this reduces energy use for cooling-dominated homes in the south, the combination of this low SHGC in the south with the “NR” no requirement in zones 5-8 creates a loophole that actually harms energy efficiency in the north.

Windows are generally distributed through national networks, and the “NR” allows the same ultra-low SHGC window designed for the south to also be used in the north. However, the performance of homes is simply not the same in Arizona and Vermont. A 0.25 SHGC window will permanently block 75% of the sun’s energy from entering the home for the full life of the window. In Arizona, this is very beneficial for reducing cooling loads, but in Vermont, this significantly hinders the use of free solar energy to reduce heating loads that must otherwise be met using fossil fuels. If ultra low SHGC windows intended for the south are used in the north, it will increase annual energy consumption, rather than conserve it.

This is not just a hypothetical problem. An analysis conducted for EPA in support of the Energy Star Windows program determined that the mean and median SHGC of Energy Star double hung windows from the top 20 window manufacturers is only 0.22. [1] This is clear evidence that national window manufacturers are largely limiting their inventories to a single very low SHGC product that can meet code in all climate zones, regardless of the impact on energy efficiency for a specific location.

In its technical support for the Energy Star Windows program, Lawrence Berkeley National Laboratory (LBNL) has consistently determined that higher solar heat gain saves more energy in the north. In fact, in the latest analysis of August 2012, LBNL concluded that setting a minimum SHGC of 0.35 in the north would double the national aggregate energy savings resulting from the proposed new criteria. [2]

Nonetheless, this proposal seeks to be more moderate, and just establish a base level minimum SHGC to ensure that ultra-low SHGC windows are not inappropriately used in the north. Both EPA and Natural Resources Canada have established a minimum SHGC for the Energy Star Most Efficient designation.[3] A minimum 0.25 SHGC is parallel to the maximum 0.25 SHGC in the south, will ensure different glazing packages are used for the south and north, and includes low-e products available from all glass manufacturers with both high solar gain products for passive solar design and solar control products to mitigate summer peak loads.

This problem has increased as SHGC requirements in the south have decreased in both the IECC and Energy Star. The code must now address this problem and recognize that using the same low SHGC glazing in Phoenix and Boston makes no sense.

1. *Technical Support for ENERGY STAR Windows Version 6.0 Specification Revision*, Lawrence Berkeley National Laboratory and D&R International, July 1, 2012, p. 2.
2. EPA's ENERGY STAR for Windows, Doors and Skylights Draft 1 Criteria and Analysis Report Stakeholder's Meeting, *Energy Star Program Savings Estimates*, Lawrence Berkeley National Laboratory, August 27, 2012, slide 98.
3. http://www.energystar.gov/ia/partners/downloads/EPA_Memo_ENERGY_STAR_Most_Efficient_2013.pdf

Cost Impact: The code change proposal will not increase the cost of construction.

RE22-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.1.1T#2-EC-CULP

RE23 – 13

Table R402.1.1 (IRC Table N1102.1.1)

Proponent: Dr. Thomas D. Culp, Birch Point Consulting LLC, representing the Glazing Industry Code Committee (culp@birchpointconsulting.com)

Revise as follows:

**TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT^a**

CLIMATE ZONE	FENESTRATION U-FACTOR ^b	SKYLIGHT ^b U-FACTOR	GLAZED FENESTRATION SHGC ^{b,e}	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE ⁱ	FLOOR R-VALUE	BASEMENT ^c WALL R-VALUE	SLAB ^d R-VALUE & DEPTH	CRAWL SPACE ^c WALL R-VALUE
1	NR	0.75 ^j	0.25	30	13	3 / 4	13	0	0	0
2	0.40 ^j	0.65 ^j	0.25	38	13	4 / 6	13	0	0	0
3	0.35 ^j	0.55 ^j	0.25	38	20 or 13+5 ^h	8/13	19	5/13 ⁱ	0	5 / 13
4 except Marine	0.35	0.55	0.40	38	20 or 13+5 ^h	8 / 13	19	10 / 13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49	20 or 13+5 ^h	13 / 17	30 ^g	15/19	10,2ft	15/19
6	0.32	0.55	NR	49	20+5 or 13+5 ^h	15 / 20	30 ^g	15/19	10,4ft	15/19
7 and 8	0.32	0.55	NR	49	20+5 or 13+10 ^h	19 / 21	38 ^g	15/19	10,4ft	15/19

(Portions of Table not shown remain unchanged.)

i. In wind-borne debris regions in Climate Zones 2 through 3, impact rated fenestration complying with Section R301.2.1.2 of the *International Residential Code* or Section 1609.1.2 of the *International Building Code* shall have a maximum U-factor of 1.20 and maximum SHGC of 0.30.

Reason: The purpose of this proposal is to account for the unique situation of hurricane impact-resistant fenestration in wind-borne debris regions. The current U-factor requirements in zones 2-3 require double glazing, which is entirely appropriate for most situations. However, hurricane events pose a unique circumstance with both significant safety and cost issues. In double glazed impact-resistant windows, only one lite is laminated. (Laminating both lites is much less common because it significantly affects cost, weight, and operability of the window.) As a result, one lite is not laminated, and presents a safety issue by potentially creating flying glass debris during a hurricane event. If the unlaminated lite is located to the exterior, this adds to the debris and safety hazard during clean-up. And even worse, if the unlaminated lite is located to the interior, the flying glass debris also poses a potential risk to life safety for occupants inside the home or apartment.

Furthermore, the higher cost of double glazed impact-resistant fenestration (commonly \$200-300 per window higher than non-impact windows) already creates a cost incentive to use the exceptions in Section R301.2.1.2 of the IRC and Section 1609.1.2 of the IBC that allow 1/2" wood structural panels to be provided to the homeowner to install over the windows when a hurricane approaches. This is not desirable in that the use of wood structural panels is highly unreliable – what if the panels cannot be easily located, the panels have been disposed, the homeowner has difficulty installing the panels on the 2nd floor, or if the homeowner is out of town? In this case, the home is left with no protection, increasing the potential life safety risk and property damage.

For these safety and cost reasons, it is prudent to allow monolithic laminated products for the very limited circumstances of coastal wind-borne debris regions in warm climates (zones 1-3). This is accomplished through a footnote to allow a U-factor of 1.2 for this limited area, and also a 0.30 SHGC because it is difficult to achieve 0.25 SHGC in monolithic applications without using darker glass. For a typical 2000 ft² home, the energy impact is approximately \$50-150 per year, which is reasonable given the unique life safety issue and the limited region.

Some might contend that the UA trade-off or performance path can be used to allow monolithic impact-resistant products to be used in these areas without the addition of a new footnote. However, many homes use the prescriptive path, the UA trade-off does not help with SHGC, and *none* of these trade-offs are available for replacement windows. The standards for energy efficiency must be viewed together with life safety requirements and practical application. We believe this proposal provides a good balance for these warmer wind-borne debris regions – maintaining a high level of safety protection while also providing good performance solar control.

Cost Impact: This proposal will lower the cost of construction.

RE23-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.1.1T#3-EC-CULP

RE24 – 13

Table R402.1.1 (IRC Table N1102.1.1)

Proponent: Don Surrena, CBO, National Association of Home Builders (NAHB) (dsurrena@nahb.org)

Revise as follows:

**TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT^a**

CLIMATE ZONE	FENESTRATION U-FACTOR ^b	SKYLIGHT ^b U-FACTOR	GLAZED FENESTRATION SHGC ^{b,e}	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE ⁱ	FLOOR R-VALUE	BASEMENT ^c WALL R-VALUE	SLAB ^d R-VALUE & DEPTH	CRAWL SPACE ^c WALL R-VALUE
1	NR	0.75	0.25	30	13	3 / 4	13	0	0	0
2	0.40	0.65	0.25	38	13	4 / 6	13	0	0	0
3	0.35	0.55	0.25	38	20 or 13+5 ^h	8/13	19	5/13 ^f	0	5 / 13
4 except Marine	0.35	0.55	0.40 NR	38	20 or 13+5 ^h	8 / 13	19	10 / 13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49	20 or 13+5 ^h	13 / 17	30 ^g	15/19	10,2ft	15/19
6	0.32	0.55	NR	49	20+5 or 13+5 ^h	15 / 20	30 ^g	15/19	10,4ft	15/19
7 and 8	0.32	0.55	NR	49	20+5 or 13+10 ^h	19 / 21	38 ^g	15/19	10,4ft	15/19

(Portions of Table not shown remain unchanged)

Reason: The addition of a prescriptive restriction for the SHGC of 0.40 was added in the 2012 IECC. This is not a requirement that saves energy. In Climate Zone 4, heating degree days outnumber cooling degree days by about 2 to 3 times. Therefore for most of the year, the “sun is your friend” and solar heat gain is beneficial and reduces heating loads. There are some exceptions to this, but the majority of homes will not benefit from this restriction. The values being modified by this proposal are the same as what was proposed by the Department of Energy in their proposal EC13 from the last cycle. The values currently adopted were an increase from proposals not submitted by the Department of Energy.

Energy modeling below shows some examples of the additional energy required when this artificial restriction is placed on windows in Climate Zone 4.

Cost Impact: The code change proposal will not increase the cost of construction.

RE24-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R402.1.1T#2-EC-SURRENA

RE25 – 13

Table R402.1.1 (IRC Table N1102.1.1)

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

Revise as follows:

TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT^a

CLIMATE ZONE	FENESTRATION U-FACTOR ^b	SKYLIGHT ^b U-FACTOR	GLAZED FENESTRATION SHGC ^{b,e}	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE ⁱ	FLOOR R-VALUE	BASEMENT ^c WALL R-VALUE	SLAB ^d R-VALUE & DEPTH	CRAWL SPACE ^c WALL R-VALUE
1	NR	0.75	0.25 0.30	30	13	3 / 4	13	0	0	0
2	0.40	0.65	0.25 0.30	38	13	4 / 6	13	0	0	0
3	0.35	0.55	0.25 0.30	38	20 or 13+5 ^h	8/13	19	5/13 ^f	0	5 / 13
4 except Marine	0.35	0.55	0.40 NR	38	20 or 13+5 ^h	8 / 13	19	10 / 13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49	20 or 13+5 ^h	13 / 17	30 ^g	15/19	10,2ft	15/19
6	0.32	0.55	NR	49	20+5 or 13+5 ^h	15 / 20	30 ^g	15/19	10,4ft	15/19
7 and 8	0.32	0.55	NR	49	20+5 or 13+10 ^h	19 / 21	38 ^g	15/19	10,4ft	15/19

For SI: 1 foot = 304.8 mm.

(Portions of Table not shown remain unchanged)

Reason: Windows exist mainly to give a view and bring in light. It makes sense to limit the heat (SHGC) in southern climates when doing so does not limit the other goals. Windows at an SHGCs of 0.25 and lower have to limit the visible light. Limiting the SHGC to 0.25 places too much of a limit on the visible light.

Perhaps future residential skylights and windows can provide day lighting, perhaps including automated day lighting in the future. Day lighting can be valuable in terms of limits cooling loads. Limiting SHGC down to 0.25 will tend to keep some of the best day lighting windows / skylights off the market.

Cost Impact: The code change proposal will not increase the cost of construction.

RE25-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R402.1.1T#1-EC-CONNER

RE26– 13

Table R402.1.1 (IRC Table N1102.1.1), Table R402.1.3, (IRC Table N1102.1.3)

Proponent: Shirley Ellis, Energy Systems Laboratory, Texas A&M Engineering Experiment Station, Texas A&M University System (shirleyellis@tamu.edu); Brenda A. Thompson, Clark County Building Department, Las Vegas NV, representing the ICC Sustainability, Energy & High Performance Code Action Committee (SEHPCAC) (bat@clarkcounty.gov); Mark Halverson, APA-The Engineered Wood Association & Loren Ross, The American Wood Council.

Revise as follows:

**TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT^a**

CLIMATE ZONE	FENESTRATION U-FACTOR ^b	SKYLIGHT U-FACTOR	GLAZED FENESTRATION SHGC ^{b,e}	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE ⁱ	FLOOR R-VALUE	BASEMENT ^c WALL R-VALUE	SLAB ^d R-VALUE & DEPTH	CRAWL SPACE ^c WALL R-VALUE
1	NR	0.75	0.25	30	13	3 / 4	13	0	0	0
2	0.40	0.65	0.25	38	13	4 / 6	13	0	0	0
3	0.35	0.55	0.25	38	20 or 13+5 ^h 13	8 / 13	19	5/13 ^f	0	5 / 13
4 except Marine	0.35	0.55	0.40	49	20 or 13+5 ^h	8 / 13	19	10 / 13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49	20 or 13+5 ^h	13 / 17	30 ^g	15/19	10,2ft	15/19
6	0.32	0.55	NR	49	20+5 or 13+10 ^h	15 / 20	30 ^g	15/19	10,4ft	15/19
7 and 8	0.32	0.55	NR	49	20+5 or 13+10 ^h	19 / 21	38 ^g	15/19	10,4ft	15/19

(Portions of Table not shown remain unchanged)

**TABLE R402.1.3 (N1102.1.3)
EQUIVALENT U-FACTORS^a**

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT U-FACTOR	CEILING U-FACTOR	FRAME WALL U-FACTOR	MASS WALL U-FACTOR ^b	FLOOR U-FACTOR	BASEMENT WALL U-FACTOR	CRAWL SPACE WALL U-
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								FACTOR
1	NR	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	0.082	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.057 0.082	0.098	0.047	0.091 ^c	0.136
4 except Marine	0.35	0.55	0.026	0.057	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026	0.057	0.082	0.033	0.050	0.055
6	0.32	0.55	0.026	0.048	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	0.048	0.057	0.028	0.050	0.055

Reason.

Ellis: We support the Department of Energy's code change proposal (EC13) for the 2012 IECC that held the wood frame wall R-value at R-13 in Table R402.1.1. The increase in R-values in Climate Zone 3 in wood frame walls is just not cost effective and shown to have a payback period of over 35 years. When analyzing the construction cost vs. energy savings, the simple payback can potentially be longer than the expected life of the home. This payback will be unacceptable to most homebuyers.

There are other areas within buildings where energy conservation can be increased such as energy efficient equipment or higher quality windows which can be provide a payback that will be more acceptable to most homebuyers.

Thompson: This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee

SEHPCAC: The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 2 open meetings and over 15 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

DOE did not propose changing the value for **Climate Zone 3** in EC13 for the 2012 cycle. This is completely compatible with the DOE proposal which is attached on the following pages.

The cavity only entries proposed for **Climate Zone 6, 7, and 8** are reflective of the cavity only changes proposed for the Commercial chapter for RESIDENTIAL.

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Halverson-Ross: We support the U.S. Department of Energy's position for Climate Zone 3, as stated in EC13-09/10 that held the wood frame wall R-value at R13 in Table R402.1.1. The increase in R-values for Climate Zone 3 wood frame walls is not cost effective and is shown to have a payback period of over 35 years. When analyzing the construction cost vs. energy savings, the simple payback can potentially be longer than the expected life of the home.

The National Association of Home Builders Research Center estimated the cost to builders to increase the wood framed wall R-value from R13 to R20 to be \$1.33 per square foot of wall or approximately \$3,433 per house. The total increase in cost for the builder to meet the 2012 IECC requirements compared to meeting the 2009 IECC requirements was estimated to be \$7,203. So the cost of increasing just the insulation in the walls was nearly 50% of the total cost of meeting all of the provisions of the 2012 IECC in Climate Zone 3 while the energy savings of the increased wall insulation was only estimated to contribute 10% of the total energy savings.

This payback will be unacceptable to nearly all consumers. With energy savings only running between \$2 and \$5.50 per month in Climate Zone 3, we urge the code body to approve this proposal with the modification made in this Public Comment.

We ask the support of the committee for this proposal.

Cost Impact:

ELLIS: None.

THOMPSON: This code change will decrease the cost of construction.

HALVERSON-ROSS: This code change proposal will not increase the cost of construction.

RE26-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.1.1T-EC-ELLIS

RE27 – 13

R202 (NEW) (IRC N1101.9 (NEW)), Table R402.1.1, (IRC Table N1102.1.1), Chapter 5 (IRC Chapter 44)

Proponent: Wesley Hall, Reflectix, Inc., representing self (wes.hall@reflectixinc.com), Vickie Lovell, InterCode Incorporated, representing the Reflective Insulation Manufacturers Association International (vickie@intercodeinc.com)

Revise as follows:

TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT^a

CLIMATE ZONE	FENESTRATION U-FACTOR ^b	SKYLIGHT ^b U-FACTOR	GLAZED FENESTRATION SHGC ^{b,e}	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE ⁱ	FLOOR R-VALUE	BASEMENT ^c WALL R-VALUE	SLAB ^d R-VALUE & DEPTH	CRAWL SPACE ^c WALL R-VALUE
1	NR	0.75	0.25	30 ^l	13	3 / 4	13	0	0	0
2	0.40	0.65	0.25	38 ^j	13	4 / 6	13	0	0	0
3	0.35	0.55	0.25	38 ^j	20 or 13+5 ^h	8 / 13	19	5/13 ^f	0	5 / 13
4 except Marine	0.35	0.55	0.40	49	20 or 13+5 ^h	8 / 13	19	10 / 13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49	20 or 13+5 ^h	13 / 17	30 ^g	15/19	10,2ft	15/19
6	0.32	0.55	NR	49	20+5 or 13+10 ^h	15 / 20	30 ^g	15/19	10,4ft	15/19
7 and 8	0.32	0.55	NR	49	20+5 or 13+10 ^h	19 / 21	38 ^g	15/19	10,4ft	15/19

(Portions of Table not shown remain unchanged)

j. Radiant barriers in vented attics shall comply with the requirements of ASTM C1313 and shall be installed in accordance with ASTM C1743.

Add a new definition as follows:

RADIANT BARRIER. A material having a low emittance surface of 0.1 or less installed in building assemblies.

Add new standards to Chapter 5 as follows:

ASTM

C1313/C1313M-12 Standard Specification for Sheet Radiant Barriers for Building Construction Applications

C1743-12 Standard Practice for Installation and Use of Radiant Barrier Systems (RBS) in Residential Building Construction

Reason: (HALL) The purpose of this proposal is to provide information and references for radiant barriers.

The content of this proposal contains product requirements and references that will aid the contractors and code officials in recognizing and understanding radiant barrier products and correct installation procedures.

Attic radiant barriers are extensively used across Climate Zones 1, 2 and 3, i.e. in the sunbelt areas. These products have been on the market for over 24 years and are used by 87 of the top 100 US Builders. They have an established history and have been accepted into several regional code requirements and are included in the Energy Star Homes Guidelines. Some 650 million square feet of the product is being installed annually.

The current state and city codes that include radiant barrier are:

- HI – Chapter 181 of Title 3, Table 402.1.1.1, Section 402.1.1.6, 402.1.1.8.1
- TX - Austin, Chapter 25-12, Article 12. Energy Code, Section 402.6
- FL – 2010 Florida Building Code, Section 405.6.1, Figure 405.6.1 & Table 303.2 (ASTM Standards)
- CA – Title 24, Part 6, Subsection 8, Section (f), Subsection 2; Table 151-B; Table 151-C; Table 151-D

This product has two ASTM Standards that are applicable – ASTM C1313, “Standard Specification for Sheet Radiant Barriers for Building Construction Applications,” and ASTM C1743, “Standard Practice for Installation and Use of Radiant Barrier Systems (RBS) in Residential Building Construction”. This proposal does not require the use of radiant barriers but requires that, when they are used, they comply with the two ASTM standards just referenced.

ASTM C1743-12 can be viewed at: <http://reflectixinc.com/literature/securedpdfs/C1743.pdf>.

(LOVELL) The use of radiant barriers in vented attics in hot climates has been shown to conserve substantial amounts of energy by reducing the temperatures in the attic. If the attic temperature is lower, that slows the rate of temperature differential and transfers heat away from ceiling envelope elements and HVAC equipment and ducting. Attic radiant barriers are extensively used across Climate Zones 1, 2 and 3, i.e. in the sunbelt areas, and numerous demonstration projects and studies have confirmed the energy savings and cost-effectiveness of these installations. Such radiant barrier products have been on the market for over 24 years and are used by 87 of the top 100 US Builders. They have an established history and have been accepted into several regional code requirements and are included in the Energy Star Homes Guidelines. Some 650 million square feet of the product is installed annually.

The current state and city codes that include radiant barrier are:

- HI – Chapter 181 of Title 3, Table 402.1.1.1, Section 402.1.1.6, 402.1.1.8.1
- TX - Austin, Chapter 25-12, Article 12. Energy Code, Section 402.6
- FL – 2010 Florida Building Code, Section 405.6.1, Figure 405.6.1 & Table 303.2 (ASTM Standards)
- CA – Title 24, Part 6, Subsection 8, Section (f), Subsection 2; Table 151-B; Table 151-C; Table 151-D

This product has two ASTM Standards that are applicable – ASTM C1313, “Standard Specification for Sheet Radiant Barriers for Building Construction Applications,” and ASTM C1743, “Standard Practice for Installation and Use of Radiant Barrier Systems (RBS) in Residential Building Construction”. This proposal requires the use of radiant barriers in a manner consistent with the existing language in the Energy Star for Homes – “Version 3, Exhibit 1” and, additionally, requires that the radiant barriers comply with the two ASTM standards just referenced.

The Department of Energy (DOE) has published the “Radiant Barrier Fact Sheet”¹ that is available on the DOE website through the following link: <http://www.ornl.gov/sci/ees/etsd/btrc/RadiantBarrier/RBFactSheet2010.pdf>

Values taken from this DOE document are utilized in the “Savings Benefit to the Home Owner” section below.

A very comprehensive study was performed by Mario Medina. “This paper provides a general description of RBs, including installation configurations, the physical principles that make them work, and the laboratory and field experiments used to evaluate their thermal performance. An extensive review of the literature is summarized, highlighting fundamental issues, such as reduced ceiling heat flows, reduced space cooling and heating loads, and changes in attic temperatures produced by the installation of RBs in residential attics.”² The document has been mentioned here as an additional reference related to radiant barrier product information and to highlight the scope of “benefit” studies that have been completed.

¹ Department of Energy “Radiant Barrier Fact Sheet” prepared by the Oak Ridge National Laboratory (2012).

² Medina, Mario, “A Comprehensive Review of Radiant Barrier Research Including Laboratory and Field Experiments”, report prepared for the Reflective Insulation Manufacturers Association.

The study entitled "Radiant Barrier Impact on Selected Building Performance Measurements Model Home Case Study"³, authored by B.E. Davis and J. Tiller, from the Appalachian State University Energy Center, sponsored by Centex Homes in Charlotte, NC, and demonstrates the energy savings associated with the use of radiant barriers in attics. In the study, two identical homes were fit with over sixty sensors, where one house contained a radiant barrier (designated as the "Belmont" home) and one did not. The house with the radiant barrier had a peak attic temperature drop by 23% and the improved efficiency of the cool air delivered through the ducts was 57%.

The current language in the Energy Star for Homes – "Version 3, Exhibit 1" requires the use of radiant barriers in vented attics, with an exception for attics containing no HVAC space conditioning equipment and a maximum of 10 linear feet of supply or return ducting.

Cost Calculator – to home owner – new structure – hip roof:

- Product Cost - Radiant Barrier OSB Panel – \$0.11 per sq. ft.-(takes into account waste) ⁴
- 2,000 sq. ft. house, ranch, hip roof
- 2,200 sq. ft. of roof area x \$0.11 per sq. ft. (radiant barrier cost) = \$242.00
- Cost to home owner - \$242.00
- Additional cost added to monthly payment of a 30 year mortgage – 4% fixed interest rate:
- \$242.00 @ 4% = addition of \$1.16 to the monthly payment

Savings Benefit to the Home Owner:

- Cost to add Radiant Barrier OSB - \$1.16 per month (per above)
- 2,000 sq. ft. house, ranch, hip roof
- Savings as calculated in the Department of Energy "Radiant Barrier Fact Sheet"
- Code level insulation with well-sealed ducts in the attic
- Zone 1 - \$0.03 per sq. ft. x 2,000 sq. ft. = \$60.00 / 12 months = \$5.00 per month
- Zone 2 - \$0.03 per sq. ft. x 2,000 sq. ft. = \$60.00 / 12 months = \$5.00 per month
- Zone 3 - \$0.02 per sq. ft. x 2,000 sq. ft. = \$40.00 / 12 months = \$3.33 per month
- The cost for energy is based on first year (2012) values – if increases in energy cost due to inflation and other factors occur – annual savings will increase proportionally.

In summary, this exercise exemplifies the immediate energy cost savings that are netted when a radiant barrier is included in the design of a new home in Climate Zones 1, 2 and 3 with "well-sealed" ducts in the attic. The cost to the new home is small and the energy savings are significant over the life of the home.

References:

Davis, Bruce Eugene & Tiller, Jeffrey, "Radiant Barrier Impact on Selected Building Performance Measurements, Model Home Case Study", Appalachian State University Energy Center, USA, 2009.

Medina, M. A., "A Comprehensive Review of Radiant Barrier Research Including Laboratory and Field Experiments." Paper CH-12-C051, ASHRAE Transactions, Vol. 118, Part 1, 2012.

ASTM C1743-12 can be viewed at: <http://reflectixinc.com/literature/securedpdfs/C1743.pdf>.

Cost Impact: This proposal will not increase the cost of construction.

RE27-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.1.1T-EC-HALL

³ Davis, Bruce Eugene & Tiller, Jeffrey, "Radiant Barrier Impact on Selected Building Performance Measurements, Model Home Case Study, Centex Homes,"

RE28 – 13

Table R402.1.1 (IRC Table 1102.1.1), Table R402.1.3 (IRC Table N1102.1.3)

Proponent: Don Surrena, CBO, National Association of Home Builders (NAHB) (dsurrena@nahb.org)

Revise as follows:

**TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT^a**

CLIMATE ZONE	FENESTRATION U-FACTOR ^b	SKYLIGHT ^b U-FACTOR	GLAZED FENESTRATION SHGC ^{b,e}	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE ⁱ	FLOOR R-VALUE	BASEMENT ^c WALL R-VALUE	SLAB ^d R-VALUE & DEPTH	CRAWL SPACE ^c WALL R-VALUE
1	NR	0.75	0.25	30	13	3 / 4	13	0	0	0
2	0.40	0.65	0.25	38 30	13	4 / 6	13	0	0	0
3	0.35	0.55	0.25	38 30	20 or 13+5 ^h	8 / 13	19	5/13 ^f	0	5 / 13
4 except Marine	0.35	0.55	0.40	49 38	20 or 13+5 ^h	8 / 13	19	10 / 13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49 38	20 or 13+5 ^h	13 / 17	30 ^g	15/19	10,2ft	15/19
6	0.32	0.55	NR	49	20+5 or 13+10 ^h	15 / 20	30 ^g	15/19	10,4ft	15/19
7 and 8	0.32	0.55	NR	49	20+5 or 13+10 ^h	19 / 21	38 ^g	15/19	10,4ft	15/19

(Portions of Table not shown remain unchanged)

**TABLE 402.1.3 (N1102.1.3)
EQUIVALENT *U*-FACTORS^a**

CLIMATE ZONE	FENESTRATION <i>U</i> -FACTOR	SKYLIGHT <i>U</i> -FACTOR	CEILING <i>U</i> -FACTOR	FRAME WALL <i>U</i> -FACTOR	MASS WALL <i>U</i> -FACTOR ^b	FLOOR <i>U</i> -FACTOR	BASEMENT WALL <i>U</i> -FACTOR	CRAWL SPACE WALL <i>U</i> -FACTOR
1	NR	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030 0.035	0.082	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030 0.035	0.057	0.098	0.047	0.091 ^c	0.136
4 except Marine	0.35	0.55	0.026 0.030	0.057	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026 0.030	0.057	0.082	0.033	0.050	0.055
6	0.32	0.55	0.026	0.048	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	0.048	0.057	0.028	0.050	0.055

(Portions of Table not shown remain unchanged)

Reason: There were four changes in the Ceiling R-value requirements in the 2012 IECC Edition, none of which should have been considered cost-effective. An energy and cost analysis was performed to show that the simple paybacks are in the 80-130 year range.

Climate Zone	Representative City	Change	Energy Savings	Incremental Cost	Simple Payback
2	Orlando, FL	R-38->R-30	\$10/yr	\$1,305	130 years
3	Atlanta, GA	R-38->R-30	\$16/yr	\$1,305	82 years
4	Richmond, VA	R-49->R-38	\$15/yr	\$1,379	92 years
5	Indianapolis, IN	R-49->R-38	\$15/yr	\$1,379	92 years

The energy modeling was done using the Energy Plus simulation engine and BEopt version 1.4. Cost figures came from ASHRAE RP-1481. Vaulted or cathedralized ceiling are very problematic when trying to achieve R-49 which is about 16 inches thick. This would require a rafter at least 17" tall (which does not exist) or an insulated panel, which represents a very small portion of the market.

Cost Impact: The code change proposal will not increase the cost of construction.

RE28-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R402.1.1T#6-EC-SURRENA

RE29 – 13

Table R402.1.1, (IRC Table N1102.1.1), R402.2 (IRC N1102.2), R402.2.13 (NEW) (IRC N1102.2.13 (NEW))

Proponent: Jay Crandell, P.E., ARES Consulting, representing Foam Sheathing Committee / American Chemistry Council (Jcrandell@aresconsulting.biz)

Revise as follows:

TABLE R402.1.1 (N1102.1.1) INSULATION AND FENESTRATION REQUIREMENTS BY

(Portions of Table not shown remain unchanged)

- h. First value is cavity insulation, second is continuous insulation or insulated siding, so "13 + 5" means R-13 cavity insulation plus R-5 continuous insulation or insulated siding. See Section 402.2.13 for cases where thickness of continuous insulation is varied to maintain a consistent overall sheathing thickness on walls intermittently braced with structural sheathing panels. If structural sheathing covers 40 percent or less of the exterior, continuous insulation R-value shall be permitted to be reduced by no more than R-3 in the locations where structural sheathing is used — to maintain a consistent total sheathing thickness.

R402.2 (N1102.2) Specific insulation requirements (Prescriptive). In addition to the requirements of Section R402.1, insulation shall meet the specific requirements of Sections R402.2.1 through R402.2.12. R402.2.13

R402.2.13 (N1102.2.13) Continuous insulation on walls with intermittent structural sheathing.

Where an exterior wall is intermittently braced with structural sheathing, the R-value of continuous insulation required by Table R402.1.1 shall be permitted to be reduced in the locations where structural sheathing is used in order to maintain a consistent total sheathing thickness when:

1. The overall U-factor of the opaque assembly, including areas with and without structural sheathing, is equal to or less than the required U-factor in Table R402.1.3 and
2. The assembly is in compliance with the vapor retarder requirements of Section R702.7 of the *International Residential Code* or Section 1405.3 of the *International Building Code* as applicable.

Reason: This proposal corrects a discrepancy where frame wall assemblies using component insulation R-values allowed under existing footnote (h) are not currently equivalent to U-factors in Table R402.1.3.

Cost Impact: The code change proposal may increase the cost of construction.

Note: If this change is approved, the proposed Item 2 to Section N1102.2.13 would be shown in Chapter 11 of the IRC without the reference to the IBC as follows:

2. The assembly is in compliance with the vapor retarder requirements of Section R702.7.

RE29-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.1.1T-EC-CRANDELL

RE30 – 13

Table R402.1.1, (IRC Table N1102.1.1)

Proponent: Matt Dobson, Representing Vinyl Siding Institute

Revise as follows:

TABLE R402.1.1 (N1102.1.1) INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT^a

h. First value is cavity insulation, second is continuous insulation, ~~or insulated siding~~ or combination of the two, so "13 + 5" means R-13 cavity insulation plus R-5 continuous insulation, ~~or insulated siding~~ or combination of the two. If structural sheathing covers 40 percent or less of the exterior, continuous insulation *R*-value shall be permitted to be reduced by no more than R-3 in the locations where structural sheathing is used – to maintain a consistent total sheathing thickness.

(Portions of Table not shown remain unchanged)

Reason: This change is necessary because the current footnote only allows either insulated siding or insulated sheathing (continuous insulation), but the two product categories can be used together to achieve code compliance. This is a simple fix that was lost in the shuffle of the 2012 Final Action Hearings. For more information on insulated siding, go to www.insulatedsiding.info.

Cost Impact: This change will have no cost impact.

RE30-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.1.1T-EC-DOBSON

RE31 – 13

Table R402.1.1 (IRC N1102.1.1), Table R402.1.3 (IRC Table N1102.1.3)

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

Revise as follows:

**TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT**

CLIMATE ZONE	FENESTRATION U-FACTOR ^b	SKYLIGHT ^b U-FACTOR	GLAZED FENESTRATION SHGC ^{b,e}	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE ⁱ	FLOOR R-VALUE	BASEMENT ^c WALL R-VALUE	SLAB ^d R-VALUE & DEPTH	CRAWL SPACE ^c WALL R-VALUE
1	NR	0.75	0.25	30	13	3 / 4	13	0	0	0
2	0.40	0.65	0.25	38 30	13	4 / 6	13	0	0	0
3	0.35	0.55	0.25	38	20 or 13+5^h 13	8/13	19	5/13 ^f	0	5 / 13
4 except Marine	0.35	0.55	0.40	38	20 or 13+5 ^h	8 / 13	19	10 / 13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49 38	20 or 13+5 ^h	13 / 17	30 ^g	15/19 10/13	10,2ft	15/19 10/13
6	0.32	0.55	NR	49	20+5 or 13+5 ^h	15 / 20	30 ^g	15/19	10,4ft	15/19 10/13
7 and 8	0.32	0.55	NR	49	20+5 or 13+10 ^h	19 / 21	38 ^g	15/19	10,4ft	15/19 10/13

For SI: 1 foot = 304.8 mm.

(Portions of Table not shown remain unchanged)

**TABLE 402.1.3 (N1102.1.3)
EQUIVALENT U-FACTORS^a**

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT U-FACTOR	CEILING U-FACTOR	FRAME WALL U-FACTOR	MASS WALL U-FACTOR ^b	FLOOR U-FACTOR	BASEMENT WALL U-FACTOR	CRAWL SPACE WALL U-FACTOR
1	NR	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030 0.035	0.082	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.057 0.082	0.098	0.047	0.091 ^c	0.136
4 except Marine	0.35	0.55	0.030	0.057	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026 0.030	0.057	0.082	0.033	0.050 0.059	0.055 0.065

6	0.32	0.55	0.026	0.048	0.060	0.033	0.050	0.055-0.065
7 and 8	0.32	0.55	0.026	0.048	0.057	0.028	0.050	0.055-0.065

(Portions of Table not shown remain unchanged)

Reason: In the last code cycle the primary change to the residential IECC was DOE's EC13. The insulation and fenestration part of that change was nicely balanced between increased energy efficiency and cost, picking out the places where the insulation had value. DOE's change increased insulation where it had the most value. Subsequently, several updates were made to DOE's proposal that increased the insulation requirements in areas which were not as justified. This leaves the insulation increases that DOE had proposed and removes that went beyond the DOE proposal. This change retains the seven increased insulation requirements DOE made and undoes the seven that were not in DOE's proposal.

Cost Impact: The code change proposal will not increase the cost of construction.

RE31-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R402.1.1T#2-EC-CONNER

RE32 – 13

Table R402.1.1 (IRC Table N1102.1.1)

Proponent: Tom Kositzky, Representing Coalition for Fair Energy Codes

Revise as follows:

TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT^a

CLIMATE ZONE	FENESTRATION U-FACTOR ^b	SKYLIGHT ^b U-FACTOR	GLAZED FENESTRATION SHGC ^{b,e}	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE ⁱ	FLOOR R-VALUE	BASEMENT ^c WALL R-VALUE	SLAB ^d R-VALUE & DEPTH	CRAWL SPACE ^c WALL R-VALUE
1	NR	0.75	0.25	30	13	3 / 4	13	0	0	0
2	0.40	0.65	0.25	38	13	4 / 6	13	0	0	0
3	0.35	0.55	0.25	38	20 or 13+5 ^h	8/13	19	5/13 ⁱ	0	5 / 13
4 except Marine	0.35	0.55	0.40	38	20 or 13+5 ^h	8 / 13	19	10 / 13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49	20 or 13+5 ^h	13 / 17	30 ^g	15/19	10,2ft	15/19
6	0.32	0.55	NR	49	20+5 or 13+5 ^h	15 / 20	30 ^g	15/19	10,4ft	15/19
7 and 8	0.32	0.55	NR	49	20+5 or 13+10 ^h or 28	19 / 21	38 ^g	15/19	10,4ft	15/19

(Portions of Table not shown remain unchanged.)

Reason: The purpose of this code change proposal is to ensure product neutrality with regards to the building code. It is not appropriate for the code to require builders in Climate Zones 7 and 8 to use a specific product type (continuous insulation or insulated siding) to meet the prescriptive requirements when other equitable options are readily available. The 2012 IECC set a prescriptive mandate for the use of continuous insulation in the aforementioned zones. This proposal establishes a cavity-only insulation option of R28 for these climate zones.

The U-factor calculation tables below illustrate the performance equivalency between the current prescriptive R-values and the proposed cavity insulation-only R-value option. Use of the cavity insulation-only option will likely require deeper framing members to accommodate thicker insulation that can reach the minimum level of R28. The U-factor calculations assume that the continuous insulation wall assemblies use let-in-bracing to meet the IRC requirements for wall bracing.

Table 1 shows the U-factor calculations for a 2x6 framed wall with R20 cavity insulation plus R5 continuous insulation, and for a 2x8 framed wall using R28 cavity insulation with 3/8-inch thick wood panel sheathing (which is the minimum thickness of wood panel bracing allowed in the IRC). Both calculations yield a wall U-factor of 0.046.

Table 2 shows the U-factor calculation for a 2x4 framed wall with R13 cavity insulation and R10 continuous insulation, and also a calculation for a 2x8 framed wall using R28 cavity insulation with the more common 7/16-inch thick wood structural panel sheathing. The calculations yield U-factors of 0.045 and 0.046, respectively.

This proposed code change will provide additional prescriptive options to designers and builders in these two Climate Zones. We request the committee's support of this proposal.

Table 1. Climate Zones 7-8 Wood Framed Walls

(R20+5 and R28)

Wall Thermal Resistance by Component	R20+5 Wall - (2x6)			Proposed R28 Wall - (2x8)		
	R-Value Studs	R-Value Cavity	Assembly Value	R-Value Studs	R-Value Cavity	Assembly Value
Outside Air Film	0.25			0.25		
Siding	0.59			0.59		
Continuous Insulation	5			0		
Wood Structural Panel Sheathing (3/8")	0			0.47		
Stud/Cavity Insulation	6.875	20		9.063	28	
1/2" Drywall	0.45			0.45		
Inside Air Film	0.68			0.68		
Studs at 16" o.c.	25%	75%		25%	75%	
Total Wall R-Values	13.85	26.97	21.80	11.50	30.44	21.56
Total Wall U-Factors	0.072	0.037	0.0459	0.087	0.033	0.0464

Table 2. Climate Zones 7-8 Wood Framed Walls
(R13+10 and R28)

Wall Thermal Resistance by Component	R13+10 Wall - (2x4)			Proposed R28 Wall (2x8 with 7/16" sheathing)		
	R-Value Studs	R-Value Cavity	Assembly Value	R-Value Studs	R-Value Cavity	Assembly Value
Outside Air Film	0.25			0.25		
Siding	0.59			0.59		
Continuous Insulation	10			0		
Wood Structural Panel Sheathing (7/16")	0			0.62		
Stud/Cavity Insulation	4.375	13		9.063	28	
1/2" Drywall	0.45			0.45		
Inside Air Film	0.68			0.68		
Studs at 16" o.c.	25%	75%		25%	75%	
Total Wall R-Values	16.35	24.97	22.06	11.65	30.59	21.75
Total Wall U-Factors	0.061	0.040	0.0453	0.086	0.033	0.0460

Cost Impact: The code change proposal will not increase the cost of construction.

RE32-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.1.1T #1-EC-KOSITZKY

RE33 – 13

Table R402.1.1 (IRC Table N1102.1.1), Table R402.1.3 (IRC Table N1102.1.3)

Proponent: Tom Kositzky, Representing Coalition for Fair Energy Codes

Revise as follows:

TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT^a

CLIMATE ZONE	FENESTRATION U-FACTOR ^b	SKYLIGHT ^b U-FACTOR	GLAZED FENESTRATION SHGC ^{b,e}	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE ⁱ	FLOOR R-VALUE	BASEMENT ^c WALL R-VALUE	SLAB ^d R-VALUE & DEPTH	CRAWL SPACE ^c WALL R-VALUE
1	NR	0.75	0.25	30	13	3 / 4	13	0	0	0
2	0.40	0.65	0.25	38	13	4 / 6	13	0	0	0
3	0.35	0.55	0.25	38	20 or 13+5 ^h	8/13	19	5/13 ⁱ	0	5 / 13
4 except Marine	0.35	0.55	0.40	38	20 or 13+5 ^h	8 / 13	19	10 / 13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49	20 or 13+5 ^h	13 / 17	30 ^g	15/19	10,2ft	15/19
6	0.32	0.55	NR	49	20+25 or 13+6.54 ^h or 24	15 / 20	30 ^g	15/19	10,4ft	15/19
7 and 8	0.32	0.55	NR	49	20+5 or 13+10 ^h	19 / 21	38 ^g	15/19	10,4ft	15/19

(Portions of Table not shown remain unchanged)

TABLE R402.1.3 (N1102.1.3)
EQUIVALENT U-FACTORS^a

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT U-FACTOR	CEILING U-FACTOR	FRAME WALL U-FACTOR	MASS WALL U-FACTOR ^b	FLOOR U-FACTOR	BASEMENT WALL U-FACTOR	CRAWL SPACE WALL U-FACTOR
1	0.50	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	0.082	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.057	0.098	0.047	0.091 ^c	0.136
4 except Marine	0.35	0.55	0.026	0.057	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026	0.057	0.082	0.033	0.050	0.055

6	0.32	0.55	0.026	0.048 0.055	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	0.048	0.057	0.028	0.050	0.055

(Portions of Table not shown remain unchanged)

Reason Statement: The increase in wood frame wall *R*-value in Climate Zone 6 of Table R402.1.1 of the 2012 IECC was essentially arbitrary and is without basis other than it represents the *R*-value for a readily available, specific type of foam sheathing. The requirements also mandate the use of continuous insulation since no cavity-only insulation option was included in the prescriptive table. Stakeholders around the country in Climate Zone 6 do not consider this level of insulation to be cost effective nor necessary in this climate zone. Due in part to such high insulation requirements, the 2012 IECC is not being adopted consistently in these states.

This proposal offers a compromise by increasing stringency significantly beyond the requirements of the 2009 IECC with more cost effective alternatives. The wall insulation can be met with continuous insulation and cavity insulation options (R20+2 or R13+6.5) or the cavity-only option of R24. This proposal creates much more cost effective provisions that will offer builders more alternatives in meeting the wood frame wall requirements found in Table R402.1.1. More choices will help to gain greater stakeholder buy-in and will enable the 2015 IECC to gain greater acceptance, thereby creating more energy conservation opportunities.

In combination with these changes in Table 402.1.1, we propose a corresponding change to the *U*-factor listed in Table R402.1.3 for wood frame walls. Tables 1 and 2 below provide the *U*-factor calculations for all three of the prescriptive wall alternatives identifying that all of the systems meet the proposed *U*-factor target. The right hand columns of Table 2 show that the same *U*-factor is achieved when the commonly used 7/16-inch wood structural panel sheathing is used rather than the code minimum 3/8-inch sheathing.

We ask the support of the committee for this proposal.

Table 1. - Climate Zone 6 Wood Framed Walls

Wall Thermal Resistance by Component	2x6 Wall - R20+2			2x6 Wall - R24		
	R-Value Studs	R-Value Cavity	Assembly Value	R-Value Studs	R-Value Cavity	Assembly Value
Outside Air Film	0.25			0.25		
Siding	0.59			0.59		
Continuous Insulation	2			0		
Wood Structural Panel Sheathing (3/8")	0			0.47		
Stud/Cavity Insulation	6.875	20		6.875	24	
1/2" Drywall	0.45			0.45		
Inside Air Film	0.68			0.68		
Studs at 16" o.c.	25%	75%		25%	75%	
Total Wall R-Values	10.85	23.97	18.40	9.32	26.44	18.11
Total Wall U-Factors	0.092	0.042	0.0543	0.107	0.038	0.0552

Table 2. - Climate Zone 6 Wood Framed Walls

Wall Thermal Resistance by	2x4 Wall - R13+6.5	2x6 Wall - R24
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Component	R-Value Studs	R-Value Cavity	Assembly Value	R-Value Studs	R-Value Cavity	Assembly Value
Outside Air Film	0.25			0.25		
Siding	0.59			0.59		
Continuous Insulation	6.5			0		
Wood Structural Panel Sheathing (7/16")	0			0.62		
Stud/Cavity Insulation	4.375	13		6.875	24	
1/2" Drywall	0.45			0.45		
Inside Air Film	0.68			0.68		
Studs at 16" o.c.	25%	75%		25%	75%	
Total Wall R-Values	12.85	21.47	18.38	9.47	26.59	18.31
Total Wall U-Factors	0.078	0.047	0.0544	0.106	0.038	0.0546

Cost Impact: The code change proposal will not increase the cost of construction.

RE33-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R402.1.1T #2-EC-KOSITZKY

RE34 – 13

Table R402.1.1 (IRC N1102.1.1), Table R402.1.3 (IRC Table N1102.1.3)

Proponent: Don Surrena, CBO, National Association of Home Builders (NAHB) (dsurrena@nahb.org)

Revise as follows:

TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT^a

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT ^b U-FACTOR	GLAZED FENESTRATION SHGC ^{b,e}	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE ⁱ	FLOOR R-VALUE	BASEMENT ^c WALL R-VALUE	SLAB ^d R-VALUE & DEPTH	CRAWL SPACE ^c WALL R-VALUE
1	NR	0.75	0.25	30	13	3/4	13	0	0	0
2	0.40	0.65	0.25	38	13	4/6	13	0	0	0
3	0.35	0.55	0.25	38	20 or 13+5 ^{h,i}	8/13	19	5/13 ^f	0	5 / 13
4 except Marine	0.35	0.55	0.40	38	20 or 13+5 ^{h,i}	8/13	19	10 / 13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49	20 or 13+5 ^{h,i}	13/ 7	30 ^g	15/19	10,2ft	15/19
6	0.32	0.55	NR	49	20 or 13+5 ^{h,i} 20+5 or 13+10 ^{h,i}	15/20	30 ^g	15/19	10,4ft	15/19
7 and 8	0.32	0.55	NR	49	20 or 13+5 ^{h,i} 20+5 or 13+10 ^{h,i}	19/21	38 ^g	15/19	10,4ft	15/19

For SI: 1 foot = 304.8 mm.

(Portions of Table not shown remain unchanged.).

TABLE 402.1.3 (N1102.1.3)
EQUIVALENT U-FACTORS^a

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT U-FACTOR	CEILING U-FACTOR	FRAME WALL U-FACTOR	MASS WALL U-FACTOR ^b	FLOOR U-FACTOR	BASEMENT WALL U-FACTOR	CRAWL SPACE WALL U-FACTOR
1	NR	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	0.082	0.165	0.064	0.360	0.477

3	0.35	0.55	0.030	0.057	0.098	0.047	0.091 ^c	0.136
4 except Marine	0.35	0.55	0.030	0.057	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026	0.057	0.082	0.033	0.050	0.055
6	0.32	0.55	0.026	0.048 0.057	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	0.048 0.057	0.057	0.028	0.050	0.055

(Portions of Table not shown remain unchanged.).

Reason: The prescriptive wall requirement increased to R-20+R5 in Climate zones 6, 7 and 8 of the 2012 IECC. The additional cost for this is estimated at \$1,819 for 1,016 square feet of wall. This makes the simple payback between 26 and 55 years depending on the climate zone. This also will create a negative cash flow for the consumer in all cases.

Climate Zone	Representative City	Basement Wall R-Value Change	Energy Savings	Incremental Cost	Simple Payback
6	Minneapolis, MN	R-20->R-20+5	\$33/yr	\$1,819 (\$1.79/ft ²)	55 years
7	Bemidji, MN	R-20->R-20+5	\$41/yr	\$1,819 (\$1.79/ft ²)	44 years
8	Fairbanks, AK	R-20->R-20+5	\$71/yr	\$1,819 (\$1.79/ft ²)	26 years

The energy modeling was done using the Energy Plus simulation engine and BEopt version 1.4, Cost figures came from ASHRAE RP-1481.

Cost Impact: The code change proposal will not increase the cost of construction.

RE34-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R402.1.1T#4-EC-SURRENA

RE35 – 13

Table R402.1.1 (IRC Table N1102.1.1), Table R402.1.3 (IRC Table N1102.1.3)

Proponent: Don Surrena, CBO, National Association of Home Builders (NAHB) (dsurrena@nahb.org)

Revise as follows:

TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT^a

CLIMATE ZONE	FENESTRATION U-FACTOR ^b	SKYLIGHT ^b U-FACTOR	GLAZED FENESTRATION SHGC ^{b,e}	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE ⁱ	FLOOR R-VALUE	BASEMENT ^c WALL R-VALUE	SLAB ^d R-VALUE & DEPTH	CRAWL SPACE ^c WALL R-VALUE
1	NR	0.75	0.25	30	13	3 / 4	13	0	0	0
2	0.40	0.65	0.25	38	13	4 / 6	13	0	0	0
3	0.35	0.55	0.25	38	13 20 or 13+5 ^h	8/13	19	5/13 ^f	0	5 / 13
4 except Marine	0.35	0.55	0.40	38	20 or 13+5 ^h	8 / 13	19	10 / 13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49	20 or 13+5 ^h	13 / 17	30 ^g	15/19	10,2ft	15/19
6	0.32	0.55	NR	49	20+5 or 13+5 ^h	15 / 20	30 ^g	15/19	10,4ft	15/19
7 and 8	0.32	0.55	NR	49	20+5 or 13+10 ^h	19 / 21	38 ^g	15/19	10,4ft	15/19

(Portions of Table not shown remain unchanged.)

TABLE 402.1.3 (N1102.1.3)
EQUIVALENT U-FACTORS^a

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT U-FACTOR	CEILING U-FACTOR	FRAME WALL U-FACTOR	MASS WALL U-FACTOR ^b	FLOOR U-FACTOR	BASEMENT WALL U-FACTOR	CRAWL SPACE WALL U-FACTOR
1	NR	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	0.082	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.057 0.082	0.098	0.047	0.091 ^c	0.136
4 except Marine	0.35	0.55	0.030	0.057	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026	0.057	0.082	0.033	0.050 0.059	0.055
6	0.32	0.55	0.026	0.048	0.060	0.033	0.050	0.055

7 and 8	0.32	0.55	0.026	0.048	0.057	0.028	0.050	0.055
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(Portions of Table not shown remain unchanged.)

Reason: Frame wall requirements in climate zone 3 changed from R-13 to R-20 which was is not cost effective for the consumer.

Climate Zone	Representative City	Wall R-Value Change	Energy Savings	Incremental Cost	Simple Payback
3	Atlanta, GA	R-13->R-20	\$50/yr	\$1,199	24 years

The energy modeling was done using the Energy Plus simulation engine and BEopt version 1.4. Cost figures came from ASHRAE RP-1481. Not only is the payback 24 years, but for a consumer, there would be a negative cash flow based on the incremental cost and energy savings. The increase in the monthly mortgage would be \$6.43 (@ 5%) and the average monthly energy savings would be \$4.17.

The values being modified by this proposal are the same as what was proposed by the Department of Energy in their proposal EC13 from the last cycle. The values currently adopted were an increase from proposals not submitted by the Department of Energy.

Cost Impact: The code change proposal will not increase the cost of construction.

RE35-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R402.1.1T#3-EC-SURRENA

RE36 – 13

Section R202 (NEW) (IRC N1101.9 (NEW)), Table R402.1.1 (IRC Table N1102.1.1)

Proponent: Don Surrena, CBO, National Association of Home Builders (NAHB) (dsurrena@nahb.org)

Revise as follows:

**TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT^a**

CLIMATE ZONE	FENESTRATION U-FACTOR ^b	SKYLIGHT ^b U-FACTOR	GLAZED FENESTRATION SHGC ^{b,e}	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE ⁱ	FLOOR R-VALUE	BASEMENT ^c WALL R-VALUE	SLAB ^d R-VALUE & DEPTH	CRAWL SPACE ^c WALL R-VALUE
1	NR	0.75	0.25	30	13	3/4	13	0	0	0
2	0.40	0.65	0.25	38	13	4/6	13	0	0	0
3	0.35	0.55	0.25	38	20 or 13+5 ^{h,j}	8/13	19	5/13 ^f	0	5 / 13
4 except Marine	0.35	0.55	0.40	38	20 or 13+5 ^{h,j}	8/13	19	10 / 13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49	20 or 13+5 ^{h,j}	13/17	30 ^g	15/19	10, 2ft	15/19
6	0.32	0.55	NR	49	20+5 or 13+10 ^{h,j}	15/20	30 ^g	15/19	10, 4ft	15/19
7 and 8	0.32	0.55	NR	49	20+5 or 13+10 ^{h,j}	19/21	38 ^g	15/19	10, 4ft	15/19

(Portions of Table not shown remain unchanged)

For SI: 1 foot = 304.8 mm.

i. R-18 insulation shall be permitted in place of the R-20 requirement provided the wall *framing factor* is 20 percent or less or exterior walls with 24" o.c. nominal vertical stud spacing.

Add new definition as follows:

FRAMING FACTOR. The fraction of the total building component area that is structural framing.

Reason: The ASHRAE Handbook of Fundamentals and ASHRAE Transaction 1995 Volume 101, Part 2 assumes that wood framed walls have a framing factor of 25%. Meaning 25 percent of the wall area consists of structural framing members and the remainder of the wall is a cavity suitable for installing insulation. When calculating the U-factor for a wall assembly, a high framing factor increases the overall assembly U-Factor. Reducing the framing factor will also provide an increase in the thermal performance of the wall.

This proposal provides an option for a thermally equivalent tradeoff for 2x6 wall assemblies which have reduced framing factors and R-18 insulation. Below are the calculations showing equal U-Factors for both assemblies (0.060).

Wall Thermal Resistance by Component	2x6 Wall R-20 25%FF (16" o.c.)			2x6 Wall R-18 20% FF		
	R-Value Studs	R-Value Cavity	Assembly U-Factor	R-Value Studs	R-Value Cavity	Assembly U-Factor
Wall - Outside Winter Air Film ^A	0.17			0.17		
Siding - Vinyl ^A	0.62			0.62		
Continuous Insulation	0			0		
OSB - 7/16 ^{nA}	0.62			0.62		
SPF Stud/Cavity Insulation	6.875	20		6.875	18	
1/2" Drywall ^A	0.45			0.45		
Inside Air Film ^A	0.68			0.68		
Studs at 16" o.c. ^A	25%	75%		20%	80%	
Total Wall R-Values	9.42	22.54		9.42	20.54	
Total Wall U-Factor	0.106	0.044	0.060	0.106	0.049	0.060
^A 2009 ASHRAE Handbook of Fundamentals						

Ennermodal, 2001. Characterization of Framing Factors for Low-Rise Residential Building Envelopes (904-RP). Final Report prepared for ASHRAE, Atlanta, GA (USA)

Cost Impact: The code change proposal will not increase the cost of construction.

RE36-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R402.1.1T#5-EC-SURRENA

RE37 – 13

Table R402.1.1 (IRC Table N1102.1.1)

Proponent: Brenda A. Thompson, Clark County Building Department, Las Vegas NV, representing the ICC Sustainability, Energy & High Performance Code Action Committee (SEHPCAC) (bat@clarkcounty.gov)

Revise as follows:

TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT^a

CLIMATE ZONE	FENES-TRATION <i>U</i> -FACTOR ^b	SKYLIGHT ^b <i>U</i> -FACTOR	GLAZED FENES-TRATION SHGC ^{b,e}	CEILING <i>R</i> -VALUE	WOOD FRAME WALL <i>R</i> -VALUE	MASS WALL <i>R</i> -VALUE ⁱ	FLOOR <i>R</i> -VALUE	BASEMENT ^c WALL <i>R</i> -VALUE	SLAB ^d <i>R</i> -VALUE AND DEPTH	CRAWL SPACE ^c WALL <i>R</i> -VALUE
1	NR	0.75	0.25	30	13	3/4	13	0	0	0
2	0.40	0.65	0.25	38	13	4/6	13	0	0	0
3	0.35	0.55	0.25	38	20 or 13+5 ^h	8/13	19	5/13 ⁱ	0	5/13
4 except Marine	0.35	0.55	0.40	49	20 or 13+5 ^h	8/13	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49	20 or 13+5 ^h	13/17	30 ^g	15/19	10, 2 ft	15/19
6	0.32	0.55	NR	49	20+5 or 13+10 ^h or 22	15/20	30 ^g	15/19	10, 4 ft	15/19
7 and 8	0.32	0.55	NR	49	20+5 or 13+10 or 27	15/20	38	15/19	10, 4 ft	15/19
8	0.32	0.55	NR	49	20+7.5 or 32	19/21	38 ^g	15/19	10, 4 ft	15/19

For SI: 1 foot = 304.8 mm.

- R*-values are minimums. *U*-factors and SHGC are maximums. When insulation is installed in a cavity which is less than the label or design thickness of the insulation, the installed *R*-value of the insulation shall not be less than the *R*-value specified in the table.
- The fenestration *U*-factor column excludes skylights. The SHGC column applies to all glazed fenestration. Exception: Skylights may be excluded from glazed fenestration SHGC requirements in Climate Zones 1 through 3 where the SHGC for such skylights does not exceed 0.30.
- "15/19" means R-15 continuous insulation on the interior or exterior of the home or R-19 cavity insulation at the interior of the basement wall. "15/19" shall be permitted to be met with R-13 cavity insulation on the interior of the basement wall plus R-5 continuous insulation on the interior or exterior of the home. "10/13" means R-10 continuous insulation on the interior or exterior of the home or R-13 cavity insulation at the interior of the basement wall.
- R-5 shall be added to the required slab edge *R*-values for heated slabs. Insulation depth shall be the depth of the footing or 2 feet, whichever is less in Climate Zones 1 through 3 for heated slabs.
- There are no SHGC requirements in the Marine Zone.
- Basement wall insulation is not required in warm-humid locations as defined by Figure R301.1 and Table R301.1.

- g. Or insulation sufficient to fill the framing cavity, R-19 minimum.
- h. First value is cavity insulation, second is continuous insulation or insulated siding, so “13+5” means R-13 cavity insulation plus R-5 continuous insulation or insulated siding. If structural sheathing covers 40 percent or less of the exterior, continuous insulation R-value shall be permitted to be reduced by no more than R-3 in the locations where structural sheathing is used – to maintain a consistent total sheathing thickness.
- i. The second R-value applies when more than half the insulation is on the interior of the mass wall.

Reason: This proposal is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

The SEHPCAC found discrepancies in the Commercial Energy Code RESIDENTIAL table. The SEHPCAC has proposed a fix to the discrepancy in Table C402.1.1. In an effort to further enhance the Residential Energy Code, the SEHPCAC proposes to include a so-called “Cavity Only” insulation solution in the R Values table. The Task Group assigned to this task looked at using the ASHRAE procedures to calculate an R-value based on the existing table entry of cavity insulation plus continuous insulation (e.g. 20+5 in CZ 6 & 7), and the U-factor entry associated with the respective CZ cell. In addition, the Task Group looked at the Cavity Only requirements for Residential wood frame walls from the Commercial Energy Code. The values shown here are those from the Wood Frame Wall section of the Commercial Energy Code. The SEHPCAC determined that the energy performance of wood frame wall assemblies in a residential use would be effectively similar in either the commercial group or the noncommercial group. Thus the SEHPCAC chose to propose the same values in this table. This proposal also splits climate Zone 8 away from 7 and then plugs in higher R-value into the CZ8 cell for wood frame walls. The rest of the CZ 8 cells simply duplicate the CZ 7 values.

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: This proposal will increase construction costs in Climate Zone 8 only.

RE37-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.1.1T#1-EC-THOMPSON-SEHPCAC

RE38 – 13

Table R402.1.1 (IRC Table N 1102.1.1), Table R402.1.3 (IRC Table N1102.1.3)

Proponent: Martha G. VanGeem representing the Masonry Alliance for Codes and Standards (Martha.vangeem@gmail.com)

Revise as follows:

TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT^a

CLIMATE ZONE	FENESTRATION U-FACTOR ^b	SKYLIGHT ^b U-FACTOR	GLAZED FENESTRATION SHGC ^{b,e}	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE ⁱ	FLOOR R-VALUE	BASEMENT ^c WALL R-VALUE	SLAB ^d R-VALUE & DEPTH	CRAWL SPACE ^c WALL R-VALUE
1	NR	0.75	0.25	30	13	3 / 4	13	0	0	0
2	0.40	0.65	0.25	38	13	4 / 6	13	0	0	0
3	0.35	0.55	0.25 ^e	38	20 or 13+5^h 13	8/13 <u>5 / 8</u>	19	5/13 ^f	0	5 / 13
4 except Marine	0.35	0.55	0.40	49	20 or 13+5 ^h	8 / 13	19	10 / 13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49	20 or 13+5 ^h	13 / 17	30 ^g	15/19	10,2ft	15/19
6	0.32	0.55	NR	49	20+5 or 13+10 ^h	15 / 20	30 ^g	15/19	10,4ft	15/19
7 and 8	0.32	0.55	NR	49	20+5 or 13+10 ^h	19 / 21	38 ^g	15/19	10,4ft	15/19

(Portions of Table not shown remain unchanged)

**TABLE R402.1.3 (N1102.1.3)
EQUIVALENT *U*-FACTORS^a**

CLIMATE ZONE	FENESTRATION <i>U</i> -FACTOR	SKYLIGHT <i>U</i> -FACTOR	CEILING <i>U</i> -FACTOR	FRAME WALL <i>U</i> -FACTOR	MASS WALL <i>U</i> -FACTOR ^b	FLOOR <i>U</i> -FACTOR	BASEMENT WALL <i>U</i> -FACTOR	CRAWL SPACE WALL <i>U</i> -FACTOR
1	NR	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	0.082	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.057 0.082	0.098 0.141	0.047	0.091 ^c	0.136
4 except Marine	0.35	0.55	0.026	0.057	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026	0.057	0.082	0.033	0.050	0.055
6	0.32	0.55	0.026	0.048	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	0.048	0.057	0.028	0.050	0.055

(Portions of Table not shown remain unchanged)

Reason: It is not practical or cost effective to require more than R-13 insulation for wood frame walls in Climate Zone 3. If this value for frame walls is changed back to R13 as in Table 402.1.1 in the 2009 IECC, then the mass wall R-value in Table 402.1.1 should be changed back to the mass wall R-value for Climate Zone 3 in the 2009 IECC. Similarly, the U-factor should be changed back to the mass wall U-factor in Table 402.1.3 of the 2009 IECC. These changes are indicated above.

The equivalency between mass wall and frame wall R-values in Climate Zone 3 was previously demonstrated for previous versions of the IECC. Mass walls have significant energy saving benefits in Climate Zone 3.

Cost Impact: The code change proposal will not increase the cost of construction.

RE38-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R402.1.1T-EC-VANGHEEM

RE39– 13

Table R402.1.1 (IRC Table N1102.1.1)

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

Revise as follows:

**TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT^a**

CLIMATE ZONE	FENESTRATION U-FACTOR ^b	SKYLIGHT ^b U-FACTOR	GLAZED FENESTRATION SHGC ^{b, e}	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R- VALUE ⁱ	FLOOR R- VALUE	BASEMENT ^c WALL R-VALUE	SLAB ^d R-VALUE & DEPTH	CRAWL SPACE ^c WALL R-VALUE
1	NR	0.75	0.25	30	13	3/4	13	0	0	0
2	0.40	0.65	0.25	38	13	4/6	13	0	0	0
3	0.35	0.55	0.25	38	20 or 13+5 ^h	8/13	19	5/13 ^f	0	5/13
4 except Marine	0.35	0.55	0.40	49	20 or 13+5 ^h	8/13	19	10 /13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49	20 or 13+5 ^h	13/17	30 ^g	15/19	10, 2 ft	15/19
6	0.32	0.55	NR	49	20+5 or 13+10 ^h	15/20	30 ^g	15/19	10, 4 ft	15/19
7 and 8	0.32	0.55	NR	49	20+5 or 13+10 ^h	19/21	38 ^g	15/19	10, 4 ft	15/19

(Portions of Table not shown remain unchanged)

For SI: 1 foot = 304.8 mm.

i. ~~The second R-value applies when more than half the insulation is on the interior of the mass wall.~~

i. Continuous insulation shall be permitted to be reduced by R-5 with any one of the following:

Opaque doors <= 0.17 and windows U-factor <=0.28, or

framing factor <=16% and window U-factors <=0.28 or

window U-factors <=0.25

Reason: Provides simple options for those who don't want to do continuous insulation.

Cost Impact: The code change proposal will not increase the cost of construction.

RE_-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R402.1.1-EC-CONNER

RE40 – 13

Table R402.1.1 (IRC Table N1102.1.1), Table R402.1.3 (IRC Table N1102.1.3)

Proponent: Don Surrena, CBO, National Association of Home Builders (NAHB) (dsurrena@nahb.org)

Revise as follows:

**TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT**

CLIMATE ZONE	FENESTRATION U-FACTOR ^b	SKYLIGHT ^b U-FACTOR	GLAZED FENESTRATION SHGC ^{b,e}	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE ⁱ	FLOOR R-VALUE	BASEMENT ^c WALL R-VALUE	SLAB ^d R-VALUE & DEPTH	CRAWL SPACE ^c WALL R-VALUE
1	NR	0.75	0.25	30	13	3 / 4	13	0	0	0
2	0.40	0.65	0.25	38	13	4 / 6	13	0	0	0
3	0.35	0.55	0.25	38	20 or 13+5 ^h	8/13	19	5/13 ^f	0	5 / 13
4 except Marine	0.35	0.55	0.40	38	20 or 13+5 ^h	8 / 13	19	10 / 13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49	20 or 13+5 ^h	13 / 17	30 ^g	15/19 10/13	10,2ft	15/19
6	0.32	0.55	NR	49	20+5 or 13+5 ^h	15 / 20	30 ^g	15/19	10,4ft	15/19
7 and 8	0.32	0.55	NR	49	20+5 or 13+10 ^h	19 / 21	38 ^g	15/19	10,4ft	15/19

For SI: 1 foot = 304.8 mm.

(Portions of Table not shown remain unchanged.)

**TABLE 402.1.3 (N1102.1.3)
EQUIVALENT U-FACTORS^a**

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT U-FACTOR	CEILING U-FACTOR	FRAME WALL U-FACTOR	MASS WALL U-FACTOR ^b	FLOOR U-FACTOR	BASEMENT WALL U-FACTOR	CRAWL SPACE WALL U-FACTOR
1	NR	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	0.082	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.057	0.098	0.047	0.091 ^c	0.136
4 except	0.35	0.55	0.030	0.057	0.098	0.047	0.059	0.065

Marine								
5 and Marine 4	0.32	0.55	0.026	0.057	0.082	0.033	0.050 0.059	0.055
6	0.32	0.55	0.026	0.048	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	0.048	0.057	0.028	0.050	0.055

(Portions of Table not shown remain unchanged.)

Reason: The prescriptive basement wall requirement increased from R-10 to R-15 in the 2012 IECC. Calculations used to justify the change were based on energy models which had less sophisticated algorithms than Energy Plus which is now the preferred modeling software of the Department of Energy. When using Energy Plus, the energy savings in a 700 square foot basement totaled \$7/yr in Chicago (Climate zone 5). The additional cost for this is conservatively estimated at \$590. This makes the simple payback in excess of 58 years. This also will create a negative cash flow for the consumer. The values being modified by this proposal are the same as what was proposed by the Department of Energy in their proposal EC13 from the last cycle. The values currently adopted were an increase from proposals not submitted by the Department of Energy.

Climate Zone	Representative City	Basement Wall R-Value Change	Energy Savings	Incremental Cost	Simple Payback
5	Chicago, IL	R-10->R-15	\$7/yr	\$590 (\$0.82/ft ²)	84 years

The energy modeling was done using the Energy Plus simulation engine and BEopt version 1.4, Cost figures came from ASHRAE RP-1481

Cost Impact: The code change proposal will not increase the cost of construction.

RE40-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R402.1.1T#1-EC-SURRENA

RE41 – 13

R202, Table R402.1.1 (IRC Table N1102.1.1), R402.1.2 (IRC N1102.1.2)

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

Revise as follows:

TABLE R402.1.1 (N1102.1.1) INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT^a

- h. First value is cavity insulation, second is continuous insulation ~~or insulated siding~~, so “13+5” means R-13 cavity insulation plus R-5 continuous insulation ~~or insulated siding~~. If structural sheathing covers 40 percent or less of the exterior, continuous insulation R-value shall be permitted to be reduced by no more than R-3 in the locations where structural sheathing is used – to maintain a consistent total sheathing thickness.

(Portions of Table not shown remain unchanged)

R402.1.2 (N1102.1.2) R- value computation. Insulation material used in layers, such as framing cavity insulation ~~and insulating sheathing or continuous insulation~~, shall be summed to compute the corresponding component R-value. Framing and cavity insulation values shall be computed separately. The manufacturer’s settled R-value shall be used for blown insulation. Computed R-values shall not include an R-value for other building materials or air films.

Add new definition as follows:

IECC SECTION R202 (IRC N1101.9) GENERAL DEFINITIONS

CONTINUOUS INSULATION. Insulation in the opaque building envelope that extends across framing members without interruption by thermal bridges, except for fasteners and service openings. The insulation may be inside, outside or integral to the building envelope. When referring to an R-value in a multi-layer product, the term refers to the R-value of the insulation material.

Reason: This proposal clarifies what constitutes “continuous insulation”. Several products would qualify as continuous insulation, including insulated sheathing and insulated siding; all combined under the term “continuous insulation”.

The section on calculating R-values was written before the distinction between continuous and cavity insulation entered the code. The rewritten section better differentiates between “continuous” insulation that covers thermal breaks and “cavity” insulation that is separated by thermal breaks into a cavity. From a thermal performance standpoint the two perform significantly differently.

Cost Impact: The code change proposal will not increase the cost of construction.

RE41-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.1.2-EC-CONNER

RE42 – 13

R202 (New), Table R402.1.1 (IRC Table N1102.1.1), R402.1.2 (IRC N1102.1.2)

Proponent: Jay Crandell, P.E., ARES Consulting, representing Foam Sheathing Committee / American Chemistry Council (Jcrandell@aresconsulting.biz)

Revise as follows:

TABLE R402.1.1 (N1102.1.1) INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT^a

- h. First value is cavity insulation, second is continuous insulation or insulated siding, so "13 + 5" means R-13 cavity insulation plus R-5 continuous insulation or insulated siding. If structural sheathing covers 40 percent or less of the exterior, continuous insulation R-value shall be permitted to be reduced by no more than R-3 in the locations where structural sheathing is used – to maintain a consistent total sheathing thickness.

(Portions of Table not shown remain unchanged)

R402.1.2 (N1102.1.2) Component R-value computation. Insulation material used in layers to provide the, such as framing cavity insulation component or and the continuous insulation component insulating sheathing, shall be summed to compute the corresponding insulation component R-value. The manufacturer's settled R-value shall be used for blown insulation. Computed R-values shall not include an R-value for other building materials or air films.

Add new definition as follows:

IECC SECTION R202 (IRC N1101.9) GENERAL DEFINITIONS

CONTINUOUS INSULATION (ci): Insulation that is continuous across all structural members without thermal bridges other than fasteners and service openings. It is installed on the interior or exterior or is integral to any opaque surface of the building envelope.

Reason: This proposal provides a needed definition for continuous insulation (a term presently used in the IRC and IECC). The proposed definition is from the 2010 edition of ASHRAE 90.1 and provides an effective definition that is inclusive of all types of continuous insulation materials, including spray foam, insulated siding, foam sheathing, and others. Having this term defined permits simplification of existing code language where specific and sometimes limited lists of continuous insulation material types have been used. Thus, the code was scanned and two locations corrected to ensure consistent and inclusive use of the term continuous insulation. In the process, confusing or misleading language regarding computation of R-values for cavity or continuous insulation was identified and addressed. These are all considered to be editorial improvements.

Cost Impact: The code change proposal will not increase the cost of construction.

RE42-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.1.2-EC-CRANDELL

RE43 – 13

R402.1.2 (IRC N1102.1.2)

Proponent: John Woestman, Kellen Company, representing Extruded Polystyrene Foam Association (XPSA) (jwoestman@kellencompany.com)

Revise as follows:

R402.1.2 (N1102.1.2) R-value computation. Insulation material used in layers, such as framing cavity insulation ~~and insulating sheathing, or continuous insulation~~ shall be summed to compute the corresponding component *R*-value. The manufacturer's settled *R*-value shall be used for blown insulation. Computed *R*-values shall not include an *R*-value for other building materials or air films.

Reason: This proposal is intended to clarify intent. It does not alter, add or delete current code requirements or have a cost impact. The proposal makes these changes:

Revised "insulating sheathing" to "continuous insulation". This section of the code is making a distinction between insulation interrupted by framing and insulation that is not interrupted by framing. Insulated sheathing is a type of continuous insulation (insulation that is not interrupted by framing) but not the only type. Therefore this change clarifies the true intent of this section.

Inserted "corresponding". As currently written the language in this section is confusing and could be misinterpreted to mean that you can sum cavity and continuous insulation *R*-values together to come up with the required *R*-values as listed in Table R402.1.1. However, for insulation material used in layers, the intent is for the *R*-values of layered cavity insulation to be summed to meet the required cavity insulation *R*-value and the *R*-values of layered continuous insulation to be summed to meet the continuous insulation *R*-value.

Cost Impact: The code change proposal will not increase the cost of construction.

RE43-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.1.2-EC-WOESTMAN

RE44 – 13

Table R402.1.3 (IRC Table N1102.1.3)

Proponent: Shirley Ellis, Energy Systems Laboratory, Texas A&M Engineering Experiment Station, Texas A&M University System (shirleyellis@tamu.edu)

Revise as follows:

**TABLE R402.1.3 (N1102.1.3)
EQUIVALENT U-FACTORS^a**

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT U-FACTOR	CEILING U-FACTOR	FRAME WALL U-FACTOR	MASS WALL U-FACTOR ^b	FLOOR U-FACTOR	BASEMENT WALL U-FACTOR	CRAWL SPACE WALL U-FACTOR
1	0.50	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	0.082	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.057 0.060	0.098	0.047	0.091 ^c	0.136
4 except Marine	0.35	0.55	0.026	0.057 0.060	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026	0.057	0.082	0.033	0.050	0.055
6	0.32	0.55	0.026	0.048	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	0.048	0.057	0.028	0.050	0.055

(Portions of Table not shown remain unchanged)

Reason: This code change proposal is intended to correct the assumptions behind the wood-frame wall U-factors embedded in Table R402.1.3 of the IECC. The misrepresent the true performance of homes and, as such, over-estimate the energy efficiency of a typical R13 wood wall assembly when the Total UA or Simulated Performance path is used to demonstrate compliance to the IECC.

The wood wall U-factor values in Table R402.1.3 are currently based on a wall system that assumes the use of 5/8" plywood sheathing, which is well in excess of the minimum (3/8" thick) structural wood panel wall bracing in the International Residential Code (IRC). The U-factor value for the R13+5 wood wall system also assumes that a full double layer of 5/8" plywood sheathing and 1" continuous insulation is used. Neither the use of 5/8" structural panel wall sheathing or double sheathing with structural panels and continuous insulation in single family houses is commonly practiced or required by code.

According to the NAHB Research Center's 2011 Builders Survey, 5/8" or thicker wood structural panel wall sheathing makes up only 10% of the structural wood wall sheathing used in single-family residential construction. While 68% of residential single family wall area used wood structural panel sheathing was 7/16" thick or less.

There are several code options for braced wall segments that can incorporate continuous insulation over the top without adding a layer of structural wood panels. There are also options to use structural panels in combination with continuous insulation in between the structural segments. The code must be based on minimum systems that meet the provisions of the code in order to establish requirements that are fair to all products and assemblies. That minimum system would be a single layer of sheathing using continuous insulation.

Cost Impact: The code change proposal will not increase the cost of construction.

RE44-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R402.1.3T #1-EC-ELLIS

RE45 – 13

Table R402.1.3 (IRC N1102.1.3)

Proponent: Shirley Ellis, Energy Systems Laboratory, Texas A&M Engineering Experiment Station, Texas A&M University System (shirleyellis@tamu.edu)

Revise as follows:

**TABLE R402.1.3 (N1102.1.3)
EQUIVALENT U-FACTORS^a**

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT U-FACTOR	CEILING U-FACTOR	FRAME WALL U-FACTOR	MASS WALL U-FACTOR ^b	FLOOR U-FACTOR	BASEMENT WALL U-FACTOR	CRAWL SPACE WALL U-FACTOR
1	0.50	0.75	0.035	0.082 0.084	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	0.082 0.084	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.057 0.060	0.098	0.047	0.091 ^c	0.136
4 except Marine	0.35	0.55	0.026	0.057 0.060	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026	0.057	0.082	0.033	0.050	0.055
6	0.32	0.55	0.026	0.048	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	0.048	0.057	0.028	0.050	0.055

(Portions of Table not shown remain unchanged)

Reason: This code change proposal is intended to correct the assumptions behind the wood-frame wall U-factors embedded in Table R402.1.3 of the IECC. The misrepresent the true performance of homes and, as such, over-estimate the energy efficiency of a typical R13 wood wall assembly when the Total UA or Simulated Performance path is used to demonstrate compliance to the IECC.

The wood wall U-factor values in Table R402.1.3 are currently based on a wall system that assumes the use of 5/8" plywood sheathing, which is well in excess of the minimum (3/8" thick) structural wood panel wall bracing in the International Residential Code (IRC).

While 3/8" is the minimum wood structural panel wall bracing thickness allowed in the IRC, the most common structural panel thickness used in the United States is 7/16-inch. According to the 2011 Builders Survey, 68% of residential single family wall area used wood structural panel sheathing that was 7/16" thick or less. Therefore, it is reasonable to use an R-value for structural wood panels of 0.62R in the calculation for the U-value for climate zones 1 and 2. According to Table 2, that U-factor is 0.084.

Cost Impact: The code change proposal will not increase the cost of construction.

RE45-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R402.1.3T #2-EC-ELLIS

RE46 – 13

Table R402.1.3 (IRC Table N1102.1.3)

Proponent: Tom Kositzky, representing Coalition for Fair Energy Codes

Revise as follows:

**TABLE R402.1.3 (N1102.1.3)
EQUIVALENT *U*-FACTORS^a**

CLIMATE ZONE	FENESTRATION <i>U</i> -FACTOR	SKYLIGHT <i>U</i> -FACTOR	CEILING <i>U</i> -FACTOR	FRAME WALL <i>U</i> -FACTOR	MASS WALL <i>U</i> -FACTOR ^b	FLOOR <i>U</i> -FACTOR	BASEMENT WALL <i>U</i> -FACTOR	CRAWL SPACE WALL <i>U</i> -FACTOR
1	0.50	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	0.082	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.057 0.060	0.098	0.047	0.091 ^c	0.136
4 except Marine	0.35	0.55	0.026	0.057 0.060	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026	0.057 0.060	0.082	0.033	0.050	0.055
6	0.32	0.55	0.026	0.048	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	0.048	0.057	0.028	0.050	0.055

(Portions of Table not shown remain unchanged)

Reason: This code change proposal is intended to bring transparency and accuracy to the code by using more realistic assumptions to generate Climate Zones 3-5 wood frame wall *U*-factors in Table R402.1.3. The *REScheck*TM assumptions result in *U*-factors that misrepresent the true energy performance of wood walls and, as such, over-estimate the energy efficiency of a typical R20 and R13+5 wood wall assemblies when the assembly *U*-factor, Total UA alternative or Simulated Performance alternative is used to demonstrate compliance.

This proposal corrects two *REScheck*TM assumptions which were used to generate the wood wall *U*-factors in Table R402.1.3.

1. It was assumed that 5/8-inch plywood wall sheathing is used.
(This assumption is in excess of the minimum required, 3/8-inch thick, wood structural panel wall bracing that is required in the IRC.)
2. The assumption that a double layer of wall sheathing is used for R13+5 assemblies.
(A layer of R5 continuous insulation with an additional layer of continuous 5/8-inch plywood wall sheathing is assumed.)

Both of these assumptions are not based upon common practice nor are they required by the IRC. In order to establish baseline requirements that are fair to all products and systems, the code should be based upon the minimum performing assemblies that meet the provisions of the code. The minimum performing system in IECC Table R402.1.1 is found in footnote h. It allows continuous insulating sheathing to be used in combination with intermittent structural wall bracing (a.k.a., corner bracing) and results in a *U*-factor of 0.064 as shown below in Table 3.

Recognizing the strong opposition regarding the use of this common prescriptive wall assembly (footnote h) as a basis for generating *U*-factors, we propose basing the Climate Zone 3-5 continuous insulating sheathing *U*-factor on an assembly that uses let-in-bracing (per IRC Table R602.10.4) or metal strap bracing to provide lateral support. The resulting *U*-factor of 0.060 correlates to the *U*-factor for an R20 wall when code minimum 3/8-inch wood structural panel sheathing is used in lieu of 5/8-inch plywood. (See Table 2 below.)

A *U*-factor of 0.060 aligns more closely with common construction practices and would be a more reasonable value for wood frame walls in Climate Zones 3-5.

We ask the support of the committee for this proposal.

Table 1 shows the *REScheck*TM component assumptions which were used to determine the prescriptive *U*-factors in Table R402.1.3 of the IECC^{1,2}. The cells representing the 5/8-inch plywood and double layer wall sheathing assumptions are shaded.

Table 2 shows the component assumptions for the *U*-factor being proposed.

Table 3 represents a code-compliant and common construction approach which is provided for reference.

**Table 1. U-Factor Calculations for Climate Zones 3-5, Wood Framed Walls
(Current U-Factor Basis)**

Wall Thermal Resistance by Component	2x4 Wall - R13+5			2x6 Wall - R20		
	R-Value Studs	R-Value Cavity	Assembly Value	R-Value Studs	R-Value Cavity	Assembly Value
Outside Air Film	0.25			0.25		
Siding	0.59			0.59		
Continuous Insulation	5			0		
Wood Structural Panel Sheathing (5/8")	0.83			0.83		
Stud/Cavity Insulation	4.375	13		6.875	20	
1/2" Drywall	0.45			0.45		
Inside Air Film	0.68			0.68		
Studs at 16" o.c.	25%	75%		25%	75%	
Total Wall R-Values	12.18	20.80	17.67	9.68	22.80	17.03
Total Wall U-Factors	0.082	0.048	0.0566	0.103	0.044	0.0587

Table 2. U-Factor Calculations for Climate Zones 3-5, Wood Framed Walls
(Common Basis)

Wall Thermal Resistance by Component	2x4 Wall - R13+5 Corrected			2x6 Wall - R20 Corrected		
	R-Value Studs	R-Value Cavity	Assembly Value	R-Value Studs	R-Value Cavity	Assembly Value
Outside Air Film	0.25			0.25		
Siding	0.59			0.59		
Continuous Insulation	5			0		
Wood Structural Panel Sheathing (3/8")	0			0.47		
Stud/Cavity Insulation	4.375	13		6.875	20	
1/2" Drywall	0.45			0.45		
Inside Air Film	0.68			0.68		
Studs at 16" o.c.	25%	75%		25%	75%	
Total Wall R-Values	11.35	19.97	16.78	9.32	22.44	16.59
Total Wall U-Factors	0.088	0.050	0.0596	0.107	0.045	0.0603

**Table 3. U-Factor Calculations for Climate Zones 3-5, 2x4 Wood Framed Walls
(Using Table 402.1.1, Footnote h as Basis)**

Wall Thermal Resistance by Component	2x4 Wall - R13+5 (60 percent of wall area with specified continuous insulation level and no structural bracing)			2x4 Wall - R13+5 (40 percent of wall area with reduced continuous insulation level + structural sheathing)			Total Assembly Value
	R-Value Studs	R-Value Cavity	60% of wall area	R-Value Studs	R-Value Cavity	40% of wall area	
Outside Air Film	0.25			0.25			
Siding	0.59			0.59			
Continuous Insulation	5			2			
Intermittent Structural Wall Bracing (3/8")	0			0.47			
Stud/Cavity Insulation	4.375	13		4.375	13		
1/2" Drywall	0.45			0.45			
Inside Air Film	0.68			0.68			
Studs at 16" o.c.	25%	75%		25%	75%		
Total Wall R-Values	11.35	19.97	16.78	8.82	17.44	14.01	15.6733
Total Wall U-Factors	0.088	0.050	0.0596	0.113	0.057	0.0714	0.0638

References:

¹U.S. Department of Energy, Washington D.C. 2011 Methodology for Developing the REScheck™ Software through Version 4.4.3.
<http://www.energycodes.gov/methodology-developing-rescheck-software-through-version-443>

²See ICC-ES, ESR-2586, Table 4. www.apawood.org/docs/2013/ICC_ESR_2586.pdf

Cost Impact: The code change proposal will not increase the cost of construction.

RE46-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R402.1.3T #1-EC-KOSITZKY

RE47 – 13

Table R402.1.3 (IRC N1102.1.3)

Proponent: Tom Kositzky, representing Coalition for Fair Energy Codes

Revise as follows:

**TABLE R402.1.3 (N1102.1.3)
EQUIVALENT *U*-FACTORS^a**

CLIMATE ZONE	FENESTRATION <i>U</i> -FACTOR	SKYLIGHT <i>U</i> -FACTOR	CEILING <i>U</i> -FACTOR	FRAME WALL <i>U</i> -FACTOR	MASS WALL <i>U</i> -FACTOR ^b	FLOOR <i>U</i> -FACTOR	BASEMENT WALL <i>U</i> -FACTOR	CRAWL SPACE WALL <i>U</i> -FACTOR
1	0.50	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	0.082	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.057 0.060	0.098	0.047	0.091 ^c	0.136
4 except Marine	0.35	0.55	0.026	0.057 0.060	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026	0.057	0.082	0.033	0.050	0.055
6	0.32	0.55	0.026	0.048 0.046	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	0.048 0.046	0.057	0.028	0.050	0.055

(Portions of Table not shown remain unchanged)

Reason: The purpose of this code change proposal is to bring transparency and accuracy to the code by correcting the wood-frame wall *U*-factors for Climate Zones 6, 7 and 8 in Table R402.1.3. The previous assembly component assumptions resulted in *U*-factors that misrepresent the true energy performance of wood walls and, as such, underestimate the energy efficiency of a typical R20+5 wood wall assembly. Correcting the *U*-factor to 0.046 from 0.048 is more consistent with common construction practices for the corresponding assemblies listed in Table 402.1.1.¹

Table 402.1.1 lists two prescriptive wood wall assembly options for Climate Zones 6-8, both of which require continuous insulation. In addition to meeting the IECC, these walls must also provide lateral resistance for the house which is typically provided through prescriptive wall bracing or shear walls. There are several structural wall bracing options in Table R602.10.4 of the IRC, two of which are commonly used with continuous insulating sheathing:

1. Let-in-bracing (LIB), and;
2. Intermittent structural sheathing (combined with insulating sheathing installed between the structural sheathing, and a thinner insulating sheathing or insulated siding on top of the structural sheathing, per IECC Table R402.1.1, footnote h).

In order to establish baseline requirements that treat all building products and systems equally, the code should be based on the minimum performing assemblies that meet the provisions of the code. The minimum performing system in IECC Table R402.1.1 is continuous insulating sheathing used in combination with intermittent structural wall bracing (footnote h), which results in a *U*-factor of 0.048 as demonstrated in Tables 2 and 3, below. Recognizing that there is opposition to using footnote h as a baseline assembly, we propose basing the *U*-factors for Climate Zones 6-8 on the continuous insulating sheathing wall assemblies that use let-in-bracing that requires no structural sheathing. This proposal results in a *U*-factor of 0.046, which both assemblies are shown to meet, per Table 1.

We ask the support of the committee for this proposal.

Table 1. U-Factor Calculations for Climate Zones 6-8 Wood Framed Walls

Wall Thermal Resistance by Component	2x4 Wall - R13+10			2x6 Wall - R20+5		
	R-Value Studs	R-Value Cavity	Assembly Value	R-Value Studs	R-Value Cavity	Assembly Value
Outside Air Film	0.25			0.25		
Siding	0.59			0.59		
Continuous Insulation	10			5		
Wood Structural Panel Sheathing	0			0		
Stud/Cavity Insulation	4.375	13		6.875	20	
1/2" Drywall	0.45			0.45		
Inside Air Film	0.68			0.68		
Studs at 16" o.c.	25%	75%		25%	75%	
Total Wall R-Values	16.35	24.97	22.06	13.85	26.97	21.80
Total Wall U-Factors	0.061	0.040	0.0453	0.072	0.037	0.0459

**Table 2. U-Factor Calculations for Climate Zone 6-8, 2x6 Wood Framed Wall
(Using Table 402.1.1, Footnote h as Basis)**

Wall Thermal Resistance by Component	2x6 Wall - R20+5 (60 percent of wall area with specified continuous insulation level and no structural bracing)			2x6 Wall - R20+5 (40 percent of wall area with reduced continuous insulation level + structural sheathing)			Total Assembly Value
	R-Value Studs	R-Value Cavity	60% of wall area	R-Value Studs	R-Value Cavity	40% of wall area	
Outside Air Film	0.25			0.25			
Siding	0.59			0.59			
Continuous Insulation	5			2			
Intermittent Structural Wall Bracing (3/8")	0			0.47			
Stud/Cavity Insulation	6.875	20		6.875	20		
1/2" Drywall	0.45			0.45			
Inside Air Film	0.68			0.68			
Studs at 16" o.c.	25%	75%		25%	75%		
Total Wall R-Values	13.85	26.97	21.80	11.32	24.44	18.95	20.66
Total Wall U-Factors	0.072	0.037	0.0459	0.087	0.041	0.0528	0.0484

**Table 3. U-Factor Calculations for Climate Zone 6-8, 2x4 Wood Framed Walls
(Using Table 402.1.1, Footnote h as Basis)**

Wall Thermal Resistance by Component	2x4 Wall - R13+10 (60 percent of wall area with specified continuous insulation level and no structural bracing)			2x4 Wall - R13+10 (40 percent of wall area with reduced continuous insulation level + structural sheathing)			Total Assembly Value
	R-Value Studs	R-Value Cavity	60% of wall area	R-Value Studs	R-Value Cavity	40% of wall area	
Outside Air Film	0.25			0.25			
Siding	0.59			0.59			
Continuous Insulation	10			7			
Intermittent Structural Wall Bracing (3/8")	0			0.47			
Stud/Cavity Insulation	4.375	13		4.375	13		
1/2" Drywall	0.45			0.45			
Inside Air Film	0.68			0.68			
Studs at 16" o.c.	25%	75%		25%	75%		
Total Wall R-Values	16.35	24.97	22.06	13.82	22.44	19.41	21.0001
Total Wall U-Factors	0.061	0.040	0.0453	0.072	0.045	0.0515	0.0476

References:¹ See ICC-ES, ESR-2586, Table 4. www.apawood.org/docs/2013/ICC_ESR_2586.pdf

Cost Impact: The code change proposal will not increase the cost of construction.

RE47-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R402.1.3T #2-EC-KOSITZKY

RE48 – 13

Table R402.1.3 (IRC N1102.1.3)

Proponent: Tom Kositzky, representing Coalition for Fair Energy Codes

Revise as follows:

**TABLE R402.1.3 (N1102.1.3)
EQUIVALENT *U*-FACTORS^a**

CLIMATE ZONE	FENESTRATION <i>U</i> -FACTOR	SKYLIGHT <i>U</i> -FACTOR	CEILING <i>U</i> -FACTOR	FRAME WALL <i>U</i> -FACTOR	MASS WALL <i>U</i> -FACTOR ^b	FLOOR <i>U</i> -FACTOR	BASEMENT WALL <i>U</i> -FACTOR	CRAWL SPACE WALL <i>U</i> -FACTOR
1	0.50	0.75	0.035	0.082 0.085	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	0.082 0.085	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.057	0.098	0.047	0.091 ^c	0.136
4 except Marine	0.35	0.55	0.026	0.057	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026	0.057	0.082	0.033	0.050	0.055
6	0.32	0.55	0.026	0.048	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	0.048	0.057	0.028	0.050	0.055

(Portions of Table not shown remain unchanged)

Reason: This code change proposal is intended to bring transparency and accuracy to the code by using more realistic assumptions to generate the Climate Zone 1 and 2 wood-frame wall *U*-factors in Table R402.1.3. The previous assumptions resulted in *U*-factors that misrepresent the true energy performance of wood walls and, as such, overestimate the energy efficiency of a typical R13 wood wall assembly when the assembly *U*-factor alternative, the total UA alternative or Simulated Performance alternative is used to demonstrate compliance. The wood wall *U*-factors in Table R402.1.3 are currently based on an assembly that assumes the use of 5/8-inch plywood sheathing, which is well in excess of the minimum 3/8-inch thick structural wood panel wall bracing in the IRC.

Table 1 incorporates the REScheckTM assumptions which were used to determine the prescriptive *U*-factors in Table R402.1.3 of the IECC^{1,2} in the left hand columns of the table. This base calculation assumes that 5/8-inch thick plywood is used as the sheathing material, resulting in the current 0.082 *U*-factor. The proposed component *R*-value basis in the right-hand columns in Table 1 uses the same REScheckTM assumptions but incorporates the *R*-value for 3/8-inch wood structural panel sheathing, resulting in a *U*-factor of 0.085.

Adjusting the Climate Zone 1-2 *U*-factors in Table R402.1.3 to 0.085 will more accurately reflect the energy efficiency of an R13 wood wall assembly when the Total UA or Simulated Performance alternatives are used to demonstrate compliance.

We ask the support of the committee for this proposal.

Table 1. U-Factor Calculations for Climate Zones 1-2 Wood Framed Walls

Wall Thermal Resistance by Component	Current Component R-Value Basis			Proposed Component R-Value Basis		
	R-Value Studs	R-Value Cavity	Assembly Value	R-Value Studs	R-Value Cavity	Assembly Value
Outside Air Film	0.25			0.25		
Siding	0.59			0.59		
Continuous Insulation	0			0		
Wood Structural Panel Sheathing	0.83		(5/8")	0.47		(3/8")
Stud/Cavity Insulation	4.38	13		4.38	13	
1/2" Drywall	0.45			0.45		
Inside Air Film	0.68			0.68		
Studs at 16" o.c.	25%	75%		25%	75%	
Total Wall R-Values	7.18	15.80	12.15	6.82	15.44	11.73
Total Wall U-Factors	0.139	0.063	0.0823	0.147	0.065	0.0853

References:

¹U.S. Department of Energy, Washington D.C. 2011 Methodology for Developing the REScheck™ Software through Version 4.4.3.
<http://www.energycodes.gov/methodology-developing-rescheck-software-through-version-443>

²See ICC-ES, ESR-2586, Table 4. www.apawood.org/docs/2013/ICC_ESR_2586.pdf

Cost Impact: The code change proposal will not increase the cost of construction.

RE48-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R402.1.3T #3-EC-KOSITZKY

RE49 – 13

Table R402.1.3 (IRC Table N1102.1.3)

Proponent: Eric Makela, Britt/Makela Group, Inc., representing Northwest Energy Codes Group (Eric@BrittMakela.com)

Revise as follows:

**TABLE R402.1.3 (N1102.1.3)
EQUIVALENT U-FACTORS^a**

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT U-FACTOR	CEILING U-FACTOR	FRAME WALL U-FACTOR	MASS WALL U-FACTOR ^b	FLOOR U-FACTOR	BASEMENT WALL U-FACTOR	CRAWL SPACE WALL U-FACTOR
1	0.50	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	0.082	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.057 0.060	0.098	0.047	0.091 ^c	0.136
4 except Marine	0.35	0.55	0.026	0.057 0.060	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026	0.057	0.082	0.033	0.050	0.055
6	0.32	0.55	0.026	0.048 0.044	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	0.048 0.044	0.057	0.028	0.050	0.055

- Nonfenestration U-factors shall be obtained from measurement, calculation or an approved source.
- When more than half the insulation is on the interior, the mass wall U-factors shall be a maximum of 0.17 in Climate Zone 1, 0.14 in Climate Zone 2, 0.12 in Climate Zone 3, 0.087 in Climate Zone 4 except Marine, 0.065 in Climate Zone 5 and Marine 4, and 0.057 in Climate Zones 6 through 8.
- Basement wall U-factor of 0.360 in warm-humid locations as defined by Figure R301.1 and Table R301.1.

Reason: The wood framed wall U-factors are all generated using the methodology embedded in the US DOE REScheck software. All of the U-factors assume that structural sheathing is installed over 100% of the wall system with continuous insulation covering the structural sheathing. The 0.048 U-factor was calculated assuming no structural sheathing installed under the continuous insulation. Correcting the U-factor would provide consistency in how the values are calculated.

Cost Impact: The code change proposal will not increase the cost of construction.

RE49-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R402.1.3T-EC-MAKELA

RE50 – 13

Table R402.1.3 (IRC Table N1102.1.3)

Proponent: Don Surrena, CBO, representing National Association of Home Builders (NAHB)
(dsurrena@nahb.org)

Revise as follows:

**TABLE R402.1.3 (N1102.1.3)
EQUIVALENT U-FACTORS^a**

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT U-FACTOR	CEILING U-FACTOR	FRAME WALL U-FACTOR	MASS WALL U-FACTOR ^b	FLOOR U-FACTOR	BASEMENT WALL U-FACTOR	CRAWL SPACE WALL U-FACTOR
1	0.50	0.75	0.035	0.082 0.084	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	0.082 0.084	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.057 0.060	0.098	0.047	0.091 ^c	0.136
4 except Marine	0.35	0.55	0.026	0.057 0.060	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026	0.057 0.060	0.082	0.033	0.050	0.055
6	0.32	0.55	0.026	0.048 0.045	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	0.048 0.045	0.057	0.028	0.050	0.055

(Portions of table not shown remain unchanged)

Reason: The intent of these changes is not to alter the stringency of the code, but rectify the conversion from R-Value to U-Factor. Currently the R-Values and equivalent U-Factors do not match when applying a consistent calculation method.

It is important that the U-Factors and R-Values do match when small alterations are being made to the wall assemblies selected in the R-Value table. For example, a builder does not want to install R-20 as suggested in the R-Value table. Instead, the builder's preferred wall is R-15+R3.8c.i. Although the R-15+R3.8c.i. wall is thermally better than the R-20 wall, it does not meet the requirements of the Equivalent U-Factor table.

Below are a series of calculations which justify the proposed changes to the Frame Wall U-Factor values:

Climate Zone 1 and 2 Wall U-Factor Calculation Spreadsheet

Wall Thermal Resistance by Component	2x4 Wall R-13 Batt		Assembly Value
	R-Value Studs	R-Value Cavity	
Wall - Outside Winter Air Film [^]	0.17		
Siding - Vinyl [^]	0.62		
Continuous Insulation	0		
OSB - 7/16" [^]	0.62		
SPF Stud/Cavity Insulation	4.375	13	
1/2" Drywall [^]	0.45		
Inside Air Film [^]	0.68		
Studs at 16" o.c. [^]	25%	75%	
Total Wall R-Values	6.92	15.54	11.85
Total Wall U-Values	0.145	0.064	0.084
[^] 2009 ASHRAE Handbook of Fundamentals			

Climate Zones 3-5 Wall U-Factor Calculation Spreadsheet

Wall Thermal Resistance by Component	2x4 Wall R-13+R5			2x6 Wall R-20		
	R-Value Studs	R-Value Cavity	Assembly U-Factor	R-Value Studs	R-Value Cavity	Assembly U-Factor
Wall - Outside Winter Air Film ^A	0.17			0.17		
Siding - Vinyl ^A	0.62			0.62		
Continuous Insulation	5			0		
OSB - 7/16" ^{uA}	0.62			0.62		
SPF Stud/Cavity Insulation	4.375	13		6.875	20	
1/2" Drywall ^A	0.45			0.45		
Inside Air Film ^A	0.68			0.68		
Studs at 16" o.c. ^A	25%	75%		25%	75%	
Total Wall R-Values	11.92	20.54	17.39	9.42	22.54	16.71
Total Wall U-Factor	0.084	0.049	0.057	0.106	0.044	0.060
^A 2009 ASHRAE Handbook of Fundamentals						

Climate Zones 6-8 Wall U-Factor Calculation Spreadsheet

Wall Thermal Resistance by Component	2x4 Wall R-13+R-10 c.i.			2x6 Wall R-20+R-5 c.i.		
	R-Value Studs	R-Value Cavity	Assembly Value	R-Value Studs	R-Value Cavity	Assembly Value
Wall - Outside Winter Air Film ^A	0.17			0.17		
Siding - Vinyl ^A	0.62			0.62		
Continuous Insulation	10			5		
OSB - 7/16" ^{uA}	0.62			0.62		
SPF Stud/Cavity Insulation	4.375	13		6.875	20	
1/2" Drywall ^A	0.45			0.45		
Inside Air Film ^A	0.68			0.68		
Studs at 16" o.c. ^A	25%	75%		25%	75%	
Total Wall R-Values	16.92	25.54	22.65	14.42	27.54	22.43
Total Wall U-Values	0.059	0.039	0.044	0.069	0.036	0.045
^A 2009 ASHRAE Handbook of Fundamentals						

Referenced Standards: None

Cost Impact: The code change proposal will not increase the cost of construction.

RE50-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R402.1.3T-EC-SURRENA

RE51 – 13

R402.1.5 (NEW) (IRC N1102.1.5 (NEW)), Table R402.1.5 (NEW) (IRC 1102.1.5 (NEW)), Table 402.1.6 (NEW) (IRC Table N1102.1.6 (NEW))

Proponent: Brian Dean, Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition

Add new text as follows:

R402.1.5 (N1102.1.5) Calculating opaque envelope component *U*-factors. Where determining the *U*-factor of an opaque assembly as part of Section R402.1.3, R402.1.4, or R405.5.2, Table R402.1.5 shall be used to calculate the *U*-factor using a series-parallel path calculation. Where actual insulation and framing fractions have been calculated for the proposed design, they shall be used; otherwise the default insulation and framing fractions in Table R402.1.5 shall be used. Where required by the *code official*:

1. Actual *U*-factors, insulation and framing fractions shall be calculated and documented in a written report; and
2. The calculated and documented values shall be inspected, reviewed, and certified by an independent party approved by the *code official*.

TABLE R402.1.5 (N1102.1.5)
COMPONENT R-VALUE AND INSULATION AND FRAMING FRACTIONS BY ASSEMBLY TYPE

	Interior Air Film	Interior Finish Layer	Cavity Insulation Layer	Cavity Insulation Fraction	Cavity Framing Layer	Framing Fraction	Continuous Insulation Layer ^c	Structural Sheathing Layer ^c	Siding Layer	Exterior Air Film
	<i>R</i> -Value	<i>R</i> -Value	<i>R</i> -Value	Percent	<i>R</i> -Value	Percent	<i>R</i> -Value	<i>R</i> -Value	<i>R</i> -Value	<i>R</i> -Value
Wood Frame Ceiling	0.61	0.45	as specified ^a	93	R-1.25 per inch ^b	7	0 or as specified	-	-	0.61
Wood Frame Wall	0.68	0.45	as specified	75	R-1.25 per inch ^b	25	0 or as specified	0.62	0.59	0.25
Steel Frame Wall	0.68	0.45	as specified	-	-	-	0 or as specified	0.62	0.59	0.25
Mass Wall	0.68	0.45	as specified	-	-	-	0 or as specified	0.62	0.59	0.25
Mass Wall with Frame	0.68	0.45	as specified	75	R-1.25 per inch ^b	25	0 or as specified	0.62	0.59	0.25
Wood Frame Floor	0.92	1.23 + 0.94	as specified	90	R-1.25 per inch ^b	10	0 or as specified	-	-	0.92
Basement Wall	0.68	0.45	as specified	-	-	-	0 or as specified	-	-	0.25
Crawlspace Wall	0.68	0.45	as specified	-	-	-	0 or as specified	-	-	0.25

- a. Where calculating the equivalent *U*-factor for the standard reference design, the depth of the insulation shall be calculated to account for limited depth at the edge of the ceiling based on a standard truss with available depth of 3.86 inches at the edge of the ceiling and a roof slope of 1 foot for every 3 feet across. In the proposed design, the ceiling insulation *U*-value shall be calculated with the actual insulation depths in the proposed design.
- b. The depth of the wood framing shall be based on the actual depth of the wood framing. Where calculating the equivalent *U*-factor for the standard reference design, the depth of the wood framing shall be calculated as the cavity insulation *R*-value divided by 4 and then rounded up to the following depths in inches: 3.5 for a 2x4 frame, 5.5 for a 2x6 frame, 7.5 for a 2x8 frame or 9.5 for a 2x10 frame.

- c. Where calculating the equivalent *U-factor* for the standard reference design using continuous insulation, 100% of the net wall is assumed to be covered by the insulating sheathing. The proposed design shall be calculated with the actual percentage of continuous insulation and structural sheathing.
- d. Where calculating the equivalent *U-factor* of a steel framed assembly using Table R402.1.5, a series path calculation shall be used. The *R-value* of the cavity insulation layer for steel framed assemblies shall be calculated by multiplying the specified cavity insulation *R-value* by the corresponding correction factor located in Table R402.1.6. Where there is no specified cavity insulation, the *R-value* of the cavity/framing layer shall be taken as R-0.8 for 16 inch on center assemblies and R-0.9 for 24 inch on center assemblies.

TABLE R402.1.6 (N1102.1.6)
STEEL FRAMED ASSEMBLIES CAVITY INSULATION CORRECTION FACTORS

Nominal Stud Size	Cavity Insulation <i>R-Value</i>	Nominal Framing Spacing	
		16 in. on center	24 in. on center
<u>2x4</u>	<u>11</u>	<u>0.50</u>	<u>0.60</u>
<u>2x4</u>	<u>13</u>	<u>0.46</u>	<u>0.55</u>
<u>2x4</u>	<u>15</u>	<u>0.43</u>	<u>0.52</u>
<u>2x6</u>	<u>19</u>	<u>0.37</u>	<u>0.45</u>
<u>2x6</u>	<u>20</u>	<u>0.36</u>	<u>0.44</u>
<u>2x6</u>	<u>21</u>	<u>0.35</u>	<u>0.43</u>
<u>2x8</u>	<u>25</u>	<u>0.31</u>	<u>0.38</u>

Reason: The purpose of the code change is to clarify the code by standardizing the method used to calculate the *R-values* and *U-factors* in opaque envelope assemblies. There is currently no method outlined in the *IECC* or *IRC* that would specify the assumptions for calculating the efficiencies of opaque assemblies in compliance software. This proposal does not change the prescriptive insulation *R-value* or *U-factor* requirements, but it standardizes crucial assumptions such as framing fractions that must be used in energy calculations.

The *IECC* currently allows the use of energy modeling tools to show compliance, but the guidance is vague. Section R402.1.4 Total UA alternative requires simply that the "UA calculation shall be done using a method consistent with the *ASHRAE Handbook of Fundamentals* and shall include the thermal bridging effects of framing materials."

Some stakeholders have used the lack of specificity in the code to argue for a "least common denominator" approach to code compliance, in which worst-case assumptions would be used as the baseline in Total UA or performance path calculations. That approach could lead to highly inconsistent results and significant losses of energy efficiency, and it runs counter to the purpose of regulating building energy efficiency in the first place. To be clear, this proposal does not intend to alter the simple prescriptive path, nor does it intend to create multiple prescriptive alternatives. Rather, it specifies the basic assumptions that must be used whenever the Total UA alternative or simulated performance alternative is used and standardizes this approach for all users.

The proposal above offers an objective, uniform set of default assumptions to be used in energy modeling, based on standard and advanced construction techniques. The proposal primarily uses values based on *ASHRAE*, supplemented by the approaches used in US DOE's REScheck compliance software, the HERS program, and the Washington State Energy Code. The proposal has also been carefully refined based on comments received during previous code cycles to similar proposals.

Cost Impact: The code change proposal will not increase the cost of construction.

RE51-13

Public Hearing: Committee: AS AM D
 Assembly: ASF AMF DF

R402.1.5 (NEW)-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE

RE52 – 13

R402.2.1 (IRC N1102.2.1), R402.2.2 (IRC N1102.2.2)

Proponent: Brian Dean, Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition

Revise as follows:

R402.2.1 (N1102.2.1) Ceilings with attic spaces. ~~When Section R402.1.1 would require R-38 in the ceiling, R-30 shall be deemed to satisfy the requirement for R-38 wherever~~ Where the full height of uncompressed R-30 insulation extends over the wall top plate at the eaves does not allow sufficient space for the required insulation in Section R402.1.1, ~~Similarly, R-38 shall be deemed to satisfy the requirement for R-49 wherever the full height of uncompressed R-38 insulation extends over the wall top plate at the eaves. This reduction shall not apply to the U-factor alternative approach in Section R402.1.3 and the total UA alternative in Section R402.1.4 shall be used.~~

R402.2.2 (N1102.2.2) Ceilings without attic spaces. ~~Where Section R402.1.1 would require insulation levels above R-30 and the design of the roof/ceiling assembly does not allow sufficient space for the required insulation in Section R402.1.1, the minimum required insulation for such roof/ceiling assemblies shall be R-30. This reduction of insulation from the requirements of Section R402.1.1 shall be limited to 500 square feet (46 m²) or 20 percent of the total insulated ceiling area, whichever is less. This reduction shall not apply to the U-factor alternative approach in Section R402.1.3 and the total UA alternative in Section R402.1.4 shall be used.~~

Reason: The purpose of this code change is to improve the efficiency of buildings by removing exceptions to the prescriptive ceiling R-value requirements. The 2012 IECC carves out an exception to the ceiling R-value requirements (in Section R402.2.1 for ceilings with attic spaces and Section R402.2.2 for ceilings without attic spaces) for cases (where there is insufficient space in the ceiling design to install the full amount of required insulation. Although this exception reduces the efficiency of ceilings, there is no corresponding increase of efficiency elsewhere in the building.

The proposal above eliminates the exception in each section because it is unnecessary. Where ceiling space is inadequate to install sufficient insulation, the builder or design professional using the prescriptive approach should use the Total UA analysis (or may opt for the Simulated Performance Alternative) to make up for the efficiency loss elsewhere in the thermal envelope or overall performance of the building. There is no valid reason to continue to give a free pass to buildings designed with insufficient space for adequate ceiling insulation.

Cost Impact: The code change proposal will increase the cost of construction.

RE52-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.2.1-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE

RE53 – 13

R402.2.1 (IRC N1102.2.1)

Proponent: Ellen Eggerton, representing Virginia Building and Code Officials Association

Revise as follows:

R402.2.1 (N1102.2.1) Ceilings with attic spaces. ~~When~~ Where Section R402.1.1 would require R38 in the ceiling, installing R30 over 100 percent of the ceiling area requiring insulation shall be deemed to satisfy the requirement for R38 whenever the full height of uncompressed R30 insulation extends over the wall top plate at the eaves. Similarly, where Section R402.1.1 would require R49 in the ceiling, installing R38 over 100 percent of the ceiling area requiring insulation shall be deemed to satisfy the requirement for R49 whenever the full height of uncompressed R38 insulation extends over the wall top plate at the eaves. This reduction shall not apply to the U-factor alternative approach in Section R402.1.3 and the total UA alternative in Section R402.1.4.

Reason: Revised language clarifies how to interpret the “alternative” ceiling insulation requirement. It has come to VBCOA’s attention that some code officials have interpreted R402.1.1 as permitting R38 over the wall top plate when using “raised heel” or “energy” trusses, but where R49 could be installed in the interior of the attic where height permits, R49 would in fact be required in those areas. The amendment seeks to clarify that R38 may be used throughout the entire attic, where a full R38 can be installed over the top plate. This approach is consistent with US DOE analysis of heat flow through insulated attics (ca. 1996), accounting for actual insulation thicknesses and framing members.

Cost Impact: Depending on how this particular provision had been previously enforced, impact may be to reduce overall installed insulation materials in attics and associated costs, with no appreciable difference in heat flow rate through this part of the thermal envelope.

RE53-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.2.1-EC-EGGERTON

RE54 – 13

R402.2.1 (IRC N1102.2.1)

Proponent: Robby Schwarz, representing EnergyLogic, Inc. (robby@nrglogic.com)

Revise as follows:

R402.2.1 (N1102.2.1) Ceilings with attic spaces. When Section R402.1.1 would require R-38 in the ceiling, it is required to be continuous across the entire attic at a depth sufficient to achieve an R-38. R-30 shall only be deemed to satisfy the requirement for R-38 wherever the full height of uncompressed R-30 insulation extends over the wall top plate at the eaves and the remainder or the attic continues to be R-38. Similarly, R-38 shall be deemed to satisfy the requirement for R-49 wherever the full height of uncompressed R-38 insulation extends over the wall top plate at the eaves and the remainder or the attic continues to be R-49. This reduction shall not apply to the *U*-factor alternative approach in Section R402.1.3 and the total UA alternative in Section R402.1.4.

Reason: The language of this section has been misinterpreted for years to mean exactly what is being stated in the change. The language change makes it clear that continuous depth of insulation is required across the entire attic to the level that is called out in section R402.1.1. The only exception is over the top plate where insulation depth can be reduced due to the slop of the roof. Efficiency of the home is increased and if a reduction of the R-value is necessary for other building reasons then the other alternative compliance paths are available so tradeoffs can be utilized and code compliance can be achieved.

Cost Impact: The code change proposal will not increase the cost of construction.

RE54-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.2.1-EC-SCHWARZ

RE55 – 13

R402.2.2 (IRC N1102.2.2)

Proponent: Robby Schwarz, representing EnergyLogic, Inc. (robby@nrglogic.com)

Revise as follows:

R402.2.2 (N1102.2.2) Ceilings without attic spaces. Where Section R402.1.1 would require insulation levels above R- 30 and the design of the roof/ceiling assembly does not allow sufficient space for the required insulation, ~~the minimum required insulation for such roof/ceiling assemblies shall be R-30 the residential building shall be required to utilize the U-factor alternative approach in Section R402.1.3, the total UA alternative in of Section R402.1.4, or Section 405 to demonstrate code compliance. This reduction of insulation from the requirements of Section R402.1.1 shall be limited to 500 square feet (46 m2) or 20 percent of the total insulated ceiling area, whichever is less. This reduction shall not apply to the U-factor alternative approach in Section R402.1.3 and the total UA alternative in Section R402.1.4.~~

Reason: The R-values have been established to achieve a specific level of quantifiable energy performance. If the levels cannot be achieved in a specific building assembly alternative compliance paths are available that will demonstrate that the assembly meets the requirements of the code.

Cost Impact: The code change proposal will not increase the cost of construction.

RE55-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.2.2-EC-SCHWARZ

RE56 – 13

R202 (NEW) (IRC N1101.9), R402.2.3 (IRC N1102.2.3), R402.2.3.1 (NEW) (IRC N1102.2.3.1 (NEW)), R402.2.3.2 (NEW) (IRC N1102.2.3.2 (NEW)), Chapter 5

Proponent: Forrest Fielder, CBO, Arizona Building Officials (fielder_4@msn.com)

Revise as follows:

R402.2.3 (N1102.2.3) ~~Eave baffle~~ .Vented attics. Roof assemblies containing vented attics shall comply with 402.2.3.1 and 402.2.3.2.

R402.2.3.1 (N1102.2.3.1) Eave baffle. For air permeable insulation in vented attics, a baffle shall be installed adjacent to soffit and eave vents. Baffles shall maintain an opening equal or greater than the size of the vent. The baffle shall extend over the top of the attic insulation. The baffle shall be permitted to be any solid material.

R402.2.3.2 (N1102.2.3.2) Radiant barriers. In Climate Zones 1, 2, and 3, vented attics shall contain radiant barriers, as tested in accordance with ASTM C1313M-12 and installed in accordance with ASTM C1743-12

Exception: Attics containing no HVAC space conditioning equipment or attics with a maximum of 10 lineal feet of supply or return ducting.

Add new definition as follows:

IECC SECTION R202 (IRC N1101.9) GENERAL DEFINITIONS

RADIANT BARRIER. A material having a low emittance surface (0.1 or less) and where installed in building assemblies, the low emittance surface shall face a ventilated or unventilated air space.

Add new standards to Chapter 5 as follows:

ASTM C1313/C1313M-12 Standard Specification for Sheet Radiant Barriers for Building Construction Applications

ASTM C1743-12 Standard Practice for Installation and Use of Radiant Barrier Systems (RBS) in Residential Building Construction

Reason: In cooling climates, attic radiant barriers (ARBs) have been shown to conserve substantial amounts of energy by reducing temperatures in vented attics. Lower attic temperatures slow the rate of temperature differential – driven heat transfer from ceiling envelope elements and HVAC equipment and ducting.

Attic radiant barriers are extensively used across Climate Zones 1, 2 and 3, i.e. in the sunbelt areas, and numerous demonstration projects and studies have confirmed the energy savings and cost-effectiveness of these installations. Such radiant barrier products have been on the market for over 24 years and are used by 87 of the top 100 US Builders. They have an established history and have been accepted into several regional code requirements and are included in the Energy Star Reference Home Guidelines. Some 650 million square feet of radiant barriers are installed annually.

The current state and city codes that include radiant barrier are:

- HI – Chapter 181 of Title 3, Table 402.1.1.1, Section 402.1.1.6, 402.1.1.8.1
- TX - Austin, Chapter 25-12, Article 12. Energy Code, Section 402.6
- FL – 2010 Florida Building Code, Section 405.6.1, Figure 405.6.1 & Table 303.2 (ASTM Standards)
- CA – Title 24, Part 6, Subsection 8, Section (f), Subsection 2; Table 151-B; Table 151-C; Table 151-D

This product has two ASTM Standards that are applicable – ASTM C1313, “Standard Specification for Sheet Radiant Barriers for Building Construction Applications,” and ASTM C1743, “Standard Practice for Installation and Use of Radiant Barrier Systems (RBS) in Residential Building Construction”. This proposal requires the use of radiant barriers in a manner consistent with the existing language in the Energy Star for Homes – “Version 3, Exhibit 1” and, additionally, requires that the radiant barriers comply with the two ASTM standards just referenced.

The Department of Energy (DOE) has published the "Radiant Barrier Fact Sheet"¹ that is available on the DOE website through the following link: <http://www.ornl.gov/sci/ees/etsd/btrc/RadiantBarrier/RBFactSheet2010.pdf>

A comprehensive review of radiant barrier studies was performed by Mario Medina, Ph.D. P.E. "This paper provides a general description of RBs, including installation configurations, the physical principles that make them work, and the laboratory and field experiments used to evaluate their thermal performance. An extensive review of the literature is summarized, highlighting fundamental issues, such as reduced ceiling heat flows, reduced space cooling and heating loads, and changes in attic temperatures produced by the installation of RBs in residential attics."² The document has been mentioned here as an additional reference related to radiant barrier product information and to highlight the scope of "benefit" studies that have been completed.

The study entitled "Radiant Barrier Impact on Selected Building Performance Measurements Model Home Case Study"³, authored by B.E. Davis and J. Tiller, from the Appalachian State University Energy Center, sponsored by Centex Homes in Charlotte, NC, demonstrates the energy savings associated with the use of radiant barriers in attics. In the study, two identical homes were fit with over sixty sensors, where one house contained a radiant barrier (designated as the "Belmont" home) and one did not. The house with the radiant barrier had a peak attic temperature drop by 23%, and the improved efficiency of the cool air delivered through the ducts was 57%.

The current language in the Energy Star for Homes – "Version 3, Exhibit 1" requires the use of radiant barriers in vented attics of the reference home, with an exception for attics containing no HVAC space conditioning equipment and a maximum of 10 linear feet of supply or return ducting.

¹ Department of Energy "Radiant Barrier Fact Sheet" prepared by the Oak Ridge National Laboratory (2012).

² Medina, Mario, "A Comprehensive Review of Radiant Barrier Research Including Laboratory and Field Experiments", report prepared for the Reflective Insulation Manufacturers Association.

³ Davis, Bruce Eugene & Tiller, Jeffrey, "Radiant Barrier Impact on Selected Building Performance Measurements, Model Home Case Study, Centex Homes".

Cost Impact: The code change proposal will increase the cost of construction.

Analysis: A review of the standards proposed for inclusion in the code, ASTM C1313/C1313M-12 Standard Specification for Sheet Radiant Barriers for Building Construction Applications, and C1743-12 Standard Practice for Installation and Use of Radiant Barrier Systems (RBS) in Residential Building Construction with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

RE56-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.2.3-EC-FIELDER

RE57 – 13

R202 (NEW) (IRC N1101.9 (NEW)), R402.2.3, (N1102.2.3) R402.2.3.1 (NEW) (IRC N1102.2.3.1 (NEW)), R402.2.3.2 (NEW) (IRC N1102.2.3.2 (NEW), Chapter 5

Proponent: Wesley Hall, Reflectix, Inc., representing self (wes.hall@reflectixinc.com), Vickie Lovell, InterCode Incorporated, representing the Reflective Insulation Manufacturers Association International (Vickie@InterCodeinc.com)

Revise as follows:

R402.2.3 (N1102.2.3) Vented Attics. Sections 402.2.3.1 and 402.2.3.2 shall apply to roof assemblies containing vented attics.

R402.2.3.1 (N1102.3.1) Eave baffle. For air permeable insulations in vented attics, a baffle shall be installed adjacent to soffit and eave vents. The baffle shall maintain an opening equal or greater than the size of the vent. The baffle shall extend over the top of the attic insulation. The baffle shall be permitted to be any solid material.

R402.2.3.2 (N1102.2.3.2) Radiant barrier. Radiant barriers, used to supplement insulation in Climate Zones 1, 2, and 3, shall comply with the requirements of ASTM C1313 and shall be installed in accordance with ASTM C1743.

~~**R402.2.3 (N1102.2.3) Eave baffle.** For air permeable insulations in vented attics, a baffle shall be installed adjacent to soffit and eave vents. Baffles shall maintain an opening equal or greater than the size of the vent. The baffle shall extend over the top of the attic insulation. The baffle shall be permitted to be any solid material.~~

Add new definition as follows:

IECC SECTION R202 (IRC N1101.9) GENERAL DEFINITIONS

RADIANT BARRIER. A material having a low emittance surface of 0.1 or less installed in building assemblies.

Add new standards to Chapter 5 as follows:

ASTM

C1313/C1313M-12 Standard Specification for Sheet Radiant Barriers for Building Construction Applications

C1743-12 Standard Practice for Installation and Use of Radiant Barrier Systems (RBS) in Residential Building Construction

Analysis: A review of the standards proposed for inclusion in the code, ASTM C1313/C1313M-12 Standard Specification for Sheet Radiant Barriers for Building Construction Applications, and C1743-12 Standard Practice for Installation and Use of Radiant Barrier Systems (RBS) in Residential Building Construction with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

Reason: (HALL) Radiant barriers are a viable building option, widely distributed and have an established place in the market. The purpose of this proposal is to provide information and references for radiant barriers.

The content of this proposal contains product requirements and references that will aid the contractors and code officials in recognizing and understanding radiant barrier products and correct installation procedures.

Attic radiant barriers are extensively used across Climate Zones 1, 2 and 3, i.e. in the sunbelt areas. These products have been on the market for over 24 years and are used by 87 of the top 100 US Builders. They have an established history and have been accepted into several regional code requirements and are included in the Energy Star Homes Guidelines. Some 650 million square feet of the product is being installed annually.

The current state and city codes that include radiant barrier are:

- HI – Chapter 181 of Title 3, Table 402.1.1.1, Section 402.1.1.6, 402.1.1.8.1
- TX - Austin, Chapter 25-12, Article 12. Energy Code, Section 402.6
- FL – 2010 Florida Building Code, Section 405.6.1, Figure 405.6.1 & Table 303.2 (ASTM Standards)
- CA – Title 24, Part 6, Subsection 8, Section (f), Subsection 2; Table 151-B; Table 151-C; Table 151-D

This product has two ASTM Standards that are applicable – ASTM C1313, “Standard Specification for Sheet Radiant Barriers for Building Construction Applications,” and ASTM C1743, “Standard Practice for Installation and Use of Radiant Barrier Systems (RBS) in Residential Building Construction”. This proposal does not require the use of radiant barriers but requires that, when they are used, they comply with the two ASTM standards just referenced.

ASTM C1743-12 can be viewed at: <http://reflectixinc.com/literature/securedpdfs/C1743.pdf>

(LOVELL) The use of radiant barriers in vented attics in hot climates has been shown to conserve substantial amounts of energy by reducing the temperatures in the attic. If the attic temperature is lower, that slows the rate of temperature differential and transfers heat away from ceiling envelope elements and HVAC equipment and ducting. Attic radiant barriers are extensively used across Climate Zones 1, 2 and 3, i.e. in the sunbelt areas, and numerous demonstration projects and studies have confirmed the energy savings and cost-effectiveness of these installations. Such radiant barrier products have been on the market for over 24 years and are used by 87 of the top 100 US Builders. They have an established history and have been accepted into several regional code requirements and are included in the Energy Star Homes Guidelines. Some 650 million square feet of the product is installed annually.

The current state and city codes that include radiant barrier are:

- HI – Chapter 181 of Title 3, Table 402.1.1.1, Section 402.1.1.6, 402.1.1.8.1
- TX - Austin, Chapter 25-12, Article 12. Energy Code, Section 402.6
- FL – 2010 Florida Building Code, Section 405.6.1, Figure 405.6.1 & Table 303.2 (ASTM Standards)
- CA – Title 24, Part 6, Subsection 8, Section (f), Subsection 2; Table 151-B; Table 151-C; Table 151-D

This product has two ASTM Standards that are applicable – ASTM C1313, “Standard Specification for Sheet Radiant Barriers for Building Construction Applications,” and ASTM C1743, “Standard Practice for Installation and Use of Radiant Barrier Systems (RBS) in Residential Building Construction”. This proposal requires the use of radiant barriers in a manner consistent with the existing language in the Energy Star for Homes – “Version 3, Exhibit 1” and, additionally, requires that the radiant barriers comply with the two ASTM standards just referenced.

The Department of Energy (DOE) has published the “Radiant Barrier Fact Sheet that is available on the DOE website through the following link: <http://www.ornl.gov/sci/ees/etsd/btrc/RadiantBarrier/RBFactSheet2010.pdf>

Values taken from this DOE document are utilized in the “Savings Benefit to the Home Owner” section below.

A very comprehensive study was performed by Mario Medina. “This paper provides a general description of RBs, including installation configurations, the physical principles that make them work, and the laboratory and field experiments used to evaluate their thermal performance. An extensive review of the literature is summarized, highlighting fundamental issues, such as reduced ceiling heat flows, reduced space cooling and heating loads, and changes in attic temperatures produced by the installation of RBs in residential attics. The document has been mentioned here as an additional reference related to radiant barrier product information and to highlight the scope of “benefit” studies that have been completed.

The study entitled “Radiant Barrier Impact on Selected Building Performance Measurements Model Home Case Study, authored by B.E. Davis and J. Tiller, from the Appalachian State University Energy Center, sponsored by Centex Homes in Charlotte, NC, and demonstrates the energy savings associated with the use of radiant barriers in attics. In the study, two identical homes were fit with over sixty sensors, where one house contained a radiant barrier (designated as the “Belmont” home) and one did not. The house with the radiant barrier had a peak attic temperature drop by 23% and the improved efficiency of the cool air delivered through the ducts was 57%.

The current language in the Energy Star for Homes – “Version 3, Exhibit 1” requires the use of radiant barriers in vented attics, with an exception for attics containing no HVAC space conditioning equipment and a maximum of 10 linear feet of supply or return ducting.

Cost Calculator – to home owner – new structure – hip roof:

- Product Cost - Radiant Barrier OSB Panel – \$0.11 per sq. ft.-(takes into account waste) ⁴
- 2,000 sq. ft. house, ranch, hip roof
- 2,200 sq. ft. of roof area x \$0.11 per sq. ft. (radiant barrier cost) = \$242.00
- Cost to home owner - \$242.00
- Additional cost added to monthly payment of a 30 year mortgage – 4% fixed interest rate:
- \$242.00 @ 4% = addition of \$1.16 to the monthly payment

Savings Benefit to the Home Owner:

- Cost to add Radiant Barrier OSB - \$1.16 per month (per above)
- 2,000 sq. ft. house, ranch, hip roof
- Savings as calculated in the Department of Energy “Radiant Barrier Fact Sheet”
- Code level insulation with well-sealed ducts in the attic
- Zone 1 - \$0.03 per sq. ft. x 2,000 sq. ft. = \$60.00 / 12 months = \$5.00 per month
- Zone 2 - \$0.03 per sq. ft. x 2,000 sq. ft. = \$60.00 / 12 months = \$5.00 per month
- Zone 3 - \$0.02 per sq. ft. x 2,000 sq. ft. = \$40.00 / 12 months = \$3.33 per month

- The cost for energy is based on first year (2012) values – if increases in energy cost due to inflation and other factors occur – annual savings will increase proportionally.

In summary, this exercise exemplifies the immediate energy cost savings that are netted when a radiant barrier is included in the design of a new home in Climate Zones 1, 2 and 3 with “well-sealed” ducts in the attic. The cost to the new home is small and the energy savings are significant over the life of the home.

References:

Davis, Bruce Eugene & Tiller, Jeffrey, “Radiant Barrier Impact on Selected Building Performance Measurements, Model Home Case Study”, Appalachian State University Energy Center, USA, 2009.

Medina, M. A., “A Comprehensive Review of Radiant Barrier Research Including Laboratory and Field Experiments.” Paper CH-12-C051, ASHRAE Transactions, Vol. 118, Part 1, 2012.

ASTM C1743-12 can be viewed at: <http://reflectixinc.com/literature/securedpdfs/C1743.pdf>.

Cost Impact: The code change proposal will not increase the cost of construction.

RE57-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.3 (NEW)-EC-HALL

RE58 – 13

R402.2.4 (IRC N1102.2.4)

Proponent: Jeff Inks, representing the Window & Door Manufacturers Association.

Revise as follows:

R402.2.4 (N1102.2.4) Access hatches and doors. Access doors from conditioned spaces to unconditioned spaces (e.g., attics and crawl spaces) shall be weatherstripped and insulated to a level equivalent to the insulation on the surrounding surfaces. Access shall be provided to all equipment that prevents damaging or compressing the insulation. A wood framed or equivalent baffle or retainer is required to be provided when loose fill insulation is installed, the purpose of which is to prevent the loose fill insulation from spilling into the living space when the attic access is opened, and to provide a permanent means of maintaining the installed R-value of the loose fill insulation.

Exception: Vertical doors that provide access from conditioned to unconditioned spaces shall be permitted to meet the requirements of Table R402.1.1 based on the applicable climate zone specified in Chapter 3.

Reason: As currently written, this provision is being interpreted in some jurisdictions as requiring vertical doors providing access to certain unconditioned spaces such as attics to meet the thermal insulation levels of the surrounding wall they are installed in rather than the thermal requirements for doors contained in Table R402.1.1 applicable to the building thermal envelope. The thermal performance requirements for these vertical doors should be no greater than those for exterior doors installed elsewhere in the building thermal envelope.

Cost Impact: The code change proposal will not increase the cost of construction.

RE58-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.2.4-EC-INKS

RE59 – 13

R402.2.4 (IRC N1102.2.4)

Proponent: Joel Rodriguez, Gwinnett county, Georgia, representing Metropolitan Atlanta Inspector's Association (MAIA) (joel.rodriguez@gwinnettcountry.com)

Revise as follows:

R402.2.4 (N1102.2.4) Access hatches and doors. Access doors from conditioned spaces to unconditioned spaces (e.g., attics and crawl spaces) shall be weatherstripped and insulated to a level in accordance with the following insulation values:

1. Hinged vertical doors shall have a maximum U-Factor of U-0.20 (R-5 minimum);
2. Hatches/scuttle hole covers shall have a maximum U-Factor of U-0.05 (R-19 minimum); and
3. Pull down stairs shall have a maximum U-Factor of U-0.020 with a minimum of 75 percent of the panel area having (R-5 minimum) insulation.

~~equivalent to the insulation on the surrounding surfaces.~~ Access shall be provided to all equipment that prevents damaging or compressing the insulation. A wood framed or equivalent baffle or retainer is required to be provided when loose fill insulation is installed, the purpose of which is to prevent the loose fill insulation from spilling into the living space when the attic access is opened, and to provide a permanent means of maintaining the installed R-value of the loose fill insulation. There shall be a floor or landing on top of the ceiling joist with a minimum width of 10 inches (254 mm) around the perimeter of access hatches and pull down stairs into an attic area.

Reason: To eliminate the conflict in the insulation requirement language in TABLE R402.1.1 INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT, TABLE R402.1.3 EQUIVALENT U-FACTORS and 402.2.3 Fenestration access hatches and doors. To insulate to the levels specified in R402.2.4 Access hatches and doors compared to the above insulation requirements is expensive, in some cases not practical. It doesn't make sense to require R-30 to R-49 insulation on a hatch or pull down stairs when one can have a skylight that is U-FACTOR 0.55-0.75 (les than R-2). The calculated additional energy costs between and R-5 and R-30 is approximately \$7.00 per year for Climate Zoe 4 (based on the methodology listed in ASHRAE Handbook Fundamentals for 10 SF pull down stairs. (Electricity cost based on \$0.11 KWH and Natural Gas \$0.70 Therm). To require a door into an attic to be R-13 to R-20+ doesn't make sense when a n exterior door or window exposed to the outside can be R-2 to R-3 (U-FACTOR 0.32-0.55). The manufacturers of doors, pull down stairs and hatches currently manufacture fenestration that meets these proposed insulation requirements. There is not a manufacturer that makes an R-13 or better door and the only way to achieve an R-30 or better with pull down stairs is to build or install a separate cover over the pull down stairs. This can create an unsafe entrance into the attic because the step up will be 16 inches or more, and that conflicts with IRC R311.7.5.1 Risers.

Cost Impact: The code change proposal will not increase the cost of construction. The savings will be a minimum of \$200 per opening.

RE59-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.2.4-EC-RODRIGUEZ

RE60 – 13

R402.2.7 (IRC N1102.2.7), Table R402.4.1.1 (IRC Table N1102.4.1.1)

Proponent: Joseph Lstiburek, Building Science Corporation, representing self
(joe@buildingscience.com)

Revise as follows:

R402.2.7 (N1102.2.7) Floors. Floor framing cavity insulation shall be installed to maintain permanent contact with the underside of the subfloor decking.

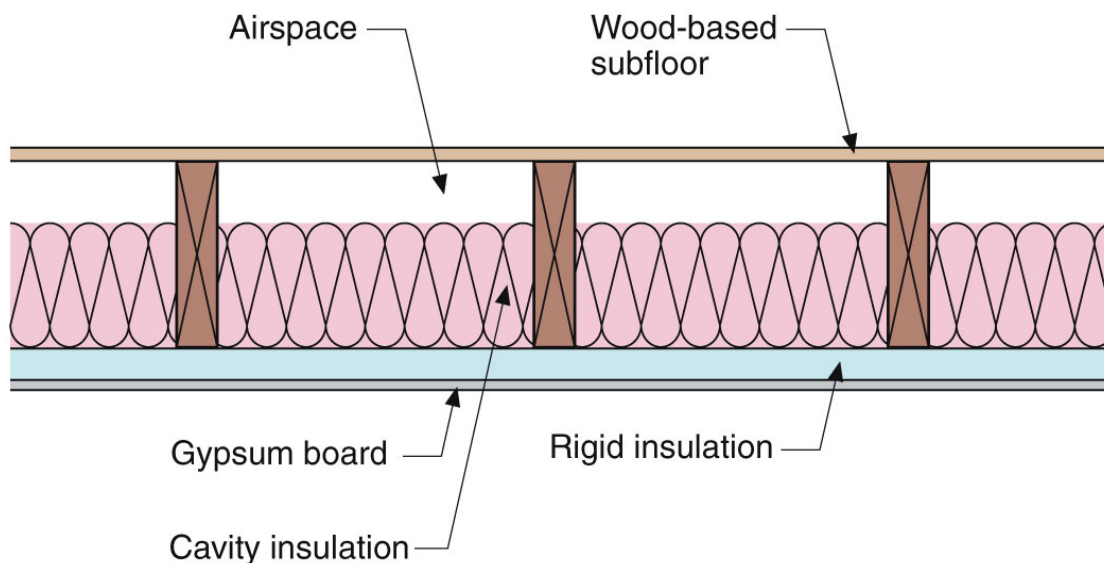
Exception: The floor framing cavity insulation shall be permitted to be in contact with the topside of sheathing or continuous insulation installed on the bottom side of floor framing when combined with insulation that meets or exceeds the minimum Wood Frame Wall R-value in Table 402.1.1 and extends from the bottom to the top of all perimeter floor framing members.

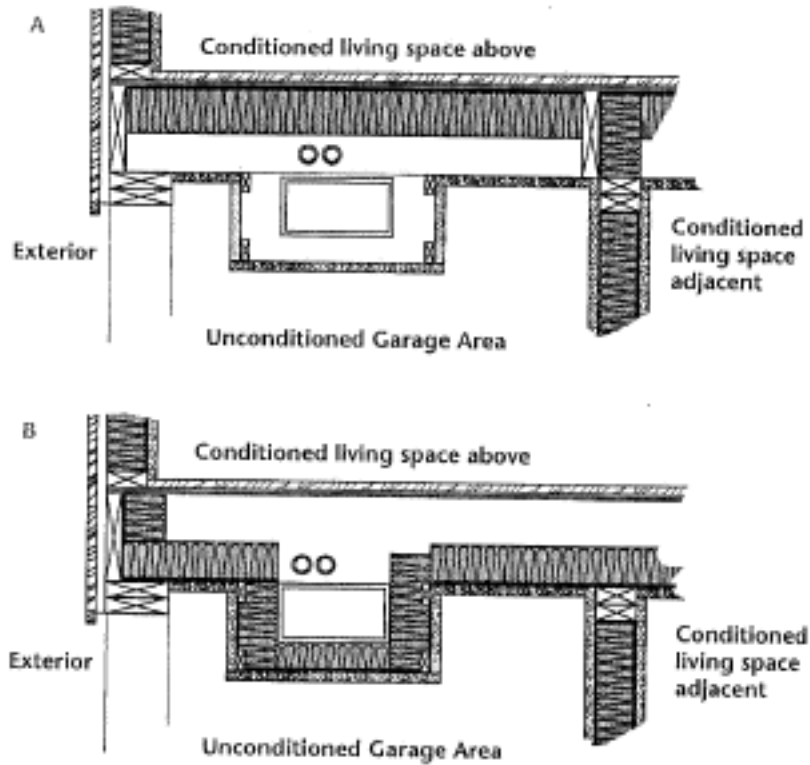
TABLE 402.4.1.1 (N1102.4.1.1)
AIR BARRIER AND INSULATION INSTALLATION

COMPONENT	CRITERIA
Floors (including above-garage and cantilevered floors)	Insulation Floor framing cavity insulation shall be installed to maintain permanent contact with underside of subfloor decking or <u>floor framing cavity insulation shall be permitted to be in contact with the topside of sheathing or continuous insulation installed on the bottom side of floor framing and extends from the bottom to the top of all perimeter floor framing members.</u> The air barrier shall be installed at any exposed edge of insulation.

(Portions of Table not shown remain unchanged)

Reason: Requiring insulation in floors to be in direct contact with the underside of subfloor decking is one insulating option. Another option is to have an airspace between the floor sheathing and the top of the cavity insulation where this cavity insulation is in direct contact with the topside of sheathing or continuous insulation installed on the underside of the floor framing and is combined with perimeter insulation that meets or exceeds the R-value requirements for walls. This second option leads to fewer cold spots yet does not change the heat loss as long as the cavity insulation is in direct contact with a sheathing below it or continuous insulation below it. It also facilitates services to be enclosed within the thermal envelope. Examples of these configurations are illustrated below:





Cost Impact: The code change proposal will not increase the cost of construction.

RE60-13

Public Hearing: Committee: AS AM D
 Assembly: ASF AMF DF

R402.2.7-EC-LSTIBUREK

RE61 – 13

R402.2.7 (IRC N1102.2.7)

Proponent: Eric Makela, Britt/Makela Group, Inc., representing Northwest Energy Codes Group (Eric@BrittMakela.com)

Revise as follows:

R402.2.7 (N1102.2.7) Floors. Floor insulation shall be installed to maintain permanent contact with the underside of the subfloor decking. Insulation supports for batt insulation shall be installed so that spacing is no more than 24 inches on center and shall not compress the insulation. Foundation vents shall be placed so that the top of the vent is below the lower surface of the floor insulation.

Exception: Where foundation vents are not placed so that the top of the vent is below the lower surface of the floor insulation, a permanently attached baffle shall be installed from the top of the vent to below the lower surface of the floor insulation at an angle of 30° from horizontal, to divert air flow below the lower surface of the floor insulation.

Reason: The 2012 IECC currently requires insulation installed in a floor system to maintain permanent contact with the underside of the subfloor decking. Insulation support systems, if not installed properly, can compress the insulation degrading the insulation R-value. This proposal requires that insulation supports not compress the installed insulation to ensure that it maintains its full R-value.

The second portion of the code change proposal focuses on the installation of foundation vents in relation to the installed insulation. Foundation vents that are installed at the same level as the insulation can direct air directly at the insulation reducing the R-value of the product through windwashing. Insulation will also act as a barrier to ventilation air, reducing the effectiveness of the foundation vent. This proposal will require that foundation vents either be installed below the line of insulation, or when not possible, require the installation of baffles to direct the ventilation air below the insulation

Cost Impact: The code change proposal will not increase the cost of construction.

RE61-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.2.7-EC-MAKELA

RE62 – 13

R402.2.13 (NEW) (IRC N1102.2.13 (NEW))

Proponent: Ellen Eggerton, representing Virginia Building and Code Officials Association

Revise as follows:

R402.2.13 (N1102.2.13) Mechanical rooms. Where a room contains combustion equipment, and outside air is admitted directly into the room to provide combustion air for the equipment, then the walls, ceilings, and floors of that room bound unconditioned space and shall be insulated as part of the *building thermal envelope*.

Reason: AHJs have disagreed regarding how to apply the energy code to “mechanical rooms” with permanently installed air ducts directly connecting the room to the outdoor environment. This proposal attempts to apply the code requirements to these rooms in a feasible and enforceable manner. Note that by identifying the enclosure of the mechanical room as part of the thermal envelope, these surfaces will be sealed as well as insulated, thereby preventing unwanted and energy-consuming air intrusion into the conditioned living space adjacent to the mechanical room.

Cost Impact: To the extent that mechanical rooms have previously been considered unconditioned space and were enforced as such, this clarifying proposal has no cost impact. If these rooms were previously uninsulated, there will be some costs associated with insulating the customary framed walls and ceiling of the room, as well as sealing potential avenues of air infiltration to the conditioned living space beyond.

RE62-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.2.13 (NEW)-EC-EGGERTON

RE63 – 13

Table R402.1.1 (IRC Table N1102.1.1), R402.2.13 (NNEW) (IRC N1102.2.13 (NEW))

Proponent: Jeremiah Williams, representing U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

TABLE R402.1.1 (N1102.1.1) INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT

(Portions of Table not shown remain unchanged)

- h. First value is cavity insulation, second is continuous insulation or insulated siding, so “13+5” means R-13 cavity insulation plus R-5 continuous insulation or insulated siding. ~~If structural sheathing covers 40 percent or less of the exterior, continuous insulation R-value shall be permitted to be reduced by no more than R-3 in the locations where structural sheathing is used – to maintain a consistent total sheathing thickness.~~

R402.2.13 (N1102.2.13) Walls with partial structural sheathing. Where Section R402.1.1 would require continuous insulation on exterior walls and structural sheathing covers 40 percent or less of the gross area of all exterior walls, the continuous insulation *R*-value shall be permitted to be reduced by an amount necessary to result in a consistent total sheathing thickness, but not more than R-3, on areas of the walls covered by structural sheathing. This reduction shall not apply to the *U*-factor alternative approach in Section R402.1.3 and the total UA alternative in Section R402.1.4.

Reason: This is a clarification not intended to change the meaning of the code. Moving the relevant text out of the footnote and into a separate code section allows for a more thorough description of the sheathing reduction allowance.

Cost Impact: The code change proposal will not increase the cost of construction.

RE63-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.2.13 (NEW)-EC-WILLIAMS

RE64 – 13

R402.3 (NEW) (IRC N1102.3 (NEW)), R402.3.1 (NEW) (IRC N1102.3.1 (NEW)), Table 402.3.1 (NEW) (IRC Table N1102.3.1 (NEW)), Chapter 5

Proponent: Jeremiah Williams, representing U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Add new text as follows:

R402.3 (N1102.3) Solar Properties of Opaque Surfaces (prescriptive).

R402.3.1 (N1102.3.1) Roof Solar Reflectance and Thermal Emittance. Roofs having a slope less than 2:12, directly above cooled *conditioned spaces* in climate zones 1, 2, and 3 shall comply with at least one option in Table R402.3.1.

Exceptions: The following are exempt from the requirements in Table R402.3.1:

1. Portions of roofs that include or are covered by:
 - 1.1 Photovoltaic systems or components
 - 1.2 Solar air or water heating systems or components
 - 1.3 Roof gardens or landscaped roofs
 - 1.4 Above-roof decks or walkways
 - 1.5 Skylights
 - 1.6 HVAC systems, components, and other opaque objects mounted above the roof
 - 1.7 A radiant barrier is installed
2. Portions of roofs shaded during the peak sun angle on the summer solstice by permanent features of the building, or by permanent features of adjacent buildings
3. Ballasted roofs with a minimum stone ballast of 17 lbs/ft² (74 kg/m²) or 23 lbs/ft² pavers (117 kg/m²)
4. Roofs where a minimum of 75% of the roof area meets a minimum of one of the exceptions above.

TABLE R402.3.1 (N1102.3.1)
MINIMUM ROOF REFLECTANCE AND EMITTANCE OPTIONS^a

Three-year aged solar reflectance ^b of 0.55 and three-year aged thermal emittance ^b of 0.75
Initial solar reflectance ^b of 0.70 and initial thermal emittance ^b of 0.75
Three-year-aged solar reflectance index ^c of 64
Initial solar reflectance index ^c of 82

- a. The use of area-weighted averages to meet these requirements shall be permitted. Materials lacking initial tested values for either *solar reflectance* or *thermal reflectance*, shall be assigned both an initial *solar reflectance* of 0.10 and an initial *thermal emittance* of 0.90. Materials lacking three-year aged tested values for either *solar reflectance* or *thermal reflectance*, shall be assigned both a three-year aged *solar reflectance* of 0.10 and a three-year aged *thermal emittance* of 0.90.
- b. Tested solar reflectance and thermal emittance shall be in accordance with ANSI/CRRC-1-2010.
- c. Solar reflectance index (SRI) determined in accordance with ASTM E1980-11 using a convection coefficient of 2.1 BTU/h-ft²-F (12W/m²-K). Calculation of aged SRI shall be based on aged tested values. Calculation of initial SRI shall be based on initial tested values.

Add new standards to Chapter 5 as follows:

ASTM

E 1980-11 Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-sloped Opaque Surfaces

CRCC Cool Roof Rating Council
1610 Harrison St
Oakland, CA 94612

ANSI/CRCC-1-2010 Cool Roof Rating Council CRCC-1 Standard

Reason: This proposed requirement applies to low-sloped roofs only and is consistent with requirements for commercial buildings in Section C402.2.1.1 of the 2012 IECC. Low-sloped roofs are commonly single-ply membranes, built-up roofs, modified bitumen membranes, and spray polyurethane foam. The U.S. DOE and Levinson report that high levels of reflectance for these types of roofs can typically be obtained for no cost increase over darker, less reflective roofs.

The low-slope DOE Cool Roof Calculator (<http://www.ornl.gov/sci/roofs+walls/facts/CoolCalcEnergy.htm>) reports these energy savings compared to a "black roof":

Climate Zone	Example City	Heating System Type	Net (Heating and Cooling) Annual Savings per 1000 ft² of roof area
2	Houston TX	Heat Pump	\$22
		Natural Gas	\$24
3	Atlanta GA	Heat Pump	\$15
		Natural Gas	\$17
Assumptions: R-30 insulation, 0.70 Solar reflectance, 0.75 thermal emittance, 12 cents/kWh electricity, \$1.00/therm natural gas, 3.5 COP cooling, 2.0 COP heat pump heating, 80% AFUE gas heat.			

Studies illustrating the savings from cool roofs are available on the Cool Roof Ratings Council website. <http://www.coolroofs.org/article.html#energy> For example, the Florida Solar Energy Center tested seven retail shops in a strip mall in Cocoa, Florida over a two-year period, which allowed surface degradation over a year period to be accounted for. The roof was resurfaced to alter the surface reflectivity from approximately 29% to 75%. There was a 25.3% average reduction in summer space cooling energy in the seven shops.

References:

Parker, D., J. Sonne, J. Sherwin. 1997. Demonstration of Cooling Savings of Light Colored Roof Surfacing in Florida Commercial Buildings: Retail Strip Mall. Florida Solar Energy Center. Cocoa, Florida.
U.S. Department of Energy. 2010. Guidelines for Selecting Cool Roofs. Washington, D.C.
Levinson, R. 2012. The Case for Cool Roofs. Lawrence Berkeley National Laboratory. Berkeley, California.
http://heatisland.lbl.gov/sites/heatisland.lbl.gov/files/Levinson_2012_Case%20for%20cool%20roofs.pdf

Cost Impact: The code change proposal may increase the cost of construction in certain situations.

Analysis: A review of the standards proposed for inclusion in the code, ASTM E1980-11 Standard Practice for calculating Solar Reflectance Index of Horizontal and Low-sloped Opaque Surfaces and CRRC Standard CRRC-1-2010 Cool Roof Rating Council CRRC-1 Standard with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

RE64-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.3 (NEW)-EC-WILLIAMS

RE65-13

202 (NEW) (IRC N1101.9 (NEW)), R402.3.3 (NEW) (IRC N1102.3.3 (NEW)), Table R402.3.3 (NEW) (IRC Table N1102.3.3 (NEW)), R402.3.6 (IRC N1102.3.6)

Proponent: Dr. Thomas D. Culp, Birch Point Consulting LLC, representing the Glazing Industry Code Committee (culp@birchpointconsulting.com)

Revise as follows:

R402.3.3 (N1102.3.3) SHGC Shading Adjustment. Vertical fenestration in Climate Zones 1 through 3 shall be permitted to meet the SHGC requirements of Table R402.3.3 based upon the calculated projection factor of any overhang, eave, or permanently attached shading device that covers the full width of the glazing and extends a minimum of 12 inches (0.3 m) beyond each side of thereof. Where different windows and glazed doors have different projection factors, they shall each be evaluated separately, or an area-weighted projection factor value shall be permitted.

**TABLE R402.3.3 (N1102.3.3)
EQUIVALENT SHGC FOR VERTICAL FENESTRATION
WITH SHADING PROJECTIONS**

Projection Factor	Maximum SHGC
$PF < 0.2$	0.25
$0.2 \leq PF < 0.5$	0.30
$PF \geq 0.5$	0.40

R402.3.6 (N1102.3.6) R402.3.7 (N1102.3.7) Replacement fenestration. Where some or all of an existing fenestration unit is replaced with a new fenestration product, including sash and glazing, the replacement fenestration unit shall meet the applicable requirements for *U*-factor and SHGC in Table R402.1.1 and Section R402.3.3.

Add new definition as follows:

IECC SECTION R202 (IRC N1101.9) GENERAL DEFINITIONS

PROJECTION FACTOR. The ratio of the horizontal depth of an overhang, eave, or permanently attached shading device, divided by the distance measured vertically from the bottom of the fenestration glazing to the underside of the overhang, eave, or permanently attached shading device.

Reason: The purpose of this proposal is to provide a prescriptive allowance for shading as an appropriate method for controlling solar gains in addition to glazing SHGC. Shading has been part of good building design for millennia, and its use should be encouraged. A prescriptive shading allowance is already included in the commercial IECC as well as ASHRAE 90.1, but is not currently included in the residential IECC, other than through the more complicated performance path.

The need to address shading has become even more important following the 2012 IECC, which introduced a very low 0.25 SHGC in zones 1-3. Even with the newest low-e coatings, it is borderline whether 0.25 SHGC can be achieved for certain products without the addition of tinted glass or a darker low-e, especially for picture windows and sliding glass doors that have a larger glass to frame ratio. Additionally, the low 0.25 SHGC could inhibit homeowners from replacing older inefficient windows, because the new 0.25 SHGC requirement would result in a mismatched appearance between the new replacement windows/doors and the rest of the windows.

Therefore, a shading credit is one way to provide flexibility for both new and replacement windows, while maintaining the overall solar control. This proposal is based on the same shading multipliers as in the commercial IECC, but simplified for easy enforcement in the residential code. Specifically, the shading allowance for south/east/west orientation is used to be conservative and account for the worst orientation, but written simply as an adjusted maximum SHGC that doesn't require determination of orientation by either the builder or code official. This is very conservative, requiring a 0.40 SHGC even for a 3 ft overhang over a 5 ft high window, providing good solar control while also allowing flexibility and promoting architectural shading.

Cost Impact: The code change proposal will not increase the cost of construction.

RE65-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.3.3 (NEW) -EC-CULP

RE66 – 13

R202 (NEW) (IRC N1101.9 (NEW)), R402.3.3 (NEW) (IRC N1102.3.3 (NEW)), Table R402.3.3 (NEW) (IRC Table N1102.3.3 (NEW))

Proponent: Don Surrena, CBO, representing National Association of Home Builders (NAHB) (dsurrena@nahb.org)

Add new text as follows:

R402.3.3 (IRC N1102.3.3) Glazed fenestration SHGC exception. In Climate Zones 1 through 4, permanently shaded vertical fenestration shall be permitted to satisfy the SHGC requirements. The projection factor of an overhang, eave, or permanently attached shading device shall be greater than or equal to the value listed in Table 402.3.3 for the appropriate orientation. The minimum projection shall extend beyond each side of the glazing a minimum of 12 inches (0.3 m). Each orientation shall be rounded to the nearest cardinal orientation (+/-45 degrees or 0.79 rad) for purposes of calculations and demonstrating compliance.

TABLE R402.3.3 (IRC N1102.3.3)
MINIMUM PROJECTION FACTOR REQUIRED BY ORIENTATION FOR SHGC EXCEPTION

<u>ORIENTATION</u>	<u>PROJECTION FACTOR</u>
<u>North</u>	$\geq 0.40^a$
<u>South</u>	≥ 0.20
<u>East</u>	≥ 0.50
<u>West</u>	≥ 0.50

a. For the north orientation, a vertical projection located on the west-edge of the fenestration with equivalent PF ≥ 0.15 shall also satisfy the minimum projection factor requirement.

Add new definition as follows:

IECC SECTION R202 (IRC N1101.9) **GENERAL DEFINITIONS**

PROJECTION FACTOR. The ratio of the horizontal depth of an overhang, eave, or permanently attached shading device, divided by the distance measured vertically from the bottom of the fenestration glazing to the underside of the overhang, eave, or permanently attached shading device.

Reason: The concept of using shading to reduce heat gain is integral to the architectural of some of the oldest world cultures. Shading in modern construction offers many possibilities. This proposed code change allows for the use of overhangs to meet the solar heat gain coefficient requirements within the IECC. Permanent exterior shading features, such as overhangs are allowed to be used in IECC Chapter 5 as a prescriptive trade-off to meeting SHGC requirements within the code. The calculation for determining the projection factor for overhangs has been in the 2000, 2003, 2006, and 2009 IECC for commercial buildings and has been proven to be very simple to calculate, fitting well into a prescriptive approach. The use of the shading devices was previously allowed under the 2003 IECC and is currently allowed as a trade-off under the commercial provisions of the IECC. Allowing flexibility in meeting the solar heat gain coefficient through the use of proven shading alternatives will increase the usability of the code for the building and design community while ensuring that the new fenestration is energy efficient. When credit for shading is permitted in the building code, it encourages an integrated approach to building designs, energy use, construction materials, renewable resources particularly as part of urban infrastructure, site and town planning and building design to be considered holistically. It also creates the opportunity for aesthetically pleasing and ingenious designs that might not otherwise be permitted.

Cost Impact: The code change proposal will not increase the cost of construction.

RE66-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.3.3 (NEW)-EC-SURRENA

RE67 – 13

R402.3.5 (NEW) (IRC N1102.3.5 (NEW))

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

Add new text as follows:

R402.3.5 (N1102.3.5) Energy Rating alternative. Fenestration with an energy rating (ER) of not less than 21 shall be considered in compliance with Table 402.1 for climate zones 6, 7 and 8. The ER shall be determined in accordance with Equation 4-g:

$$ER = (57.76 \times SHGC) - (124 \times U\text{-factor}) - (10 \times (\text{air infiltration rate})) + 40 \quad \text{Equation 4-g}$$

Fenestration U-factor, SHGC, and air infiltration rate shall be determined and labeled as specified in Sections R103.1.3 and R402.4.3. Fenestration complying under this alternative shall be labeled by the manufacturer designation of ER. Default values shall not be used to compute ER.

Reason: The ER (Energy Rating) measures a window's suitability for residential use in a heating climate. ER combines the effects of U-factor, SHGC, and air infiltration rate, which are all based on fenestration testing already specified in the IECC and IRC and should already be on the window's NFRC label. While a low SHGC (low solar heat gain coefficient) is advantageous for cooling (hence the code requirement for a low SHGC in the south), a higher SHGC is advantageous for heating. The ER is only appropriate to a heating-dominated climate; therefore the use of ER is limited to zones 6, 7, and 8.

Since the minimum required ER never varies with the residential design, this alternative way to show compliance is easy to enforce. A window with an ER of 25 or more complies, a window with an ER less than 25 fails.

The ER concept has been used in Canada for more than 10 years and is part of their Model National Energy Code For Houses. Although not needed as a reference, the proposed equation comes from the Canadian ER (in the most recent CSA 440.2 Standard). Using the ER in the United States would encourage window sales across the U.S./Canadian border.

Cost Impact: The code change proposal will not increase the cost of construction.

RE67-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.3.5 (NEW)-EC-CONNER

RE68 – 13

R402.3.5 (IRC N1102.3.5)

Proponent: Daniel J. Walker, P.E., Thomas Associates, Inc., representing the National Sunroom Association (dwalker@thomasamc.com)

Revise as follows:

R402.3.5 (N1102.3.5) Sunroom ~~U-factor~~ Fenestration. All *sunrooms* enclosing conditioned space shall meet the fenestration requirements of this code.

Exception: For *sunrooms* with *thermal isolation* and enclosing *conditioned space*, in ~~Climate Zones 4 through 8~~, the following exceptions to the fenestration requirements of this code shall apply:

1. In Climate Zones 2 through 8 the maximum fenestration *U-factor* shall be 0.45; and
- ~~2. the maximum skylight *U-factor* shall be 0.70.~~
2. In Climate Zones 1 through 3 the maximum SHGC shall be 0.30.

New fenestration separating the *sunroom* with *thermal isolation* from *conditioned space* shall meet the *building thermal envelope* requirements of this code.

Reason: The requirements for thermally isolated sunrooms was changed in the previous code cycle to relax the requirements in recognition of the lower energy consumption of these structures due to their occasional / seasonal use. The change proposed at this time would smooth the U-factor requirements since the previous change left the requirements discontinuous by requiring a lower U-factor in Climate Zones 2 and 3 than in the higher climate zones, which does not make sense. This change would set the U-factor requirements the same for all the climate zones where requirements exist, and would correct the discontinuity in the code between the requirements in Climate Zones 2, 3 and 4.

The proposal also seeks to set relaxed SHGC requirements for thermally isolated sunrooms in Climate Zones 1 through 3 because there is no practical way for the typically larger glazing used in sunrooms to meet the lower SHGC values prescribed by Table R402.1.1 unless very dark glass is used. Consumers purchase sunrooms to create a comfortable enclosed area that provides a view of the outdoors. Extremely dark glass is contrary to the very purpose of a sunroom.

Cost Impact: The proposed change would not increase the cost of construction.

RE68-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.3.5-EC-WALKER

RE69-13

R402.3.6 (N1102.3.6)

Proponent: Dr. Thomas D. Culp, Birch Point Consulting LLC, representing the Glazing Industry Code Committee (culp@birchpointconsulting.com)

Revise as follows:

R402.3.6 (N1102.3.6) Replacement fenestration. Where some or all of an existing fenestration unit is replaced with a new fenestration product, including sash and glazing, the replacement fenestration unit shall meet the applicable requirements for *U*-factor and SHGC in Table R402.1.1.

Exception: In Climate Zones 1-3, replacement of up to 75 square feet (7.0 m²) of vertical fenestration with a maximum SHGC of 0.35.

Reason: The 2012 IECC significantly lowered the SHGC requirement down to 0.25 in zones 1-3. This necessitates the use of different low-e coatings, tinted glass, or both. As a result, windows meeting the 2012 IECC will have a different appearance than previous windows. This may not be an issue for new construction where all the windows use the same glazing product, but one concern for replacement windows is that the 0.25 SHGC requirement could inhibit homeowners from replacing older inefficient windows, because the new 0.25 SHGC requirement would result in a mismatched appearance between the new replacement windows/doors and the rest of the windows.

Even with the newest low-e coatings (known as triple silver coatings), the visible light transmittance will still be approximately 8% lower than other low-e coatings, and equally important, the reflected light and color will be different. Furthermore, even with these coatings, it is borderline whether 0.25 SHGC can be achieved for certain products without the addition of tinted glass or a darker low-e, especially for picture windows and sliding glass doors that have a larger glass to frame ratio.

The California Energy Commission recognized this problem, and not wanting to discourage replacement of older less efficient windows, they created an allowance in the recently developed criteria for Title 24 that allows 0.35 SHGC for up to 75 ft² of vertical fenestration (Title 24-2013, Exception 1 to Section 150.2(b)1B). This is a limited exception that will allow the use of low-e coatings that better match existing windows and remove a barrier to window replacement, while still providing a low SHGC for energy efficient solar control.

Cost Impact: The code change proposal will lower the cost of construction.

RE69-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.3.6-EC-CULP

RE70 – 13

R402.3.6 (NEW) (IRC N1102.3.6 (NEW)), R402.2.13 (NEW) (IRC N1102.2.13 (NEW))

Proponents: Ellen Eggerton, representing Virginia Building and Code Officials Association; Harold A Stills, Jr., Hanover County, VA., representing Virginia Building and Code Officials Association (hastills@hanovercounty.gov)

Add new text as follows:

R402.3.6 (N1102.3.6) Thermally isolated garage door *R-value*. For Climate Zones 4 through 8, when the garage is conditioned, the minimum garage door *R-value* shall be 5.0. All other fenestration shall meet the *building thermal envelope* requirements.

R402.2.13 (N1102.2.13) Thermally isolated garage insulation. All garages shall be thermally isolated and meet ceiling and wall *R-values* as specified in Table R402.1.1. Existing slabs shall be exempt from insulation requirements.

Reason: Eggerton: The current IECC does not allow for the average garage to be conditioned because the average garage door cannot meet the 0.35 U-factor. In addition, it is very difficult to find a garage door that has been tested according to "NFRC 100" (R303.1.3). If one searches for doors at an average big-box home improvement store, it is not difficult to find an insulated garage door with an R-6 or greater R-value.

A garage is not considered "habitable space", but some activities, (such as automobile and household item repair) do occur there. These activities do not require the same level of comfort as the habitable areas of the dwelling, but a temperature other than the current outdoor temperature may be desirable. The average homeowner also realizes that it would not be efficient to maintain this space at the same temperature as the rest of the dwelling.

The last sentence of 402.2.13 recognizes that adding a heating or cooling mechanical system to an existing garage would be acceptable after adding the required insulation to the walls and ceiling, but impractical to add slab insulation. However, ice-melting systems are allowed.

Stills: The current IECC does not allow for the average garage to be conditioned because the average garage door cannot meet the 0.35 U-factor. In addition, it is very difficult to find a garage door that has been tested according to "NFRC 100" (R303.1.3). If one searches for doors at an average big-box home improvement store, it is not difficult to find an insulated garage door with an R-6 or greater R-value. However, ice-melting systems are allowed. A garage is not considered "habitable space", but some activities, (such as automobile and household item repair) do occur there. These activities do not require the same level of comfort as the habitable areas of the dwelling, but a temperature other than the current outdoor temperature may be desirable. The average homeowner also realizes that it would not be efficient to maintain this space at the same temperature as the rest of the dwelling. The last sentence of R402.2.13 recognizes that adding a mechanical system to an existing garage would be acceptable after adding the required insulation to the walls and ceiling, but impractical to add slab insulation.

Cost Impact: The code change proposal will not increase the cost of construction.

RE70-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.3.6 (NEW)-EC-EGGERTON-STILLS

RE71-13

R402.4 (IRC N1102.4), R402.4.1.1 (IRC N1102.4.1.1), R402.4.1.2 (IRC N1102.4.1.2), R402.4.1.3 (NEW) (IRC N1102.4.1.3 NEW), R403.2.2 (IRC N1103.2.2), R403.2.2.1 (NEW) (IRC N1103.2.2.1 NEW), R403.2.2.2 (NEW) (IRC N1103.2.2.2 NEW), R403.2.2.3 (NEW) (IRC N1103.2.2.3), Table 405.5.2(1) (IRC Table N1105.5.2(1))

Proponent: Dan Buuck, representing National Association of Home Builders (NAHB)
(dbuuck@nahb.org)

Revise as follows:

R402.4 (N1102.4) Air leakage (Mandatory). The building thermal envelope shall be constructed to limit air leakage in accordance with the requirements of Sections R402.4.1 through R402.4.4.

R402.4.1.1 (N1102.4.1.1) Installation (Mandatory). The components of the *building thermal envelope* as listed in Table R402.4.1.1 shall be installed in accordance with the manufacturer's instructions and the criteria listed in Table R402.4.1.1, as applicable to the method of construction. Where required by the *code official*, an *approved* third party shall inspect all components and verify compliance.

R402.4.1.2 (N1102.4.1.2) Testing (Mandatory). The building or dwelling unit shall be tested ~~and verified as having an air leakage rate of not exceeding 5 air changes per hour in Climate Zones 1 and 2, and 3 air changes per hour in Climate Zones 3 through 8 for air leakage.~~ Testing shall be conducted with a blower door at a pressure of 0.2 inches w.g. (50 Pascals). Where required by the *code official*, testing shall be conducted by an *approved* third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the *code official*. Testing shall be performed at any time after creation of all penetrations of the *building thermal envelope*. During testing:

1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed, beyond the intended weatherstripping or other infiltration control measures;
2. Dampers including exhaust, intake, makeup air, backdraft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures;
3. Interior doors, if installed at the time of the test, shall be open;
4. Exterior doors for continuous ventilation systems and heat r, ecovery ventilators shall be closed and sealed;
5. Heating and cooling systems, if installed at the time of the test, shall be turned off; and
6. Supply and return registers, if installed at the time of the test, shall be fully open.

R402.4.1.3 (N1102.4.1.3) Leakage rate (Prescriptive). The building or dwelling unit shall have an air leakage rate not exceeding 5 air changes per hour in Climate Zones 1 and 2, and 3 air changes per hour in Climate Zones 3 through 8, when tested in accordance with Section R402.4.1.2.

R403.2.2 (N1103.2.2) Sealing (Mandatory). ~~Ducts, air handlers, and filter boxes shall be sealed. Joints and seams shall comply with either the International Mechanical Code or International Residential Code, as applicable.~~

Exceptions:

- ~~1. Air impermeable spray foam products shall be permitted to be applied without additional joint seals.~~
- ~~2. Where a duct connection is made that is partially inaccessible, three screws or rivets shall be equally spaced on the exposed portion of the joint so as to prevent a hinge effect.~~
- ~~3. Continuously welded and locking-type longitudinal joints and seams in ducts operating at static pressures less than 2 inches of water column (500 Pa) pressure classification shall not require additional closure systems.~~

~~Duct tightness shall be verified by either of the following:~~

- ~~1. Postconstruction test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.~~
- ~~2. Rough-in test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area when tested at a pressure differential of 0.4 inches w.g. (25 Pa) across the system, including the manufacturer's air handler enclosure. All registers shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 3 cfm (85 L/min) per 100 square feet (9.29 m²) of conditioned floor area.~~

~~**Exception:** The total leakage test is not required for ducts and air handlers located entirely within the building thermal envelope.~~

R403.2.2.1 (N1103.2.2.1) Construction (Mandatory). Ducts, air handlers, and filter boxes shall be sealed. Joints and seams shall comply with either the International Mechanical Code or International Residential Code, as applicable.

Exceptions:

1. Air-impermeable spray foam products shall be permitted to be applied without additional joint seals.
2. Where a duct connection is made that is partially inaccessible, three screws or rivets shall be equally spaced on the exposed portion of the joint so as to prevent a hinge effect.
3. Continuously welded and locking-type longitudinal joints and seams in ducts operating at static pressures less than 2 inches of water column (500 Pa) pressure classification shall not require additional closure systems.

R403.2.2.2 (N1103.2.2.2) Duct testing (Mandatory). Ducts shall be pressure tested for air leakage by either of the following methods:

1. Postconstruction test: Total leakage shall be measured when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.
2. Rough-in test: Total leakage shall be measured when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the system, including the manufacturer's air handler enclosure if present at the time of the test. All registers shall be taped or otherwise sealed during the test.

Exception: The total leakage test is not required for ducts and air handlers located entirely within the building thermal envelope.

A written report of the results of the test shall be signed by the party conducting the test and provided to the code official.

R403.2.2.3 (N1103.2.2.3) Duct leakage (Prescriptive). Total leakage of the ducts, when measured in accordance with Section R403.2.2.2, shall be as follows:

1. Postconstruction test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area.
2. Rough-in test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area if the air handler is present at the time of the test, or 3 cfm

(85 L/min) per 100 square feet (9.29 m²) of conditioned floor area if the air handler is not present at the time of the test.

Exception: No maximum duct leakage rate is required when ducts and air handlers are located entirely within the building thermal envelope.

TABLE R405.5.2(1) (N1105.5.2(1))
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Glazing ^a	<p>Total area^b =</p> <p>(a) The proposed glazing area; where proposed glazing area is less than 15% of the conditioned floor area.</p> <p>(b) 15% of the conditioned floor area; where the proposed glazing area is 15% or more of the conditioned floor area.</p> <p>Orientation: equally distributed to four cardinal compass orientations (N, E, S, & W)</p> <p>U-factor: from Table R402.1.3</p> <p>SHGC: From Table R402.1.1 except that for climates with no requirement (NR) SHGC = 0.40 shall be used.</p> <p>Interior shade fraction: 0.92-(0.21 × SHGC for the standard reference design)</p> <p>External shading: none</p>	<p>As proposed</p> <p>As proposed</p> <p>As proposed</p> <p>As proposed</p> <p>0.92-(0.21 × SHGC as proposed)</p> <p>As proposed</p>
Heating systems ^{f, g}	<p>As proposed for other than electric heating without a heat pump. Where the proposed design utilizes electric heating without a heat pump the standard reference design shall be an air source heat pump meeting the requirements of Section R403 of the IECC Commercial Provisions.</p> <p><u>Fuel type: same as proposed design</u></p> <p><u>Efficiencies:</u></p> <p><u>Electric: air-source heat pump with prevailing federal minimum standards</u></p> <p><u>Nonelectric furnaces: natural gas furnace with prevailing federal minimum standards</u></p> <p><u>Nonelectric boilers: natural gas boiler with prevailing federal minimum standards</u></p> <p>Capacity: sized in accordance with Section R403.6</p>	<p>As proposed</p> <p><u>As proposed</u></p> <p><u>As proposed</u></p> <p><u>As proposed</u></p> <p><u>As proposed</u></p>
Cooling systems ^{f, h}	<p>As proposed</p> <p>Fuel type: Electric</p> <p>Efficiency: in accordance with prevailing federal minimum standards</p> <p>Capacity: sized in accordance with Section R403.6</p>	<p>As proposed</p> <p><u>As proposed</u></p>

Service Water Heating ^{f,g,h,i}	<u>As proposed</u> <u>Fuel type: same as proposed design</u> <u>Efficiency: in accordance with prevailing federal minimum standards</u> <u>Use: gal/day = 30 + 10 × Nbr</u> <u>Tank temperature: 120°F</u> <u>Use: same as proposed design</u>	<u>As proposed</u> <u>As proposed</u> <u>Same as standard reference</u> <u>Same as standard reference</u> <u>gal/day = 30 + (10 × Nbr)</u>
Thermal distribution systems	<u>Untested distribution systems: DSE = 0.88</u> <u>Tested Ducts: Leakage rate to outside conditioned space as specified Section R403.2.2(1)</u> <u>Duct Location: Unconditioned attic</u> <u>Duct Insulation: Per Section R403.2.1</u>	Thermal distribution system efficiency shall be as tested or as specified in Table R405.5.2(2) if not tested. Duct insulation shall be as proposed. <u>Untested distribution systems: DSE from Table R405.5.2(2)</u> <u>Tested Ducts: Tested Leakage rate to outside conditioned space</u> <u>Duct Location: As proposed</u> <u>Duct Insulation: As proposed</u>

(Portions of Table not shown remain unchanged)

Reason: This amendment is a comprehensive proposal which provides flexibility for meeting the energy code requirements while maintaining the energy performance. It will provide a "true" unrestricted performance path that will allow for cost optimized construction of an energy equivalent house. The proposed changes provide alternatives that encourage innovation and the use of materials and equipment which will result in a home which is at least equivalent of that prescribed in the energy code.

The modifications will reinstate many of the changes made since the 2006 IECC which restricted the flexibility of the builder/designer to construct an energy efficient code compliant home while still meeting the energy performance levels of the current code.

Items included in this proposal:

- Energy neutral building tightness trade-offs
- Energy neutral duct tightness trade-offs
- Credit for more energy efficient buildings which incorporate reduced window area
- Energy neutral heating, cooling and water heating equipment efficiency trade-offs

Currently all homes have a mandatory requirement to be equal to or tighter than 3ACH50 or 5ACH50, depending on climate zone. Proposed changes will allow for homes to be less tight provided other efficiency changes are made to the house which offset energy lost due to the change in air infiltration.

Duct tightness requirements are similar to that of the entire building where all ducts must be equal to or tighter than 4 CFM25/100 CFA. Changes in this proposal will also allow for energy neutral tradeoffs for duct tightness.

Currently, when conducting a performance analysis, a building glazing area greater than 15% of the conditioned floor area (CFA) is penalized for using more energy. However, a building with less than 15% window to CFA does not get credit for saving energy. This proposal allows the builder/designer to optimize window area that is both energy efficient and pleasing to the consumer.

Cost Impact: The code change proposal will not increase the cost of construction.

RE71-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R402.4-EC-BUUCK

RE72 – 13

R402.4 (IRC N1102.4), R402.4.1.1 (IRC N1102.4.1.1), R402.4.1.2 (IRC N1102.4.1.2), R402.4.1.3 (NEW) (IRC N1102.4.1.3 (NEW))

Proponents: Craig Conner, Building Quality, representing self (craig.conner@mac.com); Don Surrena, CBO, representing National Association of Home Builders (NAHB) (dsurrena@nahb.org)

Revise as follows:

R402.4 (N1102.4) Air leakage (Mandatory). The building thermal envelope shall be constructed to limit air leakage in accordance with the requirements of Sections R402.4.1 through R402.4.4.

R402.4.1.1 (N1102.4.1.1) Installation (Mandatory). The components of the *building thermal envelope* as listed in Table R402.4.1.1 shall be installed in accordance with the manufacturer's instructions and the criteria listed in Table R402.4.1.1, as applicable to the method of construction. Where required by the *code official*, an *approved* third party shall inspect all components and verify compliance.

R402.4.1.2 (N1102.4.1.2) Testing (Mandatory). The building or dwelling unit shall be tested ~~and verified as having an air leakage rate of not exceeding 5 air changes per hour in Climate Zones 1 and 2, and 3 air changes per hour in Climate Zones 3 through 8 for air leakage.~~ Testing shall be conducted with a blower door at a pressure of 0.2 inches w.g. (50 Pascals). Where required by the *code official*, testing shall be conducted by an *approved* third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the *code official*. Testing shall be performed at any time after creation of all penetrations of the *building thermal envelope*. During testing:

1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed, beyond the intended weatherstripping or other infiltration control measures;
2. Dampers including exhaust, intake, makeup air, backdraft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures;
3. Interior doors, if installed at the time of the test, shall be open;
4. Exterior doors for continuous ventilation systems and heat recovery ventilators shall be closed and sealed;
5. Heating and cooling systems, if installed at the time of the test, shall be turned off; and
6. Supply and return registers, if installed at the time of the test, shall be fully open.

R402.4.1.3 (N1102.4.1.3) Leakage rate (Prescriptive). The building or dwelling unit shall have an air leakage rate not exceeding 5 air changes per hour in Climate Zones 1 and 2, and 3 air changes per hour in Climate Zones 3 through 8, when tested in accordance with Section R402.4.1.2.

Reason: Conner: This is exactly the online draft DOE posted. It makes the duct tightness tradable. DOE's posted reason statement said it well:

"Changing the envelope air leakage rate from mandatory to prescriptive will allow builders the option of trading improvements in other building components for less stringent pressure test results. This provides flexibility in meeting the requirements and options for recovering from an unexpected test failure. The proposed change retains a mandatory pressure test and leaves all other aspects of envelope sealing mandatory."

Surrena: These modifications remove the mandatory maximum air tightness requirement and provide designers and builders the flexibility to trade-off building tightness with other performance path measures when using the performance path. Currently the building tightness requirement is mandatory and the 3 and 5 ACH tightness levels even under ideal circumstances, are very difficult to achieve. This will provide energy neutral trade-offs for expensive and sometimes unattainable requirements with other building improvements. This proposal does not change the stringency of the code it only increases the flexibility.

Cost Impact: The code change proposal will not increase the cost of construction.

RE72-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.4-EC-CONNER-SURRENA

RE73 – 13

R402.4 (IRC N1102.4), R402.4.1 (IRC N1102.4.1), R402.4.1.1 (IRC N1102.4.1.1), R402.4.1.2 (IRC N1102.4.1.2), R402.4.1.3 (NEW) (IRC N1102.4.1.3 (NEW)), R402.4.2 (IRC N1102.4.2), R402.4.3 (IRC N1102.4.3), R402.4.4 (IRC N1102.4.4)

Proponent: Brian Dean, Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition

Revise as follows:

R402.4 (N1102.4) Air leakage (Mandatory). The building thermal envelope shall be constructed to limit air leakage in accordance with the requirements of Sections R402.4.1 through R402.4.4.

R402.4.1 (N1102.4.1) Building thermal envelope. The *building thermal envelope* shall comply with Sections R402.4.1.1 and R402.4.1.2 through R402.4.1.3. ~~The sealing methods between dissimilar materials shall allow for differential expansion and contraction.~~

R402.4.1.1 (N1102.4.1.1) Installation (Mandatory). The components of the *building thermal envelope* as listed in Table R402.4.1.1 shall be installed in accordance with the manufacturer's instructions and the criteria listed in Table R402.4.1.1, as applicable to the method of construction. The sealing methods between dissimilar materials shall allow for differential expansion and contraction. Where required by the *code official*, an *approved* third party shall inspect all components and verify compliance.

R402.4.1.2 (N1102.4.1.2) Testing (Mandatory). The building or dwelling unit shall be tested for air leakage and verified as having an air leakage rate of not exceeding 5 air changes per hour in Climate Zones 1 and 2, and 3 air changes per hour in Climate Zones 3 through 8. Testing shall be conducted with a blower door at a pressure of 0.2 inches w.g. (50 Pascals). ~~Where required by the code official, testing shall be conducted by an approved third party.~~ A written report of the results of the test shall be signed by the party conducting the test and provided to the *code official*. Testing shall be performed at any time after creation of all penetrations of the *building thermal envelope*.

During testing:

1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed, beyond the intended weatherstripping or other infiltration control measures;
2. Dampers including exhaust, intake, makeup air, backdraft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures;
3. Interior doors, if installed at the time of the test, shall be open;
4. Exterior doors for continuous ventilation systems and heat recovery ventilators shall be closed and sealed;
5. Heating and cooling systems, if installed at the time of the test, shall be turned off; and
6. Supply and return registers, if installed at the time of the test, shall be fully open.

R402.4.1.3 (N1102.4.1.3) Leakage rate (Prescriptive). The building or dwelling unit shall have an air leakage rate that does not exceed 5 air changes per hour in Climate Zones 1 and 2, and 3 air changes per hour in Climate Zones 3 through 8, when tested in accordance with Section R402.4.1.2.

R402.4.2 (N1102.4.2) Fireplaces (Mandatory). New wood-burning fireplaces shall have tight-fitting flue dampers and outdoor combustion air.

R402.4.3 (N1102.4.3) Fenestration air leakage (Mandatory). Windows, skylights and sliding glass doors shall have an air infiltration rate of no more than 0.3 cfm per square foot (1.5 L/s/m²), and swinging doors no more than 0.5 cfm per square foot (2.6 L/s/m²), when tested according to NFRC 400 or

AAMA/WDMA/CSA 101/I.S.2/A440 by an accredited, independent laboratory and *listed* and *labeled* by the manufacturer.

Exception: Site-built windows, skylights and doors.

R402.4.4 (N1102.4.4.) Recessed lighting (Mandatory). Recessed luminaires installed in the *building thermal envelope* shall be sealed to limit air leakage between conditioned and unconditioned spaces. All recessed luminaires shall be IC-rated and *labeled* as having an air leakage rate not more than 2.0 cfm (0.944 L/s) when tested in accordance with ASTM E 283 at a 1.57 psf (75 pa) pressure differential. All recessed luminaires shall be sealed with a gasket or caulk between the housing and the interior wall or ceiling covering.

Reason: The purpose of this code change is to clarify the code language related to air leakage, modify certain requirements, including changing a mandatory air leakage value to prescriptive and to require all necessary testing to be done by an approved third party. By changing the allowable tested air leakage rate from “mandatory” to “prescriptive,” this proposal would allow air leakage to be part of the tradeoff calculation under section R405 performance trade-offs. The result will maintain energy efficiency, while providing increased flexibility to the builder and an alternative path for cases in which a building fails the air leakage test or where achieving a low air leakage rate would be too difficult. This is an important consideration where the on-site testing requirement is already set at a tight level.

This proposal also adds objectivity and transparency by requiring that all required air leakage testing be administered by a code-official-approved third party. This proposal also reorganizes Section R402.4 to add clarity and simplicity to the code. However, it should be noted that this proposal does not change or tighten required values for tested air leakage, which were initially set in the 2012 *IECC*.

Cost Impact: The code change proposal will increase the cost of construction.

RE73-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.4-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE

RE74 – 13

R402.4 (IRC N1102.4)

Proponent: Eric Makela, Britt/Makela Group, Inc., representing Northwest Energy Codes Group (Eric@BrittMakela.com)

Revise as follows:

R402.4 (N1102.4) Air Leakage (Mandatory). The building thermal envelope shall be constructed to limit air leakage in accordance with the requirements of Sections R402.4.1 through R402.4.4. The building design shall not create conditions of accelerated deterioration from moisture condensation.

Reason: The 2006 IECC Section 502.1.1 Moisture Control provided language that states that “the design shall not create conditions of accelerated deterioration from moisture condensation”. This language was removed from the code in as part of the development of the residential provisions of the 2006 IECC when the requirements for vapor retarders were moved to the International Residential Code. This language was not moved with the vapor retarder language to the detriment of portions of the building. The removal of this language has created problems in cold climates including condensation on rim joists. Air permeable insulation installed in rim joists allows warm air movement through the insulation which can then condense when coming in contact with the cold rim joist causing mold to grow. Adding back in the language “The building design shall not create conditions of accelerated deterioration from moisture condensation” will allow the code official to require air impermeable insulation to insulate the rim joists if a potential problem is identified. Water damage and mold are common occurrences in colder climates where batt insulation is allowed to be installed on rim joists and the band joist is used as the air barrier on the exterior of the wall. Because moisture condensation is a direct result of this type of installation it is important to bring the language back into the code in order to mitigate the problem.

Cost Impact: The code change proposal will not increase the cost of construction.

RE74-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.4-EC-MAKELA

RE75 – 13

R402.4 (IRC N1102.4)

Proponent: Don Surrena, CBO, representing National Association of Home Builders (NAHB)
(dsurrena@nahb.org)

Revise as follows:

R402.4 (N1102.4) Air leakage (Mandatory). The building thermal envelope shall be constructed to limit air leakage in accordance with the requirements of Section R402.4.1 through R402.4.4.

Exception: Dwelling units of R-2 Occupancies shall be permitted to comply with Section C402.4

Reason: Air tightness testing for single family homes is very straightforward; however, it is much more difficult to accurately test multi-family buildings. Currently the code treats low-rise multi-family buildings, which are 3 stories or less, like single family homes and multi-family buildings of 4 stories or more like commercial buildings. Regardless of height, all multi-family buildings have the same air tightness testing complications, such as: Does the entire building need to be tested at one time? What about multi-family buildings with open corridors? Does every dwelling need to be tested? Can the leakages be averaged between units? Is the leakage tested only to the "outside" or should it include leakage to adjacent units?

By approving this change, low-rise multi-family buildings will avoid these complications, but yet will still held to the same level of performance as high rise (R-2) residential building as well as all commercial buildings.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis. This exception will not appear in Chapter 11 of the IRC, since it is not applicable to the IRC.

RE75-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.4 #1-EC-SURRENA

RE76 – 13

R402.2 (IRC N1102.2), R402.2.1 (NEW) (IRC N1102.2.1 (NEW)), Table R402.4.1.1 (NEW) (IRC Table N1102.4.1.1 (NEW))

Proponent: Proponent: Eric Makela, Britt/Makela Group, Inc., representing Northwest Energy Codes Group (Eric@BrittMakela.com); Jim Meyers, Southwest Energy Efficiency Partnership; Robby Schwarz, Energy Logic

Revise as follows:

R402.2 (N1102.2) Specific insulation requirements (Prescriptive). In addition to the requirements of Section R402.1, insulation shall meet the specific requirements of Sections R402.2.1 through R402.2.12. Insulation shall also be installed in accordance with Table R402.4.1.1.

R402.2.1 (N1102.2.1) Insulation installation requirements (Mandatory). Insulation shall be installed in accordance with Table R402.4.1.1.

Delete Table R402.4.1.1 in its entirety and replace with new Table R402.4.1.1

TABLE R402.4.1.1 (N1102.4.1.1)
AIR BARRIER AND INSULATION INSTALLATION

COMPONENT	AIR BARRIER CRITERIA^a	INSULATION INSTALLATION CRITERIA
<u>General Requirements</u>	<p><u>A continuous air barrier shall be installed in the buildings thermal envelope and be in alignment with the insulation.</u></p> <p><u>Air permeable cavity insulation shall be installed in a six sided assembly.</u></p> <p><u>Breaks or joints in the air barrier shall be sealed with an air impermeable material to ensure that the air barrier system is impermeable to air movement.</u></p> <p><u>Air barriers shall be constructed and mechanically fastened to framing and sealed at edges, gaps, or voids with air sealing materials that are appropriate to the construction materials being sealed.</u></p>	<p><u>Air-permeable insulation shall not be used as a sealing material.</u></p> <p><u>Exterior thermal envelope insulation for framed walls and floors is installed in substantial contact and continuous alignment with building envelopes interior air barrier.</u></p>
<u>Ceiling / attic</u>	<p><u>The air barrier in any dropped ceiling/soffit shall be aligned with the insulation and any gaps in the air barrier shall be sealed.</u></p> <p><u>Access openings, drop down stair or knee wall doors to unconditioned attic spaces shall be sealed.</u></p> <p><u>An air barrier at the drywall conditioned space and a ventilated attic is required</u></p>	<p><u>In any insulated ceiling or dropped ceiling/soffit, the insulation is substantially aligned with the air barrier.</u></p>
<u>Walls</u>	<p><u>The junction of the foundation and sill plate shall be sealed.</u></p> <p><u>The drywall junction at the top plate of interior and exterior walls separating conditioned space from ventilated attic space shall be sealed.</u></p> <p><u>Wall cavity insulation, including knee walls adjacent to attics, shall be encapsulated on</u></p>	<p><u>Corners, headers, and interior wall intersections shall be insulated to a minimum of R-5.</u></p> <p><u>The insulation shall be installed according to manufacturer's instructions and/or industry standards which requires that the insulation material uniformly fills each cavity side-to-side, top-to-bottom, and without substantial gaps or voids.</u></p>

<u>COMPONENT</u>	<u>AIR BARRIER CRITERIA^a</u>	<u>INSULATION INSTALLATION CRITERIA</u>
	<p><u>six sides by an interior and exterior air barrier system</u></p> <p><u>The junction of the bottom plate of the exterior wall and floor sheathing shall be sealed.</u></p>	<p><u>No exterior sheathing shall be visible from the building interior through gaps in the cavity insulation material.</u></p> <p><u>Wall and floor cavity insulation shall be enclosed on all six sides, and shall be in substantial contact with the sheathing material of the surface it is intended to insulate.</u></p> <p><u>For exterior applications of rigid insulation, insulation shall be in firm contact with the structural sheathing materials, and tightly fitted and sealed at joints.</u></p> <p><u>Faced batt insulation shall be surface stapled or inset stapled as long as inset stapled tabs are stapled neatly (no buckling), and provided the batt is only compressed at the edges of each cavity, to the depth of the tab itself.</u></p> <p><u>For sprayed or blown-in fibrous products, density shall be installed to the proper density to achieve the required R-value of the cavity it is installed in.</u></p>
<u>Windows, skylights and doors</u>	<u>The space between window/door jambs and framing and skylights and framing shall be sealed.</u>	<u>Comply with narrow cavity requirements</u>
<u>Rim joists</u>	<u>The rim or band joists shall be sealed at all edges, cracks, and gaps and must have an exterior air barrier</u>	
<u>Floors (including above garage and cantilevered floors)</u>	<p><u>Floors shall encapsulate the cavity insulation on six sides by an interior and exterior air barrier system.</u></p> <p><u>The air barrier shall be sealed at all exposed edge/sides including connections between the house floor system and the floor system above unconditioned space.</u></p>	<p><u>Floor insulation shall be held in permanent contact with the underside of the subfloor decking and shall not be overly compressed by components that are used to hold it in place so that R-value is lost.</u></p> <p><u>Where an obstruction such as a duct or piping is installed in the floor cavity the insulation shall continue to be held in permanent contact with the underside of the subfloor decking, shall encapsulate the obstruction, and a minimum of an R- 19 shall be installed below the obstruction.</u></p>
<u>Crawl space walls</u>	<u>Exposed earth in unvented crawl spaces shall be covered with a Class I vapor retarder with overlapping joints sealed and edges sealed to the foundation walls and footings.</u>	<p><u>Where provided in lieu of floor insulation, insulation shall be permanently attached to the crawlspace walls and extend from the vapor barrier covering the dirt floor to the sill attached to the top of the foundation.</u></p> <p><u>Where the floor system between the house and the crawl space is insulated it must conform with the floor insulation requirement described above.</u></p>
<u>Shafts, penetrations</u>	<u>Duct shafts, utility penetrations, wiring penetrations, plumbing penetrations, gas line penetrations, and flue shafts or other similar penetrations through the building envelope shall be sealed.</u>	<u>Insulation shall not extend through draft-stopping or fire-stopping openings. Use caulking rated for the application</u>
<u>Narrow cavities</u>	<u>Cavities too small to insulate, shall be sealed with an air barrier material.</u>	<u>Batts in narrow cavities shall be cut to fit, or narrow cavities shall be filled by insulation that on installation readily conforms to the available cavity space.</u>

<u>COMPONENT</u>	<u>AIR BARRIER CRITERIA^a</u>	<u>INSULATION INSTALLATION CRITERIA</u>
<u>Garage separation</u>	<u>Air sealing shall be provided between the garage and conditioned spaces.</u>	
<u>Recessed lighting</u>	<u>Recessed light fixtures installed in the building thermal envelope shall be air tight and sealed to the drywall.</u>	<u>Recessed light fixtures installed in the building thermal envelope shall be air tight, IC rated.</u>
<u>Plumbing and wiring</u>	<u>All plumbing, ductwork and wiring air barrier penetrations shall be sealed.</u>	<u>Batt insulation shall be cut neatly to fit around obstructions (such as blocking or bridging), and split, installed, and/or fitted tightly around wiring, plumbing, ducting, and other services in the cavity, or insulation that on installation readily conforms to available space shall encapsulate any obstruction in the cavity.</u>
<u>Shower / tub on exterior wall</u>	<u>Exterior walls adjacent to shower stalls, shower pans, and tubs shall have an air barrier installed separating conditioned space and exterior wall insulation.</u> <u>Tub and shower drain trap penetrations through the subfloor shall be sealed with an air barrier material.</u>	<u>Exterior walls adjacent to showers and tubs shall be insulated.</u>
<u>Electrical / phone box on exterior walls</u>	<u>Electrical, communication, or other boxes located in exterior walls, ceilings, or floors shall be air tight boxes or shall be made to be air tight using air barrier material's</u> <u>Bath fan housing adjacent to and or installed in unconditioned spaces shall be sealed to the drywall and made air tight.</u>	<u>Insulation completely fills voids between the box and exterior sheathing</u>
<u>HVAC register boots</u>	<u>HVAC register boots that penetrate building thermal envelope shall be sealed to the subfloor or drywall.</u>	
<u>Fireplace</u>	<u>Exterior walls adjacent to fireplace enclosures shall have an air barrier installed encapsulating and separating interior conditioned space and exterior wall insulation.</u> <u>Fireplaces shall have tight fitting doors</u>	<u>Exterior walls adjacent to fireplaces shall be insulated.</u>

a. In addition, inspection of log walls shall be in accordance with the provisions of ICC-400.

Reason: Manufacturer instructions, best building practices, DOE's Building America program, Building Energy Code Programs, and other building educators all propose installing products and materials with best building practices and according to manufacturer instructions. However few go further than the code book to learn what best practices and manufactured instructions are. The intent of this new language is to clearly define air barrier and insulation requirements and installation practices that will lead to houses that can easily meet the air leakage standards of the energy code and ensure the performance of the stalled insulation materials.

The 2012 IECC also requires that insulation be installed correctly in order to comply with the air barrier requirements of the IECC. While it is important to install insulation correctly, this type of provision should not be linked to air sealing the house. This proposal provides two distinct sections to the table focused on either air sealing or insulation installation. It also provides a reference in the prescriptive requirements for insulation installation to the table.

Field experience shows that some trades continue to seal holes in the buildings enclosure with air permeable insulation, which is not best building practice does not meet manufacturers' intents for the use of their products.

When the 2009 IECC was released many code officials were introduced to the importance of air barriers and are still struggling to understand where and how an air barrier is integral to the building enclosure. This new language will better prepare trades, builders, and code officials with how and where air barriers should be installed. The quality of the installation and enforcement should increase due to greater clarity and specificity.

The 2009 and 2012 IECC do not require a minimum level of insulation for corners and headers. The new requirement specifies a minimum insulation value and also includes interior wall intersections that also reduce the possibility for full wall insulation in these areas of the building.

Field practice has found kneewalls that are not enclosed on the exterior (attic) vertical plane exhibit more air infiltration and provide the opportunity for insulation to fall away from kneewalls over time reducing the efficiency of the overall building.

Other field practices observed by raters include excessive compression of tabbed insulation batts when stapling the tabs to the side of the stud. This reduces insulation values and does not comply with manufacturer instructions. By adding this language to the table, insulation trades and others who install insulation will have a simplified description for installing batts and inset stapling.

Cost Impact: The code change proposal will not increase the cost of construction.

RE76-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.2-EC-MAKELA-MEYERS-SCHWARZ

RE77 – 13

Table R402.4.1.1 (IRC Table N1102.4.1.1)

Proponent: Brian Dean, Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition

Revise as follows:

TABLE R402.4.1.1 (N1102.4.1.1)
AIR BARRIER AND INSULATION INSTALLATION INSPECTION

COMPONENT	CRITERIA ^a	<u>AIR BARRIER</u> <u>CRITERIA^a</u>	<u>INSULATION</u> <u>INSTALLATION</u> <u>CRITERIA^a</u>
<u>General Requirements-Air barrier and thermal barrier</u>	A continuous air barrier shall be installed in the building envelope. Exterior thermal envelope contains continuous air barrier. Breaks or joints in the air barrier are sealed. Air-permeable insulation shall not be used as a sealing material.	A continuous air barrier shall be installed in the <u>building thermal envelope</u> . <u>Breaks or joints in the air barrier are sealed.</u> <u>Air-permeable insulation shall not be used as a sealing material.</u>	<u>Exterior thermal envelope insulation for framed wall shall be installed in substantial contact and continuous alignment with building envelope air barrier.</u>
Ceiling / attic	The air barrier in any dropped ceiling / soffit shall be aligned with the insulation and any gaps in the air barrier are sealed. Access openings, drop down stair or knee wall doors to unconditioned attic spaces shall be sealed.	<u>Air barrier in any dropped ceiling / soffit shall be substantially aligned with insulation and any gaps shall be sealed.</u> <u>Attic access, knee wall door or drop down stair to unconditioned attic shall be sealed.</u>	<u>In any dropped ceiling/soffit, the insulation shall be substantially aligned with the air barrier.</u>
<u>Walls and Kneewalls</u>	Corners and headers shall be insulated and the junction of the foundation and sill plate shall be sealed. The junction of the top plate and top of exterior walls shall be sealed. Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier. Knee wall shall be sealed	<u>Junction of foundation and sill plate shall be sealed.</u> <u>Junction of exterior wall and top plate shall be sealed.</u>	<u>Corners and headers shall be insulated.</u> <u>Insulation shall be in substantial contact and continuous alignment with air barrier.</u>
<u>Fenestration Windows, skylights and</u>	The space between window/door jambs and framing and skylights and	<u>Space between fenestration jambs and framing shall be sealed.</u>	

doors	framing shall be sealed		
Rim joists	Rim joists shall be insulated and include the air barrier	<u>Air barrier shall be installed at the rim joist.</u>	<u>Rim joists shall be insulated.</u>
Floors (including above-garage and cantilevered floors)	Insulation shall be installed to maintain permanent contact with underside of subfloor decking. The air barrier shall be installed at any exposed edge of insulation.	<u>Air barrier shall be installed at any exposed edge of insulation.</u>	<u>Insulation shall be installed in accordance with section R402.2.</u>
Crawl space walls	Where provided in lieu of floor insulation, insulation shall be permanently attached to the crawlspace walls. Exposed earth in unvented crawl spaces shall be covered with a Class I vapor retarder with overlapping joints taped.	<u>Exposed earth in unvented crawlspaces shall be covered with Class I vapor retarder with overlapping joints taped.</u>	<u>Insulation shall be permanently attached to walls.</u>
Shafts, penetrations	Duct shafts, utility penetrations, and flue shafts opening to exterior or unconditioned space shall be sealed.	<u>Duct shafts, utility penetrations, knee walls, and flue shafts opening to exterior or unconditioned space shall be sealed.</u>	
Narrow cavities	Batts in narrow cavities shall be cut to fit, or narrow cavities shall be filled by insulation that on installation readily conforms to the available cavity space.	<u>Air sealing shall be provided in narrow cavities.</u>	<u>Insulation in narrow cavities shall be cut to fit, or shall readily conform to the available cavity space upon installation.</u>
Garage separation	Air sealing shall be provided between the garage and conditioned spaces.	<u>Air sealing shall be provided between the garage and conditioned spaces.</u>	
Recessed lighting	Recessed light fixtures installed in the building thermal envelope shall be airtight, IC rated, and sealed to the drywall.	<u>Recessed light fixtures installed in the building thermal envelope shall be airtight, IC rated, and sealed to drywall.</u>	
Plumbing and wiring	Batt insulation shall be cut neatly to fit around wiring and plumbing in exterior walls, or insulation that on installation readily conforms to available space shall extend behind piping and wiring.	<u>All plumbing and wiring penetrations shall be sealed to the air barrier.</u>	<u>Cavity insulation shall be installed to fit closely around wiring and plumbing in exterior walls, or shall readily conform to the available space around piping</u>

			<u>and wiring.</u>
Shower / tub on exterior wall	Exterior walls adjacent to showers and tubs shall be insulated and the air barrier installed separating them from the showers and tubs.	<u>Exterior walls adjacent to showers and tubs shall have an air barrier separating the exterior wall from the shower and tubs.</u>	<u>Exterior walls adjacent to showers and tubs shall have insulation filling gaps or voids between tub or shower walls and unconditioned space.</u>
Exterior Electrical / phone boxes on exterior walls	The air barrier shall be installed behind electrical or communication boxes or air sealed boxes shall be installed.	<u>Air barrier shall be installed behind boxes or air sealed boxes shall be installed.</u>	<u>Insulation shall fill voids around and behind the box.</u>
HVAC register boots	HVAC register boots that penetrate building thermal envelope shall be sealed to the subfloor or drywall.	<u>HVAC register boots that penetrate building envelope shall be sealed to subfloor or drywall.</u>	
Fireplace	An air barrier shall be installed on fireplace walls. Fireplaces shall have gasketed doors.	<u>Air barrier shall be installed on fireplace walls.</u> <u>Fireplaces shall have gasketed doors.</u>	

- a. In addition to meeting the air barrier criteria and the insulation installation criteria in this Table, inspection of log walls shall be in accordance with the provisions of ICC-400.

Reason: The purpose of this code change is to clarify and enhance compliance with and enforcement of the codes by organizing air barrier and insulation installation requirements into two separate checklists in the table. The proposal also updates and improves the language in the table to add clarity and to ensure that crucial elements of the thermal envelope are effectively sealed, installed and verified.

The proper installation of insulation and reasonable control of air leakage are both critical to achieving energy savings in homes. Although every building or dwelling unit is currently required to be tested for air leakage, a better-organized and more specific enumeration of key insulation and sealing requirements will lead to tighter, better-insulated, more energy efficient homes. The two columns are largely based on current insulation installation requirements and air barrier criteria in the 2012 IECC. We expect that as technology advances, and as building and inspection practices improve, this list will be updated. The reorganization of the requirements as presented above will facilitate that regular improvement in future code editions.

Cost Impact: The code change proposal will not increase the cost of construction.

RE77-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R402.4.1.1T #1-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE

RE78 – 13

Table R402.4.1.1 (IRC Table N1102.4.1.1)

Proponent: Michael Schmeida, Divisional Manager-Sustainability and Government/Regulatory Affairs representing Tremco Commercial Sealants and Waterproofing, Beachwood, Ohio (mschmeida@tremcoinc.com)

Revise as follows:

Table R402.4.1.1 (N1102.4.1.1)
AIR BARRIER AND INSULATION INSTALLATION

COMPONENT	CRITERIA
Air barrier and thermal barrier	A continuous air barrier shall be installed in the building envelope. Exterior thermal envelope contains a continuous air barrier. Breaks or joints in the air barrier shall be sealed <u>Breaks or joints in the thermal barrier shall be restored.</u> Air permeable insulation shall not be used as a sealing material.

(Portions of table not shown remain unchanged.)

Reason: Requiring insulation insures continuity in the thermal envelope and eliminates conductive transfer of energy through un-insulated spaces.

Cost Impact: The cost impact would be negligible.

RE78-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.4.1.1T #1-EC-SCHMEIDA

RE79 – 13

Table R402.4.1.1 (IRC Table N1102.4.1.1)

Proponent: Brian Dean (Brian.Dean@icfi.com), Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition

Revise as follows:

TABLE R402.4.1.1 (N1102.4.1.1) AIR BARRIER AND INSULATION INSTALLATION INSPECTION

(Portions of Table not shown remain unchanged)

- h. First value is cavity insulation, second is continuous insulation or insulated siding, so “13+5” means R-13 cavity insulation plus R-5 continuous insulation or insulated siding. ~~If structural sheathing covers 40 percent or less of the exterior, continuous insulation R-value shall be permitted to be reduced by no more than R-3 in the locations where structural sheathing is used – to maintain a consistent total sheathing thickness.~~

Reason: The purpose of this code change is to clarify and enhance compliance with and enforcement of the codes by organizing air barrier and insulation installation requirements into two separate checklists in the table. The proposal also updates and improves the language in the table to add clarity and to ensure that crucial elements of the thermal envelope are effectively sealed, installed and verified.

The proper installation of insulation and reasonable control of air leakage are both critical to achieving energy savings in homes. Although every building or dwelling unit is currently required to be tested for air leakage, a better-organized and more specific enumeration of key insulation and sealing requirements will lead to tighter, better-insulated, more energy efficient homes. The two columns are largely based on current insulation installation requirements and air barrier criteria in the 2012 IECC. We expect that as technology advances, and as building and inspection practices improve, this list will be updated. The reorganization of the requirements as presented above will facilitate that regular improvement in future code editions.

Cost Impact: The code change proposal will not increase the cost of construction.

RE79-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.4.1.1T #2-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE

RE80 – 13

Table R402.4.1.1 (IRC Table N1102.4.1.1)

Proponent: Michael Schmeida, Divisional Manager-Sustainability and Government/Regulatory Affairs representing Tremco Commercial Sealants and Waterproofing, Beachwood, Ohio (mschmeida@tremcoinc.com)

Revise as follows:

TAB:E R402.4.1.1 (N1102.4.1.1)
AIR BARRIER AND INSULATION INSTALLATION

Component	Criteria
Garage separation	Air sealing <u>and thermal separation</u> shall be provided between the garage and conditioned space <u>for all joints, service penetrations, and fenestrations.</u>

(Portions of Table not shown remain unchanged.)

Reason:

1. Sealing helps mitigate air movement into or out of the conditioned space, thereby reducing energy needs in mitigating uncontrolled air movement.
2. Requiring insulation insures continuity in the thermal envelope and eliminates conductive transfer of energy through un-insulated spaces.

Cost Impact: The impact would be \$500 depending on geography for a 2000/sqft home, but the ROI would be 3-5 years depending on region, design, etc.

RE80-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.4.1.1T #2-EC-SCHMEIDA

RE81 – 13

Table R402.4.1.1 (IRC N1102.4.1.1)

Proponent: Michael Schmeida, Divisional Manager-Sustainability and Government/Regulatory Affairs representing Tremco Commercial Sealants and Waterproofing, Beachwood, Ohio (mschmeida@tremcoinc.com)

Revise as follows:

**TABLE R402.4.1.1 (N1102.4.1.1)
AIR BARRIER AND INSULATION INTALLATION**

COMPONENT	CRITERIA ^a
Air barrier and thermal barrier	A continuous air barrier shall be installed in the building envelope. Exterior thermal envelope contains a continuous air barrier. Breaks or joints in the air barrier shall be sealed. Air-permeable insulation shall not be used as a sealing material.
Ceiling/attic	The air barrier in any dropped ceiling/soffit shall be aligned with the insulation and any gaps in the air barrier sealed. Access openings, drop down stair or knee wall doors to unconditioned attic spaces shall be sealed.
Walls	Corners and headers shall be insulated and the junction of the foundation and sill plate shall be sealed. The junction of the top plate and top of exterior walls shall be sealed. Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier. Knee walls shall be sealed.
Windows, skylights and doors	The space between window/door jambs and framing and skylights and framing shall be sealed <u>on both the interior and exterior with a middle insulating layer filling the gap between the fenestration and framing/opening.</u>
Rim joists	Rim joists shall be insulated and include the air barrier.
Floors (including above-garage and cantilevered floors)	Insulation shall be installed to maintain permanent contact with underside of subfloor decking. The air barrier shall be installed at any exposed edge of insulation.
Crawl space walls	Where provided in lieu of floor insulation, insulation shall be permanently attached to the crawlspace walls. Exposed earth in unvented crawl spaces shall be covered with a Class I vapor retarder with overlapping joints taped.
Shafts, penetrations	Duct shafts, utility penetrations, and flue shafts opening to exterior or unconditioned space shall be sealed.
Narrow cavities	Batts in narrow cavities shall be cut to fit, or narrow cavities shall be filled by insulation that on installation readily conforms to the available cavity space.
Garage separation	Air sealing shall be provided between the garage and conditioned spaces.
Recessed lighting	Recessed light fixtures installed in the building thermal envelope shall be air tight, IC rated, and sealed to the drywall.
Plumbing and wiring	Batt insulation shall be cut neatly to fit around wiring and plumbing in exterior walls, or insulation that on installation readily conforms to available space shall extend behind piping and wiring.
Shower/tub on exterior wall	Exterior walls adjacent to showers and tubs shall be insulated and the air barrier installed separating them from the showers and tubs.

Electrical/phone box on exterior walls	The air barrier shall be installed behind electrical or communication boxes or air sealed boxes shall be installed.
HVAC register boots	HVAC register boots that penetrate building thermal envelope shall be sealed to the subfloor or drywall.
Fireplace	An air barrier shall be installed on fireplace walls. Fireplaces shall have gasketed doors.

a. In addition, inspection of log walls shall be in accordance with the provisions of ICC-400.

Reason:

1. Installing a seal on both the interior and exterior side helps mitigate infiltration as well as exfiltration of air into or out of the wall assembly, thereby reducing energy needs in mitigating uncontrolled air movement.
2. Requiring insulation insures continuity in the thermal envelope and eliminates conductive transfer of energy through un-insulated spaces.

Cost Impact: The cost would be negligible.

RE81-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R402.4.1.1T #3-EC-SCHMEIDA

RE82 – 13

Table R402.4.1.1 (IRC Table N1102.4.1.1)

Proponent: Michael Schmeida, Divisional Manager-Sustainability and Government/Regulatory Affairs representing Tremco Commercial Sealants and Waterproofing, Beachwood, Ohio (mschmeida@tremcoinc.com)

Revise as follows:

Table R402.4.1.1 (N1102.4.1.1)
AIR BARRIER AND INSULATION INSTALLATION

COMPONENT	CRITERIA
Shafts, penetrations	Duct shafts, utility penetrations and flue shafts opening to exterior or unconditioned space shall be sealed <u>on both conditioned and unconditioned side of the opening with an insulating layer between the seals.</u>

(Portions of Table not shown remain unchanged.)

Reason:

1. Installing a seal on both the interior and exterior side helps mitigate infiltration as well as exfiltration of air into or out of the wall assembly, thereby reducing energy needs in mitigating uncontrolled air movement.
2. Requiring insulation insures continuity in the thermal envelope and eliminates conductive transfer of energy through un-insulated spaces.

Cost Impact: The cost would be negligible.

RE82-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.4.1.1T #4-EC-SCHMEIDA

RE83 – 13

Table R402.4.1.1 (IRC Table N1102.4.1.1)

Proponent: Ellen Eggerton, representing Virginia Building and Code Officials Association

Revise as follows:

**TABLE R402.4.1.1 (N1102.4.1.1)
AIR BARRIER AND INSULATION INSTALLATION**

COMPONENT	CRITERIA ^a
Walls	<p>Cavities within corners and headers shall be insulated <u>by completely filling the cavity with a material having a thermal resistance of R3 per inch minimum.</u> and The junction of the foundation and sill plate shall be sealed.</p> <p>The junction of the top plate and top of exterior walls shall be sealed.</p> <p>Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier.</p> <p>Knee walls shall be sealed.</p>

(Portions of Table not shown remain unchanged)

Reason: The current text says, "Corners and headers shall be insulated ..." All headers and corners under all circumstances? Insulated to what level? This provision is a carryover of the 2009 IECC requirement. Varying answers to these questions have already lead to varying interpretations of the code requirements, uneven enforcement, and confusion in the regulated community. This proposal intends to allay some of that confusion by specifying that headers and corners must be insulated when there is an available cavity (e.g., a two-ply 2x header in a 2x4 wall leaves no cavity to fill) and by providing a practical definition of what *insulated* means in this context. Typical insulating materials like fiberglass and rigid foam can easily achieve R3 per inch.

Cost Impact: There will be a cost impact from this proposal to the extent that this requirement was not previously enforced due to ambiguity in the requirement. Regardless, the quantities of insulation being installed are small, but there may be many of these areas to insulate, depending on the size, design, and layout of the proposed residential building.

RE83-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.4.1.1T-EC-EGGERTON

RE84 – 13

Table R402.4.1.1 (IRC Table N1102.4.1.1)

Proponent: Joseph Lstiburek, Building Science Corporation, representing self
(joe@buildingscience.com)

Revise as follows:

TABLE 402.4.1.1 (N1102.4.1.1)
AIR BARRIER AND INSULATION INSTALLATION

COMPONENT	<u>INSULATION INSTALLATION CRITERIA</u>
Floors (including above garage and cantilevered floors)	<u>Floor framing cavity insulation shall be installed to maintain permanent contact with underside of subfloor decking or floor framing cavity insulation shall be permitted to be in contact with the topside of sheathing or continuous insulation installed on the bottom side of floor framing and extends from the bottom to the top of all perimeter floor framing members.</u> The air barrier shall be installed at any exposed edge of insulation.

(Portions of Table not shown remain unchanged)

Reason: Requiring insulation in floors to be in direct contact with the underside of subfloor decking is one insulating option. Another option is to have an airspace between the floor sheathing and the top of the cavity insulation where this cavity insulation is in direct contact with the topside of sheathing or continuous insulation installed on the underside of the floor framing and is combined with perimeter insulation that meets or exceeds the R-value requirements for walls. This second option leads to fewer cold spots yet does not change the heat loss as long as the cavity insulation is in direct contact with a sheathing below it or continuous insulation below it. It also facilitates services to be enclosed within the thermal envelope.

Cost Impact: The code change proposal will not increase the cost of construction.

RE84-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.4.1.1T-EC-LSTIBUREK

RE85-13

Table R402.4.1.1 (IRC Table N1102.4.1.1)

Proponent: Shaunna Mozingo, City of Cherry Hills Village, representing Colorado Chapter of ICC, Inc.
smozingo@coloradocode.net

Delete and substitute as follows:

TABLE 402.4.1.1 (N1102.4.1.1)
AIR BARRIER AND INSULATION INSTALLATION

TABLE 402.4.1.1 (N1102.4.1.1)
AIR BARRIER AND INSULATION INSTALLATION

<u>COMPONENT</u>	<u>AIR BARRIER CRITERIA</u>	<u>INSULATION INSTALLATION CRITERIA</u>
<u>General Requirements</u>	<u>A continuous air barrier shall be installed in the building envelope.</u> <u>Exterior thermal envelope contains a continuous air barrier.</u> <u>Breaks or joints in the air barrier shall be sealed.</u>	<u>Air-permeable insulation shall not be used as a sealing material..</u>
<u>Ceiling / attic</u>	<u>The air barrier in any dropped ceiling/soffit shall be aligned with the insulation and any gaps in the air barrier sealed.</u> <u>Access openings, drop down stair or knee wall doors to unconditioned attic spaces shall be sealed.</u>	<u>The insulation in any dropped ceiling/soffit shall be aligned with the air barrier.</u>
<u>Walls</u>	<u>The junction of the foundation and sill plate shall be sealed.</u> <u>The junction of the top plate and top of exterior walls shall be sealed.</u> <u>Knee walls shall be sealed.</u>	<u>Corners and headers shall be insulated.</u> <u>Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier.</u>
<u>Windows, skylights and doors</u>	<u>The space between window/door jambs and framing and skylights and framing shall be sealed.</u>	
<u>Rim joists</u>	<u>Rim joists shall include the air barrier.</u>	<u>Rim joists shall be insulated.</u>
<u>Floors (including above garage and cantilevered floors)</u>	<u>The air barrier shall be installed at any exposed edge of insulation.</u>	<u>Insulation shall be installed to maintain permanent contact with underside of subfloor decking.</u>
<u>Crawl space walls</u>	<u>Exposed earth in unvented crawl spaces shall be covered with a Class I vapor retarder with overlapping joints taped.</u>	<u>Where provided in lieu of floor insulation, insulation shall be permanently attached to the crawlspace walls.</u>
<u>Shafts, penetrations</u>	<u>Duct shafts, utility penetrations, and flue shafts opening to exterior or unconditioned space shall be sealed.</u>	
<u>Narrow cavities</u>		<u>Batts in narrow cavities shall be cut to fit, or narrow cavities shall be filled by insulation that on installation readily conforms to the available cavity space.</u>
<u>Garage separation</u>	<u>Air sealing shall be provided between</u>	

	<u>the garage and conditioned spaces.</u>	
<u>Recessed lighting</u>	<u>Recessed light fixtures installed in the building thermal envelope shall be sealed to the drywall.</u>	<u>Recessed light fixtures installed in the building thermal envelope shall be air tight, IC rated.</u>
<u>Plumbing and wiring</u>		<u>Batt insulation shall be cut neatly to fit around wiring and plumbing in exterior walls, or insulation that on installation readily conforms to available space shall extend behind piping and wiring.</u>
<u>Shower / tub on exterior wall</u>	<u>The air barrier installed at exterior walls adjacent to showers and tubs shall separate them from the showers and tubs.</u>	<u>Exterior walls adjacent to showers and tubs shall be insulated.</u>
<u>Electrical / phone box on exterior walls</u>	<u>The air barrier shall be installed behind electrical or communication boxes or air sealed boxes shall be installed.</u>	
<u>HVAC register boots</u>	<u>HVAC register boots that penetrate building thermal envelope shall be sealed to the subfloor or drywall.</u>	
<u>Fireplace</u>	<u>An air barrier shall be installed on fireplace walls. Fireplaces shall have gasketed doors</u>	

a. In addition, inspection of log walls shall be in accordance with the provisions of ICC-400.

Reason: Reason: Table R402.4.1.1 in the 2012 IECC and 2009 IECC has contained a table that included insulation and air barrier requirements within the same criteria. This has created confusion with the trades in the construction of residential housing. This change adds an additional column to the table and separates air barrier criteria and insulation criteria. This change adds clarity for the trades.

No substantive changes were made in the narrative criteria descriptions with the exception of separating sentences which contain criteria for both insulation and air barrier into two narratives; one for insulation and one for air barrier criteria.

The "air barrier and thermal barrier" component from Table R402.4.1.1 in the 2009 and 2012 IECC was renamed as "general requirements" but the criteria from the previous "air barrier and thermal barrier" component row has not changed with the exception of separating insulation and air barrier criteria.

Cost Impact: The code change proposal will not increase the cost of construction. No additional costs.

RE85-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R402.4.1.1T-EC-MOZINGO

RE86 – 13

Table R402.4.1.1 (IRC Table N1102.4.1.1), R402.4.2 (IRC N1102.4.2)

Proponent: Thomas Stroud, Senior Manager, Codes & Standards, representing Hearth, Patio & Barbecue Association (stroud@hpba.org)

Revise as follows:

TABLE R402.4.1.1 (N1102.4.1.1)
AIR BARRIER AND INSULATION INSTALLATION

COMPONENT	CRITERIA ^a
Air barrier and thermal barrier	A continuous air barrier shall be installed in the building envelope. Exterior thermal envelope contains a continuous air barrier. Breaks or joints in the air barrier shall be sealed. Air-permeable insulation shall not be used as a sealing material.
Ceiling/attic	The air barrier in any dropped ceiling/soffit shall be aligned with the insulation and any gaps in the air barrier sealed. Access openings, drop down stair or knee wall doors to unconditioned attic spaces shall be sealed.
Walls	Corners and headers shall be insulated and the junction of the foundation and sill plate shall be sealed. The junction of the top plate and top of exterior walls shall be sealed. Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier. Knee walls shall be sealed.
Windows, skylights and doors	The space between window/door jambs and framing and skylights and framing shall be sealed.
Rim joists	Rim joists shall be insulated and include the air barrier.
Floors (including above-garage and cantilevered floors)	Insulation shall be installed to maintain permanent contact with underside of subfloor decking. The air barrier shall be installed at any exposed edge of insulation.
Crawl space walls	Where provided in lieu of floor insulation, insulation shall be permanently attached to the crawlspace walls. Exposed earth in unvented crawl spaces shall be covered with a Class I vapor retarder with overlapping joints taped.
Shafts, penetrations	Duct shafts, utility penetrations, and fire place chases and flue shafts opening to exterior or unconditioned space shall be sealed.
Narrow cavities	Batts in narrow cavities shall be cut to fit, or narrow cavities shall be filled by insulation that on installation readily conforms to the available cavity space.
Garage separation	Air sealing shall be provided between the garage and conditioned spaces.
Recessed lighting	Recessed light fixtures installed in the building thermal envelope shall be air tight, IC rated, and sealed to the drywall.
Plumbing and wiring	Batt insulation shall be cut neatly to fit around wiring and plumbing in exterior walls, or insulation that on installation readily conforms to available space shall extend behind piping and wiring.
Shower/tub on exterior wall	Exterior walls adjacent to showers and tubs shall be insulated and the air barrier installed separating them from the showers and tubs.
Electrical/phone box on exterior walls	The air barrier shall be installed behind electrical or communication boxes or air sealed boxes shall be installed.

HVAC register boots	HVAC register boots that penetrate building thermal envelope shall be sealed to the subfloor or drywall.
Fireplace	An air barrier shall be installed on fireplace walls. Fireplaces shall have gasketed doors.

a. In addition, inspection of log walls shall be in accordance with the provisions of ICC-400.

R402.4.2 (N1102.4.2) Fireplaces. New wood-burning fireplaces shall have tight fitting flue dampers or doors, and outdoor combustion air. When using tight-fitting doors on UL 127 fireplaces, they must be tested and listed for the fireplace.

Reason: In 2012 Table R402.4.1.1 Fireplace criteria states an air barrier shall be installed on fireplace walls. Fireplaces shall have gasketed doors. In Section R402.4.2 it states new wood-burning fireplaces shall have tight-fitting flue dampers or doors, and outdoor combustion air. We interpret this to mean traditional, field-fabricated, "masonry fireplaces" in accordance with 2009 IRC Section R1001, and constructed of concrete or solid clay-masonry units; NOT "factory-built," UL 127 fireplaces in accordance with IRC Section R1004. Because of requirements in the IECC that require all fireplaces to be provided with gasketed doors, a great deal of controversy has resulted. Most factory-built fireplaces are not listed for use with sealed glass doors and installing such doors on fireplaces that are not tested for these doors could cause overheating of the fireplace resulting in a fire hazard. Without testing, the effect of the doors will be an unknown. In this regard, the intent of Section R402.4.2 is to mitigate air leakage during periods of non-use, but not where the conditions of fireplace installation are in violation of the UL 127 listing.

Regarding the requirement for an air barrier on "fireplace walls", this is an unclear statement and is clarified by the addition in *Shafts, Penetrations* that the air sealing is to be on the chase and not on the fireplace. This will address chase sealing details that are needed and gives clarification to address framed wall construction.

Cost Impact: These code changes will not increase the cost of construction.

RE86-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.4.1.1T-EC-STROUD

RE87 – 13

Table R402.4.1.1, (IRC Table N1102.4.1.1), R402.4.2 (IRC N1102.4.2)

Proponent: Brenda A. Thompson, Clark County Development Services, Las Vegas NV, representing ICC Sustainability, Energy & High Performance Building Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

TABLE R402.4.1.1 (N1102.4.1.1)
AIR BARRIER AND INSULATION INSTALLATION

COMPONENT	CRITERIA ^a
Air barrier and thermal barrier	A continuous air barrier shall be installed in the building envelope. Exterior thermal envelope contains a continuous air barrier. Breaks or joints in the air barrier shall be sealed. Air-permeable insulation shall not be used as a sealing material.
Ceiling/attic	The air barrier in any dropped ceiling/soffit shall be aligned with the insulation and any gaps in the air barrier sealed. Access openings, drop down stair or knee wall doors to unconditioned attic spaces shall be sealed.
Walls	Corners and headers shall be insulated and the junction of the foundation and sill plate shall be sealed. The junction of the top plate and top of exterior walls shall be sealed. Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier. Knee walls shall be sealed.
Windows, skylights and doors	The space between window/door jambs and framing and skylights and framing shall be sealed.
Rim joists	Rim joists shall be insulated and include the air barrier.
Floors (including above-garage and cantilevered floors)	Insulation shall be installed to maintain permanent contact with underside of subfloor decking. The air barrier shall be installed at any exposed edge of insulation.
Crawl space walls	Where provided in lieu of floor insulation, insulation shall be permanently attached to the crawlspace walls. Exposed earth in unvented crawl spaces shall be covered with a Class I vapor retarder with overlapping joints taped.
Shafts, penetrations	Duct shafts, utility penetrations, and flue shafts <u>and fire places</u> opening to exterior or unconditioned space shall be sealed.
Narrow cavities	Batts in narrow cavities shall be cut to fit, or narrow cavities shall be filled by insulation that on installation readily conforms to the available cavity space.
Garage separation	Air sealing shall be provided between the garage and conditioned spaces.
Recessed lighting	Recessed light fixtures installed in the building thermal envelope shall be air tight, IC rated, and sealed to the drywall.
Plumbing and wiring	Batt insulation shall be cut neatly to fit around wiring and plumbing in exterior walls, or insulation that on installation readily conforms to available space shall extend behind piping and wiring.
Shower/tub on exterior wall	Exterior walls adjacent to showers and tubs shall be insulated and the air barrier installed separating them from the showers and tubs.
Electrical/phone box on exterior walls	The air barrier shall be installed behind electrical or communication boxes or air sealed boxes shall be installed.
HVAC register boots	HVAC register boots that penetrate building thermal envelope shall be sealed to the subfloor or drywall.
Fireplace	An air barrier shall be installed on fireplace walls. Fireplaces shall have gasketed doors.

^a In addition, inspection of log structures shall be in accordance with the provisions of ICC-400.

R402.4.2 (IRC N1102.4.2) Fireplaces. New wood-burning fireplaces shall have tight fitting flue dampers or doors, and outdoor combustion air.

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

The reason for this proposal:

In 2012 Table R402.4.1.1 Fireplace criteria states an air barrier shall be installed on fireplace walls. Fireplaces shall have gasketed doors. In Section R402.4.2 it states new wood-burning fireplaces shall have tight-fitting flue dampers or doors, and outdoor combustion air. We interpret this to mean traditional, field-fabricated, "masonry fireplaces" in accordance with 2009 IRC Section R1001, and constructed of concrete or solid clay-masonry units; NOT "factory-built," UL 127 fireplaces in accordance with IRC Section R1004. Because of requirements in the IECC that require all fireplaces to be provided with gasketed doors, a great deal of controversy has resulted. Most factory-built fireplaces are not tested for use with sealed glass doors and installing such doors on fireplaces that are not tested for these doors could cause overheating of the fireplace resulting in a fire hazard. Without testing, the effect of the doors will be an unknown. In this regard, the intent of Section R402.4.2 is to mitigate air leakage during periods of non-use, but not where the conditions of fireplace installation are in violation of the UL 127 listing. This will address chase seal details that are needed and gives clarification to address framed wall construction.

Please note that deleting the air barrier requirement for fireplace walls has not net effect as there are at least 2 other locations in the table where the air barrier requirement for walls is restated and such would include fireplace walls.

Cost Impact: The change will not increase the cost of construction.

RE87-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.4.1.1T-EC-THOMPSON-SEHPCAC

RE88 – 13

R402.4.1.2 (IRC N1102.4.1.2), R402.4.1.2.1 (NEW) (IRC N1102.4.1.2.1 (NEW))

Proponent: Michael D. Fischer, Kellen Company, representing the Center for the Polyurethanes Industry (mfischer@kellencompany.com)

Revise as follows:

R402.4.1.2 (N1102.4.1.2) Testing. The building or dwelling unit shall be tested by an approved agency and verified as having an air leakage rate of not exceeding ~~5~~ 4 air changes per hour in Climate Zones 1 and 2, and 3 air changes per hour in Climate Zones 3 through 8. Testing shall be conducted with a blower door at a pressure of 0.2 inches w.g. (50 Pascals). ~~Where required by the code official, testing shall be conducted by an approved third party.~~ A written report of the results of the test shall be signed by the testing agency party conducting the test and provided to the *code official*. Testing shall be performed at any time after creation and sealing of all penetrations of the *building thermal envelope*.

402.4.1.2.1 (N1102.4.1.2.1) The air leakage rate in Climate Zones 3 through 8 shall be permitted to be no greater than 4 air changes per hour where all heating and conditioning ducts, air handlers, and filter boxes are located within the *building thermal envelope*.

Reason: Building envelope tightness is a proven energy efficiency measure. With recent improvements in construction techniques and quality control, builders have demonstrated their ability to comply with air barrier requirements in the code as well as above-code programs. At the same time, the location of air handling ducts within the building thermal envelope has also become a more common and desirable construction technique- especially with new provisions for unvented attics in the IRC. This proposal offers a compromise that establishes a slight improvement in air barrier performance in the southern climate zones, as well as a trade-up in Climate Zones 3-8 that encourages the use of unvented attics.

Cost Impact: This proposal may result in an increased initial construction cost in some climate zones depending upon the method of construction, but is likely to provide a short break-even point on energy consumption and utility costs.

RE88-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.4.1.2-EC-FISCHER

RE89-13

R402.4.1.2 (IRC N1102.4.1.2)

Proponent: Michael Schmeida, Divisional Manager- Sustainability and Government/Regulatory Affairs, representing Tremco Commercial Sealants and Waterproofing, Beachwood, Ohio (mschmeida@tremcoinc.com)

Revise as follows:

R402.4.1.2 (N1102.4.1.2) Testing. The building or dwelling unit shall be tested and verified as having an air leakage rate of not exceeding ~~5 air changes in Climate Zones 1 and 2, and 3 air exchanges per hour in Climate Zones 3 through 8.~~ 0.6 times the volume of the home per hour. Testing shall be conducted with a blower door at a pressure of 0.2 inches w.g. (50 Pascals). Where required by the *code official*, testing shall be conducted by an *approved* third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the *code official*. Testing shall be performed at any time after creation of all penetrations of the *building thermal envelope*.

During testing:

1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed, beyond the intended weatherstripping or other infiltration control measures;
2. Dampers including exhaust, intake, makeup air, backdraft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures;
3. Interior doors, if installed at the time of the test, shall be open;
4. Exterior doors for continuous ventilation systems and heat recovery ventilators shall be closed and sealed;
5. Heating and cooling systems, if installed at the time of the test, shall be turned off; and
6. Supply and return registers, if installed at the time of the test, shall be fully open.

Reason:

1. Unmitigated air leakage is often cited as the number one reason for energy loss in structures. Continual reduction of air leakage in code is an ideal means of furthering energy conservation.
2. A climate zone specific mandate for energy-related performance does not conserve energy resources, such as coal and natural gas. Energy is not just what is at the outlet, switch, etc., but the energy in the fuels being burned to create electrical energy. Requiring stricter energy performance in structures regardless of whether they are in warm climates that may use strictly electricity for cooling without significant heating does conserve energy resources.

Cost Impact: The impact would vary greatly from design to design and climate to climate. However, it would be offset by savings in energy use.

RE89-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.4.1.2-EC-SCHMEIDA

RE90 – 13

R402.4.1.2 (IRC N1102.4.1.2), Table R405.5.2(1) (IRC Table N1105.5.2(1))

Proponent: Don Surrena, CBO, representing National Association of Home Builders (NAHB)
(dsurrena@nahb.org)

Revise as follows:

R402.4.1.2 (N1102.4.1.2) Testing. The building or dwelling unit shall be tested and verified as having an air leakage rate of not exceeding 5 air changes per hour in Climate Zones 1 and 2, and ~~3~~ 4 air changes per hour in Climate Zones 3 through 8. Testing shall be conducted with a blower door at a pressure of 0.2 inches w.g. (50 Pascals). Where required by the *code official*, testing shall be conducted by an *approved* third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the *code official*. Testing shall be performed at any time after creation of all penetrations of the *building thermal envelope*.

Table R405.5.2(1) (N1105.5.2(1))
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Air exchange rate	Air leakage rate of 5 air changes per hour in Climate Zones 1 and 2, and 3 4 air changes per hour in Climate Zones 3 through 8 at a pressure of 0.2 inches w.g (50 Pa). The mechanical ventilation rate shall be in addition to the air leakage rate and the same as in the proposed design, but no greater than $0.01 \times \text{CFA} + 7.5 \times (\text{N}_{\text{br}} + 1)$ where: CFA = conditioned floor area Nbr = number of bedrooms Energy recovery shall not be assumed for mechanical ventilation.	For residences that are not tested, the same air leakage rate as the standard reference design. For tested residences, the measured air exchange rate ^c . The mechanical ventilation rated shall be in addition to the air leakage rate and shall be as proposed.

(Portions of table not shown remain unchanged)

Reason: Building tightness is an important part of an energy efficient and comfortable house; however, 3 air changes per hour at 50 Pascals is an extremely low target tightness especially for smaller homes. The ASHRAE Handbook of Fundamentals shows that less than 10% of new homes achieve 3 ACH or less. Four ACH is still an aggressive tightness level which will provide a tight, comfortable, energy efficient home for the consumer.

Cost Impact: The code change proposal will not increase the cost of construction.

RE90-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.4.1.2-EC-SURRENA

RE91 – 13

R402.4.1.2 (IRC N1102.4.1.2), Chapter 5

Proponent: Theresa A. Weston, PhD., representing DuPont Building Innovations
(theresa.a.weston@usa.dupont.com)

Revise as follows:

R402.4.1.2 (N1102.4.1.2) Testing. The building or dwelling unit shall be tested and verified as having an air leakage rate of not exceeding 5 air changes per hour in Climate Zones 1 and 2, and 3 air changes per hour in Climate Zones 3 through 8. Testing shall be conducted in accordance with ASTM E 779 or ASTM E 1827 with a blower door and reported at a pressure of 0.2 inches w.g. (50 Pascals). Where required by the *code official*, testing shall be conducted by an *approved* third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the *code official*. Testing shall be performed at any time after creation of all penetrations of the *building thermal envelope*.

During testing:

1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed, beyond the intended weatherstripping or other infiltration control measures;
2. Dampers including exhaust, intake, makeup air, backdraft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures;
3. Interior doors, if installed at the time of the test, shall be open;
4. Exterior doors for continuous ventilation systems and heat recovery ventilators shall be closed and sealed;
5. Heating and cooling systems, if installed at the time of the test, shall be turned off; and
6. Supply and return registers, if installed at the time of the test, shall be fully open. Add new reference standards:

Add new standards to Chapter 5 as follows:

E779-10 Standard Test Method for Determining Air Leakage Rate by Fan Pressurization

E1827-11 Standard Test Methods for Determining Airtightness of Buildings Using an Orifice Blower Door

Reason: This proposal adds appropriate standard blower door test methods to the code. The code currently does not reference a test method standard. The specification of standard test methods should improve the reliability of the data by which code compliance is determined.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code ASTM E1827-11 Standard Test Methods for Determining Airtightness of Buildings Using an Orifice Blower Door with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013. Standard ASTM E779-03 is currently referenced in the IECC-Commercial Provisions, Chapter 5. Update to the latest edition, 2010 will be considered in a code change proposal for administrative update of standards. See the hearing order for the Administrative Code Committee.

RE91-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.4.1.2-EC-WESTON

RE92 – 13

R402.4.1.2 (New), (IRC N1102.4.1.2)

Proponent: Brent Ursenbach, Salt Lake County representing Utah Chapter ICC and Utah Association of Plumbing and Mechanical Officials Chapter ICC (bursenbach@slco.org)

Add text as follows:

R402.4.1.2 (N1102.4.1.2) Combustion Air Openings. In climate zones 3 through 8, where open combustion air ducts provide combustion air to open combustion fuel burning appliances, the appliances and combustion air opening shall be located outside the thermal envelope or enclosed in a room, isolated from inside the thermal envelope. Such rooms shall be sealed and insulated per the envelope requirements of Table R402.1.1, where the walls shall meet a minimum of the basement wall R-value requirement. The door into the room shall be fully gasketed and any water lines and ducts in the room insulated per the requirements of R403. The combustion air duct must be insulated where it passes through conditioned space to a minimum of R-8.

Exception:

1. Direct vent appliances with both intake and exhaust pipes installed continuous to the outside.
2. Fireplaces and stoves complying with the requirements of R402.4.2 and IRC R1006.

Reason: The entire section R402.4 Air leakage- is of little value when a combustion air duct is installed, open to the conditioned space, virtually placing a large hole through the thermal envelope. Blower door testing as now required by the code cannot be accomplished with a combustion air opening inside the thermal envelope. Testers regularly block these opening as this is the only way they can pressurize the home; only to be opened after the test is completed. Ideally, direct vent, sealed combustion appliances solve the problem. Where less efficient, open combustion fuel burning appliances are used, it is reasonable and proper to isolate the appliances and the required combustion air from inside the thermal envelope.

Cost Impact: The code change proposal will increase the cost of construction, while it will reduce the energy consumption and cost throughout the life of the home.

RE92-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.4.1.2 (NEW)-EC-URSENBACH

RE93 – 13

R402.4.1.3 (NEW) (IRC N1102.4.1.3 (NEW))

Proponent: Robby Schwarz, representing EnergyLogic, Inc. (robby@nrglogic.com)

Add new text as follows:

R402.4.1.3 (N1102.4.1.3) Connection to Garage. The building or dwelling unit shall be tested and verified as being separate from an attached garage. While the blower door is being utilized to test the building or dwelling unit's leakage rate, the connection between the dwelling unit and the garage shall also be tested. The pressure in the garage with reference to dwelling unit shall not be less than 45 Pascals relative to the dwelling unit when the dwelling unit pressure is at 50 Pascals relative to the outside.

Reason: Separation between the house(dwelling unit) and garage is specifically called out on the air barrier and insulation table R402.4.1.1 yet it is unclear what is meant by this and why it is called out separately from the rest of the thermal envelopes sealing that separates conditioned space from unconditioned space. The rationale is an extension of efficiency into safety to ensure that pollutants and contaminants from the garage will not enter the home. A visual or written reference to this makes no sense when a test is available to ensure that separation has occurred. Testing is the only way to ensure safety and in extension greater efficiency.

Cost Impact: The code change proposal will not increase the cost of construction.

RE93-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.4.1.3 (NEW)-EC-SCHWARZ

RE94 – 13

R402.4.3 (IRC N1102.4.3)

Proponent: Jeff Inks, representing the Window & Door Manufacturers Association.

Revise as follows:

R402.4.3 (N1102.4.3) Fenestration air leakage. Windows, skylights and sliding glass doors shall have an air infiltration rate of no more than 0.3 cfm per square foot (1.5 L/s/m²), and swinging doors no more than 0.5 cfm per square foot (2.6 L/s/m²), when tested according to NFRC 400 or AAMA/ WDMA/CSA 101/I.S.2/A440 by an accredited, independent laboratory and listed and labeled by the manufacturer.

Exception: ~~Site-built windows, skylights and doors.~~

Reason: This proposal is primarily a clean-up. The exception for site-built fenestration was removed from the commercial requirements during the last code development cycle as there is no justification for allowing it. These assemblies are required to meet the air leakage provisions of C402.4.3 for IECC commercial construction. Likewise, site-built windows, skylights and doors, if used in IECC residential construction, should meet the requirements of Section R402.4.3 without exception.

Cost Impact: The code change proposal will not increase the cost of construction.

RE94-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.4.3-EC-INKS

RE95 – 13

R402.5 (IRC N1102.5)

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com); Dr. Thomas D. Culp, Birch Point Consulting LLC, representing the Glazing Industry Code Committee (culp@birchpointconsulting.com)

Delete without substitution:

~~**R402.5 (N1102.5) Maximum fenestration U-factor and SHGC (Mandatory).** The area-weighted average maximum fenestration U-factor permitted using tradeoffs from Section R402.1.4 or R405 shall be 0.48 in Climate Zones 4 and 5 and 0.40 in Climate Zones 6 through 8 for vertical fenestration, and 0.75 in Climate Zones 4 through 8 for skylights. The area-weighted average maximum fenestration SHGC permitted using tradeoffs from Section R405 in Climate Zones 1 through 3 shall be 0.50.~~

Reason:

CONNER: The limits on U-factor and SHGC trade offs reduce flexibility without any compensating energy savings. A decrease in the energy efficiency of the windows through the performance calculation would have to be made up elsewhere leaving the resulting energy efficiency, so the energy result is neutral.

Given the stringency of the newer codes, this section mostly adds a bit of confusion to the code. The statement of a limit on trade offs is sometimes confused with the actual requirement itself (in Table R402.1). There is no need to bulk up the code with even small statements that seldom have any impact.

CULP: By definition, trade-offs are energy neutral, so these mandatory "hard limits" save no energy, but set artificial constraints that limit design flexibility and innovation. Practically speaking, the vast majority of "normal" windows already meet these criteria, so this section has little real impact, and only serves to (a) add confusion between these numbers and the real requirements in Table R402.1.1, and (b) cause compliance problems for unique or special applications.

For example, glass block used in a bathroom remodel:

- ... it has no label, so use the default U-factor and SHGC
- ... but the default values do not meet Table R402.1.1, so use a trade-off
- ... but the default values do not meet the hard limits in this section R402.5, so use area-weighted averaging
- ... but there is nothing else in the remodel to area-weight average.

So it becomes effectively illegal, even if there are other trade-offs that make the overall remodel even more energy efficient, and the only recourse is to seek a special allowance through the alternative methods provision.

This is just one example. What about special products used in tornado storm shelters that won't meet the U-factor hard limit? What about vacuum glazing that meets the U-factor and greatly exceeds the required energy efficiency, but not the SHGC hard limit? Do we want to discourage vacuum glazing?

Granted, these are not common situations, but what have we accomplished by creating artificial barriers and extra headaches for code officials and builders? This section should be removed.

Cost Impact: The code change proposal will not increase the cost of construction.

RE95-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.5-EC-CONNER-CULP

RE96 – 13

R402.5 (IRC N1102.5)

Proponent: Brian Dean, Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition

Revise as follows:

R402.5 (N1102.5) Maximum fenestration U-factor and SHGC (Mandatory). The area-weighted average maximum fenestration U-factor permitted for vertical fenestration products when complying with this code using trade-offs from under Section R402.1.4 or Section R405 shall not exceed the U-factor specified in Table R402.1.1 by more than 25% be 0.48 in Climate Zones 4 and 5 and 0.40 in Climate Zones 6 through 8 for vertical fenestration, and 0.75 in Climate Zones 4 through 8 for skylights. The area-weighted average U-factor for skylights when complying with this code under Section R402.1.4 or Section R405 shall not exceed the U-factor specified in Table R402.1.1 by more than 25%. The area-weighted average maximum fenestration SHGC permitted for all fenestration products when complying with this code under using trade-offs from Section R405 shall not exceed the SHGC specified in Table R402.1.1 by more than 50% in Climate Zones 1 through 3 shall be 0.50.

Reason: The purpose of this code change is to modify the requirements and clarify the language related to the maximum U-factor and SHGC for fenestration when using trade-offs for code compliance. This revision improves the energy efficiency and usability of the energy code by ensuring that as prescriptive fenestration efficiency requirements change, the mandatory fenestration maximums (for trade-offs) will automatically adjust as well, specifically by setting the maximum weighted average U-factor at 25% above the prescriptive value and the SHGC at 50% above the prescriptive value. In addition, the revision improves and clarifies the language in the section.

For nearly a decade, the current version of the fenestration U-factor and SHGC maximums in Section R402.5 have provided an effective and critical backstop for fenestration efficiency trade-offs under the Total UA compliance path and the Simulated Performance Alternative. This section ensures that fenestration, which is a crucial element in the thermal envelope, particularly from the standpoint of comfort, as well as condensation, energy efficiency and HVAC sizing, will not be overly weakened by trade-offs.

Unfortunately, as prescriptive fenestration U-factors and SHGC requirements have improved substantially over the last few code change cycles, the fenestration maximums have remained unchanged. For example:

- In the 2006 IECC, the prescriptive SHGC requirement in climate zone 3 was 0.40 and the SHGC maximum in trade-offs was 0.50 (25% higher than the prescriptive value).
- In the 2009 IECC, the prescriptive SHGC requirement was improved to 0.30, but the SHGC maximum remained at 0.50 (67% higher).
- In the 2012 IECC, the prescriptive SHGC requirement was further improved to 0.25, but the SHGC maximum remained at 0.50 (100% higher).

The proposal sets the maximum area-weighted average U-factor 25% higher and the SHGC 50% higher than the prescriptive value, giving a reasonable (but not unlimited) amount of flexibility to the design professional. We chose 25% for U-factor and 50% for SHGC based on judgment after reviewing the resulting values, in recognition that prescriptive U-factors tend to be greater than prescriptive SHGC values, justifying a smaller percentage, and reflecting the need for more flexibility for SHGC due to passive solar concerns. The following table shows the effect of this new proposal on the maximum values for vertical windows:

Climate Zone	Prescriptive U-factor	Maximum U-factor Current	Maximum U-factor Proposed	Prescriptive SHGC	Maximum SHGC Current	Maximum SHGC Proposed
1	NR	NR	NR	0.25	0.50	0.38
2	0.40	NR	0.50	0.25	0.50	0.38
3	0.35	NR	0.44	0.25	0.50	0.38
4	0.35	0.48	0.44	0.40	NR	0.60
5	0.32	0.48	0.40	NR	NR	NR
6 - 8	0.32	0.40	0.40	NR	NR	NR

The proposal also applies a uniform backstop percentage over all climate zones, improving efficiency and simplifying compliance and enforcement in states that stretch across multiple climate zones. The new maximums also allow considerable flexibility for innovative designs such as passive solar, because individual or multiple windows may have significantly higher SHGC or U-factor values, as long as they achieve an area-weighted average value that is within a reasonable range of the prescriptive values.

Because the Total UA and Simulated Performance Alternative compliance options are typically software-based, the change to a percentage-based maximum should require no additional effort on the part of the builder or design professional. Over the long run, this proposal will simplify the code, improve energy efficiency, and add consistency because the maximum will automatically track any change to the fenestration U-factor or SHGC requirements.

The fenestration trade-off limits currently found in the residential chapter of the *IECC* are simple, mandatory measures that ensure all new buildings contain high-quality, cost-effective windows that save energy, provide reasonable comfort, resist condensation in colder climates and block unwanted solar gain in warmer climates. Without the protection of this backstop, fenestration values could be traded away to levels unacceptable in modern building practice. Given the improvements to window efficiency brought about by the 2012 *IECC* and our nation's high priority for energy efficiency, this proposal is a common-sense improvement to an effective code requirement.

- **Simple compliance.** The residential fenestration maximums are effective and easy to understand. These requirements have been successfully applied for the last several years. All states that have already adopted the 2006, 2009, and 2012 *IECC* have adopted these maximums to residential construction. They are also already seamlessly built into compliance software such as the Department of Energy's REScheck.
- **Flexible standard.** The area-weighted average approach embodied in the fenestration maximums allows considerable flexibility for the use of decorative glass, glass block, and other fenestration products, while maintaining a baseline performance for the building's overall glazing. In short, not all products are required to individually meet the maximum values; only the area-weighted average of all products in the building are required to meet the maximum values specified in this code provision.
- **Quality windows, energy savings and peak demand savings nationwide.** The fenestration maximums encourage the use of cost-effective energy-efficient windows nationwide. Because good windows reduce energy consumption both during peak cooling times in the summer months and during peak heating hours in the winter months, such windows help to reduce the strain on the electric grid and natural gas pipeline system and delay the need to build expensive peaking facilities. By reducing the trade-off of efficient windows for other measures, the maximums better capture the benefits of blocking solar gain and providing reasonable insulating value such as peak reduction, reduced cooling system sizes and year-round comfort. Consumers also enjoy the reduced costs that come with economies of scale and market transformation.
- **More comfortable buildings and less energy use.** Incremental changes in window efficiency can have a huge impact on occupant comfort because even the most efficient windows are, at best, still only the equivalent of about an R-3 wall in the winter. Moreover, unlike the opaque wall, even the best fenestration allows substantial summer solar heat gain into the conditioned space. Hot spots created by high solar gain in the summer and/or cold or drafty glass in the winter months can force an occupant to adjust the thermostat to compensate. A good window will provide reasonable insulating value, keeping occupants more comfortable during the coldest months. Similarly, windows with low SHGC will protect against hot spots and occupant discomfort, and will make it less likely that occupants will need to adjust the thermostat and use more energy.

For a more detailed discussion of the benefits of good fenestration, see the section on the benefits of efficient windows on the website of the Efficient Windows Collaborative (a Collaborative of the Alliance to Save Energy, the University of Minnesota, Center for Sustainable Building Research and Lawrence Berkeley National Laboratory, with support from the U.S. Department of Energy) -- <http://www.efficientwindows.org/benefits.cfm>.

The fenestration maximums have served an important role in ensuring residential energy efficiency for many years. We recommend that the proposed improvements to the fenestration maximums be adopted.

Cost Impact: The code change proposal will not increase the cost of construction.

RE96-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.5-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE

RE97 – 13

R402.5 (IRC N1102.5), R405.5 (IRC N1102.5), R405.5.3 (NEW) (IRC N1105.5.3 (NEW))

Proponent: Jeff Sonne, representing the Florida Solar Energy Center (jeff@fsec.ucf.edu)

Revise as follows:

~~**R402.5 (N1102.5) Maximum fenestration U-factor and SHGC (Mandatory).** The area-weighted average maximum fenestration U-factor permitted using tradeoffs from Section R402.1.4 or R405 shall be 0.48 in Climate Zones 4 and 5 and 0.40 in Climate Zones 6 through 8 for vertical fenestration, and 0.75 in Climate Zones 4 through 8 for skylights. The area-weighted average maximum fenestration SHGC permitted using tradeoffs from Section R405 in Climate Zones 1 through 3 shall be 0.50.~~

R405.5 (N1105.5) Calculation procedure. Calculations of the performance design shall be in accordance with Sections R405.5.1 ~~and through~~ R405.5.2 R405.5.3.

R405.5.3 (N1105.5.3) Maximum fenestration SHGC. In Climate Zones 1 through 3 the Proposed Design shall have either an area-weighted average maximum fenestration SHGC of 0.50 or a fenestration area-weighted average overhang of 4.0 feet or greater (all conditioned space fenestration products that are greater than 50-percent glazed shall be included in the calculation).

Reason: Prescriptive compliance already has separate window U-factor and SHGC requirements stipulated in Table R402.1.1, so section R402.5 only applies to performance compliance; this mod moves the requirement to Section R405 (performance) for clarity.

Porches provide shade for windows. Relaxing the SHGC requirement for performance compliance only for dwellings with large overhangs will help lower costs and typically increase visible light in these dwellings, preserving regional vernacular architecture while still upholding energy performance.

Cost Impact: The code change proposal will not increase the cost of construction. The proposal only provides a clarification and a compliance option.

RE97-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.5-EC-SONNE

RE98 – 13

R402.6 (NEW) (IRC N1102.6 (NEW))

Proponent: Jeff Sonne, representing the Florida Solar Energy Center (jeff@fsec.ucf.edu)

Revise as follows:

R402.6 (N1102.6) Limitations to compliance by Section R402 (Prescriptive). Where Section R402 is chosen as the compliance option for the building, the restrictions in Section R402.6.1 through R402.6.3 shall apply.

R402.6.1 (N1102.6.1) Electric space heating. Electric resistance space heating systems shall not be used when complying with this code by Section R402.

Exception: The prohibition on electric resistance heat does not apply to additions, renovations and replacement heating systems installed in existing buildings.

R402.6.2 (N1102.6.2) Air handlers in attics. Air handlers shall not be installed in attics when complying with Section R402.

R402.6.3 (N1102.6.3) Maximum percent fenestration area. The area of fenestration products more than 50-percent glazed shall not exceed 15 percent of the conditioned floor area (CFA).

Exceptions:

1. For new construction the building shall be considered in compliance with Table R402.1.1 where the total *building thermal envelope* UA (sum of U-factor times assembly area) is less than or equal to the total UA resulting from using the U-factors in Table R402.1.3 multiplied by:
 - 1.1 For non-fenestration products: the same assembly area as in the proposed building.
 - 1.2 For fenestration products less than or equal to 50-percent glazed: the same assembly area as in the proposed building.
 - 1.3 For fenestration products that are greater than 50-percent glazed: the assembly area of the fenestration but not greater than 15 percent of the conditioned floor area.
2. For additions the following shall apply:
 - 2.1 Where fenestrations in an existing exterior wall are being removed or enclosed by an addition, the total fenestration area used to determine the installed fenestration percentage need not include the area of the fenestrations removed or enclosed by the addition.
 - 2.2 Additions of not greater than 600 square feet shall have a maximum of 50 percent fenestration area to conditioned floor area.
 - 2.3 Glazed fenestrations that were previously located in an existing exterior wall that is being removed or enclosed by an addition shall not be required to comply with the U-factor and solar heat gain coefficient requirements in Table R402.1.1 when reinstalled as part of the addition.

Reason: Electric space heating: During most cold spells, heat pumps can perform at twice the efficiency of electric resistance furnaces, reducing utility peak winter energy use. 2012 IECC Section R405, Table R405.5.2(1) is clear that the Standard Reference Home specification for heating systems that the "baseline" is an air source heat pump.

Attic air handler exclusion: All the heated or cooled air passes through the air handler. Locating the air handler in an attic creates a considerable summertime heat gain by conduction and by any return side air leakage for the system. Similarly, during winter nights the heated air will lose heat by conduction and any return side leakage will reduce the temperature of the air going into the system. Anyone wishing to comply with an air handler in the attic can comply with the performance method where energy modeling software applies the appropriate energy penalty for an attic location.

Maximum percent fenestration area: This limitation is consistent with the performance compliance reference and helps provide compliance method equivalence. It also provides better assurance that each new home will be able to achieve a high level of energy

performance and reduce large disparity between two minimum code compliant homes. Homes with larger fenestration area have two alternative compliance paths, either the UA alternative method defined in the exception or the performance method.

Cost Impact: The code change proposal will not increase the cost of construction.

RE98-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.6 (NEW)-EC-SONNE

RE99-13

R403.1 (IRC N1103.1), R403.1.1 (IRC N1103.1.1), R403.1.2 (IRC N1103.1.2), R403.2.1 (IRC N1103.2.1), R403.2.2 (N1103.2.2), R403.2.3 (IRC N1103.2.3), R403.2.4 (NEW) (IRC N1103.2.4 (NEW)), R403.2.2.1 (IRC N1103.2.2.1), R403.2.6 (NEW), (IRC N1103.2.6 (NEW), Table R405.2(1) (IRC Table N1105.2(1))

Proponent: Brian Dean, Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition.

Revise as follows:

R403.1 (N1103.1) Controls (Mandatory). ~~At least one thermostat shall be provided for each separate heating and cooling system.~~ Heating and cooling system controls shall comply with Sections R403.1.1 through R403.1.3.

R403.1.1 (N1103.1.1) Thermostat (Mandatory). Not less than one thermostat shall be provided for each separate heating and cooling system.

~~R403.1.1 (N1103.1.1)~~ R403.1.2 (N1103.1.2) Programmable thermostat (Mandatory). Where the primary heating system is a forced-air furnace, at least one thermostat per dwelling unit shall be capable of controlling the heating and cooling system on a daily schedule to maintain different temperature set points at different times of the day. This thermostat shall include the capability to set back or temporarily operate the system to maintain *zone* temperatures down to 55°F (13°C) or up to 85°F (29°C). The thermostat shall initially be programmed with a heating temperature set point not higher than 70°F (21°C) and a cooling temperature set point not lower than 78°F (26°C).

R403.1.2 (N1103.1.2) R403.1.3 (N1103.1.3) Heat pump supplementary heat (Mandatory). Heat pumps having supplementary electric-resistance heat shall have controls that, except during defrost, prevent supplemental heat operation when the heat pump compressor can meet the heating load.

R403.2 (N1103.2) Ducts. Ducts and air handlers shall be sealed, tested for leakage and insulated in accordance with Sections R403.2.1 through R403.2.36.

~~R403.2.1 (N1103.2.1) Insulation (Prescriptive).~~ ~~Supply ducts in attics shall be insulated to a minimum of R-8. All other ducts shall be insulated to a minimum of R-6.~~

~~Exception:~~ ~~Ducts or portions thereof located completely inside the building thermal envelope.~~

R403.2.1 (N1103.2.1) Building cavities (Mandatory). Building framing cavities shall not be used as ducts or plenums.

R403.2.2 (N1103.2.2) Sealing (Mandatory). Ducts, air handlers, and filter boxes shall be sealed. Joints and seams shall comply with either the *International Mechanical Code* or *International Residential Code*, as applicable.

Exceptions:

1. Air-impermeable spray foam products shall be permitted to be applied without additional joint seals.
2. Where a duct connection is made that is partially inaccessible, three screws or rivets shall be equally spaced on the exposed portion of the joint so as to prevent a hinge effect.

3. Continuously welded and locking-type longitudinal joints and seams in ducts operating at static pressures less than 2 inches of water column (500 Pa) pressure classification shall not require additional closure systems.

Duct tightness shall be verified by either of the following:

1. ~~Postconstruction test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.~~
2. ~~Rough-in test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the system, including the manufacturer's air handler enclosure. All registers shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 3 cfm (85 L/min) per 100 square feet (9.29 m²) of conditioned floor area.~~

~~Exception: The total leakage test is not required for ducts and air handlers located entirely within the building thermal envelope.~~

~~R403.2.3 (N1103.2.3) Building cavities (Mandatory).~~ Building framing cavities shall not be used as ducts or plenums.

R403.2.3 (N1103.2.3) Duct testing (Mandatory). The ductwork in a building or dwelling unit shall be tested for air leakage. Testing shall be conducted at the rough-in stages or post-construction. Testing for duct leakage shall be at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test. Testing shall be conducted by an *approved* third party. A written report of the results of the test shall be signed by the party conducting the test and shall be provided to the *code official*.

Exception: Ductwork air leakage testing shall not be required where all ducts and air handlers are located entirely within the *building thermal envelope*.

R403.2.4 (N1103.2.4) Duct leakage (Prescriptive). The total leakage of ducts, where measured in testing accordance with Section R403.2.3, shall meet one of the following requirements:

1. Rough-in test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area where the air handler is installed at the time of the test. Where the air handler is not installed at the time of the test, the total leakage shall be less than or equal to 3 cfm (85 L/min) per 100 square feet (9.29 m²) of conditioned floor area.

2. Postconstruction test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area.

Exception:

R403.2.2.1 (N1103.2.2.1) R403.2.5 (N1103.2.5) Sealed Air handler leakage (Mandatory). Air handlers shall have a manufacturer's designation for an air leakage of not more than 2 percent of the design air flow rate when tested in accordance with ASHRAE 193.

R403.2.6 (N1103.2.6) Insulation (Prescriptive). Supply ducts in attics shall be insulated to a *R-value* of not less than R-8. All other ducts shall be insulated to a *R-value* of not less than R-6.

Exception: Ducts or portions of ducts located completely inside the *building thermal envelope* shall not be required to be insulated.

**TABLE R405.2(1) (N1105.2(1))
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS**

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Thermal distribution systems	<p><u>For ducted thermal distribution systems, the duct leakage rate shall be in accordance with Section R403.2.4 and the duct insulation shall be in accordance with Section R403.2.6.</u></p> <p><u>For nonducted thermal distribution systems, a distribution system efficiency, DSE, of 0.88 shall be applied to both the heating and cooling system.</u></p>	Thermal distribution system efficiency shall be as tested or as specified in Table R405.5.2(2) if not tested. Duct insulation shall be as proposed.

(Portions of Table not shown remain unchanged)

Reason: The purpose of this code change is to make a number of improvements to the provisions of the code related to HVAC system controls and ducts. However, it should be noted that this proposal does not change or tighten required values for tested duct leakage, which were initially set in the 2009 *IECC* and tightened in the 2012 *IECC*. The proposed improvements include:

- Reorganize section R403.1 to clearly specify requirements for controls (no change proposed in substantive requirements for this section).
- Reorganize section R403.2 regarding duct sealing, testing and leakage requirements, including the following substantive changes:
 - Clarify that for required testing, such testing must be conducted by a code official-approved third party; and
 - Convert the duct leakage rate from a mandatory to prescriptive requirement (allowing duct leakage to be traded off under the performance path). Note that testing is still mandatory.
- Revise Table R405.5.2(1) to establish a baseline in the Standard Reference Home for duct leakage/distribution system efficiency. The baseline was incorrectly deleted in 2012.

This proposal maintains the efficiency provided by the improved duct leakage rate set in the 2012 *IECC*, and it improves the transparency and objectivity by requiring that testing be administered by a third party. This proposal also creates a practical solution for situations in which a completed duct system fails the leakage test, by allowing the duct performance shortfall to be offset by other improvements under section R405. This is an important consideration where the on-site testing requirement is already set at a tight level. As a result, this proposal adds flexibility for the builder and increased compliance at no additional energy cost. This proposal also reorganizes the subsections related to systems and ducts to add more clarity and simplicity to the code.

Cost Impact: The code change proposal will increase the cost of construction.

RE99-13

Public Hearing: Committee: AS AM D
 Assembly: ASF AMF DF

R403.1-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE.DOC

RE100-13

R403.1 (IRC N1103.1), R403.1.1 (New) (IRC N1103.1 (New)), R403.1.2 (N1103.1.2),

Proponent: Jeff Sonne, Florida Solar Energy Center representing the Florida Solar Energy Center
(jeff@fsec.ucf.edu)

Revise as follows:

R403.1 (N1103.1) Controls. (Mandatory). ~~At least one thermostat shall be provided for each separate heating and cooling system.~~ Controls for heating and cooling systems shall be in accordance with Sections R403.1.1 through R403.1.3.

R403.1.1 (N1103.1.1) Thermostat provision (Mandatory). Each separate heating and cooling system shall be provided with not less than one thermostat.

~~R403.1.1 (N1103.1.1)~~ R403.1.2 (N1103.1.2) Programmable thermostat (Prescriptive). Where the primary heating system ~~is has~~ a forced-air ~~furnace~~ distribution system, at least one thermostat per dwelling unit shall be capable of controlling the heating and cooling system on a daily schedule to maintain different temperature set points at different times of the day. This thermostat shall include the capability to set back or temporarily operate the system to maintain zone temperatures down to 55°F (13°C) or up to 85°F (29°C). The thermostat shall initially be programmed with a heating temperature set point no higher than 70°F (21°C) and a cooling temperature set point no lower than 78°F (26°C).

~~R403.1.2 (N1103.1.2)~~ R403.1.3 (N1103.1.3) Heat pump supplementary heat (Mandatory). Heat pumps having supplementary electric-resistance heat shall have controls that, except during defrost, prevent supplemental heat operation when the heat pump compressor can meet the heating load.

Reason: Although Section R403.1 Controls, is labeled as Mandatory, it is unclear whether all control requirements are. Table R405.5.2(1) specifies a manual thermostat for Section R405 (performance) compliance. The proposed language would clarify that programmable thermostats are required for prescriptive compliance by Section R402.1 (if the primary heating system is forced-air), but they are not required for Section R405 (performance) compliance (whether the primary heating system is forced-air or not). "Furnace" is replaced with "distribution system" so that forced air heat pumps are also included in this requirement.

Cost Impact: The code change proposal will not increase the cost of construction.

RE100-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.1-EC-SONNE.DOC

RE101-13

R403.1.1 (IRC N1103.1.1)

Proponent: Michael J. Early, PD&R, U.S. Department of Housing and Urban Development
(michael.j.early@hud.gov)

Revise as follows:

R403.1.1 (N1103.1.1) Programmable thermostat. Where the primary heating system is a forced air furnace, at least one thermostat per dwelling unit shall be capable of controlling the heating and cooling system on a daily schedule to maintain different temperature set points at different times of the day. The thermostat shall be located on an interior wall within the dwelling unit, in an area that is exposed to the dwelling unit's general airflow and at a location that minimizes the duration that the thermostat is exposed to direct sunlight. The thermostat shall not be in close proximity to the dwelling unit's exterior doors, exterior windows, cooking appliances, cooling appliances, supply vents and heating or cooling devices. This thermostat shall include the capability to set back or temporarily operate the system to maintain *zone* temperatures down to 55°F (13°C) or up to 85°F (29°C). The thermostat shall initially be programmed with a heating temperature set point no higher than 70°F (21°C) and a cooling temperature set point no lower than 78°F (26°C).

Reason: Providing a more prescribed location for a dwelling's thermostat will help regulate the temperature more accurately and also benefit occupants financially by expending less energy.

By positioning the thermostat in a location that avoids direct sunlight and is away from the dwelling's supply vents, devices, and applications, the number of inadvertent temperature fluctuations that the thermostat observes will decrease. In turn, by decreasing the number of fluctuations, the dwelling's heating and cooling systems will cycle on and off less frequently, thereby extending the systems' lifespan and creating more comfortable temperatures.

Cost Impact: The code change will not increase the cost of construction.

RE101-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.1.1 #1-EC-EARLY.DOC

RE102-13

R403.1.1 (IRC N1103.1.1)

Proponent: Michael J. Early, PD&R, U.S. Department of Housing and Urban Development
(michael.j.early@hud.gov)

Revise as follows:

R403.1.1 (N1103.1.1) Programmable thermostat. Where the primary heating system is a forced air furnace, at least one thermostat per dwelling unit shall be capable of controlling the heating and cooling system on a daily schedule to maintain different temperature set points at different times of the day. The thermostat shall be located not greater than 44 inches (1120 mm) above the floor. This thermostat shall include the capability to set back or temporarily operate the system to maintain zone temperatures down to 55°F (13°C) or up to 85°F (29°C). The thermostat shall initially be programmed with a heating temperature set point no higher than 70°F (21°C) and a cooling temperature set point no lower than 78°F (26°C).

Reason: Provide more reachable access for occupants with disabilities to regulate the temperature of a dwelling. Placing the thermostat at a height of not greater than 44 inches (1120 mm) from the floor is in accordance with ADA Accessibility Guidelines for Buildings and Facilities (ADAAG), and provides a convenient location for occupants to observe the dwelling's temperature conditions and make necessary adjustments. As per section 308.2.2 and 308.3.2 of ADAAG (see the following link)

(<http://www.ada.gov/regs2010/2010ADASTandards/2010ADASTandards.pdf>)

the maximum high forward and parallel reaches allowed for objects mounted on the wall above an obstruction are 44 inches (1120 mm) and 46 inches (1170 mm), respectively.

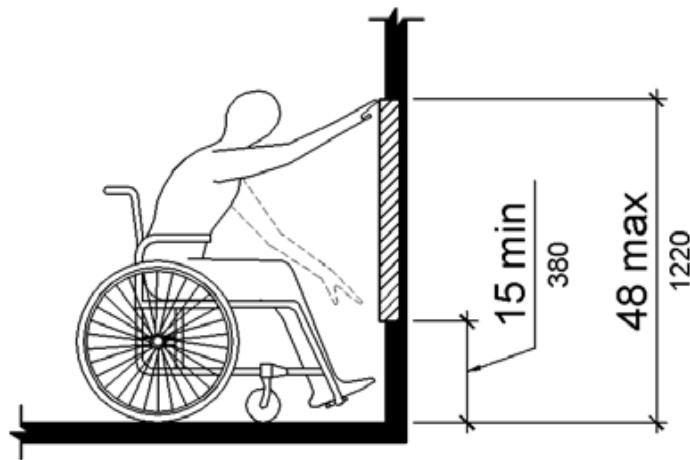


Figure 308.2.1
Unobstructed Forward Reach

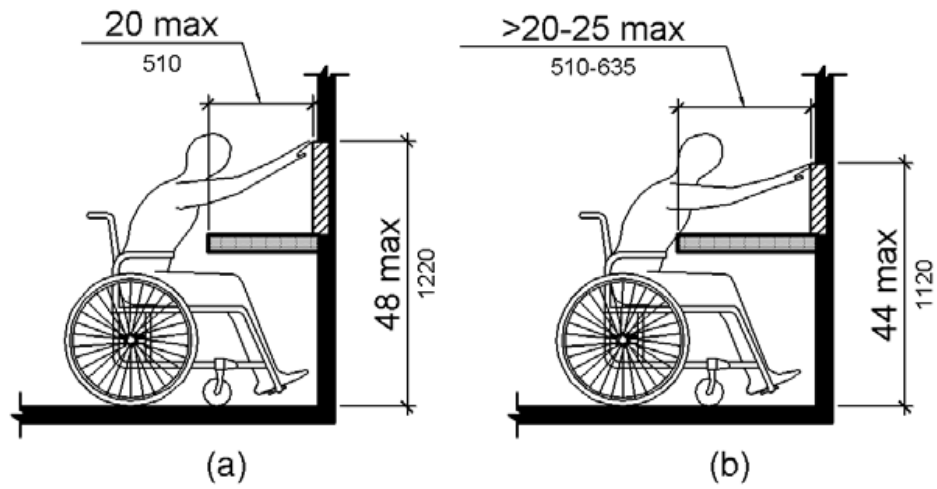


Figure 308.2.2
Obstructed High Forward Reach

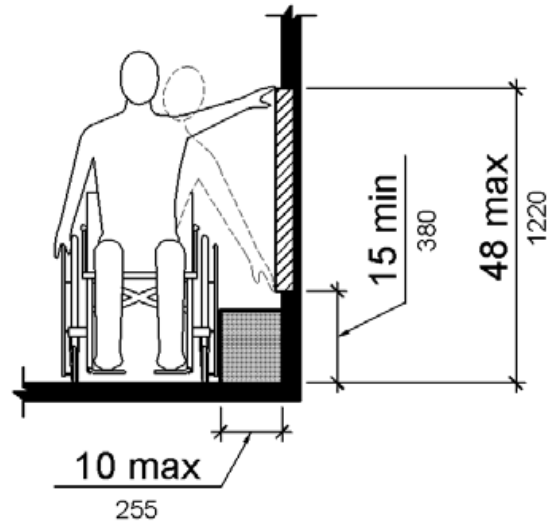


Figure 308.3.1
Unobstructed Side Reach

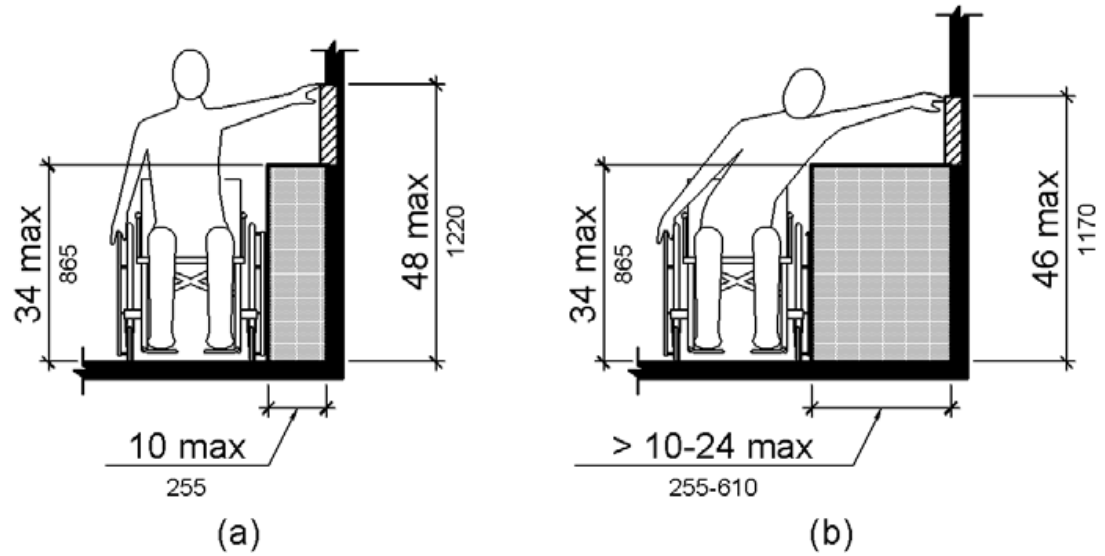


Figure 308.3.2
Obstructed High Side Reach

Cost Impact: The code change will not increase the cost of construction.

RE102-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R403.1.1 #2-EC-EARLY.DOC

RE103-13

R403.1.1 (IRC N1103.1.1)

Proponent: Dr. Thomas D. Culp, Birch Point Consulting LLC, representing self
(culp@birchpointconsulting.com)

Revise as follows:

R403.1.1 (N1103.1.1) Programmable thermostat. Where the primary heating system is a forced-air furnace, at least one thermostat per dwelling unit shall be capable of controlling the heating and cooling system on a daily schedule to maintain different temperature set points at different times of the day. This thermostat shall include the capability to set back or temporarily operate the system to maintain *zone* temperatures down to 55°F (13°C) or up to 85°F (29°C). The thermostat shall initially be programmed by the manufacturer with a heating temperature set point no higher than 70°F (21°C) and a cooling temperature set point no lower than 78°F (26°C).

Reason: When this requirement was added to the 2009 IECC, the last sentence about initial programmed set points was really intended for manufacturer design, so that the thermostat would be ready to go “out of the box”. However, there have been reports that this sentence adds extra compliance work for code officials who have to spend time checking and in some cases programming the thermostat set points. This proposal clarifies that this requirement is the manufacturer's responsibility, so that ultimately all thermostats on the market will come already in compliance with this section.

Cost Impact: None, or possible decrease in compliance time / costs.

RE103-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.1.1 -EC-CULP.DOC

RE104-13

R403.1.1 (IRC N1103.1.1)

Proponent: Craig Conner, Building Quality representing self (craig.conner@mac.com)

Delete without substitution:

R403.1.1 (N1103.1.1) Programmable thermostat. Where the primary heating system is a forced-air furnace, at least one thermostat per dwelling unit shall be capable of controlling the heating and cooling system on a daily schedule to maintain different temperature set points at different times of the day. This thermostat shall include the capability to set back or temporarily operate the system to maintain zone temperatures down to 55°F (13°C) or up to 85°F (29°C). The thermostat shall initially be programmed with a heating temperature set point no higher than 70°F (21°C) and a cooling temperature set point no lower than 78°F (26°C).

Reason: Research shows programmable thermostats don't save energy. Multiple studies of actual use show that those with and without programmable thermostats setback with about equal frequency and have about the same average house temperature. Turns out people without setback thermostats often setback manually, and some people with setback thermostats do not use them. The IECC should not include requirements that don't save energy.

Energy Star acknowledged the lack of impact by removing programmable thermostats. "*The ENERGY STAR specification for programmable thermostats was suspended on December 31, 2009 and the ENERGY STAR label is no longer available for this category.*" http://www.energystar.gov/index.cfm?c=archives.thermostats_spec

The thermostat required by this section differs from the thermostat specified in the performance calculation in Table R405.5.2(1).

References:

"An Unexpected Setback for Programmable Thermostats" *Energy Design Update* (11/2000). Monic Nevuis, Wisconsin Energy Center.

"Surprise! There Are People Inside Those Buildings" *Energy Design Update* (1/2001). Craig Conner and Robert Lucas, Pacific Northwest National Laboratory.

"Automatic Setback Thermostats: Measure Persistence and Customer Behavior" *Proceedings of the 1997 International Energy Program Evaluation Conference, Chicago, August 27-29, 1997. David Cross and David Judd.*

Cost Impact: The code change proposal will not increase the cost of construction.

RE104-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.1.1-EC-CONNER.DOC

RE105-13

R403.1.1 (IRC N1103.1.1)

Proponent: Ellen Eggerton, representing Virginia Building and Code Officials Association

Revise as follows:

R403.1.1 (N1103.1.1) Programmable thermostat. ~~Where the primary heating system is a forced air furnace, at least one thermostat per~~ The thermostat controlling the primary heating or cooling system of the dwelling unit shall be capable of controlling the heating and cooling system on a daily schedule to maintain different temperature set points at different times of the day. This thermostat shall include the capability to set back or temporarily operate the system to maintain *zone* temperatures down to 55°F (13°C) or up to 85°F (29°C). The thermostat shall initially be programmed with a heating temperature set point no higher than 70°F (21°C) and a cooling temperature set point no lower than 78°F (26°C).

Reason: This suggested change recognizes that forced air heating and air conditioning systems are not the only systems that may benefit from programmable thermostats. Hydronic, radiant electric, and solar thermal systems could also be programmed for night or "unoccupied" setback periods. The proposal concurrently clarifies that the primary heating or cooling system, at minimum, is the system that should receive the programmable thermostat. This clarification is necessary for those residential dwelling units that have multiple systems; e.g., first floor / second floor forced air systems, or radiant electric systems with thermostats in each room. Which system must have a programmable thermostat? It is the "primary" system, typically the one serving the largest area of the dwelling, but subject to reasonable interpretation by the Building Official. Impact of this proposal may be to reduce installation of unnecessary programmable thermostats in multiple H/AC systems.

Cost Impact: If the non-forced air system would otherwise have a non-programmable thermostat installed, then this proposal will increase the cost of construction. However, programmable thermostats are becoming more standard in the marketplace for new residential construction, so the cost impact is effectively zero. Cost differentials when purchasing a programmable vs. non-programmable thermostat are minimal.

RE105-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.1.1-EC-EGGERTON.DOC

RE106-13

R403.1.2 (IRC N1103.1.2)

Proponent: Eric Makela / Britt/Makela Group, Inc./ representing Northwest Energy Codes Group
Eric@BrittMakela.com

Revise as follows:

R403.1.2 (N1103.1.2) Heat pump supplementary heat (Mandatory). Heat pumps having supplementary electric-resistance heat shall have controls that, except during defrost, prevent supplemental heat operation when the heat pump compressor can meet the heating load. Unitary air cooled heat pumps shall include controls that minimize supplemental heat usage during start-up, set-up and defrost conditions. The controls shall anticipate need for heat and use compression heating as the first stage of heat. The controls shall indicate when supplemental heating is being used through visual means such as a light emitting diode indicator. Heat pumps equipped with supplementary heaters shall be installed with controls that prevent supplemental heater operation at outdoor temperatures greater than 40°F (4.4 °C). The auxiliary heat lock out control shall be set at 35°F (1.7°C) or less at final inspection.

Reason: The current language in the 2012 IECC requiring heat pump thermostats that is fairly general. The language requires a thermostat for heat pumps and includes language that outlines the general intent of the control but does not provide the level of detail needed to enforce the provision. The proposed language provides guidance on what to inspect for to determine if the supplemental heat is on. The proposed language also provides a temperature setpoint for when the supplemental heat is allowed to come on to satisfy the load (40°F). The existing language states that the control must prevent supplemental heat operation when the heat pump can meet the heating load but without a specific temperature threshold the provision is unenforceable. The proposed language is from the Washington State Residential Energy Code and has been field tested.

Cost Impact: The code change proposal will not increase the cost of construction.

RE106-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.1.2-EC-MAKELA.DOC

RE107-13

R403.2.1 (IRC N1103.2.1)

Proponent: Shaunna Mozingo, City of Cherry Hills Village, representing Colorado Chapter of ICC, Inc.
smozingo@coloradocode.net

Revise as follows:

R403.2.1 (N1103.2.1) Insulation (Prescriptive). Supply and return ducts in attics shall be insulated to a minimum of R-8. ~~All other ducts~~ Supply and return ducts in other portions of the building shall be insulated to a minimum of R-6.

Exception: Ducts or portions thereof located completely inside the building thermal envelope.

Reason: The requirement as written is commonly misinterpreted to say that all supply ducts in attics are insulated to R-8 and all other ducts in attics, including bathroom exhausts, returns, etc are insulated to R-6 when in fact, the intent was that the supply ducts in attics get R-8 and the supplies in other unconditioned spaces in the building, such as garages, ventilated crawl spaces, etc, get R-6. Also, the ducts should not be limited to supplies but should include return ducts as well. This intent is called out much more clearly in the commercial section of the code.

Cost Impact: The code change proposal will not increase the cost of construction.

RE107-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.2.1-EC-MOZINGO.DOC

RE108-13

R403.2.1 (IRC N1103.2.1)

Proponent: Michael Schmeida, Divisional Manager- Sustainability and Government/Regulatory Affairs;
Tremco Commercial Sealants and Waterproofing, Beachwood, Ohio (mschmeida@tremcoinc.com)

Revise as follows:

R403.2.1 (N1103.2.1) Insulation (Prescriptive). Supply ducts in attics shall be insulated to a minimum of R-8. All other ducts shall be insulated to a minimum of R-6.

Exception: ~~Ducts or portions thereof located completely inside the *building thermal envelope*.~~

Reason: The loss of heating or cooling through uninsulated ducts, while not an energy loss to the outside of the thermal envelope, can result in extra run time of HVAC equipment to compensate for air of the proper/intended temperature not reaching the desired occupied areas.

Cost Impact: The cost impact would be <\$1000 depending on design. ROI is not determined at this time.

RE108-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.2.1-EC-SCHMEIDA.DOC

RE109-13

R403.2 (IRC N1103.2), R403.2.2 (IRC N1103.2.2), R403.2.3 (NEW) (IRC N1103.2.3 (NEW)), R403.2.4 (NEW) (IRC N1103.2.4 (NEW))

Proponent: Craig Conner, Building Quality representing self (craig.conner@mac.com)

Revise as follows:

R403.2 (N1103.2) Ducts. Ducts and air handlers shall be in accordance with Sections R403.2.1 through ~~R403.2.3~~ R403.2.5.

R403.2.2 (N1103.2.2) Sealing (Mandatory). Ducts, air handlers, and filter boxes shall be sealed. Joints and seams shall comply with either the International Mechanical Code or International Residential Code, as applicable.

Exceptions:

1. Air-impermeable spray foam products shall be permitted to be applied without additional joint seals.
2. Where a duct connection is made that is partially inaccessible, three screws or rivets shall be equally spaced on the exposed portion of the joint so as to prevent a hinge effect.
3. Continuously welded and locking-type longitudinal joints and seams in ducts operating at static pressures less than 2 inches of water column (500 Pa) pressure classification shall not require additional closure systems.

~~Duct tightness shall be verified by either of the following:~~

- ~~1. Postconstruction test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.~~
- ~~2. Rough-in test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the system, including the manufacturer's air handler enclosure. All registers shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 3 cfm (85 L/min) per 100 square feet (9.29 m²) of conditioned floor area.~~

~~**Exception:** The total leakage test is not required for ducts and air handlers located entirely within the building thermal envelope.~~

R403.2.3 (N1103.2.3) Duct testing (Mandatory). Ducts shall be pressure tested to determine air leakage by one of the following methods:

1. Postconstruction test: Total leakage shall be measured with a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.
2. Rough-in test: Total leakage shall be measured with a pressure differential of 0.1 inches w.g. (25 Pa) across the system, including the manufacturer's air handler enclosure if installed at the time of the test. All registers shall be taped or otherwise sealed during the test.

Exception: A duct air leakage test shall not be required where the ducts and air handlers are located entirely within the building thermal envelope.

A written report of the results of the test shall be signed by the party conducting the test and provided to the code official.

R403.2.4 (N1103.2.4) Duct leakage (Prescriptive). The total leakage of the ducts, where measured in accordance with Section R403.2.3, shall be as follows:

1. Postconstruction test: The total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area.

2. Rough-in test: The total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area where the air handler is installed at the time of the test. Where the air handler is not installed at the time of the test, the total leakage shall be less than or equal to 3 cfm (85 L/min) per 100 square feet (9.29 m²) of conditioned floor area.

~~R403.2.3~~ R403.2.5 (N1103.2.3 N1103.2.5) Building cavities (Mandatory). Building framing cavities shall not be used as ducts or plenums.

Reason: This is exactly the online draft DOE posted. DOE put it well in their reason statement as posted online with the change above:

"The proposal simply changes the duct leakage requirements from mandatory to prescriptive, while retaining the testing requirement and duct construction specifications. Changing the duct leakage rate from mandatory to prescriptive will allow builders the option of trading improvements in other building components for less stringent pressure test results or vice versa. This provides flexibility in meeting the requirements and options for recovering from an unexpected test failure. "

Cost Impact: The code change proposal will not increase the cost of construction.

RE109-12

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.2.2-EC-CONNER.DOC

RE110-13

R403.2.2 (IRC N1103.2.2)

Proponent: Amanda Hickman, InterCode Inc. representing DuctMate Industries
(amanda@intercodeinc.com)

Revise as follows:

R403.2.2 (N1103.2.2) Sealing (Mandatory). Ducts, air handlers, and filter boxes shall be sealed. Joints and seams shall comply with either the *International Mechanical Code* or *International Residential Code*, as applicable.

Exceptions:

1. Air-impermeable spray foam products shall be permitted to be applied without additional joint seals.
2. Where a duct connection is made that is partially inaccessible, three screws or rivets shall be equally spaced on the exposed portion of the joint so as to prevent a hinge effect.
3. ~~Continuously welded and locking-type longitudinal joints and seams in ducts operating at static pressures less than 2 inches of water column (500 Pa) pressure classification shall not require additional closure systems.~~

Duct tightness shall be verified by either of the following:

1. Postconstruction test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.
2. Rough-in test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the system, including the manufacturer's air handler enclosure. All registers shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 3 cfm (85 L/min) per 100 square feet (9.29 m²) of conditioned floor area.

Exception: The total leakage test is not required for ducts and air handlers located entirely within the building thermal envelope.

Reason: The requirements for low pressure duct sealing were clarified in the International Mechanical Code in M151-12 (proposed by the PMG Code Action Committee). M151-12 was approved by the voting membership in Portland for the 2015 IMC.

Currently, low pressure duct sealing is addressed in the IMC, two places in the IECC, and in the IRC. Identical language in the IECC is not necessary since it defers to the IMC and the IRC (for residential mechanical).

If the code sections in the IMC, IRC, and IECC are not maintained cycle after cycle, inconsistencies can develop between the sections. It is more efficient to simply eliminate the sections altogether in the IECC since they are redundant.

A similar proposal is being submitted to the 2015 IECC Commercial chapter for consistency.

Cost Impact: The code change proposal will not increase the cost of construction.

RE110-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.2.2-EC-HICKMAN.DOC

RE111-13

R403.2.2 (IRC N1103.2.2)

Proponent: Vickie Lovell InterCode Inc. representing DuctMate Industries (vickie@intercodeinc.com)

Revise as follows:

R403.2.2 (N1103.2.2) Sealing (Mandatory). Ducts, air handlers, and filter boxes shall be sealed. Joints and seams shall comply with either the *International Mechanical Code* or *International Residential Code*, as applicable.

Exceptions:

1. Air-impermeable spray foam products shall be permitted to be applied without additional joint seals.
2. Where a duct connection is made that is partially inaccessible, three screws or rivets shall be equally spaced on the exposed portion of the joint so as to prevent a hinge effect.
3. ~~Continuously welded and locking-type longitudinal joints and seams in ducts operating at static pressures less than 2 inches of water column (500 Pa) pressure classification shall not require additional closure systems.~~ For ducts having a static pressure classification of less than 2 inches of water column (500 Pa), additional closure systems shall not be required for continuously welded joints and seams, and locking-type joints and seams of other than the snap-lock and button-lock types.

Duct tightness shall be verified by either of the following:

1. Postconstruction test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.
2. Rough-in test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the system, including the manufacturer's air handler enclosure. All registers shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 3 cfm (85 L/min) per 100 square feet (9.29 m²) of conditioned floor area.

Exception: The total leakage test is not required for ducts and air handlers located entirely within the building thermal envelope.

Reason: This proposed text is derived from a revision to the International Mechanical Code that was proposed by the PMG Code Action Committee in M151-12 and was approved by the voting membership in Portland for the 2015 IMC. That reason statement is supplied below:

"Unless sealant or a gasket is used, snap-lock and button-lock type seams will leak significantly. The current exception attempted to prevent unnecessary sealing for joints and seams that leak very little or not at all, but it went too far by including all locking type joints and seams. Some locking joints are leakproof such as mechanically folded seams used for spiral seam duct, but this cannot be said for all locking joints."

The identical proposal is being submitted to the 2015 IECC commercial requirements for consistency.

Cost Impact: The code change proposal will not increase the cost of construction.

RE111-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.2.2-EC-LOVELL.DOC

RE112-13

R403.2.2 (IRC N1103.2.2)

Proponent: Eric Makela / Britt/Makela Group, Inc./ representing Northwest Energy Codes Group
(Eric@BrittMakela.com)

Revise as follows:

R403.2.2 (N1103.2.2) Sealing (Mandatory). Ducts, air handlers, and filter boxes shall be sealed. Joints and seams shall comply with either the *International Mechanical Code* or *International Residential Code*, as applicable.

Exceptions:

1. Air-impermeable spray foam products shall be permitted to be applied without additional joint seals.
2. Where a duct connection is made that is partially inaccessible, three screws or rivets shall be equally spaced on the exposed portion of the joint so as to prevent a hinge effect.
3. Continuously welded and locking-type longitudinal joints and seams in ducts operating at static pressures less than 2 inches of water column (500Pa) pressure classification shall not require additional closure systems.

Duct tightness shall be verified by either of the following:

1. Postconstruction test: Leakage to outdoors shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area or total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.
2. Rough-in test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the system, including the manufacturer's air handler enclosure. All registers shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 3 cfm (85 L/min) per 100 square feet (9.29 m²) of conditioned floor area.

Exception: The total leakage test is not required for ducts and air handlers located entirely within the building thermal envelope.

Reason: Allowing for duct leakage to the outside will give both HVAC installers and homeowners an accurate measurement of duct leaks to the exterior of the building. Duct leakage to the outdoors is an accepted duct testing method in the industry and was allowed under Section 403.2.2 of the 2009 IECC. The proposed leakage rate is set at 4 cfm per 100 square feet of conditioned floor area which consistent with the 2012 requirements for total duct leakage.

Cost Impact: The code change proposal will not increase the cost of construction.

RE112-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.2.2-EC-MAKELA.DOC

RE113-13

R403.2.2 (IRC N1103.2.2)

Proponent: Michael Schmeida, Divisional Manager- Sustainability and Government/Regulatory Affairs, representing Tremco Commercial Sealants and Waterproofing, Beachwood, Ohio (mschmeida@tremcoinc.com)

Revise as follows:

R403.2.2 (N1103.2.2) Sealing (Mandatory). Ducts, air handlers, and filter boxes shall be sealed. Joints and seams shall comply with either the *International Mechanical Code* or *International Residential Code*, as applicable.

Exceptions:

1. Air-impermeable spray foam products shall be permitted to be applied without additional joint seals.
2. Where a duct connection is made that is partially inaccessible, three screws or rivets shall be equally spaced on the exposed portion of the joint so as to prevent a hinge effect.
3. Continuously welded and locking-type longitudinal joints and seams in ducts operating at static pressures less than 2 inches of water column (500 Pa) pressure classification shall not require additional closure systems.

Duct tightness shall be verified by either of the following:

1. Postconstruction test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.
2. Rough-in test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the system, including the manufacturer's air handler enclosure. All registers shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 3 cfm (85 L/min) per 100 square feet (9.29 m²) of conditioned floor area.

Exception: ~~The total leakage test is not required for ducts or air handlers located entirely within the building thermal envelope.~~

Reason: The loss of heating or cooling through improperly sealed ducts, while not an energy loss to the outside of the thermal envelope, can result in extra run time of HVAC equipment to compensate for air of the proper/intended temperature not reaching the desired occupied areas.

Cost Impact: The cost impact would be <\$1000 depending on design. ROI is variable depending on climate, design, etc., but is estimated in many studies at 1 -2 years.

RE113-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.2.2-EC-SCHMEIDA.DOC

RE114-13

R403.2.2 (IRC N1103.2.2), Chapter 5

Proponent: Jeff Sonne, Florida Solar Energy Center representing the Florida Solar Energy Center
(jeff@fsec.ucf.edu)

Revise as follows:

R403.2.2 (N1103.2.2) Sealing (Mandatory). Ducts, air handlers, and filter boxes shall be sealed. Joints and seams shall comply with either the *International Mechanical Code* or *International Residential Code*, as applicable.

Exceptions:

1. Air-impermeable spray foam products shall be permitted to be applied without additional joint seals.
2. Where a duct connection is made that is partially inaccessible, three screws or rivets shall be equally spaced on the exposed portion of the joint so as to prevent a hinge effect.
3. Continuously welded and locking-type longitudinal joints and seams in ducts operating at static pressures less than 2 inches of water column (500 Pa) pressure classification shall not require additional closure systems.

Duct tightness shall be verified by testing in accordance with Section 803 of the RESNET Standards. The allowable leakage shall be one ~~by either~~ of the following:

1. Postconstruction test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.
2. Rough-in test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the system, including the manufacturer's air handler enclosure. All registers shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 3 cfm (85 L/min) per 100 square feet (9.29 m²) of conditioned floor area.

Exception: The total leakage test is not required for ducts and air handlers located entirely within the building thermal envelope.

Add new standard to Chapter 5 (IRC Chapter 44) as follows:

RESNET Residential Energy Services Network, Inc.
P.O. Box 4561
Oceanside, CA 92052-4561

RESNET Standards-2013 RESNET Mortgage Industry National Home Energy Rating Standards.

Reason: RESNET Section 803 is the only standard available that addresses single-point testing, including error analysis, and that does not require both pressurization and depressurization testing to meet the standard.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standards proposed for inclusion in the code, RESNET Standards, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

RE114-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R403.2.2-EC-SONNE.DOC

RE115-13

R403.2.2 (IRC N1103.2.2), R403.2.2.1 (NEW) (IRC N1103.2.2.1 (NEW)), R403.2.2.2 (NEW) (IRC N1103.2.2.2 (NEW)), R403.2.2.3 (NEW) (IRC N1103.2.2.3 (NEW))

Proponent: Don Surrena, CBO, National Association of Home Builders (NAHB) (dsurrena@nahb.org)

Revise as follows:

R403.2.2 (N1103.2.2) Sealing (Mandatory). Ducts, air handlers, and filter boxes shall be sealed and tested in accordance with Sections R403.2.2.1 through R403.2.1.3. ~~Joins and seams shall comply with either the International Mechanical Code or International Residential Code, as applicable.~~

Exceptions:

- ~~1. Air impermeable spray foam products shall be permitted to be applied without additional joint seals.~~
- ~~2. Where a duct connection is made that is partially inaccessible, three screws or rivets shall be equally spaced on the exposed portion of the joint so as to prevent a hinge effect.~~
- ~~3. Continuously welded and locking-type longitudinal joints and seams in ducts operating at static pressures less than 2 inches of water column (500 Pa) pressure classification shall not require additional closure systems.~~

~~Duct tightness shall be verified by either of the following:~~

- ~~1. Postconstruction test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.~~
- ~~2. Rough-in test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the system, including the manufacturer's air handler enclosure. All registers shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 3 cfm (85 L/min) per 100 square feet (9.29 m²) of conditioned floor area.~~

Exception: The total leakage test is not required for ducts and air handlers located entirely within the building thermal envelope.

R403.2.2.1 (N1103.2.2.1) Construction (Mandatory). Ducts, air handlers, and filter boxes shall be sealed. Joints and seams shall comply with either the *International Mechanical Code* or *International Residential Code*, as applicable.

Exceptions:

1. Where air-impermeable spray foam products are applied to ducts, air handlers and filter boxes, joints and seams covered by such products shall not be required to be sealed in accordance with *International Mechanical Code* and *International Residential Code*.
2. Where a duct connection is made that is partially inaccessible and three screws or rivets, equally spaced, are installed on the exposed portion of the joint, the joint shall not be required to comply with the duct connection mechanical fastening requirement of the *International Mechanical Code* and *International Residential Code*.

3. Continuously welded and locking-type longitudinal joints and seams in ducts that, in operation, have a static pressure of less than 2 inches of water column (500 Pa), shall not require additional closure systems.

R403.2.2.2 (N1103.2.2.2) Duct testing (Mandatory). Ductwork systems shall be tested for air leakage by one of the following methods:

1. Postconstruction test: The total leakage of the ductwork systems shall be measured when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.
2. Rough-in test: The total leakage of the ductwork systems shall be measured when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the system, including the manufacturer's air handler enclosure where present at the time of the test. All registers shall be taped or otherwise sealed during the test.

Exception: Ductwork leakage tests shall not be required for ducts and air handlers located entirely within the building thermal envelope.

A written report of the results of the test shall be signed by the party conducting the test and provided to the code official.

R403.2.2.3 (N1103.2.2.3) Duct leakage (Prescriptive). The total leakage of the ductwork, when tested in accordance with Section R403.2.2.2, shall be as follows:

1. Postconstruction test: The total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area.
2. Rough-in test: The total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area where the air handler is present at the time of the test or where the air handler is not present at the time of the test, 3 cfm (85 L/min) per 100 square feet (9.29 m²) of conditioned floor area.

Exceptions: The total leakage from ductwork and air handlers located entirely within the building thermal envelope shall be unlimited.

Reason: These modifications remove the mandatory maximum air tightness requirement and provide designers and builders the flexibility to trade-off duct tightness with other performance path measures when using the performance path. Currently the duct tightness requirements are mandatory and even under ideal circumstances, difficult to achieve. This will provide energy neutral trade-offs for expensive and sometimes unattainable requirements with other building improvements. This proposal does not change the stringency of the code it only increases the flexibility.

Cost Impact: The code change proposal will not increase the cost of construction.

RE115-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R403.2.2 #1-EC-SURRENA.DOC

RE116-13

R403.2.2 (IRC N1103.2.2), Table R405.5.2(1) (IRC Table N1105.5.2(1))

Proponent: Don Surrena, CBO, National Association of Home Builders (NAHB) (dsurrena@nahb.org)

Revise as follows:

R403.2.2 (N1103.2.2) Sealing (Mandatory). Ducts, air handlers, and filter boxes shall be sealed. Joints and seams shall comply with either the *International Mechanical Code* or *International Residential Code*, as applicable.

Exceptions:

1. Air-impermeable spray foam products shall be permitted to be applied without additional joint seals.
2. Where a duct connection is made that is partially inaccessible, three screws or rivets shall be equally spaced on the exposed portion of the joint so as to prevent a hinge effect.
3. Continuously welded and locking-type longitudinal joints and seams in ducts operating at static pressures less than 2 inches of water column (500 Pa) pressure classification shall not require additional closure systems.

Duct tightness shall be verified by either of the following:

1. Postconstruction test: ~~Total Leakage to the outside of a conditioned space or total leakage~~ shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All registers ~~boots~~ shall be taped or otherwise sealed during the test.
2. Rough-in test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the system, including the manufacturer's air handler enclosure. All registers shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 3 cfm (85 L/min) per 100 square feet (9.29 m²) of conditioned floor area.

Exception: The total leakage test is not required for ducts and air handlers located entirely within the building thermal envelope.

**TABLE R405.5.2(1) (N1105.5.2(1))
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS**

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Thermal distribution systems	<p>Thermal distribution system efficiency shall be as tested or as specified in Table R405.5.2(2) if not tested. Duct insulation shall be as proposed.</p> <p><u>Untested distribution systems: DSE = 0.88</u></p> <p><u>Tested Ducts: Leakage rate to outside conditioned space as specified Section R403.2.2(1)</u></p> <p><u>Tested duct Location: Unconditioned attic</u></p> <p><u>Tested duct Insulation: in accordance with Section R403.2.1</u></p>	<p>Thermal distribution system efficiency shall be as tested or as specified in Table R405.5.2(2) if not tested. Duct insulation shall be as proposed.</p> <p><u>Untested distribution systems: DSE from Table R405.5.2(2)</u></p> <p><u>Tested Ducts: Tested Leakage rate to outside conditioned space</u></p> <p><u>Duct Location: As proposed</u></p> <p><u>Duct Insulation: As proposed</u></p>

Reason: Currently there is no guidance in Table R405.5.2(1) on how to model ducts for the Standard Reference Design when performing a simulated energy performance calculation. Consequently, systems which perform better than the code minimum are not recognized in the performance analysis. Proposed changes provide clarity as to what distribution system efficiency should be applied to the Standard Reference Design and how the ducts should be modeled in the performance path.

The default distribution system efficiency (DSE) is set to 0.88 for untested systems in the standard reference design, which is the established default for ducts located in conditioned space. If ductless or hydronic systems are used, a recognized benefit will result in the performance model.

When a duct system is tested, the standard reference tightness is defined in section R403.2.2(1) (4cfm/100ft² of CFA). Buildings with ducts tighter than the 4cfm/100ft² will get credit for performing better than the minimum requirement. In addition, the manufacturers of the modeling software will have clear definition how to model the Standard Reference Design including duct placement and insulation level.

Changes in section R403.2.2 make it clear that postconstruction duct testing can be tested to either outside conditioned space or total duct leakage, as determined by the contractor.

Cost Impact: The code change proposal will not increase the cost of construction.

RE116-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R403.2.2 #2-EC-SURRENA.DOC

RE117-13

R403.2.2 (IRC N1103.2.2)

Proponent: Donald J. Vigneau, AIA, Northeast Energy Efficiency Partnerships, Inc. (NEEP)
(dvigneau@neep.org)

Revise as follows:

R403.2.2 (N1103.2.2) Sealing (Mandatory). Ducts, air handlers, and filter boxes shall be sealed. Joints and seams shall comply with either the International Mechanical Code or International Residential Code, as applicable.

Exceptions:

1. Air-impermeable spray foam products shall be permitted to be applied without additional joint seals.
2. Where a duct connection is made that is partially inaccessible, three screws or rivets shall be equally spaced on the exposed portion of the joint so as to prevent a hinge effect.
3. Continuously welded and locking-type longitudinal seams in ducts operating at a static pressure less than 2 inches of water column (500 Pa) pressure classification shall not require additional closure systems.

Duct tightness shall be verified by either of the following options:

- ~~1.~~ 2. Rough-in test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handling enclosure. All register boots shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 3 cfm per 100 square feet (9.29 m²) of conditioned floor area.
- ~~2.~~ 4. Post-construction test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handling enclosure. All register boots shall be taped or otherwise sealed during the test.

Exception: The total leakage test is not required for ducts and air handlers located entirely within the building thermal envelope.

Reason: Reversing the order of the required testing options places the first option in a preferential position, to lead the user in selection of these required test options. Rough-in testing is the optimum time for the test, as it allows maximum opportunity to inspect the duct sealing, identify and rectify leaks in the sealed joints, and allow for inspections when the completeness of the ductwork assembly can be verified and before concealed spaces are closed in. The remaining openings for terminals and connections can readily be checked at building appliance and equipment installation inspections customarily accomplished shortly before a final inspection.

Reversing the order increases the probability that problems in the duct sealing not only can be more easily found, but also corrected at the best possible time for easy access and reduced costs for the corrections. No revisions to the existing options text is required; only re-numbering.

Note: This is the second code change proposal submitted on the same code section. Each submittal covers different subsections of the code section requirements and the two proposals are not related.

Cost Impact: The code change proposal will not increase the cost of construction.

RE117-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.2.2 #2-EC-VIGNEAU.DOC

RE118-13

R403.2.2 (IRC N1103.2.2)

Proponent: Donald J. Vigneau, AIA, Northeast Energy Efficiency Partnerships, Inc. (NEEP)
(dvigneau@neep.org)

Revise as follows:

R403.2.2 (N1103.2.2) Sealing (Mandatory). Ducts, air handlers, and filter boxes shall be sealed. Joints and seams shall comply with either the International Mechanical Code or International Residential Code, as applicable.

Exceptions:

1. Air-impermeable spray foam products shall be permitted to be applied without additional joint seals.
2. Where a duct connection is made that is partially inaccessible, three screws or rivets shall be equally spaced on the exposed portion of the joint so as to prevent a hinge effect.
3. Continuously welded and locking-type longitudinal seams in ducts operating at a static pressure less than 2 inches of water column (500 Pa) pressure classification shall not require additional closure systems.

Duct tightness shall be verified by either of the following options:

1. 2. Rough-in test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handling enclosure. All register boots shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 3 cfm per 100 square feet (9.29 m²) of conditioned floor area.
2. 4. Post-construction test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handling enclosure. All register boots shall be taped or otherwise sealed during the test.

Exception: The total leakage test is not required for ducts and air handlers located entirely within the building thermal envelope.

Reason: Reversing the order of the required testing options places the first option in a preferential position, to lead the user in selection of these required test options. Rough-in testing is the optimum time for the test, as it allows maximum opportunity to inspect the duct sealing, identify and rectify leaks in the sealed joints, and allow for inspections when the completeness of the ductwork assembly can be verified and before concealed spaces are closed in. The remaining openings for terminals and connections can readily be checked at building appliance and equipment installation inspections customarily accomplished shortly before a final inspection.

Reversing the order increases the probability that problems in the duct sealing not only can be more easily found, but also corrected at the best possible time for easy access and reduced costs for the corrections. No revisions to the existing options text is required; only re-numbering.

Note: This is the second code change proposal submitted on the same code section. Each submittal covers different subsections of the code section requirements and the two proposals are not related.

Cost Impact: The code change proposal will not increase the cost of construction.

RE11813

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.2.2 #2-EC-VIGNEAU.DOC

RE119-13

R403.2.3 (IRC N1103.2.3)

Proponent: Dan Buuck, National Association of Home Builders (NAHB) (dbuuck@nahb.org)

Revise as follows:

R403.2.3 (N1103.2.3) Building cavities (Mandatory). Building framing cavities shall not be used as ducts ~~or plenums~~.

Reason: Right now we have a conflict between this section and the IMC and IRC, both of which allow plenums in stud cavities and joist spaces. There is also an apparent conflict within the IECC: It currently allows stud cavity and joist space plenums in residential occupancies more than three stories in height along with all other commercial buildings.

The general prohibition of plenums has also lost its effectiveness in regards to energy savings. When it was approved for the IECC, using stud spaces in exterior walls as plenums was still allowed. That it is now prohibited (see IRC M1601.1.1), so heat loss is not an issue.

During the Group A hearings a proposal to prohibit plenums in the IMC was not successful. The PMG CAC considered this conflict and decided not to support a proposal that would remove language in the IRC that provides guidance on the safe construction of plenums. This would have put the IRC in conflict with the IMC. States are also removing plenums from this section of the IECC as they adopt the 2012 version.

Cost Impact: The code change proposal will not increase the cost of construction.

RE119-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.2.3-BUUCK.DOC

RE120-13

R403.2.3 (IRC N1103.2.3)

Proponent: Brenda A. Thompson, Clark County Building Department, Las Vegas NV, representing the ICC Sustainability, Energy & High Performance Code Action Committee (SEHPCAC)

Revise as follows:

R403.2.3 (N1103.2.3) Building cavities (Mandatory). Building framing cavities in the building thermal envelope shall not be used as ducts or plenums.

Reason: This proposal is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

This proposal revises Section R403.2.3 to align with the requirements of Section M1601.1.1 of the IRC and Section 602.3 of the IMC, which prohibit building framing cavities in exterior walls to be used as ducts or plenums, but allow framing cavities in interior walls to be used as ducts or plenums. As currently configured these code sections conflict with one another and make enforcement confusing and difficult.

The current language in Section R403.2.2 of the IECC does not allow building cavities in interior walls or floors to be used as ducts. While this section would not prevent such interior walls or floors to be used as ducts or plenums, Section 602.3 of the IMC and Section M1601.1.1 prohibit their use as supply ducts. Therefore, these interior wall and floor building cavities would ultimately be permitted to be used only as return ducts.

Note that the IECC defines *building thermal envelope* as "The *basement walls*, *exterior walls*, floor, roof and any other building element that enclose *conditioned space* or provides a boundary between *conditioned space* and exempt or unconditioned space."

Also note that, while the *building thermal envelope* is an energy issue, ducts are a mechanical issue and are governed primarily by the IMC and the mechanical chapters of the IRC.

Cost Impact: The code change proposal will decrease the cost of construction.

RE120-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.2.3-EC-THOMPSON-SEHPCAC.DOC

RE121-13

R403.4 (IRC N1103.4), R403.4.1 (NEW) (IRC N1103.4.1 (NEW))

Proponent: Brian Dean, Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition.

Revise as follows:

R403.4 (N1103.4) Service hot water systems. Energy conservation measures for service hot water systems shall be in accordance with Sections R403.4.1, ~~and~~ R403.4.2 and R403.4.3.

R403.4.1 (N1103.4.1) Service hot water equipment efficiency rating (Mandatory). New or replacement service water heating equipment shall have an efficiency rating equal to or greater than the minimum required by federal law for the geographic location where the equipment is installed.

Reason: The purpose of this code change is to codify the requirement that service hot water equipment must satisfy federal minimum requirements for the location. This proposal does not establish new requirements since it simply requires that equipment meet the federal standard, but it allows the code official to enforce the requirements. This proposal improves the effectiveness of the code by reinforcing a practice that should already be taking place in plan review and inspection -- verification of the efficiency rating of service hot water equipment. Although federal rules set the minimum efficiency levels for manufacturers, only code officials can determine whether equipment actually installed in buildings meets or exceeds the federal minimums. We have offered a similar proposal for heating and cooling equipment under section R403.6.

This proposal is more important now than in the past because federal minimums are expected to shift away from single nationwide efficiency levels to regionally-based efficiency levels that will vary from state to state. It is possible, whether by accident or bad intent, to see equipment that would meet federal requirements in one jurisdiction used in other states or regions in which it does not meet the regional requirement. Although this verification may already be taking place, the proposal above is intended to make it a specific requirement in all buildings. This is an important opportunity for federal, state and local governments to work together to ensure that equipment installed meets federal minimums for the location.

Cost Impact: The code change proposal will not increase the cost of construction.

RE121-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.4-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE.DOC

RE122-13

R403.4 (IRC N1103.4), R403.4.3 (NEW) (IRC N1103.4.3 (NEW)), Table R403.4.3 (NEW) (IRC Table N1103.4.3 (NEW))

Proponent: Edward R. Osann, Natural Resources Defense Council, on behalf of self.
(eosann@nrdc.org)

Revise as follows:

R403.4 (N1103.4) Service hot water systems. Energy conservation measures for service hot water systems shall be in accordance with Sections R403.4.1, ~~and~~ R403.4.2 and R403.4.3.

R403.4.3 (N1103.4.3) Hot water pipe volume (Mandatory). In a service hot water distribution system, the volume in the piping between the end of a hot water fixture supply and the piping connection to a hot water source shall not exceed 0.5 gallon (1.9 liters). The hot water source shall be a recirculating system pipe, a heat-traced pipe or a water heater. The volume in the piping shall be calculated using the values in Table R403.4.3.

TABLE R403.4.3 (N1103.4.3)
INTERNAL VOLUME OF VARIOUS WATER DISTRIBUTION PIPING

LIQUID OUNCES OF WATER PER FOOT LENGTH OF HOT WATER TUBING								
Nominal Size (Inches)	Copper Type M	Copper Type L	Copper Type K	CPVC CTS SDR 11	CPVC SCH 40	PEX-AL-PEX ASTM F 1281	PE-AL- PE	PEX CTS SDR 9
<u>3/8</u>	<u>1.06</u>	<u>0.97</u>	<u>0.84</u>	<u>N/A</u>	<u>1.17</u>	<u>0.63</u>	<u>0.63</u>	<u>0.64</u>
<u>1/2</u>	<u>1.69</u>	<u>1.55</u>	<u>1.45</u>	<u>1.25</u>	<u>1.89</u>	<u>1.31</u>	<u>1.31</u>	<u>1.18</u>
<u>5/8</u>	<u>2.49</u>	<u>2.31</u>	<u>2.22</u>	<u>N/A</u>	<u>N/A</u>	<u>2.12</u>	<u>2.12</u>	<u>1.72</u>
<u>3/4</u>	<u>3.43</u>	<u>3.22</u>	<u>2.90</u>	<u>2.67</u>	<u>3.38</u>	<u>3.39</u>	<u>3.39</u>	<u>2.35</u>
<u>1</u>	<u>5.81</u>	<u>5.49</u>	<u>5.17</u>	<u>4.43</u>	<u>5.53</u>	<u>5.56</u>	<u>5.56</u>	<u>3.91</u>
<u>1 1/4</u>	<u>8.70</u>	<u>8.36</u>	<u>8.09</u>	<u>6.61</u>	<u>9.66</u>	<u>8.49</u>	<u>8.49</u>	<u>5.81</u>
<u>1 1/2</u>	<u>12.18</u>	<u>11.83</u>	<u>11.45</u>	<u>9.22</u>	<u>13.20</u>	<u>13.88</u>	<u>13.88</u>	<u>8.09</u>
<u>2</u>	<u>21.08</u>	<u>20.58</u>	<u>20.04</u>	<u>15.79</u>	<u>21.88</u>	<u>21.48</u>	<u>21.48</u>	<u>13.86</u>

For SI: 1 inch = 25.4 mm, 1 liquid ounce = 0.0296 liters, 1.0 ounce = 0.00781 gallons,
0.5 gallon (1.9 liters) = 64.0 liquid ounces

Reason: Cold or tepid water in the initial draw from a hot water outlet is often unusable for its intended purpose, and is frequently purged, resulting in a waste of water, energy, and time for building occupants. Pipe insulation significantly reduces heat loss and helps to ensure that hot water gets to the shower sooner. However, a complementary strategy is to reduce the volume of water contained in the hot water distribution system in the first place.

This proposal, which is comparable to the criteria adopted by the US EPA WaterSense for New Homes specification in 2009, establishes a maximum volume of 0.5 gallons for water in a hot water supply line, based on internal volumes specific to the piping material. By allowing the volume limitation to be computed from runs from recirculation loops, this provision allows designers additional flexibility while effectively limiting the amount of water to be purged to 1/2 gallon per draw.

The proposal designates this provision as mandatory. The reason for this is that while the 2012 IECC performance approach allows credit for improving the efficiency of the hot water heat source, no credit is available for features of the hot water distribution system that might actually reduce the amount of hot water used, such as a limitation on hot water supply pipe volume. Thus, even though this design criterion will save significant amounts of energy over the life of the building, its energy savings cannot be "scored" or accumulated within the performance framework of the code. If designated "prescriptive", it is likely to be ignored by builders using the performance path since it cannot contribute to compliance under the IECC performance approach. Thus, "mandatory" is the better approach at this time. If and when Section R405 is modified to ensure that the performance path will account for the energy attributes of the hot water distribution system, consideration can be given to removing the mandatory designation from this proposed section.

Cost Impact: This code change proposal is a design requirement that will not increase the cost of construction.

RE122-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R403.4.2-EC-OSANN.DOC

RE123-13

R202 (IRC N1101.9), R403.4 (IRC N1103.4), R403.4.1 (NEW) (IRC N1103.4.1 (NEW)), Chapter 5

Proponent: Meg Waltner, Natural Resources Defense Council (mwaltner@nrdc.org)

Revise as follows:

R403.4 (N1103.4) Service hot water systems. Energy conservation measures for service hot water systems shall be in accordance with Sections R403.4.1 ~~and R403.4.2~~, R403.4.2 and R403.4.3.

R403.4.1 (N1103.4.1) Water heating equipment (Prescriptive). This section shall apply only to buildings in climate zones 1 through 5. Service water heating equipment shall be of one or more of the types in the following list. Where replacement of existing service water heating equipment is required and the replacement equipment is of the same type as the existing, the replacement shall have an efficiency that is the same or better than the existing equipment. Where existing equipment is replaced with another type of service water heating equipment, the equipment shall be of one or more of the types in the following list.

1. a desuperheater water heater listed and labeled to AHRI 470
2. a heat pump water heater a heat pump water heater with an energy factor, EF, of 2.0 or greater
3. a solar water heating system having a solar system heating fraction of 0.50 or greater
4. an instantaneous water heater
5. a fuel-gas fired storage water heater with energy factor, EF, of 0.67 or greater

Add new definition as follows:

IECC SECTION R202 (IRC N1101.9) GENERAL DEFINITIONS

DESUPERHEATER WATER HEATER. A factory-made assembly of elements by which the flows of refrigerant vapor and water are maintained in a heat transfer relationship so that the refrigerant vapor is desuperheated and the water is heated.

Add new standard to Chapter 5 as follows:

AHRI

470-06 Performance Rating of Desuperheater/Water Heaters

Reason: As shown in the attached analysis prepared by the Department of Energy, there are cost effective ways to achieve significant energy savings in service water heating systems in climate zones 1-5 compared to standard-efficiency storage electric and fuel-fired heaters. The proposed change offers multiple options for compliance with the new requirement. Cost-effective measures should be included in the IECC as a measure of sound energy policy and to protect consumers from unnecessarily high future energy costs.

Water Heaters

Description

Residential envelopes have been getting tighter and better over the last few years. As a result, domestic water heating energy is emerging as a significant end-use from the efficiency stand-point. There are multiple ways of improving the efficiency of generating hot water in homes. DOE analyzed some of the more common methods – for homes with gas water heaters, water heaters with Energy factor (EF) greater than the federal minimum baseline and tankless water heaters are analyzed; for homes with electric water heaters, heat-pump water heaters are analyzed. Desuperheaters are analyzed for all cases.

The Life Cycle cost analysis uses the DOE Cost Effectiveness Methodology¹ for assessing cost effectiveness. This analysis has been carried out for the single family prototype, for 15 locations, one foundation type and one heating system except the heat pump water heater analysis which is carried out for homes with electric resistance and heat pump space heating. Table 1 indicates the

location cost indices provided by Faithful and Gould (2011)¹ used to reflect local construction costs. Recent residential fuel prices specific to each location summarized in Table 2 are used for energy cost calculations. These have been obtained from the DOE Energy Information Administration.^{2,3}

Table 1: Cost multipliers by State

Location	State	Climate Zone	Moisture Regime	multiplier
Miami	FL	1	moist	0.884
Phoenix	AZ	2	dry	0.928
Houston	TX	2	moist	0.837
El Paso	TX	3	dry	0.837
San Francisco	CA	3	marine	1.142
Memphis	TN	3	moist	0.863
Albuquerque	NM	4	dry	0.903
Salem	OR	4	marine	1.038
Baltimore	MD	4	moist	0.956
Boise	ID	5	dry	0.918
Chicago	IL	5	moist	1.069
Helena	MT	6	dry	0.936
Burlington	VT	6	moist	0.933
Duluth	MN	7	moist	1.06
Fairbanks	AK	8	moist	1.336

High efficiency gas storage water heaters

This concept looks at the energy savings potential of high efficiency storage water heater. The residential prototype is presently equipped with a 40 gallon hot water heater. Federal minimum efficiency requirements were revised in 2010 and compliance with the required standards for water heaters is required from April 2015. The new rule requires 40 gallon gas storage water heaters to have an EF of 0.615². An EF of 0.67 is analyzed in this concept.

Table 2: Fuel Costs by State

Location	State	Climate Zone	Moisture Regime	Electricity-winter (\$/kWh)	Electricity-summer (\$/kWh)	Gas (\$/thm)	Oil (\$/MBtu)
Miami	FL	1	moist	0.117	0.117	1.532	23.7
Phoenix	AZ	2	dry	0.099	0.117	1.306	23.7
Houston	TX	2	moist	0.11	0.12	0.814	23.7
El Paso	TX	3	dry	0.11	0.12	0.814	23.7
San Francisco	CA	3	marine	0.149	0.156	0.943	23.7
Memphis	TN	3	moist	0.095	0.095	0.862	23.7
Albuquerque	NM	4	dry	0.099	0.116	0.791	23.7
Salem	OR	4	marine	0.091	0.092	1.174	23.7
Baltimore	MD	4	moist	0.134	0.151	1.039	23.7
Boise	ID	5	dry	0.078	0.084	0.869	23.7
Chicago	IL	5	moist	0.108	0.122	0.717	23.7

¹Faithful + Gould. 2011. *Residential Energy Efficiency Measures – Locations Factors*. Portland, Oregon.

<http://bc3.pnnl.gov/wiki/index.php/Downloads>

² http://www1.eere.energy.gov/buildings/appliance_standards/residential/pdfs/htgpf_finalrule_fedreg.pdf

Helena	MT	6	dry	0.091	0.096	0.795	23.7
Burlington	VT	6	moist	0.158	0.155	1.433	23.13
Duluth	MN	7	moist	0.103	0.108	0.833	23.7
Fairbanks	AK	8	moist	0.166	0.171	0.839	23.7

Energy Cost Savings

Figure 1 below shows energy cost savings for each climate zone.

Cost Effectiveness

The cost for high efficiency water heaters were derived from the Technical Support document and Life Cycle Cost (LCC) spreadsheets for the Appliance Standards rule-making for water heaters³⁴. These costs are blended for retrofits and new construction. To generate costs specific to new construction alone, the Crystal Ball (CB) analysis was re-run with the fractions set to 100% new construction and 0% retrofits.

The total installed cost for a 40 gallon gas storage water heater with EF 0.62 works out to \$1609 while the total installed cost for a 40 gallon gas storage water heater with EF 0.67 works out to \$1468. This unexpected drop in costs is due to lower venting costs associated with the high efficiency water heater. The baseline requires natural draft venting which has higher costs than the plastic power venting apparatus required by the high efficiency water heater.

It can be concluded that using a higher efficiency water heater not only saves energy during its life, but also costs less to install. This measure is thus, cost-effective.

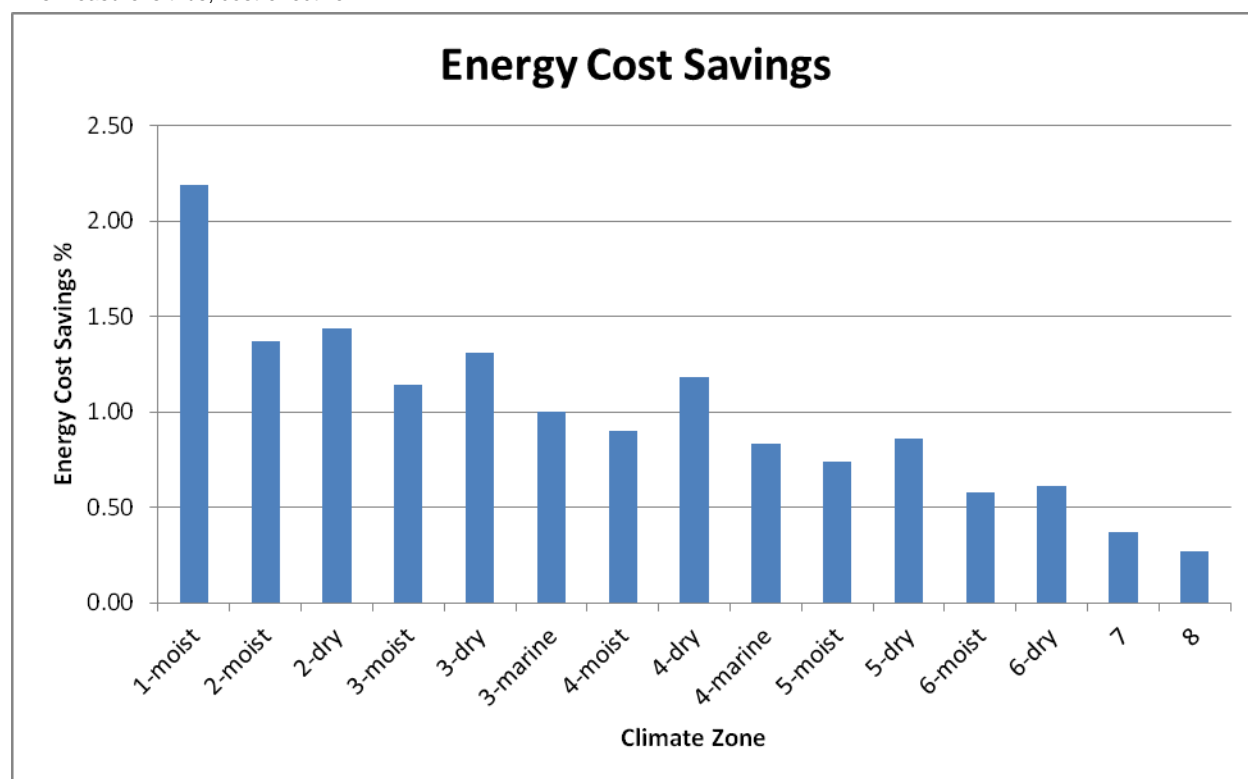


Figure 1: Energy Cost Savings for Gas Storage Water Heaters with EF 0.67 over the 2012 IECC code

³ http://www1.eere.energy.gov/buildings/appliance_standards/residential/heating_products_fr_tsd.html

⁴ http://www1.eere.energy.gov/buildings/appliance_standards/residential/heating_products_fr_spreadsheets.html

Tankless Water Heaters

The most common type of water heaters in residences are storage type. Stand-by losses are associated with storage tank water heaters because hot water draws are inconsistent in homes. This concept looks at tankless type of water heaters, which eliminate the stand-by losses almost entirely. Tankless water heaters have a small storage tank, usually 1 gallon, which has a small associated stand-by loss. Tankless water heaters with an Energy Factor (EF) of 0.82, which is the minimum EF for EnergyStar tankless water heaters⁵, are analyzed in this concept.

There is some evidence that instantaneous water heaters don't perform at their rated efficiency when subjected to realistic hot water draw profiles, i.e., shorter draws that occur frequently during a typical day in residences. To account for this reduction in performance, the assumed EF of instantaneous water heaters is reduced to 92% of its value⁶.

Energy Cost Savings

Figure 2 below shows energy cost savings for each climate zone.

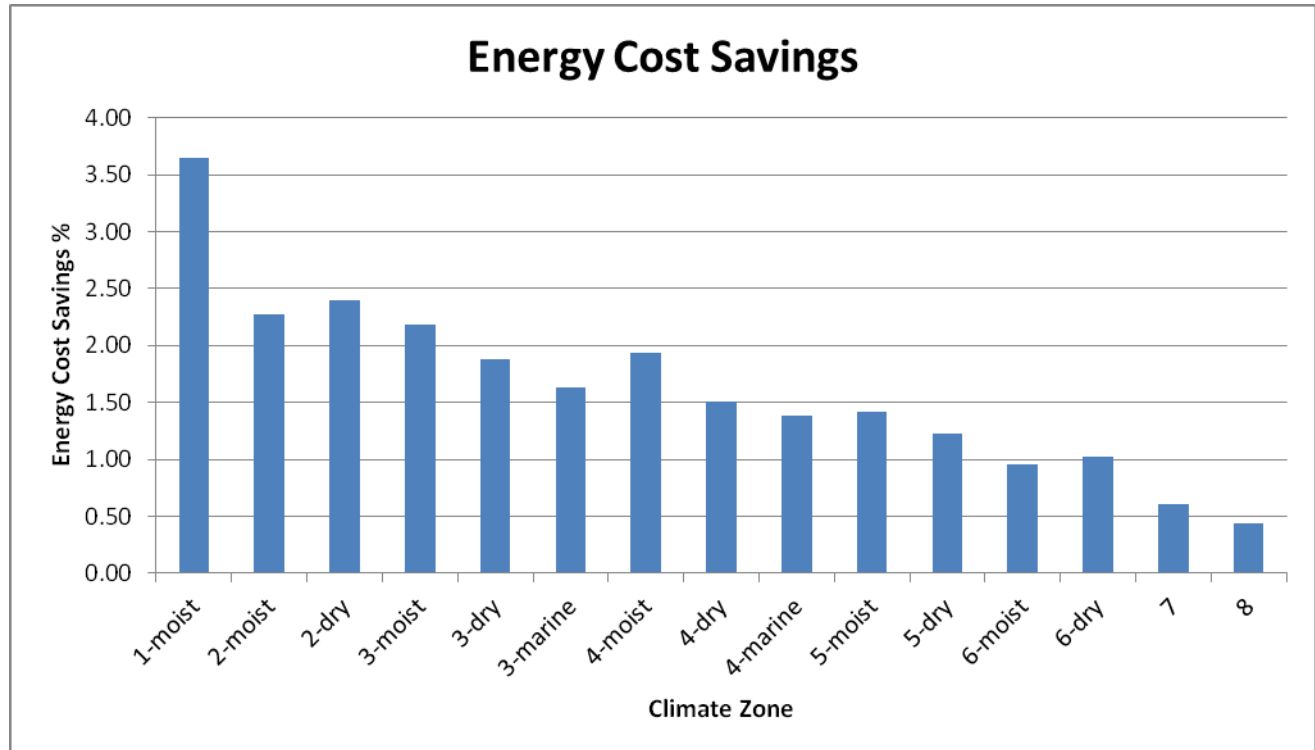


Figure 2: Energy Cost Savings for Tankless Water Heaters over the 2012 IECC code

Cost Effectiveness

The costs for gas fired instantaneous water heaters are derived from the Technical Support document and Life Cycle Cost (LCC) spreadsheets for the Appliance Standards rule-making for water heaters. These costs are blended for retrofits and new construction. To generate costs specific to new construction alone, the Crystal Ball (CB) analysis was re-run with the fractions set to 100% new construction and 0% retrofits.

The total installed cost for a 40 gallon gas storage water heater with EF 0.62 works out to \$1609 while the total installed cost for a gas fired instantaneous water heater with EF 0.82 works out to \$2376. Figure 3 below shows the Life Cycle Cost for this measure across all climate zones. Tankless water heaters turn out to be cost effective in the warmer climate zones but not so much as we move to the colder climate zones.

⁵ EnergyStar website http://www.energystar.gov/index.cfm?c=water_heat.pr_crit_water_heaters

⁶ RESNET reduction factor for the EF of instantaneous water heaters

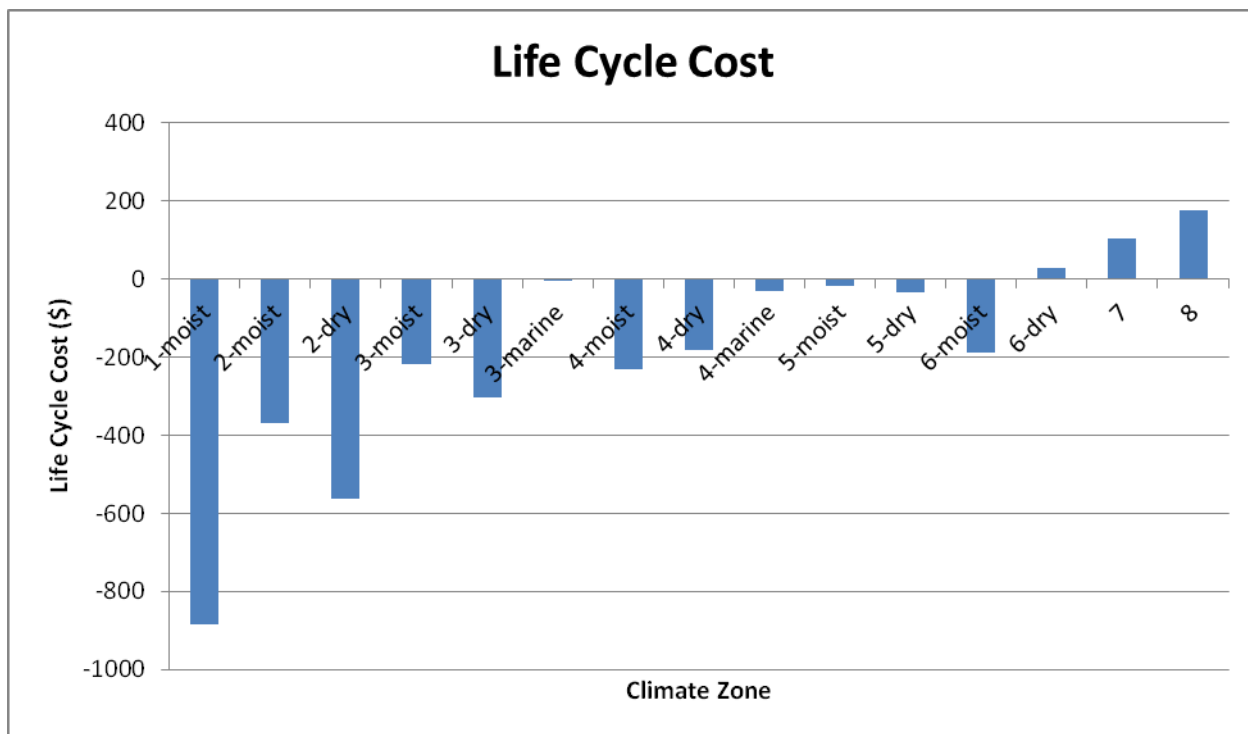


Figure 3: Life Cycle Cost for Tankless water heaters over the 2012 IECC. *Negative values indicate savings.*

Heat-Pump Water Heaters

Heat-Pump water heaters (HPWH) combine the elements of a heat-pump and a water heater. HPWHs extract heat from the surrounding space and use it to heat water. As a result, they provide the dual benefit of cooling a space while providing the required hot water. DOE considered a HPWH with EF 2.0 for this concept.

The HPWH is assumed to be located inside the conditioned living space. Water heaters are usually placed in unconditioned garages or in closets inside a conditioned space. In order to perform effectively, HPWHs require sufficient surrounding space for heat exchange which may not always be available within a conditioned space. Due to the nature of HPWHs, they perform much better within conditioned spaces in cooling dominated climates. HPWHs are simulated in all climate zones in this analysis.

Energy Cost Savings

Figure 4 below shows energy cost savings for each climate zone.

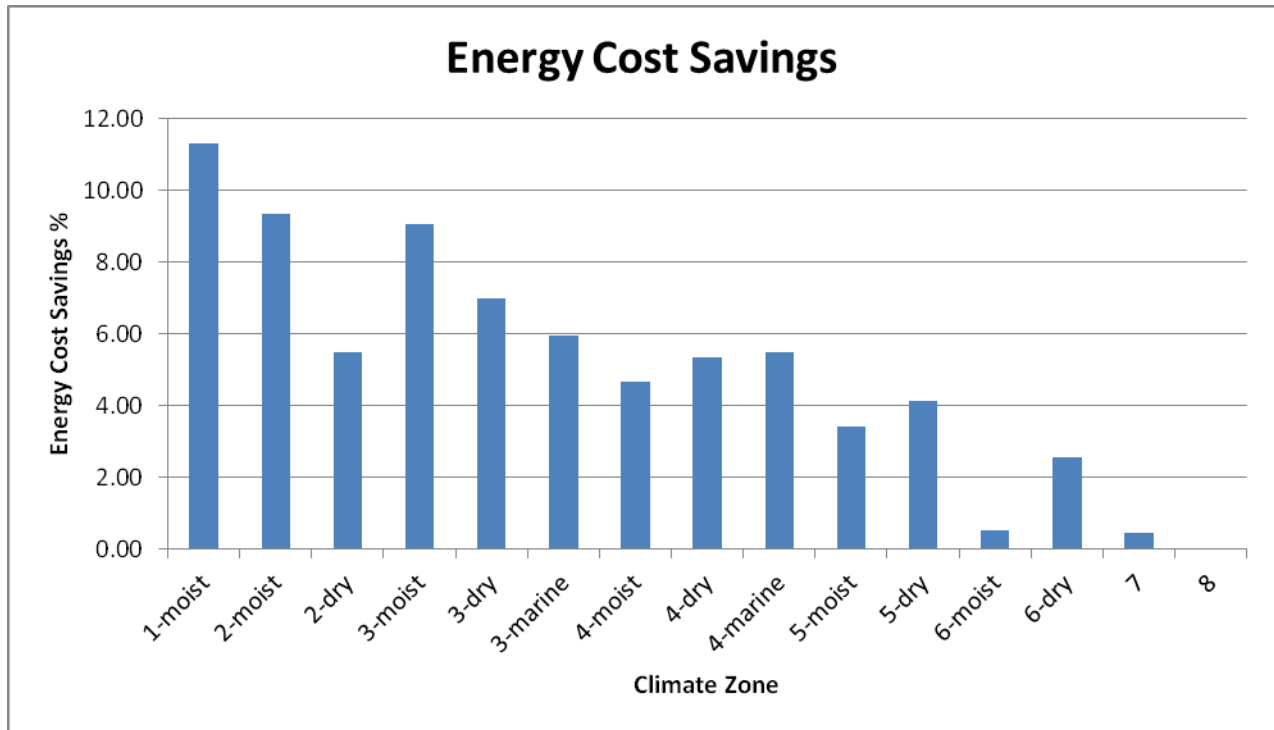


Figure 4: Energy Cost Savings for Heat-Pump Water Heaters over the 2012 IECC code (electric only)

Cost Effectiveness

The cost for high efficiency water heaters were derived from the Technical Support document and Life Cycle Cost (LCC) spreadsheets for the Appliance Standards rule-making for water heaters. These costs are blended for retrofits and new construction. To generate costs specific to new construction alone, the Crystal Ball (CB) analysis was re-run with the fractions set to 100% new construction and 0% retrofits.

According to this data, the installed cost of 40 gallon Electric Storage Water Heaters with EF 0.95 is \$688 and that of an EF 2.35 Heat Pump Water Heater is \$1697. State cost multipliers from table 2 are used to generate incremental costs by state. Figure 5 below shows the Life Cycle Cost Savings from this measure. According to our analysis, Heat-Pump water heaters in place of electric storage water heaters are cost effective in all zones.

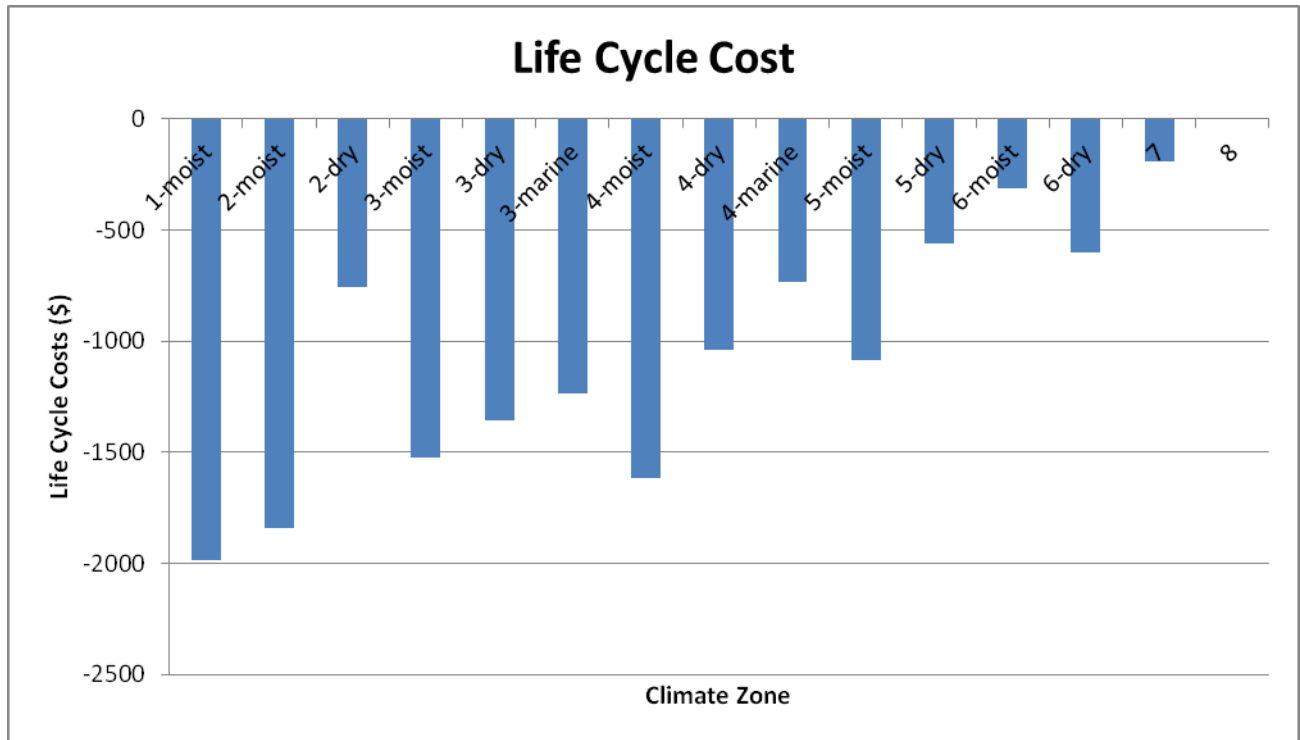


Figure 5: Life Cycle Cost for the concept over the 2012 IECC. Negative values indicate savings.

Desuperheaters

During summer operation, the heat removed from the refrigerant would normally be rejected to the atmosphere. Using this heat in the hot water system, therefore, results in significant energy savings because hot water heating is performed at a reduced energy input (greatly reduced in some cases). Heat supplied to the water during winter operation (in the heating season) is not "free" as in the cooling mode, because that heat would normally be used to satisfy space heating demands. However, energy savings are possible because the water heating takes place at an advantageous coefficient of performance (COP).

Energy Cost Savings

Figure 6 below shows energy cost savings for each climate zone. Desuperheaters are most effective for cooling dominated climate zones as it operates only when the air conditioner is running. Hence the expected the energy savings are much higher for CZ 1-3, with decreasing savings for the colder climate zones.

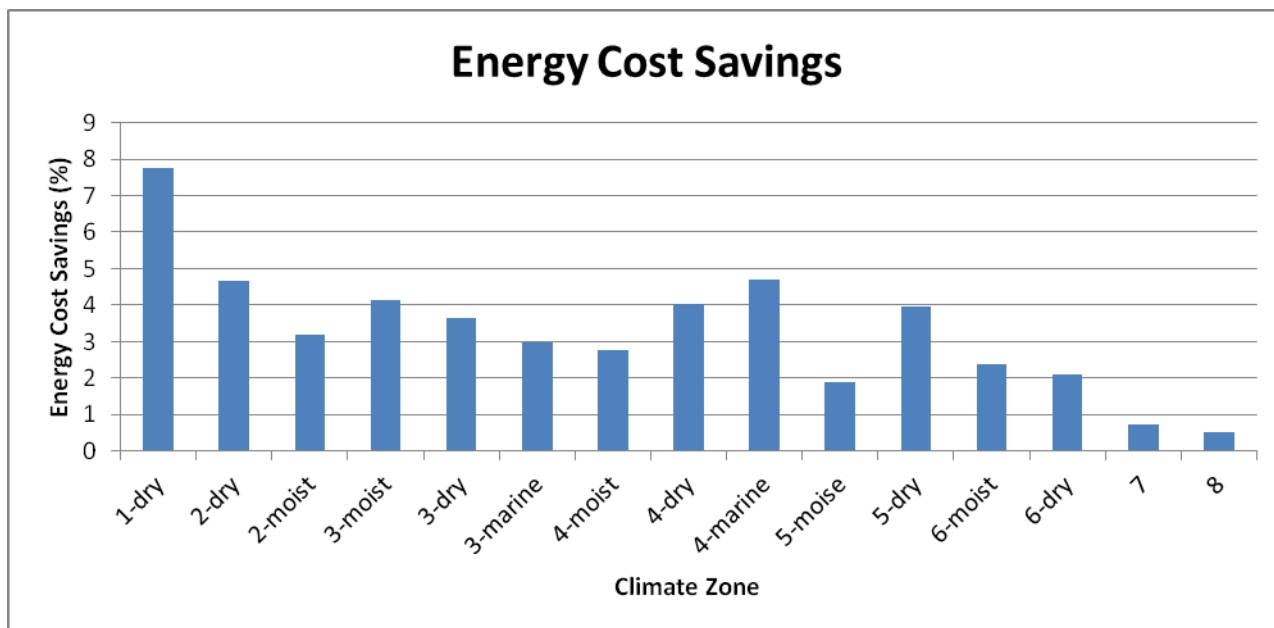


Figure 6: Energy Cost Savings over the 2012 IECC code for Desuperheaters

Cost Effectiveness

Data available online documents the cost of equipment at \$500 with installation costs ranging from \$500-\$1000.^{7 8} An incremental cost of \$1250 has been assumed for both equipment and installation.

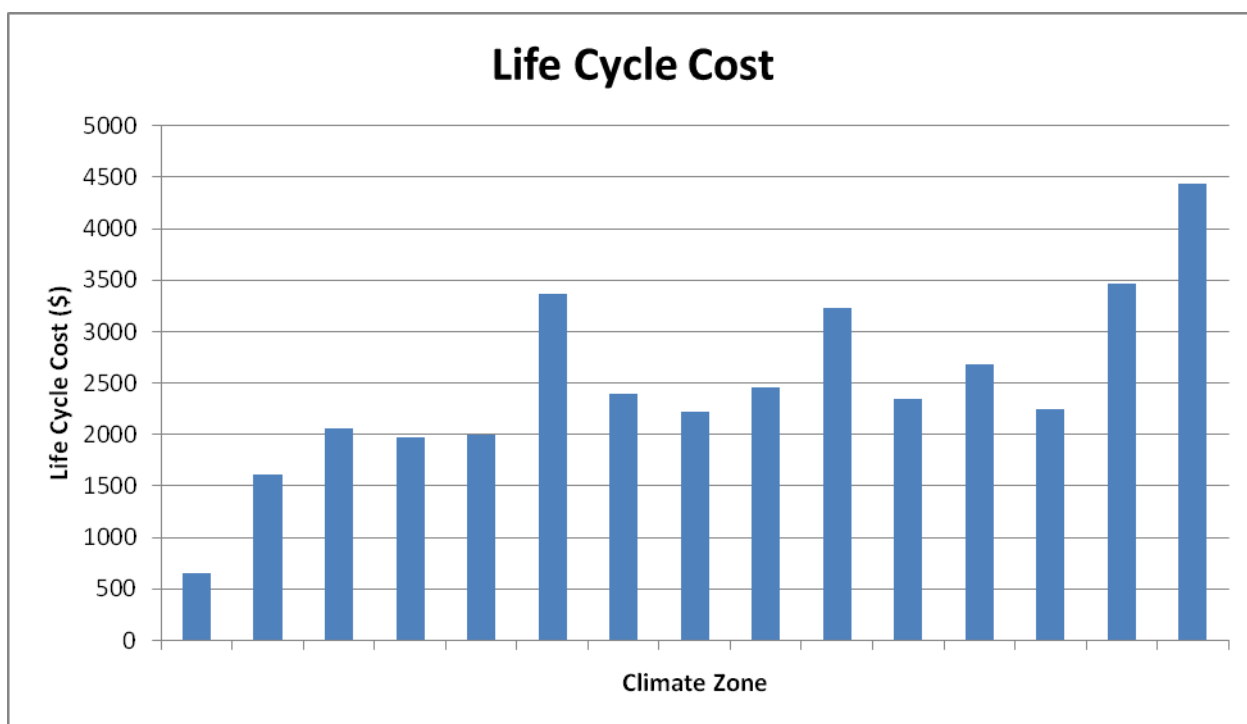


Figure 7: Life Cycle Costs over the 2012 IECC code for Desuperheaters

⁷ [http://bc3.pnnl.gov/wiki/index.php/Desuperheaters_\(0004\)](http://bc3.pnnl.gov/wiki/index.php/Desuperheaters_(0004))

⁸ NW Council Costs on Desuperheaters. August 2008, Regional Technical Forum.

Cost Impact: The code change proposal will increase the cost of construction.

Analysis: A review of the standards proposed for inclusion in the code, AHRI 470 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1 2013.

RE123-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.4-EC-WALTNER.DOC

RE124-13

R403.4.1 (IRC N1103.4.1)

Proponent: Gary Klein, Affiliated International Management, LLC, representing self,
gary@aim4sustainability.com

Revise as follows:

R403.4.1 (N1103.4.1) ~~Circulating hot~~ Heated water systems controls (Mandatory).

Circulating ~~hot~~ heated water systems and heat trace temperature maintenance systems shall be provided with ~~an automatic or readily accessible manual switch controls that can turn off the hot water circulating pump when the system is not in use~~ automatically adjust either system in accordance with the times when heated water is used in the occupancy. Automatic controls, temperature sensors and pumps shall be accessible. Manual controls shall be readily accessible.

Reason: The first reason for this change is to broaden the scope of the section to include both circulating heated water systems and heat trace temperature maintenance systems. The second reason is to distinguish between controls that need to be *accessible* from those than need to be *readily accessible*.

Cost Impact: The code change proposal will not increase the cost of construction.

RE124-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.4.1 #1-EC-KLEIN

RE125-13

R403.4.1 (IRC N1103.4.1), R403.4.1.1 (NEW) (IRC N1103.4.1.1 (NEW)), R403.4.1.2 (NEW) (IRC N1103.4.1.2 (NEW)), Chapter 5, IPC [E] 607.2.1, [E] 607.2.1.1 (NEW), [E] 607.2.1.1.1 (NEW), [E] 607.2.1.1.2 (NEW), IPC Chapter 14, IRC P2905 (NEW), IRC P2905.1 (NEW)

Proponent: Gary Klein, Affiliated International Management, LLC Gary Klein
(Gary@aim4sustainability.com)

THIS IS A 3 PART CODE CHANGE. PARTS I AND II WILL BE HEARD BY THE IECC RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS 2 SEPARATE CODE CHANGES. PART III WILL BE HEARD BY THE IRC-PM COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R403.4.1 (IRC N1103.4.1) ~~Circulating hot~~ Heated water circulation and temperature maintenance systems (Mandatory). ~~Circulating hot water systems shall be provided with an automatic or readily accessible manual switch that can turn off the hot water circulating pump when the system is not in use. Heated water circulation systems shall be in accordance with Section R403.4.1.1. Heat trace temperature maintenance systems shall be in accordance with Section R403.4.1.2. Automatic controls, temperature sensors and pumps shall be accessible. Manual controls shall be readily accessible.~~

R403.4.1.1 (IRC N1103.4.1.1) Circulation systems. Heated water circulation systems shall be provided with a circulation pump. The system return pipe shall be a dedicated return pipe or a cold water supply pipe. Gravity and thermo-siphon circulation systems shall be prohibited. Circulation system pump controls shall be demand activated. The controls shall start the pump upon sensing the presence of a user of a fixture or appliance, receiving a signal from the action of an action of a user of a fixture or appliance or sensing the flow of heated water to a fixture or appliance. The controls shall limit the water temperature increase in the return water piping to not more than 10°F (5.6 °C) greater than the initial temperature of the water in the return piping and shall limit the return water temperature to 102°F (38.9°C).

R403.4.1.2 (IRC N1103.4.1.2) Heat trace systems. Electric heat trace systems shall comply with IEEE 515.1. Controls for such systems shall be able to automatically adjust the energy input to the heat tracing to maintain the desired water temperature in the piping in accordance with the times when heated water is used in the occupancy.

Add new standards to Chapter 5 (IRC Chapter 44) as follows:

The Institute of Electrical and Electronic Engineers, Inc.
3 Park Avenue
New York, NY 1016-5997

IEEE

515.1-2012 IEEE Standard for the Testing, Design, Installation, and Maintenance of
Electrical Resistance Trace Heating for Commercial Applications

PART II-IPC

Revise as follows:

[E] 607.2.1 Hot Heated water circulation and temperature maintenance systems controls. For other than Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane, automatic circulating hot water system pumps or heat trace shall be arranged to be conveniently turned off, automatically or manually, when the hot water system is not in operation. Heated water circulation and temperature maintenance systems for Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane shall be in accordance with Section 607.2.1.1.

[E] 607.2.1.1 Group R2, R3 and R4 occupancies 3 stories or less. This section shall apply to Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane. Heated water circulation systems shall be in accordance with Section 607.2.1.1.1. Heat trace temperature maintenance systems shall be in accordance with Section 607.2.1.1.2. Access to automatic controls, temperature sensors and pumps shall be provided. Ready access to manual controls shall be provided.

[E] 607.2.1.1.1 Circulation systems. Heated water circulation systems shall be provided with a circulation pump. The system return pipe shall be a dedicated return pipe or a cold water supply pipe. Gravity and thermo-siphon circulation systems shall be prohibited. Circulation system pump controls shall be demand activated. The controls shall start the pump upon sensing the presence of a user of a fixture or appliance, receiving a signal from the action of an action of a user of a fixture or appliance or sensing the flow of heated water to a fixture or appliance. The controls shall limit the water temperature increase in the return water piping to not more than 10°F (5.6 °C) greater than the initial temperature of the water in the return piping and shall limit the return water temperature to 102°F (38.9°C).

[E] 607.2.1.1.2 Heat trace systems. Electric heat trace systems shall comply with IEEE 515.1. Controls for such systems shall be able to automatically adjust the energy input to the heat tracing to maintain the desired water temperature in the piping in accordance with the times when heated water is used in the occupancy.

Add standards to Chapter 14 as follows:

The Institute of Electrical and Electronic Engineers, Inc.
3 Park Avenue
New York, NY 1016-5997

IEEE

515.1-2012 IEEE Standard for the Testing, Design, Installation, and Maintenance of
Electrical Resistance Trace Heating for Commercial Applications

PART III-IRC

Add new text as follows:

SECTION P2905 **HEATED WATER DISTRIBUTION SYSTEMS**

P2905.1 Heated water systems. Heated water circulation and temperature maintenance systems shall be in accordance with Section N1103.4.1.

Reason: There are 2 primary reasons for this proposed change. 1) Correlate the language in the IECC, the IRC and the IPC; 2) Clarify the requirements for heated water circulation systems and for heat trace systems, if they are installed. The proposed changes do not require the use of circulation or heat trace.

The current code language is not the same in the IECC and the IPC. It should be. It should also be the same in the IRC since the heated water systems do not know what occupancy they are in.

The current language allows for continuously operating circulation pumps, which creates inefficiency in the hot water distribution system. It also does not address the use of heat trace in both codes and there is currently no requirement that the heat trace be suitable for the application. The consequence is that water heating energy consumption is increased.

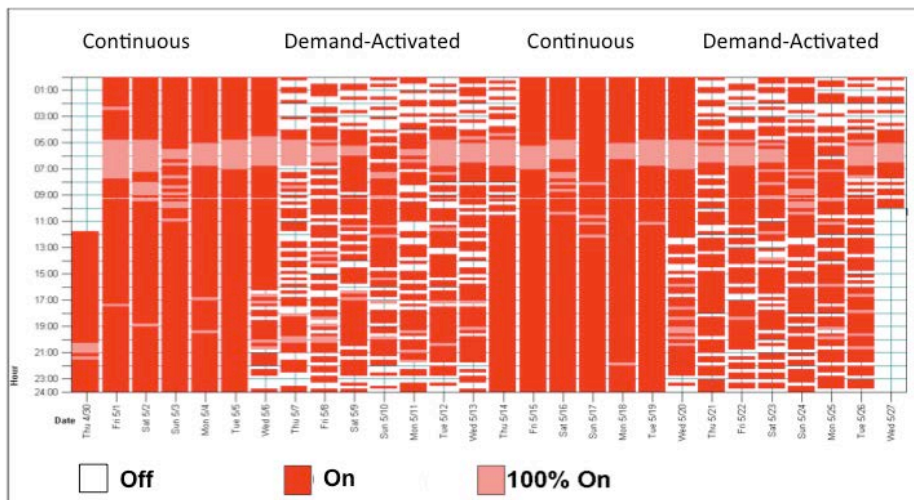
Figure 1 shows that demand activated circulation is significantly more energy efficient than any other type of heated water circulation system. The annual energy needed to keep the loop hot with water heated electrically or with natural gas are shown separately from the energy needed for the pump. The majority of the energy is lost in keeping the water in the loop at the desired temperature (all of it if there is a gravity loop). A small loop, 100 feet including the supply and the return was analyzed. The savings ranges from 87.5 percent when compared to a recirculation system that runs only 2-hours per day to 99 percent when compared to a recirculation system that runs only 24-hours per day. The operating costs and savings remain proportional as the length of the circulation loop and the flow rate of the pump increase.

Figure 1 Annual Energy Requirements for Demand Activated Circulation and Standard Recirculation

	Standard Recirculation						Demand Activated Circulation
	Daily Hours of Operation						
	24	12	8	6	4	2	0.25
Loop Heat Losses							
Natural Gas (therms)	292	146	97	73	49	24	3
Electric (kWh)	6,388	3,194	2,129	1,597	1,065	532	67
Pump Energy (kWh)	438	219	146	110	73	37	8

Figure 2 shows the differences in run-time at the water heater (or boiler) between a continuously pumped recirculation loop and one that has a demand activated pump control. Blank space (white) means the water heater was off. Red means some percent of run-time between zero and continuous. Pink means the water heater or boiler was running continuously. The test results come from studies done by Southern California Gas Company on a sample of more than 300 multi-family buildings with central water heaters and recirculation systems. Most systems tested were built before insulation was required on hot water recirculation loops. Savings ranged from 10-30 percent of the water heating energy use and 84 percent of the pump electricity use. The costs for installing the retrofit were paid back in just about one year. In new construction, the marginal costs would be recovered in just a few months

Figure 2 Run-time of Water Heater with Two Different Pump Controls



Why is demand-activated circulation such an efficient strategy? The 2012 IECC, IPC and IRC require that the hot water piping in automatic temperature maintenance systems in new buildings be insulated with pipe insulation. This means the water in the circulation loop will stay hot for a very long time – up to 45 minutes for ¾ inch nominal pipe up to 2 hours for 2-inch nominal pipe – even if the circulating pump is shut off. If this is the case, why run the pump when the water is still hot? Why run the pump when no one is in the building or when no one is demanding hot water? The only time it makes sense to run the pump is shortly before hot water is needed: hence the requirement that the pump be controlled on-demand.

The requirements for heat trace are partly to ensure that the systems can be operated in the most energy efficient manner consistent with providing heated water to the occupancy. The reference standards are included to ensure that installed systems are safe for the intended application. The energy consequences of using heat trace are very reasonable. Figure 3 presents the energy requirements for a heat trace system with the same hot water supply piping as the circulation systems shown in Figure 1. The energy requirements of keeping the trunk line hot – the same as keeping the supply portion of the loop hot in a circulating system – are 701 kWh per year, assuming 12 hours at high temp (115F) and 12 hours at economy temp (105F). This is equivalent to

operating the loop about 3 hours per day, but with hot water available 24/7 in the supply trunk! This is a significant savings when water heating is done electrically or with a similarly expensive fuel. If the branches are also traced, we can deliver heated water even more quickly to the fixtures using only 1,682 kWh per year, which is the same energy as running the loop a little more than 6 hours a day.

Figure 3. Annual Energy Needed for Electric Heat Trace Systems

Heat Trace			
	(kWh per year)		
	Trunk	Br	T-Br
Supply Heat Losses			
High Temp	394	552	946
Economy Temp	307	429	736
Total Electricity	701	981	1,682

Cost impact: The proposal does not require either circulation or heat trace; however if either is selected, it clarifies the requirements for installation. Most recirculation systems today are installed with some form of control, usually a timer, a bandwidth thermostat (aquastat) or both. Some come with more sophisticated controls, such as programmable or are connected to an energy management system. In some cases, switching from these control strategies to demand activated controls will cost less. In other cases, the demand-activated controls will cost more.

Analysis: A review of the standards proposed for inclusion in the code, UL 515 and CSA 22.2 No 130-03 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

RE125-13

PART I IECC-RESIDENTIAL PROVISIONS

Public Hearing: Committee: AS AM D
 Assembly: ASF AMF DF

PART II IPC

Public Hearing: Committee: AS AM D
 Assembly: ASF AMF DF

PART III IRC-P

Public Hearing: Committee: AS AM D
 Assembly: ASF AMF DF

R403.4.1 #2-EC-KLEIN

RE126-13

R403.4.1 (IRC N1103.4.1)

Proponent: Eric Makela / Britt/Makela Group, Inc. representing Northwest Energy Codes Group
(Eric@BrittMakela.com)

Revise as follows:

R403.4.1 (N1103.4.1) Circulating hot water systems (Mandatory). Circulating hot water systems shall be provided with an automatic or readily accessible manual switch that can turn off the hot water circulating pump when the system is not in use equipped with a control system that controls the recirculation pump operation based on measurement of hot water demand and hot water return temperature.

Reason: The IECC has allowed the use of either manual or automatic controls for turning circulating pumps on and off for hot water recirculating systems. If manual controls are installed, the homeowner is responsible for turning the system on and off when needed. If not turned off, the pump will continue to circulate 120° to 140°F water through piping leading to pipe heat loss and also requiring the water heater to run longer to continue to bring the water up to temperature. Installing a time clock on the circulation pump is more dependable if set properly, but still can lead to losses in the piping and additional run time for the water heater with no benefit to the home owner if set to run when the occupants are not in the house. In addition to piping and water heating energy use, electricity to run the pump can also cost a few hundred dollars per year. Constant recirculation of hot water can also degrade piping. A study conducted by the California Energy Commission's Public Interest Energy Research demonstrated that hot water distribution systems lose significant amounts of energy. This is significant considering that water heating uses 31% of energy in a typical house.

Demand control is the best automatic control option and superior to both manual off and time clock controls. The design features will prevent the pump motor burning out due to an air pocket, which is a common failure. The demand controlled recirculation system matches the user's demand to the delivery of hot water. The user gets the hot water quickly when they want it. On demand pumps for water heating systems can potentially save \$2 billion dollars a year in existing single family homes and \$100 million in new construction. There is more potential for multi-family buildings. On demand systems prevent energy waste and mean less maintenance and repair costs over a standard recirculation system because the pump is only on when the occupant requires hot water.

This proposal will increase energy and water savings over a water heater circulation system with manual or automatic controls.

Cost Impact: The code change proposal will increase the cost of construction.

RE126-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.4.1-EC-MAKLEA.DOC

RE127-13

R403.4.2 (IRC N1103.4.2), IPC [E]607.5, IRC P2905 (New), IRC P2905.1 (New)

THIS IS A 3 PART CODE CHANGE. PARTS I AND II WILL BE HEARD BY THE IECC-RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS 2 SEPARATE CODE CHANGES. PART III WILL BE HEARD BY THE IRC-PM COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Craig Conner, representing self (craig.conner@mac.com), Gary Klein, Affiliated International Management, LLC (gary@aim4sustainability.com)

PART I IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R403.4.2 (IRC N1103.4.2) Hot Heated water piping insulation (Prescriptive). Insulation for hot water pipe with a minimum thermal resistance (*R*-value) of *R*-3 shall be applied to the following: The following piping conveying water heated by a water heater shall have ~~be externally insulated with insulation with having a thermal resistance (*R*-value) of not less than *R*-3.~~ Pipe insulation shall be continuous except where piping passes through a framing member. Piping that is heat traced shall be insulated in accordance with the heat trace manufacturer's recommendations.

1. Piping larger than 3/4 inch (19 mm) nominal diameter.
2. Piping serving more than one dwelling unit.
3. Piping from the water heater to kitchen outlets.
4. Piping located outside the conditioned space.
- ~~5. Piping from the water heater to a distribution manifold.~~
- ~~6- 5. Piping located in or under a floor concrete slab.~~
- ~~7- 6. Piping that is buried in piping the earth.~~
- ~~8- 7. Supply and return piping in a heated water recirculation systems~~
- ~~8. Supply piping in other than a demand recirculation system.~~
- ~~9. Piping with run lengths greater than the maximum~~
~~— run lengths for the nominal pipe diameter given in~~
~~— Table 403.4.2.~~

All remaining piping shall be insulated to at least *R*-3 or meet the run length requirements of Table 403.4.2.

TABLE R403.4.2
MAXIMUM RUN LENGTH (feet)^a

Nominal Pipe Diameter of Largest Diameter Pipe in the Run (inch)	3/8	1/2	3/4	>3/4
Maximum Run Length	30	20	10	5

For SI: 1 inch=25.4 mm, 1 foot = 304.8 mm

a. Total length of all piping from the distribution manifold or the recirculation loop to a point of use.

PART II-IPC

Revise as follows:

[E] 607.5 Pipe insulation. Hot water piping in automatic temperature maintenance systems shall be insulated with 1 inch (25 mm) of insulation having a conductivity not exceeding 0.27 Btu per inch/h • ft² • °F (1.53 W per 25 mm/m² • K). The first 8 feet (2438 mm) of hot water piping from a *hot water* source that does not have heat traps shall be insulated with 0.5 inch (12.7 mm) of material having a conductivity not

exceeding 0.27 Btu per inch/h • ft² • °F (1.53 W per 25 mm/m² • K). This section does not apply to Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane. Piping in those occupancies shall be insulated in accordance with Section R403.4.2 of the *International Energy Conservation Code*.

Part III – IRC-P

Add new text as follows:

SECTION P2905 HEATED WATER DISTRIBUTION SYSTEMS

P2905.1 Insulation of piping required. Piping conveying water heated by a water heater shall be externally insulated in accordance with Section N1103.4.2.

Reason:

PART I-IECC-RE

Several changes in terminology are included in this proposal. The phrase “water heated by a water heater” was used instead of “hot water” because the IECC does not have a definition for “hot water”. The “hot water” definition found in the IRC and the IPC says water of a temperature 110F or greater. Therefore, the code would not clear about insulation requirements for any piping if the code user stated they intended to set the water heater temperature to 108F. The phrase “water heated by a water heater” clarifies the code.

Items 6, 7 and 8 in the list were clarified. The requirements were not changed.

The first 8 items listed above describe situations where there are more likely to be repeated flows of heated water within less than an hour, or where the piping is in a more harsh environment, such as outside; both cases where the insulation is of more value. In most other situations, there is extended time between hot water draws so that the pipe and the insulation is of limited value.

Item #5 concerning “distribution manifolds” is struck because it is difficult to define “distribution manifold”, because the important piping is probably covered in other items, and because a “distribution manifold” on a line that is seldom used does not make sense to insulate.

Item 9 and the Table were deleted, as these applications of insulation are of limited value. When the supply pipes are located in room temperature air (65-70F), the largest value in pipe insulation comes when it allows heated water to be retained from one use to the next use in the pipes, as subsequent uses do not have to begin with the cooled off water in the pipes. The time spent waiting for hot water is the time it takes to empty the cool water in the pipe and move the hot water to the point of use. After use the water in that pipe cools down and another fill of the pipe with hot water is required for the next use. Pipe insulation saves energy where the pipe has multiple hot water draws within a period of 10 to 60 minutes. Pipe insulation also saves energy by reducing the temperature drop from the water heater to the fixtures; this is a couple of degrees in room temperature air; much more in more adverse environments. The line from the hot water supply to the kitchen is by far the most valuable to insulate due to the high likelihood of multiple hot-water draws in a short time period.

Removing item 9 and Table R403.2 eliminates the need to measure pipe lengths.

PART II – IPC

Normally, the IPC covers plumbing in commercial buildings. However, because the Residential Provisions of the IECC covers R2, R3 and R4 buildings that are 3 stories or less above grade, a ‘pointer’ in the IPC is added to alert the plumbing installer of Group R2, R3 and R4 piping insulation requirements. The installer then knows to allow sufficient space to accommodate the pipe insulation.

PART III – IRC

A new section is added in Chapter 29 of the IRC to alert the plumbing installer that the heated water piping installation includes insulating the piping system. The installer then knows to allow sufficient space to accommodate the insulation.

Cost Impact: The code change proposal will not increase the cost of construction.

RE127-13**PART I-IECC RESIDENTIAL PROVISIONS**

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II-IPC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART III-IRC-P

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.4.2-EC-CONNER-KLEIN.DOC

RE128-13

R403.4.2 (IRC N1103.4.2), Table R403.4.2 (IRC Table N1103.4.2)

Proponent: Brian Dean, Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition.

Revise as follows:

R403.4.2 (N1103.4.2) Hot water pipe insulation (Prescriptive). Insulation for hot water piping with a minimum thermal resistance (*R*-value) of R-3 shall be applied to the following:

1. Piping larger than 3/4 inch nominal diameter.
2. Piping serving more than one dwelling unit.
3. Piping from the water heater to kitchen outlets.
4. Piping located outside the conditioned space.
5. Piping from the water heater to a distribution manifold.
6. Piping located under a floor slab.
7. Buried piping.
8. Supply and return piping in recirculation systems other than demand recirculation systems.
9. Piping with run lengths greater than the ~~maximum~~ run length limits for pipes without R-3 insulation for the nominal pipe diameter ~~given~~ in Table R403.4.2.

~~All remaining piping shall be insulated to at least R-3 or meet the run length requirements of Table R403.4.2.~~

TABLE R403.4.2 (N1103.4.2)
MAXIMUM RUN LENGTH LIMITS FOR PIPING WITHOUT R-3 INSULATION (feet)^a

Nominal Pipe Diameter of Largest Diameter Pipe in the Run (inch)	3/8	1/2	3/4	≥ 3/4
Maximum Run Lengths Limit (feet)	30	20	10	5

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm

a. Total length of all piping from the distribution manifold or the recirculation loop to a point of use.

Reason: The purpose of this code change is to simplify and clarify the code and clear up potentially confusing language. The proposal does not change the stringency of the requirements. Specifically, the proposal:

- removes duplicative, confusing language from Section R403.4.2 and Table R403.4.2;
- clarifies the requirements for pipe in excess of ¾ inch in diameter, which are always required to be insulated and therefore there is no applicable limit on length; and
- eliminates the use of the word “maximum” related to pipe lengths in the table, which may be read to limit all pipe lengths, when the code provision is intended to only limit pipe lengths where the piping is not fully insulated to R-3.

Cost Impact: The code change proposal will not increase the cost of construction.

RE128-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R403.4.2-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE.DOC

RE129-13

R403.4.2 (IRC N1103.4.2), Table R403.4.2 (IRC Table N1103.4.2), IPC [E]607.5, IRC P2905 (NEW)

THIS IS A 3 PART CODE CHANGE PROPOSAL. PARTS I AND II WILL BE HEARD BY THE IECC-RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS TWO SEPARATE PROPOSALS. PART III WILL BE HEARD BY THE IRC-MP COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Gary Klein, Affiliated International Management, LLC, representing self, (gary@aim4sustainability.com)

PART I – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R403.4.2 (IRC N1103.4.2) ~~Hot-Heated~~ water pipe insulation (Prescriptive). Piping conveying water heated by a water heater shall be insulated. The insulation shall have a thermal resistance (*R-value*) of not less than R-3 or where tubular pipe insulation is used for insulating piping, the thermal conductivity, k , of such insulation shall be not greater than 0.28 Btu per inch/h•ft² • F [0.40 W/(m•K)] for water temperatures less than or equal to 140°F (60°C) and not greater than 0.29 Btu per inch/h•ft² • F [0.42 W/(m•K)] for water temperatures greater than 140°F (60°C) and less than or equal to 200°F (93.3°C). Tubular pipe insulation shall be installed in accordance with the insulation manufacturer's instructions. Pipe insulation shall be continuous except where the piping passes through a framing member. The minimum insulation thickness requirements of this section shall not supersede any greater insulation thickness requirements necessary for the protection of piping from freezing temperatures or the protection of personnel against external surface temperatures on the insulation. ~~Insulation for hot water pipe with a minimum thermal resistance (*R-value*) of R-3 shall be applied to the following:~~

- ~~1. Piping larger than 3/4 inch (19 mm) nominal diameter.~~
- ~~2. Piping serving more than one dwelling unit.~~
- ~~3. Piping from the water heater to for kitchen outlets.~~
- ~~4. Piping located outside the conditioned space.~~
- ~~5. Piping from the water heater to a distribution manifold.~~
- ~~6. Piping located under a floor slab.~~
- ~~7. Buried in piping.~~
- ~~8. Supply and return piping in recirculation systems other than demand recirculation systems.~~
- ~~9. Piping with run lengths greater than the maximum run lengths for the nominal pipe diameter given in Table 403.4.2.~~

All remaining piping shall be insulated to at least R-3 or meet the run length requirements of Table 403.4.2.

**TABLE R403.4.2 (N1103.4.2)
MAXIMUM RUN LENGTH (feet)^a**

Nominal Pipe Diameter of Largest Diameter Pipe in the Run (inch)	3/8	1/2	3/4	>3/4
Maximum Run Length	30	20	10	5

For SI: 1 inch=25.4 mm, 1 foot=304.8 mm

a. Total length of all piping from the distribution manifold or the recirculation loop to a point of use.

Exceptions: Insulation shall not be required to be installed on the following:

1. Flexible connectors or reduced sized fixture supply tubing from the connection at the end of the fixture supply piping to a fixture fitting.
2. Valves, pumps and threaded unions in heated water piping.
3. Piping from shower and bath mixing valves to the water outlets.
4. Cold water piping that receives heated water as part of a water recirculation system that does not have a dedicated return pipe to the water heater.
5. Tubing from hot drinking-water heating units to the water outlet.
6. Piping at locations where a vertical support of the piping is installed.
7. Piping or tubing from a tankless water heater serving only one fixture.

TABLE R403.4.2 (N1103.4.2)
TUBULAR INSULATION WALL THICKNESS

NOMINAL PIPE OR TUBE DIAMETER (inches)	MINIMUM INSULATION WALL THICKNESS (inches)	
	≤140 °F WATER TEMPERATURE	>140 °F to 200°F WATER TEMPERATURE
≤3/8	3/8	3/8
> 3/8 to <3/4	1/2	1/2
> 3/4 to <1	3/4	1
≥1 to <1 1/2	1	1 1/2
≥1 1/2 to <4	1 1/2	2
≥4 to <8	1 1/2	2
≥8	1 1/2	2

For SI: 1 inch = 25.4 mm; °C = [(°F – 32)]/1.8

PART II-IPC

Revise as follows:

[E] 607.5 Pipe Insulation of piping. Hot water piping in automatic temperature maintenance systems shall be insulated with not less than 1 inch (25 mm) of insulation having a conductivity not exceeding 0.27 Btu per inch/h • ft² • °F (1.53 W per 25 mm/m² • K). The first 8 feet (2438 mm) of hot water piping from a hot water source that does not have heat traps shall be insulated with 0.5 inch (12.7 mm) of material having a conductivity not exceeding 0.27 Btu per inch/h • ft² • °F (1.53 W per 25 mm/m² • K). For other than Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane, piping to the inlet of a water heater and piping conveying water heated by a water heater shall be insulated in accordance with Sections C404.5 of the *International Energy Conservation Code*. For Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane, piping to the inlet of a water heater and piping conveying water heated by a water heater shall be insulated in accordance with Section R403.4.2 of the *International Energy Conservation Code*.

PART III – IRC-P

Add new text as follows:

SECTION P2905 **HEATED WATER DISTRIBUTION SYSTEMS**

P2905.1 Insulation of piping required. Piping conveying water heated by a water heater shall be insulated in accordance with Section N1103.4.2.

Reason: PART I-IECC The current requirements as to where pipe insulation must be installed and the run length allowance where insulation *doesn't* have to be installed, are much too complex for most installers to comprehend. Think of trying to explain the current run length allowance to the typical person that ends up performing this type of work. It also requires too much thinking on the part the inspector when the inspector is facing a plumbing system that has some hot water piping insulated and some not. The insulation requirement needs to be simple – just insulate all of the hot water piping. The minor amount of savings by not insulating

some lengths of hot water piping is overshadowed by confusion/time wasted in the field and the significant potential of not getting it correct (and failing an inspection).

The phrase "water heated by a water heater" was used instead of "hot water" because the IECC does not have a definition for hot water. Code users could refer to the definition found in the IRC and the IPC for hot water which says water of a temperature 110F or greater. However, an installer *could* try to justify not installing insulation on any piping with the claim that they intended to set the water heater temperature at 108F. This is not the intent of the existing language and by using the phrase "water heated by a water heater", this loophole will be closed.

The description of the required insulation is expanded. Where tubular pipe insulation is used, that material does not have an R value rating. The equivalent R value must be calculated. And while some submittal specification sheets show the equivalent R-value for each wall thickness, some do not. And how often does a submittal sheet show up on a jobsite? Tubular pipe insulation is specified in wall thickness and k value. The k value in this code section covers the most commonly used insulation materials for this application. To keep it simple – Table R403.4.2 is provided to show the required wall thicknesses that closely approximates a R value of R-3 for the two most common types of pipe insulation materials. This takes the calculations out of the picture to make it simple for installers and inspectors.

The option for insulating piping with materials that are R-value rated was left in this section because it is sometimes possible to "encapsulate" piping within wall or ceiling insulation without the need for installing tubular pipe insulation. Where piping is properly "nested" into fiberglass batts in walls or is covered with spray-in foam systems, the installation of tubular pipe insulation is a waste of time and money. This option needs to remain to allow these alternate cost savings methods to be used.

The last sentence "Pipe insulation shall be continuous along all piping." is intended to prohibit a common practice of just insulating piping up to where the piping enters and exits a structural member. For example, a pipe that runs vertically through the bottom plate of a wall or through a joist needs to be insulated continuously through those members in order for the insulated piping system to be effective in reducing energy loss.

The exceptions are added to this section to clarify where "piping insulation" is not required. Most items are common sense. Valves and pumps are difficult to insulate and the benefit of such effort is minimal. Let's keep it simple and easy.

PART II– IPC

The text that is struck out in IPC 607.5 is replaced with text that points the appropriate sections on the IECC that cover insulation.

Normally, the IPC only covers plumbing in commercial buildings. However, because the residential chapters in the IECC covers R2, R3 and R4 occupancy buildings that are 3 stories or less above grade plane in height *and* these occupancies are not covered by the plumbing chapter in the IRC, there needs to be a 'pointer section' in the IPC to alert the plumbing installer that there are piping insulation requirements in the residential provisions of the IECC that apply. Of primary concern are for allowing sufficient space around the piping (such as in wall cavities) and properly sizing holes through structural members to accommodate the insulation.

PART III – IRC

A new section is added in Chapter 29 of the IRC to alert the plumbing installer that the heated water piping installation must allow for insulating of the piping system. Of primary concern are for allowing sufficient space around the piping (such as in wall cavities) and properly sizing holes through structural members to accommodate the insulation.

Cost Impact: None.

RE129-13

PART I-IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II-IPC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART III-IRC-P

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.4.2-EC-KLEIN

RE130-13

R403.4.2 (IRC N1103.4.2)

Proponent: Edward R. Osann, Natural Resources Defense Council, on behalf of self (eosann@nrdc.org)

Revise as follows:

R403.4.2 (N1103.4.2) Hot water pipe insulation (Prescriptive). Insulation for hot water pipe with a minimum thermal resistance (*R*-value) of R-3 shall be applied to the following:

1. Piping larger than $\frac{3}{4}$ inch nominal diameter.
2. Piping serving more than one dwelling unit.
3. Piping from the water heater to kitchen outlets.
4. In occupancies with three or more bedrooms, piping from the water heater or recirculation system piping to the outlet for any shower or tub/shower combination.
45. Piping located outside the conditioned space.
56. Piping from the water heater to a distribution manifold.
67. Piping located under a floor slab.
78. Buried piping.
89. Supply and return piping in recirculation systems other than demand recirculation systems.
910. Piping with run lengths greater than the maximum run lengths for the nominal pipe diameter given in Table R403.4.2.

All remaining piping shall be insulated to at least R-3 or meet the run length requirements of Table R403.4.2.

Reason: Every adult in the United States has experienced the waiting time for water that is hot enough to step into the shower. Most do so on a regular basis, and often for a minute or more. While cold or tepid water in the initial draw from a hot water outlet serving a clothes washer, dishwasher, or lavatory sink may be usable for its intended purpose, cold or tepid water for showering is routinely purged, a waste of water, energy, and time. Pipe insulation significantly reduces heat loss and helps to ensure that hot water gets to the shower sooner. During showering, pipe insulation keeps the water hotter by reducing the temperature drop from the source of hot water to the shower outlet. This saves significant energy by making it possible to reduce the set point for the storage temperature at the hot water heater. Every 1°F reduction in hot water storage temperature reduces standby heat losses by almost 2%. During the cool-down phase, pipe insulation increases the time it takes for the temperature of the water to cool down, roughly doubling the cool-down time for $\frac{1}{2}$ inch nominal pipe and tripling it for $\frac{3}{4}$ inch nominal pipe. This saves energy, water, and time for all those hot water events, including showers, that are clustered between 10 and 45 minutes apart, as when occupants are getting ready for work and school in the AM.

Cost Impact: This code change proposal will increase the cost of construction only to the extent that all or a portion of the pipe run to a shower would not already require insulation under the existing requirements of Section R403.4.2. For example, under the current language of this section, hot water pipe running in an unconditioned crawl space or attic is required to be insulated. Pipe running from a water heater to a distribution manifold is also required to be insulated, while up to 20 feet of $\frac{1}{2}$ inch supply piping from a manifold to an end use such as a shower may be uninsulated. At an estimated cost of materials, labor, and profit of \$1.10 to \$1.50 per linear foot for installing foam insulation¹, the cost of insulating 20 feet of $\frac{1}{2}$ inch supply piping would be \$22 to \$30. Klein, Gary, "Cost Estimation for Materials and Installation of Hot Water Piping Insulation," prepared for Pacific Northwest National Laboratory, June 2012, accessible at <<http://bc3.pnnl.gov/wiki/index.php/Downloads>>.

RE130-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.4.2-EC-OSANN.DOC

RE131-13

R403.4.2 (IRC N1103.4.2)

Proponent: Edward R. Osann, on behalf of Natural Resources Defense Council; Ryan Meres, on behalf of Institute for Market Transformation.(eosann@nrdc.org)

Revise as follows:

R403.4.2 (N1103.4.2) Hot water pipe insulation (Prescriptive Mandatory). Insulation for hot water pipe with a minimum thermal resistance (*R*-value) of R-3 shall be applied to the following:

1. Piping larger than $\frac{3}{4}$ inch nominal diameter.
2. Piping serving more than one dwelling unit.
3. Piping from the water heater to kitchen outlets.
4. Piping located outside the conditioned space.
5. Piping from the water heater to a distribution manifold.
6. Piping located under a floor slab.
7. Buried piping.
8. Supply and return piping in recirculation systems other than demand recirculation systems.
9. Piping with run lengths greater than the maximum run lengths for the nominal pipe diameter given in Table R403.4.2.

All remaining piping shall be insulated to at least R-3 or meet the run length requirements of Table R403.4.2.

Reason: The 2012 edition of the IECC added this prescriptive section on hot water pipe insulation, containing a list of 9 factors or locations that require pipe to be insulated to R-3. However, because it is prescriptive and not mandatory, it is not required in any project that opts for the performance approach. Unfortunately, while the 2012 IECC performance approach allows credit for improving the efficiency of the hot water heat source, no credit is available for features of the hot water distribution system that might actually reduce the amount of hot water used, such as those listed in R403.4.2. (The HERS rating system is similarly drawn, offering no credit for hot water pipe insulation.) Thus, although hot water pipe insulation is known to save significant amounts of energy over the life of the building, the energy savings cannot be "scored" or accumulated within the performance framework of the code. Section R403.4.2 cannot contribute to compliance under the IECC performance approach, and is thus likely to be ignored. For these energy savings to be realized in all new residential buildings covered by the IECC, R403.4.2 should be mandatory instead of prescriptive. If and when Section R405 is modified to ensure that the performance path will account for the energy attributes of the hot water distribution system, consideration can be given to removing the mandatory designation from some or all portions of R403.4.2.

As was noted by the original proponents of Section R403.4.2, insulation of hot water piping reduces the waste of energy, water, and time during the delivery, use, and cool-down phases of a hot water event. During the delivery phase, when the piping runs in unconditioned spaces, in a slab, when it is buried or when the flow rate is very low (less than 1 gpm), pipe insulation significantly reduces the heat loss and helps to ensure that hot enough water gets to the outlets. During the cool-down phase, pipe insulation increases the time it takes for the temperature of the water to cool down, roughly doubling the cool-down time for $\frac{1}{2}$ inch nominal pipe and tripling it for $\frac{3}{4}$ inch nominal pipe. This saves energy, water and time for all those hot water events that are clustered between 10 and 45 minutes apart, as when occupants are getting ready for work and school in the morning and during evening activities such as preparing and cleaning up from supper and getting ready for bed, as well as lunchtime when people are home during the day.

As hot water is being used, pipe insulation keeps the water hotter by reducing the temperature drop from the source of hot water to the outlet. This saves additional energy by making it possible to reduce the set point for storage temperature at the hot water heater. Every 1°F reduction in hot water storage temperature reduces standby heat losses by almost 2%.

Cost Impact: This code change proposal will not increase the cost of construction for builders following the prescriptive approach, i.e., the majority of all builders. For those following the performance path, pipe insulation will be an added cost. A recent estimate¹ of the cost of insulating hot water piping with R-3 foam insulation is \$1.10 to \$1.50 per linear foot, including labor, materials, and profit for the plumbing subcontractor. The cost of insulating all hot water piping in a 2400 ft² home was estimated by the same study to be \$135 to \$325, depending on building configuration. It should be noted that these estimates are based on insulation of *all* hot water piping in the home, which is more than is required by Section R403.4.2. Thus the actual impact on the cost of construction should be somewhat less than this range in most cases.

¹Klein, Gary, "Cost Estimation for Materials and Installation of Hot Water Piping Insulation," prepared for Pacific Northwest National Laboratory, June 2012, accessible at <<http://bc3.pnnl.gov/wiki/index.php/Downloads>>.

RE131-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.4.2-EC-OSANN.DOC

RE132-13

R403.4.2 (IRC N1103.4.2), Table R403.4.2 (IRC Table N1103.4.2)

Proponent: Don Surrena, CBO, National Association of Home Builders (NAHB) (dsurrena@nahb.org)

Revise as follows:

R403.4.2 (N1103.4.2) Hot water pipe insulation (Prescriptive). Insulation for hot water pipe with a minimum thermal resistance (*R*-value) of R-3 shall be applied to the following:

1. Piping larger than 3/4 inch nominal diameter.
2. Piping serving more than one dwelling unit.
- ~~3. Piping from the water heater to kitchen outlets.~~
- ~~43. Piping located outside the conditioned space.~~
- ~~54. Piping from the water heater to a distribution manifold.~~
- ~~65. Piping located under a floor slab.~~
- ~~76. Buried piping.~~
- ~~87. Supply and return piping in recirculation systems other than demand recirculation systems.~~
- ~~9. Piping with run lengths greater than the maximum run lengths for the nominal pipe diameter — given in Table R403.4.2.~~

All remaining piping shall be insulated to at least R-3 or meet the run length requirements of Table R403.4.2.

TABLE R403.4.2 (N1103.4.2)
MAXIMUM RUN LENGTH (feet)^a –

Nominal Pipe Diameter of Largest Diameter Pipe in the Run (inch)	3/8	1/2	3/4	≥ 3/4
Maximum Run Length	30	20	10	5

Reason: Research has been performed by a two different sources that indicate insulating hot water piping in a residential home is not cost effective. The NAHB Research Center performed a study in 2010 that concluded, based on a low cost estimate that the simple payback for insulating hot water piping was in the 60 to 100 year range based on the piping material. Additionally, a 2009 study presented by the National Renewable Energy Lab at the ASME 3rd International Conference of Energy Sustainability estimated paybacks between 72 and 183 years for various insulation configurations.

First cost, as determined in the NAHB Research Center report varied between \$500 and \$1,200. The NREL report had a slightly smaller house with an estimated installation cost of \$366.

The simulations demonstrate that the benefit of insulation is greatest when all of the hot water uses are spaced apart from 10 to 30 minutes; however, this is not typically how hot water is consumed in a home. The benefit of insulation is diminished with shorter and longer time between uses.

It was shown in the study that pipes located in colder locations such as an unconditioned crawl space, benefit more from pipe insulation than pipes located in more conditioned spaces. This is why the insulation requirement was not changed for hot water pipes outside conditioned space.

Plastic pipe was shown to have less loss than copper pipe and commensurately insulation is more beneficial on metal pipe than on plastic pipe. However, copper pipe is losing market share and currently is only being installed in 14% of new homes.

Sources:

NAHB Research Center (2010), *Domestic Hot Water System Piping Insulation: Analysis of Benefits and Cost*
Hendron, R. Burch, J. Hoeschele, M. Rainer, L. (2009), *Potential for Energy Savings Through Residential Hot Water Distribution System Improvements*, Proceedings of the 3rd International Conference on Energy Sustainability

Cost Impact: The code change proposal will not increase the cost of construction.

RE132-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R403.4.2-EC-SURRENA.DOC

RE133-13

R403.4.2 (IRC N1103.4.2)

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

R403.4.2 (N1103.4.2) Hot water pipe insulation (Prescriptive). Insulation for hot water pipe with a minimum thermal resistance (*R*-value) of R-3 shall be applied to the following:

- ~~1. Piping larger than 3/4 inch nominal diameter.~~
- ~~2. 1. Piping serving more than one dwelling unit.~~
- ~~3. 2. Piping from the water heater to kitchen outlets.~~
- ~~4. 3. Piping located outside the conditioned space.~~
- ~~5. 4. Piping from the water heater to a distribution manifold.~~
- ~~6. 5. Piping located under a floor slab.~~
- ~~7. 6. Buried piping.~~
- ~~8. 7. Supply and return piping in recirculation systems other than demand recirculation systems.~~
- ~~9. 8. Piping with run lengths greater than the maximum run lengths for the nominal pipe diameter given in Table R403.4.2.~~

All remaining piping shall be insulated to at least R-3 or meet the run length requirements of Table R403.4.2.

Reason: Insulation requirements for ¾-in piping are currently inconsistent between the list in Section R403.4.2 and Table R403.4.2. Eliminating the list item eliminates the ambiguity.

Cost Impact: The code change proposal will not increase the cost of construction.

RE13313

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.4.2-EC-WILLIAMS.DOC

RE134-13

Table R403.4.2 (IRC Table N1103.4.2)

Proponent: Edward R. Osann, Natural Resources Defense Council, on behalf of self.
(eosann@nrdc.org)

Revise as follows:

TABLE R403.4.2 (N1103.4.2)
MAXIMUM RUN LENGTH (feet)^a

Nominal Pipe Diameter of Largest Diameter Pipe in the Run (inch)	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$> \frac{3}{4}$
Maximum Run Length	30	20	<u>15</u>	10	5

For SI: 1 inch = 25.4 mm, 1 foot 304.8 mm.

a. Total length of all piping from the distribution manifold or the recirculation loop to a point of use.

Reason: This proposal adds $\frac{5}{8}$ inch pipe to Table R403.4.2 to encourage plumbing system designers and installers to consider opportunities to use $\frac{5}{8}$ inch pipe in hot water applications where the capacity provided by $\frac{1}{2}$ inch pipe is inadequate but $\frac{3}{4}$ inch pipe may not be necessary. The maximum uninsulated run length proposed is proportional to the length limits currently in the table for $\frac{1}{2}$ inch and $\frac{3}{4}$ inch pipe. Where system configurations allow $\frac{5}{8}$ inch pipe to be used in lieu of $\frac{3}{4}$ inch pipe, both energy and water will be saved by reducing the volume of water standing in the pipe subject to cool-down between draws.

Cost Impact: This code change proposal provides a design option and will not increase the cost of construction.

RE134-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R403.4.2T #1-EC-OSANN.DOC

RE135-13

Table R403.4.2 (IRC Table N1103.4.2)

Proponent: Edward R. Osann, Natural Resources Defense Council, on behalf of self.
(eosann@nrdc.org)

Revise as follows:

TABLE R403.4.2 (N1103.4.2)
MAXIMUM RUN LENGTH (feet)^a

Nominal Pipe Diameter of Largest Diameter Pipe in the Run (inch)	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	$\geq \frac{3}{4}$
Maximum Run Length	30	20	10	5

For SI: 1 inch = 25.4 mm, 1 foot 304.8 mm.

a. Total length of all piping from the distribution manifold or the recirculation loop to a point of use.

Reason: Section R403.4.2 is intended to save energy, water, and time for future occupants by requiring domestic hot water piping to be insulated where savings are likely to be greatest. The text of Section R403.4.2 currently provides that *all* hot water piping larger than $\frac{3}{4}$ inch diameter must be insulated:

"Insulation for hot water pipe with a minimum thermal resistance (*R*-value) of R-3 shall be applied to the following:

1. Piping larger than $\frac{3}{4}$ inch nominal diameter.

* * * * *

9. Piping with run lengths greater than the maximum run lengths for the nominal pipe diameter given in Table R403.4.2.

All remaining piping shall be insulated to at least R-3 or meet the run length requirements of Table R403.4.2."

Table R403.4.2 is intended to identify lengths of pipe of various nominal diameters that may remain uninsulated when running from a distribution manifold or recirculation loop to a point of use. Although Table R403.4.2 is not set out as an exception to the text of this section, the last column of the table can be read to allow for pipe greater than $\frac{3}{4}$ inch to be uninsulated if it is part of a run of up to 5 feet from a manifold or recirculation loop. The last column of the table is at best ambiguous, at worst contradictory. This proposal will resolve this ambiguity by removing pipe greater than $\frac{3}{4}$ inch from the table, reaffirming that all hot water pipe of this dimension must be insulated as per item (1) of Section R403.4.2.

Cost Impact: This code change proposal will not increase the cost of construction, except where the current language may be interpreted to allow for certain hot water pipe runs of up to 5 feet to remain uninsulated. At an estimated cost of materials, labor, and profit of \$1.10 to \$1.50 per linear foot of foam insulation installed, the additional cost for each such run would be in the range of five to seven dollars.

R135-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R403.4.2T #2-EC-OSANN.DOC

RE136-13

R403.4.2 (NEW) (IRC N1103.4.2 (NEW)), IPC 202, IPC [E]607.2.1.1 (NEW), IRC P2905 (NEW), IRC P2905.1 (NEW)

THIS IS A 3 PART CODE CHANGE PROPOSAL. PARTS I AND II WILL BE HEARD BY THE IECC-RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS 2 SEPARATE CODE CHANGES. PART III WILL BE HEARD BY THE IRC-PM COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Gary Klein, Affiliated International Management, LLC, representing self, gary@aim4sustainability.com

PART I – IECC-RESIDENTIAL PROVISIONS

Add new text as follows:

R403.4.2 (IRC N1101.4.2) Demand recirculation systems. A water distribution system having one or more recirculation pumps that pump water from a heated water supply pipe back to the heated water source through a cold water supply pipe shall be a *demand recirculation water system*. Pumps shall have controls that comply with both of the following:

1. The control shall start the pump upon receiving a signal from the action of a user of a fixture or appliance, sensing the presence of a user of a fixture or sensing the flow of hot or tempered water to a fixture fitting or appliance.
2. The control shall limit the water temperature increase in the cold water piping to not more than 10°F (5.6 °C) greater than the initial temperature of the water in the piping and limits the temperature entering the cold water piping to 102°F (38.9 °C).

PART II – IPC

Add new definition as follows:

DEMAND RECIRCULATION WATER SYSTEM. A water distribution system where one more pumps prime the service hot water piping with heated water upon demand for hot water.

Add new text as follows:

[E] 607.2.1.1 Demand recirculation controls. This section shall apply only to Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane. A water distribution system having one or more recirculation pumps that pump water from a heated water supply pipe back to the heated water source through a cold water supply pipe shall be a *demand recirculation water system*. Pumps shall have controls that comply with both of the following:

1. The control shall start the pump upon receiving a signal from the action of a user of a fixture or appliance, sensing the presence of a user of a fixture or sensing the flow of hot or tempered water to a fixture fitting or appliance.
2. The control shall limit the water temperature increase in the cold water piping to not more than 10°F (5.6 °C) greater than the initial temperature of the water in the piping and limits the temperature entering the cold water piping to 102°F (38.9 °C).

PART III – IRC-P

Add new text as follows:

SECTION P2905 **HEATED WATER DISTRIBUTION SYSTEMS**

P2905.1 Demand recirculation systems. *Demand recirculation water systems shall be in accordance with Section N1103.4.2.*

Reason: The purpose of this code change proposal is to clarify the requirements for installing circulation pumps in applications that use a cold water supply pipe to circulate the water back to the water heater. Demand recirculation water systems are significantly more energy efficient than other recirculation systems and are inherently safer when the cold water supply is used as the return.

Figure 1 shows that demand activated circulation is significantly more energy efficient than any other type of heated water circulation system. The annual energy needed to keep the loop hot with water heated electrically or with natural gas are shown separately from the energy needed for the pump. The majority of the energy is lost in keeping the water in the loop at the desired temperature (all of it if there is a gravity loop). A small loop, 100 feet including the supply and the return was analyzed. The savings ranges from 87.5 percent when compared to a recirculation system that runs only 2-hours per day to 99 percent when compared to a recirculation system that runs only 24-hours per day. The operating costs and savings remain proportional as the length of the circulation loop and the flow rate of the pump increase.

Figure 1 Annual Energy Requirements for Demand Activated Circulation and Standard Recirculation

	Standard Recirculation						Demand Activated Circulation
	Daily Hours of Operation						
	24	12	8	6	4	2	0.25
Loop Heat Losses							
Natural Gas (therms)	292	146	97	73	49	24	3
Electric (kWh)	6,388	3,194	2,129	1,597	1,065	532	67
Pump Energy (kWh)	438	219	146	110	73	37	8

The inherently better safety comes from the fact that the controls specified for demand recirculation water systems limit the flow of water from the hot water supply into the cold water supply to only minutes a day and because they limit the temperature of the water that is allowed to go into the cold water supply. There are five other control strategies for heated water recirculation systems (thermosiphon (gravity), continuous pumping, timer controlled, bandwidth temperature sensor (aquastat) controlled and a combination of timer and bandwidth temperature sensor (aquastat) controlled and none of them has the ability to meet these stringent requirements.

The requirements of this section should be identical in both the IECC and the IPC, since the language for the controls does not depend on occupancy

For more information and background on issues related to hot water distribution and for a more detailed analysis in support of this proposal please go to <http://www.aim4sustainability.com> Follow the link on the home page to Codes.

Cost impact: This proposal will not increase the cost of construction, as it does not require the use of demand recirculation water systems. In addition, the ability to use cold-water supply piping as a return pipe may reduce the cost of installing a circulation loop.

RE136-13 **PART I IECC-RESIDENTIAL PROVISIONS**

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II IPC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART III IRC-P

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.4.2 (NEW) #1-EC-KLEIN

RE137-13

R202 (IRC N1101.9), R403.4.2 (NEW) (IRC N1103.4.2 (NEW)),
R403.4.2.1 (NEW) (IRC N1103.4.2.1 (NEW)), Table R403.4.2.1 (NEW) (IRC Table
N1103.4.2.1 (NEW)), R403.4.2.2 (NEW) (IRC N1103.4.2.2 (NEW)),
R403.4.2.2.1 (NEW) (IRC N1103.4.2.2.1 (NEW)), IRC P2905 (NEW), IRC P2905.1
(NEW)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE IECC-
RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. PART II WILL BE
HEARD BY THE IRC-PM COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE
COMMITTEES.

Proponent: Gary Klein, Affiliated International Management, LLC, representing self,
(gary@aim4sustainability.com)

PART I-IECC RESIDENTIAL PROVISIONS

Add new text as follows:

R403.4.2 (IRC N1103.4.2) Efficient heated water supply piping. Heated water supply piping shall be in accordance with Section R403.4.2.1 or Section R403.4.2.2. The flow rate through ¼ inch piping shall not exceed 0.5 gpm (1.9 Lpm). The flow rate through 5/16 inch piping shall not exceed 1 gpm (3.8 Lpm). The flow rate through 3/8 inch piping shall not exceed 1.5 gpm (5.7 Lpm).

R403.4.2.1 (IRC N1103.4.2.1) Maximum allowable pipe length method. The maximum allowable piping length from the nearest source of heated water to the termination of the fixture supply pipe for *plumbing fixtures* and *plumbing appliances* shall be in accordance with the maximum piping length columns in Table R403.4.2.1. Where the piping contains more than one size of pipe, the largest size of pipe within the piping shall be used for determining the maximum allowable length of the piping in Table R403.4.2.1.

**TABLE R403.4.2.1 (IRC TABLE N1103.4.2.1)
PIPING VOLUME AND MAXIMUM PIPING LENGTHS**

<u>NOMINAL PIPE SIZE (inch)</u>	<u>VOLUME (liquid ounces per foot length)</u>	<u>MAXIMUM PIPING LENGTH (feet)</u>	
		<u>WATER FROM A WATER HEATER</u>	<u>WATER FROM A RECIRCULATION LOOP OR HEAT TRACED PIPE</u>
<u>1/4</u>	<u>0.33</u>	<u>50</u>	<u>50</u>
<u>5/16</u>	<u>0.5</u>	<u>50</u>	<u>48</u>
<u>3/8</u>	<u>0.75</u>	<u>50</u>	<u>32</u>
<u>1/2</u>	<u>1.5</u>	<u>43</u>	<u>16</u>
<u>5/8</u>	<u>2</u>	<u>32</u>	<u>12</u>
<u>3/4</u>	<u>3</u>	<u>21</u>	<u>8</u>
<u>7/8</u>	<u>4</u>	<u>16</u>	<u>6</u>
<u>1</u>	<u>5</u>	<u>13</u>	<u>5</u>
<u>1 ¼</u>	<u>8</u>	<u>8</u>	<u>3</u>
<u>1 ½</u>	<u>11</u>	<u>6</u>	<u>2</u>
<u>2 or larger</u>	<u>18</u>	<u>4</u>	<u>1</u>

1 Gallon = 128 ounces. For SI: 1 inch=25.4 mm, 1 foot = 304.8 mm, 1 liquid ounce = 0.030 L

R403.4.2.2 (IRC N1103.4.2.2) Maximum allowable pipe volume method. The water volume in the piping shall be calculated in accordance with Section R404.4.2.2.1. The maximum volume from the nearest source of heated water to the termination of the fixture supply pipe for a *plumbing fixture* or

plumbing appliance shall be 0.5 gallon (1.89 L) where the source of heated water is a water heater; and 0.19 gallon (0.7 L) where the source of heated water is a recirculating system or heat-traced piping.

R403.4.2.2.1 (IRC N1103.4.2.2.1) Water volume determination. The volume shall be the sum of the internal volumes of pipe, fittings, valves, meters and manifolds between the nearest source of heated water and the termination of the fixture supply pipe. The volume in the piping shall be determined from the volume column in Table R403.4.2.1. The volume contained within fixture shut off valves, within flexible water supply connectors to a fixture fitting and within a fixture fitting shall not be included in the water volume determination. Where heated water is supplied by a recirculating system or heat-traced piping, the volume shall include the portion of the fitting on the branch pipe that supplies water to the fixture.

PART II IRC-P

Add new text as follows:

SECTION P2905 **HEATED WATER DISTRIBUTION SYSTEMS**

P2905.1 Heated water supply piping. Heated water supply piping shall be in accordance with Section N1103.4.2.

Reason: This change speeds hot water to the user, saves energy and water, and potentially lowers construction costs. All these are accomplished by limiting the volume of water in the pipes.

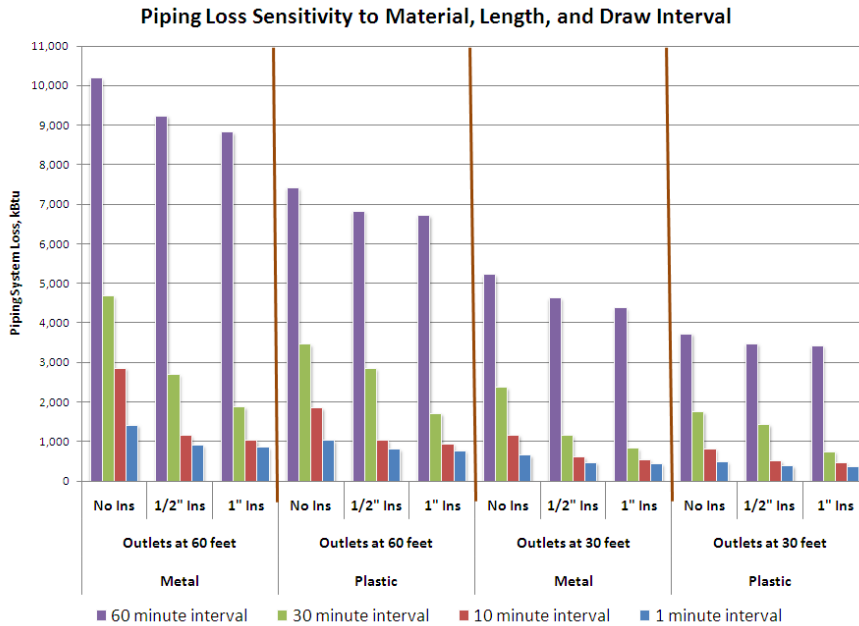
We have all have turned on the hot water and waited for it to get hot. While we wait water runs down the drain, wasting clean water. While we wait, our time is wasted. When we are done there is still hot water in the pipes, water which cools thereby wasting as much energy as it took to heat the water in the pipes. Pipes with larger volumes take longer to fill, waste more and are potentially more expensive to build.

This proposal remedies the problems above by reducing the water volume between the source of heated water and the use. The first method (Section R403.4.2.1) requires no calculation; it limits the water volume in the pipes by limiting the pipe length. The second option (Section R403.4.2.1) requires a calculation of volume in the pipes, but provides a table that translates the pipe length into a volume (columns 1 and 2); and provides quick options for different pipe assumptions in columns 3 and 4.

In simple form, cutting the volume in half: cuts the wait time in half, cuts the clean water wasted down the drain in half, cuts the energy loss while water goes through the pipes in half, and cuts the loss of energy from hot water left in the pipes after use in half.

A 2010 study done by the National Association of Home Builders Research Center shows the big impact of reducing hot water pipe volume. Figure 1, from that study, is below. The left half is for pipe 60 feet long. The right half is for pipe 30 feet long. Pick any case on the left and compare it to the same case on the right. Note there is always about a 50% reduction in piping energy lost in the 30-foot case. An example from the figure below, the energy loss of an uninsulated metal pipe 60 feet long drops from just over 10,000 kBtu to just over 5,000 kBtu for a pipe 30 feet long. Similarly uninsulated plastic pipe drops from about 7,300 kBtu to about 3,700 kBtu. The same pattern of reduction occurs when the piping is insulated.

Figure 1 Pipe Loss Comparison Using Parametric Analysis



Source: Domestic Hot Water System Piping Insulation: Analysis of Benefits and Costs, Figure 4, page 10 of 24, NAHB Research Center, December 2010.

Why is the maximum volume 0.5 gallon when the source of heated water is a water heater? So that following standard practice for plumbing engineers and meeting the minimum requirements in the energy code will be aligned. At present, they are not, with the result that hot water delivery times are greater than 30 seconds after the tap is opened; unacceptable performance according to the American Society of Plumbing Engineers.

Why is the maximum volume 0.19 gallon when the source of heated water is a circulation loop or heat-traced pipe? In exchange for the flexibility in the location of the water heater relative to the plumbing fixtures and plumbing appliances, the allowable volume that will be wasted has been reduced and the time-to-tap improved so that it will almost always fall into ASPE's range for Acceptable Performance.

The definition proposed is used in both the IRC and the IPC.

For more information and background on issues related to hot water distribution and for a more detailed analysis in support of this proposal please go to <http://www.aim4sustainability.com>. Follow the link on the home page to Codes.

Cost impact: There are several ways to meet the requirements of this proposal, many of which cost less than current piping practices. I would recommend that builders and developers select one of the less expensive methods.

RE137-13

PART I-IECC-RESIDENTIAL PROVISIONS

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II-IRC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.4.2 #2 (NEW)-EC-KLEIN

RE138-13

R202 (IRC N1101.9), R403.4.2 (NEW) (IRC N1103.4.2 (NEW)), R403.4.2.1 (NEW) (IRC N1103.4.2.1 (NEW)), Table R403.4.2.1 (NEW) (IRC N1103.4.2.1 (NEW)), R403.4.2.2 (NEW) (IRC N1103.4.2.2 (NEW)), R403.4.2.2.1 (NEW) (IRC N1103.4.2.2.1 (NEW)), IRC P2905 (NEW), IRC P2905.1 (NEW)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. PART II WILL BE HEARD BY THE IRC-PM COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Gary Klein, Affiliated International Management, LLC, representing self, (gary@aim4sustainability.com)

PART I – IECC RESIDENTIAL PROVISIONS

Add new text as follows:

R403.4.2 (N1103.4.2) Efficient heated water supply piping. Heated water supply piping shall be in accordance with Section R403.4.2.1 or Section R403.4.2.2. The flow rate through ¼ inch piping shall not exceed 0.5 gpm (1.9 Lpm). The flow rate through 5/16 inch piping shall not exceed 1 gpm (3.8 Lpm). The flow rate through 3/8 inch piping shall not exceed 1.5 gpm (5.7 Lpm).

R403.4.2.1 (N1103.4.2.1) Maximum allowable pipe length method. The maximum piping length from the nearest source of heated water to the termination of the fixture supply pipe for a public lavatory faucet shall be in accordance with the maximum piping length columns in Table R403.4.2. Where the piping contains more than one size of pipe, the largest size of pipe within the piping shall be used for determining the maximum allowable length of the piping in Table R403.4.2.1.

TABLE R403.4.2.1 (N1103.4.2.1)
PIPING VOLUME AND MAXIMUM PIPING LENGTHS

NOMINAL PIPE SIZE (inch)	VOLUME (liquid ounces per foot length)	MAXIMUM PIPING LENGTH (feet)
		LAVATORY FAUCETS— PUBLIC
1/4	0.33	6
5/16	0.5	4
3/8	0.75	3
1/2	1.5	2
5/8	2	1
3/4	3	0.5
7/8	4	0.5
1	5	0.5
1 ¼	8	0.5
1 ½	11	0.5
2 or larger	18	0.5

For SI: 1 inch=25.4 mm, 1 foot = 304.8 mm, 1 liquid ounce = 0.030 L

R403.4.2.2 (N1103.4.2.2) Maximum allowable pipe volume method. The maximum piping volume from the nearest source of heated water to the termination of the fixture supply pipe for a public lavatory

faucet shall be 2 ounces (0.06 L). The water volume in the piping shall be calculated in accordance with Section R404.4.2.2.1.

R403.4.2.2.1 (N1103.4.2.2.1) Water volume determination. The volume shall be the sum of the internal volumes of pipe, fittings, valves, meters and manifolds between the nearest source of heated water and the termination of the fixture supply pipe. The volume in the piping shall be determined from the volume column in Table R403.4.2.1. The volume contained within fixture shut off valves, within flexible water supply connectors to a fixture fitting and within a fixture fitting shall not be included in the water volume determination. Where heated water is supplied by a recirculating system or heat-traced piping, the volume shall include the portion of the fitting on the branch pipe that supplies water to the fixture.

PART II-IRC-P

Add new text as follows:

SECTION P2905 **HEATED WATER DISTRIBUTION SYSTEMS**

P2905.1 Heated water supply piping. Heated water supply piping shall be in accordance with Section N1103.4.2.

Reason: The problem of heated water taking an excessively long time to arrive at lavatory faucets in public restrooms is well known. The length of time the faucets are used during each hand washing event is very short, often around 5 seconds. Federal law requires low flow rate or small, metered volumes for the faucets in these applications. Health codes expect heated water for washing hands in these applications. The dilemma is that the volume of not-hot water in the piping from the source of hot water to the faucets is much too large for the heated water to arrive in a timely fashion; even at the 50-foot limit currently required in the 2012 IPC. Supporting this proposal will correlate the IECC with Federal law and local health codes by providing heated water for hand washing in a timely matter.

The delivery of hot water to public lavatory faucets needs to be considered separately because of potential health issues. The events are short and the flow rates are low. Table 1 shows the time-to-tap performance based on the requirements in the proposal. The 0.25 and 0.5 gpm columns are typical of the flow rates for public lavatory faucets. The volume in the pipe was chosen so that heated water would arrive in the first part of the hot water event so that every person who uses the public lavatory will have the benefits of hot water.

Table 1 Time-to-Tap Performance when the Volume in the Piping from the Source to the Use is 2 ounces

Volume in the Pipe (ounces)	Minimum Time-to-Tap (seconds) at Selected Flow Rates					
	0.25 gpm	0.5 gpm	1 gpm	1.5 gpm	2 gpm	2.5 gpm
2	3.8	1.9	0.9	0.6	0.5	0.4

The energy savings comes from not losing the heat from the water as it tries to arrive at the faucets.

For more information and background on issues related to hot water distribution please read the 4-part series at: http://www.allianceforwaterefficiency.org/Residential_Hot_Water_Distribution_System_Introduction.aspx

Cost impact: There are several ways to meet the requirements of this proposal, some of which cost less than current heated water system practices. I would recommend that builders and developers select one of the less expensive methods.

RE138-13**PART I- IECC RESIDENTIAL PROVISIONS**

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II-IRC-P

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.4.2 #3 (NEW)-EC-KLEIN

RE139-13

R403.4.3 (NEW) (IRC N1104.4.3 (NEW))

Proponent: Eric Makela, Britt/Makela Group, Inc. representing Northwest Energy Codes Group (Eric@BrittMakela.com)

Add new text as follows:

403.4.3 (N1104.4.3) Electric Water Heater Insulation. Electric water heaters located in unheated spaces or on concrete floors shall be placed on an incompressible, insulated surface having a thermal resistance (R-value) of not less than R-10.

Exception: Electric water heaters in buildings in Climate Zones 1, 2 or 3 shall not be required to comply with this section.

Reason: The Washington State Residential Energy Code has required that electric water heaters located in unheated spaces and on concrete floors be placed on rigid foam insulation to reduce the heat loss from the bottom of the tank. Often these water heaters are placed in a garage or unheated basement. The standby losses through the bottom of the water heaters account for approximately 10% of the total losses in the tank which can be significant over the life of the water heater. Estimated energy savings for an electric water heater is between 22 and 25 kWh per year. Using an average electric rate of \$.10/kWh the total savings will be between \$2.20 and \$2.50 per year. The cost of the insulation board is \$8.00 so the payback on this measure would be between 2.5 to 3.2 years. This requirement is easy to implement measure is very enforceable.

Modeling Assumptions:

- Climate Location: 4,000 HDD 65
- Water Heater EF: 0.945 (NAECA requirement for 2015)
- Gallons of hot water use per day: 64.2 (per DOE test procedure) and 55
- Energy Cost: \$0.10 kWh
- Stand-by losses through bottom of water heater: 10% of total standby loss
- Tank Setback Temperature: 125°F

Cost Impact: The code change proposal will minimally increase the cost of construction.

RE139-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.4.3 (NEW)-EC-MAKLEA.DOC

RE140-13

R403.5.1 (IRC N1103.5.1)

Proponent: Mike Moore, P.E., Newport Ventures, representing Broan-NuTone

Revise as follows:

R403.5.1 (IRC N1103.5.1) Whole-house mechanical ventilation system fan efficacy. Mechanical ventilation system fans shall meet the efficacy requirements of Table R403.5.1.

~~**Exception:** Where mechanical ventilation fans are integral to tested and listed HVAC equipment, they shall be powered by an electronically commutated motor.~~

Reason: At the current stage of development, mechanical ventilation fans that are integral to tested and listed HVAC equipment (also known as central fan integrated, or "CFI" systems), are notorious for their poor performance in regards to energy and/or ventilation, and no special exception should be made in regard to their energy performance. Following are typical known problems with CFIs that are arguments to remove this exception and hold them to the same efficacy standards as other ventilation systems.

- CFIs with electronically commutated motors (ECMs) use much more fan energy than other code-approved ventilation systems: According to IRC M1507, a 2200 sqft, 3 bedroom dwelling has a ventilation flow rate requirement of 60 cfm. Suppose this dwelling has a 3 ton AC unit that has an ECM that operates at 2.5 cfm/W, a typical fan efficacy for ECMs. At the industry sizing standard of 400 cfm/ton, the central fan can be expected to use roughly 480 Watts of power when supplying ventilation air ($3 \times 400 / 2.5 = 480$). Factory settings for typical CFI controllers are set to cycle the central fan for 10 minutes out of every thirty, meaning that to achieve the average 60 cfm code required ventilation rate, 180 cfm of ventilation air must be provided by the CFI system during the 10 minutes of run time (3x the ventilation rate required because only ventilating 1/3 the time). Over an entire year (8760 hours), this system would use 1400 kWh of fan energy to provide the ventilation air required ($8760 \times 1/3 \times 480 / 1000 = 1400$ kWh). To be fair, when the pre-scheduled ventilation run time overlaps with the run time of the central fan for heating or cooling, some of this ventilation fan energy is "free"; however, central fans typically only operate about 20% of the year for heating and cooling. Assuming that this heating and cooling operation is spread out equally across all time, the net fan energy use of the system would be 20% less, or 1120 kWh. Compared to types of ventilation systems that operate at minimum efficacy levels required by this section (e.g., 1.4 cfm/W), the net fan energy use of the CFI system with an ECM uses roughly three times as much fan energy (1120 kWh versus 375 kWh per year). The difference in fan energy use is 745 kWh ($1120 - 375 = 745$), which is about enough to power two typical Energy Star rated refrigerators for an entire year! Obviously, CFI systems with ECMs are a bad choice from an energy perspective, and should not be given an exception within this section.
- Inability to achieve ASHRAE 62.2 and 2012 IRC required flow rates at more than one fan speed setting: (i.e., if code compliant flow is confirmed while the central fan is in cooling mode, lower fan flow rates in heating and fan only mode will not meet the IRC requirements)
- Potential for over-ventilation and wasted energy: If 2012 IRC flow rates are confirmed at the fan's low speed setting (e.g., in heating mode), then these units are likely to severely over-ventilate at higher speed settings (e.g., in cooling mode), wasting energy.
- Difficult-to-confirm flow rates: Unlike HRVs that often ship with pressure taps to calibrate flows or exhaust systems that are easily measured with low cost devices, CFI systems can be very difficult to validate flow rates and so in practice, confirmation of flow rates is seldom done, meaning the system could be over-ventilating (wasting even more energy for heating and cooling), or under-ventilating, meaning adequate indoor air quality is not being achieved.

Cost Impact: No impact to cost. Many other systems are available that at the same or lower cost as CFI systems with ECMs.

RE140-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.5.1 #1-EC-MOORE.DOC

RE141-13

R403.5.1 (IRC N1103.5.1), Table R403.5.1 (IRC Table N1103.5.1), R403.5.2 (NEW) (IRC N1103.5.2 (NEW))

Proponent: Mike Moore, P.E., Newport Ventures, representing Broan-NuTone

Revise as follows:

R403.5.1 (N1103.5.1) Whole-house mechanical ventilation system fan efficacy. Mechanical ventilation system fans shall meet the efficacy requirements of Table R403.5.1. This section shall not apply to mechanical ventilation fans that are integral to tested and listed HVAC equipment and that are powered by electronically commutated motors. Fans serving as a component of whole-house mechanical ventilation systems shall be in accordance with the following:

1. Exhaust fans shall have a fan efficacy of not less than 8 cfm/W (0.004 m³/W).
2. Supply fans shall have a fan efficacy of not less than 4 cfm/W (0.002 m³/W).
3. Heat recovery ventilator fans and energy recovery ventilator fans shall have a net air flow fan efficacy of not less than 1.0 cfm/W (0.0005 m³/W).

Exception: Where mechanical ventilation fans are integral to tested and listed HVAC equipment, they shall be powered by an electronically commutated motor.

Table R403.5.1 (N1103.5.1)
MECHANICAL VENTILATION SYSTEM FAN EFFICACY

FAN LOCATION	AIR FLOW RATE MINIMUM (CFM)	MINIMUM EFFICACY (CFM/WATT)	AIR FLOW RATE MAXIMUM (CFM)
Range	Any	2.8 cfm/watt	Any
In-line fan	Any	2.8 cfm/watt	Any
Bathroom, utility room	10	1.4 cfm/watt	< 90
Bathroom, utility room	90	2.8 cfm/watt	Any

For SI: 1 cubic foot per minute = 28.3 L/min.

R403.5.2 (N1103.5.2) Recovery ventilator efficiency. Heat recovery ventilators shall have a sensible recovery efficiency of not less than 65 percent at 32°F (0°C). Energy recovery ventilators shall have a total recovery efficiency of not less than 45 percent at 95°F (35°C).

Reason: The purpose of this proposal is to reduce the energy use impact of whole house mechanical ventilation (WHMV) fans. This change is needed because these fans operate for long duty cycles and can have a significant impact on the energy use of the home. Following is the justification for the various efficacy requirements by system type.

Exhaust Fans

This proposal increases the efficacy requirement for exhaust fans to 8 cfm/W. This improvement in efficacy will reduce the fan energy use of minimum code compliant exhaust only WHMV systems by over 80%. This level of efficacy is available today from multiple manufacturers based on the use of brushless DC fans, and the cost premium is roughly \$100. This first cost premium is easily recovered when the whole-house mechanical ventilation fans are operated continuously, per design (~32 month simple payback; assumptions include: \$0.12/kWh, 60 cfm, 1.4 cfm/W efficacy for current 2012 IECC minimum fan, 8.0 cfm/W efficacy for new code minimum). The length of this payback is expected to fall even further with time.

Supply Fans

The brushless DC motors that are becoming much more common in exhaust fans have not yet been widely adopted in supply fans. So, this proposal strikes a compromise between increasing energy efficiency and ensuring that there are plenty of market-available products. Over 35% of the fans capable of providing supply ventilation in the Energy Star database achieve a minimum efficacy of 4 cfm/W, and these fans are provided by a wide range of manufacturers (87% of the manufacturers of this product class manufacture fans at 4 cfm/W or greater). With such a wide array of products available, there is little to no expected additional cost to specify a 4 cfm/W supply fan versus the current 2012 IECC minimum of 1.4 cfm/W.

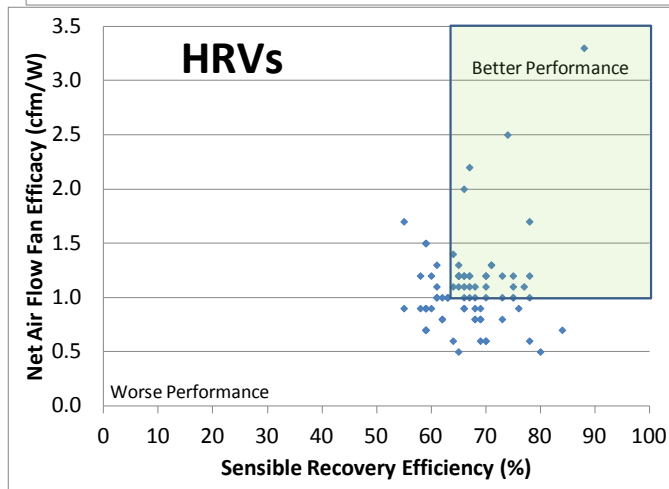
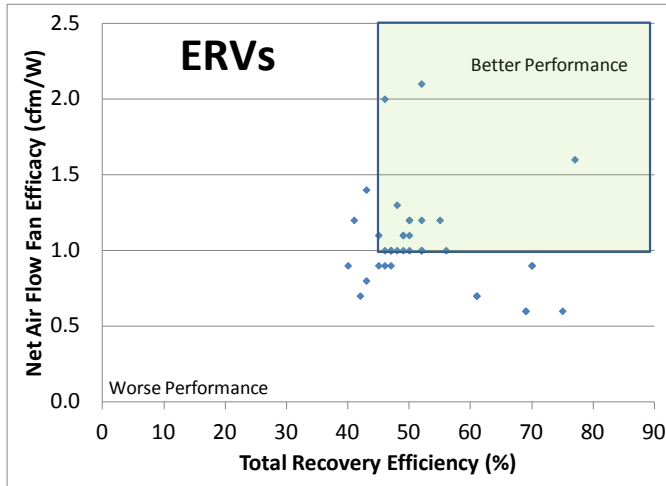
Energy Recovery (ERVs) and Heat Recovery (HRVs) Ventilators

The 2012 IECC completely exempts HRVs and ERVs from any efficacy requirements (addresses supply, exhaust, and central integrated systems, but ignores H&ERVs). The reason for this free pass is that H&ERVs are supposed to be inherently more energy efficient than systems that do not include heat or energy recovery. However, building energy simulations show that simply

installing any HRV or ERV is not sufficient to guarantee energy savings versus exhaust or supply only WHMV systems. Rather, net air flow fan efficacy and recovery efficiency are key components to assuring expected performance.

So, for HRVs, this proposal establishes “a minimum sensible recovery efficiency of 65%, and a minimum net air flow fan efficacy of 1.0 cfm/W.” The sensible recovery efficiency of 65% is the minimum criteria established in Canada to qualify as an Energy Star HRV. The fan efficacy of 1.0 cfm/W is the average efficacy of the two tiers of HRVs under the same criterion. Further, based on manufacturer feedback, the overwhelming majority of HRV units sold now meet these criteria. For ERVs, there is no performance specification to reference, so this proposal establishes “a minimum total recovery efficiency of 45%, and a minimum net air flow fan efficacy of 1.0 cfm/W.” These criteria are very achievable based on industry data of available products. Following are charts that show the performance characteristics of ERV and HRV units that are currently available (data from the Home Ventilating Institute, current as of November 2012). Units in the green boxes would meet these criteria, demonstrating that only the worst HRVs and ERVs would not be permitted to be installed. While the TRE and SRE metrics may be new to code officials, they are published by manufacturers and by the Home Ventilating Institute, so are easily referenced.

Also, selection of an ERV or HRV is not mandated by this section, and the builder is always free to choose a lower cost system.



Cost Impact: Builders are able to control costs by selecting from multiple approved system types. Where there are additional first costs, they can be recovered quickly through energy savings. Further, economies of scale are expected to drive down current incremental costs.

RE141-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R403.5.1 #2-EC-MOORE.DOC

RE142-13

R403.6 (IRC N1103.6)

Proponent: Brian Dean, Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition.

Revise as follows:

R403.6 (N1103.6) Equipment sizing and efficiency rating (Mandatory). Heating and cooling equipment shall be sized in accordance with ACCA Manual S based on building loads calculated in accordance with ACCA Manual J or other *approved* heating and cooling calculation methodologies. New or replacement heating and cooling equipment shall have an efficiency rating equal to or greater than the minimum required by federal law for the geographic location where the equipment is installed

Reason: The purpose of this code change is to codify the requirement that HVAC equipment must satisfy federal minimum requirements for the location. This proposal does not establish new requirements since it simply requires that equipment meet the federal standard, but it allows the code official to enforce the requirements. This proposal improves the effectiveness of the code by reinforcing a practice that should already be taking place in plan review and inspection -- verification of the efficiency rating of heating and cooling equipment. Although federal rules set the minimum efficiency levels for manufacturers, only code officials can determine whether equipment actually installed in buildings meets or exceeds the federal minimums. The EEC has offered a similar proposal for service hot water equipment under section R403.4.

This proposal is more important now than in the past because federal minimums are expected to shift away from single nationwide efficiency levels to regionally-based efficiency levels that will vary from state to state. It is possible, whether by accident or bad intent, to see equipment that would meet federal requirements in one jurisdiction used in other states or regions in which it does not meet the regional requirement. Although this verification may already be taking place, the proposal above is intended to make it a specific requirement in all buildings. This is an important opportunity for federal, state and local governments to work together to ensure that equipment installed meets federal minimums for the location.

Cost Impact: The code change proposal will not increase the cost of construction.

RE142-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.6-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE.DOC

RE143 – 13

R403.6 (IRC N1103.6)

Proponent: Philip Debes, Dan Deen, Steve Frazer, Lloyd Larkin, Allan Tyson, Jim Walker, all of P and N Distribution, Inc. representing themselves. Clifton Payne of DNV KEMA (Det Norske Veritas and Keuring Elektrotechnische Materialen Arnhem) Energy and Sustainability, representing Energy Design Systems, Philip Jeffers, Energy Design Systems, Inc, representing self, Scott Miller, Knauf Insulation representing self

Revise as follows:

R403.6 (N1103.6) Equipment Sizing (Mandatory). Heating and cooling equipment shall be sized in accordance with ~~ACCA Manual S based on building loads calculated in accordance with ACCA Manual J or other approved heating and cooling calculation methodologies.~~ standard engineering heat loss and heat gain formulas coupled with appropriate weather data, home construction materials and other considerations normally used in the HVAC industry.

Reasons:

[DEBES, DEEN, FRAZER, LARKIN, TYSON, WALKER] ACCA Manual J and ACCA Manual S are trademarks. Code officials mistakenly believe ACCA is the certifying agent for IECC code compliance. ACCA charges royalties for ACCA approved software and resells software directly to contractors. ACCA is an HVAC software competitor, not a certifying authority.

[PAYNE] ACCA Manual J and ACCA Manual S are trademarks. ACCA is not the certifying agent for IECC code compliance, as ACCA Code officials appear to mistakenly believe. ACCA charges royalties for ACCA approved software and resells software directly to contractors. ACCA is an HVAC software competitor, not a certifying authority. By referencing ACCA in R403.6, the IECC would be selecting and endorsing one product from the marketplace over others, not simply providing a standard that should be used to size HVAC equipment. This would create an unlevel playing field by providing ACCA with a competitive advantage.

[JEFFERS]

1. ACCA Manual J and ACCA Manual S are trademarks. ACCA and ACCA's software partners are using the IECC code to intimidate contractors. See attachment 1: ACCA "Contractors Beware", See attachment 2: Bob Volin, ACCA Code Committee Member, Photo Shopping his Letterhead onto the Code's Section R403.6 and convincing contractors into buying "ACCA Approved Software" and trying to force software developers into royalty payments totaling millions of dollars. ACCA is restraining trade, eliminating competition, and inhibiting development of more accurate software and procedures. Building Inspectors mistakenly interpret "in accordance with" to mean "approved by". ACCA uses this fact to create a de-facto IECC software certification process, making millions in fees, royalties, and reselling the software ACCA "approves". ACCA is a software competitor and Section R403.6 creates unfair competition.

2. For existing houses ACCA's Manual J procedure has no relationship to any sound engineering practice. None of the inputs such as a home's leakage rate, duct loss/gain, or any other value are known, and these inputs can have wide tolerances. Contractors use inputs that give them the answers they want. This is called confirmation Bias. An ACCA load calculation on an existing house is no different from guessing the size. The fact that contractors work ACCA's procedure backwards is widely known in the HVAC industry. ACCA load calculations average 140% of operating loads and can contribute to comfort, health, safety issues, and dramatically overstate energy usage.

"they simply change some of the inputs to make the procedure spit out answer they're comfortable with and no one questions their answers." - Hank Rutkowski P.E. Author ACCA Manual J.

3. There is no evidence what so ever that "proper sizing" saves energy.

ATTACHMENT #1

From: Melissa Broadus, ACCA [<mailto:melissa.broadus@acca.org>]

Sent: Tuesday, September 06, 2011 2:40 PM

To: don@donwestcooling.com

Subject: ACCA NEWS: Contractors: Beware of Inappropriate Load Calculation Software

For Immediate Release

September 6, 2011

Media Contact: Melissa Broadus, [703-575-4477](tel:703-575-4477) melissa.broadus@acca.org

Contractors: Beware of Inappropriate Load Calculation Software

Manual J ® is the ANSI-approved national standard for determining residential load calculations for HVACR systems, and is required by many building codes and regulations. It is produced by the Air Conditioning Contractors of America (ACCA), the nation's largest association of indoor environmental systems professionals.

Given the complexities of modern construction, contractors and design professionals are encouraged to use software for accurate system design. However, not all load calculation software is created equal.

ACCA is reminding contractors that only those software programs that have been approved and licensed by ACCA as "Powered by Manual J ®" can be considered in compliance with codes and regulations requiring the use of Manual J ®.

As of today, the only software programs that meet the requirements for Manual J ® load calculations are:

- **RHVAC Residential Load Calculation from Elite Software**
- **Right – J from Wrightsoft**
- **AccuLoads from ADTEK Software Company**
- **Florida Solar Energy Center's EnergyGauge**

Any other software program, online service or mobile application cannot be considered to be compliant with the Manual J ® standard and should not be used where Manual J ® is required. Use of non-authorized software may pose a liability for the contractor that installs the system.

For more information on Manual J ®, the ACCA system design process, and load calculation software, visit <https://www.acca.org/industry/system-design>.

Software providers interested in applying for validation and licensing of their product should contact Glenn Hourahan at glenn.hourahan@acca.org.

Manual J ® is a registered federal trademark of the Air Conditioning Contractors of America.

The Air Conditioning Contractors of America (ACCA) is a non-profit association serving more than 60,000 professionals and 4,000 businesses in the HVACR community, who work together to promote professional contracting, energy efficiency, and healthy, comfortable indoor environments for all Americans. For more information, visit www.acca.org.

You are receiving this email because you are a member of ACCA and asked to receive communications by email, or you subscribed through our website. To manage your email preferences or to unsubscribe, go to [options](#). To change your email address, please reply to this email with your new address in the body.

Air Conditioning Contractors of America 2800 Shirlington Road, Suite 300 | Arlington, VA 22206 | [703-575-4477](tel:703-575-4477) | www.acca.org



Contractors: Beware of Inappropriate Load Calculation Software

Contractor Alert!

By now most you know as of March 15th 2012 load calculation will be required on
ALL AC CHANGE OUTS.

101.4.7.1.2 Replacement equipment sizing (mandatory). An A/C contractor or licensed Florida PE shall submit a nationally recognized method based sizing calculation to the code official at the time of permit application for total replacement of the condensing and evaporator components of HVAC systems in accordance with Florida law and the provisions of Section 403.6.1 or Section 503.2.1 as applicable.

403.6 Heating and cooling equipment (Mandatory).

403.6.1 Equipment sizing. Heating and cooling equipment shall be sized in accordance with ACCA Manual S based on the equipment loads calculated in accordance with Manual J or other approved heating and cooling calculation methodologies, based on building loads for the directional orientation of the building. The manufacturer and model number of the outdoor and indoor units (if split system) shall be submitted along with the sensible and total cooling capacities at the design conditions described in Section 302.1. This Code does not allow designer safety factors, provisions for future expansion or other factors which affect equipment sizing.

Approved methodologies by Florida code

- ACCA Manual J
- ASHRAE
- Florida PE

Manual J ® is the ANSI-approved national standard for estimating residential heating and cooling loads for HVACR systems. It is the reference cited in both national model building codes. Authorities having jurisdiction (AHJ) may approve alternative methods of load calculation, however, most AHJs recognized Manual J8 due to its long history and wide acceptance in the HVAC industry. Manual J is produced by the Air Conditioning Contractors of America (ACCA), the nation's largest association of indoor environmental systems professionals.

Given the complexities of modeling modern construction, HVAC contractors and other design professionals are encouraged to use software for accurate system design. However, not all load calculation software is created equal. ACCA is reminding contractors that only those software programs that have been approved and licensed by ACCA as "Powered by Manual J ®" can be considered compliant with the procedure referenced in the model codes.

As of today, the only software programs that meet the requirements for Manual J ® load calculations are:

- RHVAC Residential Load Calculation from Elite Software
- Right - J from Wrightsoft
- AccuLoads from ADTEK Software Company
- Florida Solar Energy Center's EnergyGauge

Any other software program, online service or mobile application, or stating they are based upon, cannot be considered to be compliant with the Manual J ® standard and should not be used where Manual J ® is required. Use of non-authorized software may pose a liability for the contractor that represents that they have complied with the Manual J ® procedures.

[MILLER] ACCA Manual J and ACCA Manual S are trademarks. Code officials mistakenly believe ACCA is the certifying agent for IECC code compliance. ACCA charges royalties for ACCA approved software and resells software directly to contractors. ACCA is an HVAC software competitor, not a certifying authority.

ACCA Manual S and Manual J are trademarks of ACCA. According to ACCA, all software must be approved by ACCA or it does not comply with the intent of the IECC R-code and there are significant fees associated with the ACCA approval process. From the following link demonstrates that ACCA believes it has authority to appraise and charge a fee to other software developers for all software used in the IECC 2012 load calculation process:

<https://www.acca.org/archives/news-and-media/news-room/press-releases/5524>

The contents of the above link are as follows and the highlighted portion should be considered problematic from a trade restriction standpoint. It can be proven that this position has cost manufacturers significant sales because the manufacturer's software (while correct) has not been approved by and fees paid to ACCA.

Contractors: Beware of Inappropriate Load Calculation Software

For Immediate Release:

September 6, 2011

Contact: Melissa.Broadus@acca.org

703-824-8842

Manual J ® is the ANSI-approved national standard for determining residential load calculations for HVACR systems, and is required by many building codes and regulations. It is produced by the Air Conditioning Contractors of America (ACCA), the nation's largest association of indoor environmental systems professionals.

Given the complexities of modern construction, contractors and design professionals are encouraged to use software for accurate system design. However, not all load calculation software is created equal.

ACCA is reminding contractors that only those software programs that have been approved and licensed by ACCA as "Powered by Manual J ®" can be considered in compliance with codes and regulations requiring the use of Manual J ®.

As of today, the only software programs that meet the requirements for Manual J ® load calculations are:

- **RHVAC Residential Load Calculation from Elite Software**
- **Right – J from Wrightsoft**
- **AccuLoads from ADTEK Software Company**
- **Florida Solar Energy Center's EnergyGauge**

Any other software program, online service or mobile application cannot be considered to be compliant with the Manual J ® standard and should not be used where Manual J ® is required. Use of non-authorized software may pose a liability for the contractor that installs the system.

For more information on Manual J ®, the ACCA system design process, and load calculation software, visit <https://www.acca.org/industry/system-design>.

Cost Impact: The code change proposal will not increase the cost of construction.

RE143-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.6-EC-DEBES.DOC

RE144-13

R403.6 (IRC N1103.6)

Proponent: Richard Grace, Virginia Plumbing and Mechanical Inspectors Association and Virginia Building and Code Officials Association (Richard.Grace@fairfaxcounty.gov)

Revise as follows:

R403.6 (N1103.6) Equipment and appliance Sizing (Mandatory). Heating and cooling equipment and appliances shall be sized in accordance with ACCA Manual S based on building loads calculated in accordance with ACCA Manual J or other approved heating and cooling calculation methodologies.

Exception: Heating and cooling equipment and appliances shall not be limited to the capacities determined in accordance with Manual S where any of the following conditions apply:

1. The specified equipment or appliance utilizes multi-stage technology or variable refrigerant flow technology and the loads calculated in accordance with Manual J fall within the range of the manufacturer's published capacities for that equipment or appliance.
2. The specified equipment or appliance manufacturer's published capacities cannot satisfy both the total and sensible heat gains calculated in accordance with Manual J and the manufacturer's next larger standard size unit is specified.
3. The specified equipment or appliance is the smallest capacity unit available from the specified manufacturer.

Reason:

Item 1 - Current technology is widely available that incorporates multi-stage or VRF systems for increased efficiency. Some of these appliances have such a wide span of functionality that they extend beyond the allowable requirements outlined in Manual S. However, this technology allows the appliance to operate between minimum and maximum capacities, based on loads imposed, thus eliminating the problems associated with single-stage, oversized appliances. Additionally, the appliance will operate efficiently during times where outdoor air temperatures exceed those used to calculate the loads in Manual J.

Item 2 - Often times, the appliance manufacturer's published total and sensible capacities are at odds with the requirements of Manual S. There are many cases where the total capacity of the appliance will fall within the parameters of Manual S in relation to the calculated total gain, however the sensible capacity of the appliance may fall short of the calculated sensible gain, thus unable to provide efficient sensible cooling for the space. When the manufacturer's next standard size larger is chosen to meet the sensible gain, the total capacity of the appliance may then exceed the requirements of Manual S. Choosing the larger appliance will enable a more efficient and effective system.

Item 3 - The current code language does not have provisions for sizing appliances for minimal dwelling unit or dwelling addition loads, other than forcing owners and contractors to change appliances to less desirable systems. For example; a 2 story townhouse, in climate zone 4, with 600 square feet per floor wants to utilize a two-zone system, or a separate heat pump system for each floor. A 1.5 ton unit per floor would exceed the requirements of Manual S, however a 1.5 ton unit could be the smallest available appliance made by the desired manufacturer. Current language would require a complete design change, such as utilizing a single appliance to serve the entire dwelling rather than the more desirable two-zone system, or requiring a system that utilizes electric baseboard heating and window-mounted air conditioning units. This is absurd, and an unfair to an owner that desires to reduce energy costs.

Cost Impact: None

RE14413

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.6-EC-GRACE.DOC

RE145-13

R403.9.3 (NEW) (IRC N1103.9.3.1 (NEW))

Proponent: Edward R. Osann, Natural Resources Defense Council, on behalf of self (eosann@nrdc.org)

Add new text as follows:

R403.9.3.1 (N1103.9.3.1) Mechanical retraction mechanism. Vapor retardant pool covers having a dry weight of 40 lbs (18.1 kg) or more for heated pools associated with one- or two-family homes shall be provided with a mechanical retraction mechanism. The mechanism shall be designed for the cover material, the cover weight and the dimensions of the cover.

Reason: Pool covers serve to retain heat in heated pool systems and reduce water loss due to evaporation – but only when used. Swimming pools at single-family residences are frequently not professionally managed or maintained, and such pools are most likely to go for several consecutive days without use. These characteristics support the use and value of a pool cover. However, the frequent deployment and retraction of a large pool cover by an individual swimmer in a single-family setting is problematic, contributing to widespread disuse of this valuable energy- and water-saving feature.

This proposal would require a pool cover to come with a means for mechanical retraction if it weighs 40 pounds or more. While the most common type of floating cover material is relatively light (0.1 lb per ft²), the weight of a cover for a moderately sized back yard pool (18' X 36') can surpass 60 lbs. and be unwieldy for an individual to handle. The proposal is not specific as to the means or design of the device for mechanical retraction, and does *not* require a permanently affixed automatic retraction system. A hand operated device of suitable size would meet the requirements of this proposal.

Cost Impact: Hand operated mechanical equipment for the retraction of pool covers are marketed at around \$200, and are available from several manufacturers. At least 5 manufacturers provide automatic pool cover equipment.

RE145-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.9.3.1 (NEW)-EC-OSANN.DOC

RE146-13

R403.10 (NEW) (IRC N1103.10 (NEW))

Proponent: Steve Rosenstock, Edison Electric Institute, representing Edison Electric Institute
(srosenstock@eei.org)

Add new text as follows:

R403.10 (N1103.10) Fireplace systems (Mandatory). Fuel gas fired fireplace systems shall not have continuously burning pilot lights.

Reason: This language is consistent with the language on continuously burning pilot lights for pool heaters and gas lighting systems in the IECC. As of April 2012, under a 2009 US Department of Energy rulemaking, residential gas cooking equipment is not allowed to have continuously burning pilot lights.

According to the Hearth, Patio, and Barbecue Association, between 573,000 and 1,017,000 gas fireplace / hearth systems were shipped to North America every year between 2008 and 2011 (about 67 to 70% of total hearth shipments. See <http://www.hpba.org/index.php?id=238> for more details). Many of these units are shipped to new homes with continuously burning pilot lights, ranging from 800 to 1,200 Btu's per hour. For a fireplace that has a pilot light using 1,000 Btu/hr, and is in "standby" mode for about 8000 hours per year (assuming that the fireplace is used 5 hours per day for 150 days of the year), the pilot light uses 8 million Btu's, or 80 therms. At a national average cost of \$1.06 per therm, the cost to a typical consumer is nearly \$85 per year.

With propane systems, 8 million Btu's is equivalent to 87.59 gallons. At a national average cost of \$2.56 per gallon (*Federal Register* page 24940 April 26, 2012, Representative Average Unit Costs of Energy), the cost to a propane consumer is slightly more than \$224 per year.

As a reference point, according to the 2010 AGA *Gas Facts 2008*, a typical gas range uses about 52 therms (5.1 Mcf) per year, and a typical clothes dryer uses about 50 therms (49 Mcf) per year (Table 10-1, page 78). In fact, according to the AGA publication, in the Pacific region of the US, residential natural gas fireplaces use more energy (28.3 Mcf) than a typical residential natural gas water heater (22.1 Mcf) and gas range (5.1 Mcf) combined.

Significant energy savings are available with current technology. With advanced controls (electronic spark ignition, for example), the standby energy losses are eliminated, and the average US consumer saves nearly \$85 to \$224 per year, based on the examples shown.

Cost Impact: The code change proposal will not increase the cost of construction. Electronic ignitions are widely available.

RE146-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.10-EC-ROSENSTOCK.DOC

RE147-13

R403.10 (NEW) (IRC N1103.10 (NEW)), Table R403.10 (NEW) (IRC Table N1103.10 (NEW))

Proponent: Craig Conner, Building Quality representing self (craig.conner@mac.com)

Add new text as follows:

R403.10 (N1103.10) Improved equipment efficiency alternative. Where the installed equipment efficiency exceeds the applicable minimum federal equipment efficiency by the amount given in Table R403.10, the following shall apply:

1. The maximum air leakage rate in Section 402.4.1.2 shall be increased by 1 ACH50.
2. The maximum duct leakage in Section 403.2.2 shall be increased by 1 CFM / 100 ft².

TABLE R403.10 (N1103.10)
EQUIPMENT EFFICIENCY TRADEOFF

<u>ZONE</u>	<u>INCREASED EQUIPMENT EFFICIENCY</u>
<u>1 and 2</u>	<u>1.5 SEER</u>
<u>3</u>	<u>1 SEER and 6 AFUE</u>
<u>4</u>	<u>6 AFUE</u>
<u>5-8</u>	<u>7 AFUE</u>

Reason: This allows increased equipment efficiency to compensate for an increase in envelope and duct air leakage. The increased equipment efficiency applies to cooling in the south and heating in the north. In order to propose this tradeoff a climate zone specific trade needed to be made. This tradeoff uses the DOE computed ratios for increased equipment efficiency vs increased envelop and duct leakage by climate zone. This ratio was as taken from DOE's EC13 proposal of the last code cycle. DOE proposed a tradeoff of increased equipment efficiency for a reduction in air tightness and duct tightness requirements, although that version was not approved in the 2012 IECC.

Unexpected failures in envelope tightness and duct tightness may occur. Increased equipment efficiency represents a simple way to correct the problem of an unexpected test failure in a residence that is almost completed. This proposed option is also an alternative for those who choose not to try for a residence as tight as the new code. Those who wanted a more complete, but more complex, calculation could still use the performance analysis.

The Federal equipment efficiency requirements may be increased in the near future. Therefore this is proposed as an increment above the applicable Federal equipment efficiency and could apply whether or not the equipment efficiency minimums were raised.

Cost Impact: The code change proposal will not increase the cost of construction.

RE147-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R403.10 (NEW)-EC-CONNER

RE148-13

R404.1 (IRC N1104.1)

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

Revise as follows:

R404.1 (N1104.1) Lighting equipment (Mandatory). ~~A minimum of 75 percent of the Lamps in permanently installed lighting fixtures shall be high-efficacy lamps, or a minimum of 75 percent of the permanently installed lighting fixtures shall contain only high-efficacy lamps.~~

Exceptions:

1. Lamps in low-voltage lighting shall not be required to utilize high-efficiency lamps.
2. Lamps in lighting controlled by a dimmer or automatic control device.
3. Lamps that are 15 watts or less.
4. Lamps in lighting built into appliances.
5. Lamps in lighting automatically controlled to respond to daylighting devices.

Reason: This removes the need to count fixtures and bulbs. Lighting is supposed to be efficient. Several exceptions are added.

Cost Impact: The code change proposal will not increase the cost of construction.

RE148-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R404.1-EC-CONNER.DOC

RE149-13

R202 (IRC N1101.9), R404.1 (IRC N1104.1)

Proponent: Deborah Frankhouser, Four Point Lighting Design, representing the International Association of Lighting Designers (deborah@fourpointlighting.com)

Revise as follows:

R404.1 (N1104.1) Lighting equipment (Mandatory). ~~A minimum of 75 percent of the lamps in permanently installed lighting fixtures shall be high-efficacy lamps or a minimum of 75 percent of the permanently installed lighting fixtures shall contain only high-efficacy lamps. Permanently installed lighting shall be high efficiency luminaires.~~

Exceptions: Low-voltage lighting shall not be required to use high-efficiency lamps.

1. High efficiency luminaires shall not be required where the lamps operate at less than 25 volts, the luminaires are controlled separately from high-efficiency luminaires and the luminaires are controlled by a dimmer or automatic control device.
2. Up to 50 percent of the total number of luminaires shall not be required to be high-efficiency luminaires where all of the following apply:
 1. The non-high-efficiency luminaires do not qualify for Exception 1.
 2. The non-high efficiency luminaires are controlled separately from high-efficiency luminaires.
 3. The non-high efficiency luminaires are controlled by a dimmer or automatic control device.

Revise definition as follows:

HIGH-EFFICIENCY EFFICACY LAMPS LUMINAIRES. Luminaires containing only compact fluorescent lamps, T-8 or smaller diameter fluorescent lamps with electronic ballasts, or lamps or light emitting diodes (LEDs) with a minimum efficacy of:

1. 60 lumens per watt for lamps over 40 watts,
2. 50 lumens per watt for lamps over 15 watts to 40 watts,
3. 40 lumens per watt for lamps 15 watts or less.

Reason: This proposal:

1. Increases the overall requirement for high-efficiency luminaires from 75% to 100% with certain exceptions designed to save energy and provide maximum flexibility to designers, owners and code officials.
2. Changes the Chapter 2 definitions from *high efficacy lamps* to *high efficiency luminaires* as determined by lamp efficacy. This means owners, designers, and building code officials would count luminaires (light fixtures) vs. counting light bulbs to determine the amount of high or low efficient lighting on a project. Luminaires often have multiple lamps, making counting more cumbersome for both the owner/designer as well as the code official. By counting luminaires, the code official simply has to identify lamp type, but doesn't have to count individual lamps within each luminaire.
3. Allows for an optional and more flexible energy savings approach for owners and designers by allowing up to 50% low efficiency luminaires as long as lighting controls are used to reduce or turn off the low efficiency luminaires.

The current code requires 75% of lighting to be *high-efficacy*. However, there is a high amount of dissatisfaction with compact fluorescents because of their poor color, noise, incompatibility with dimming, and mercury content.

(Reference, Dept. of Energy's "Compact Fluorescent Lighting in America: Lessons Learned on the Way to Market," prepared by Pacific Northwest National Laboratory, June 2006) LED technology is still emerging and many of the inexpensive LED's continue to have poor color and incompatibility with dimming.

The most efficient light is the one that is off. The current code does not use lighting controls as a means of energy savings. Regardless of efficacy, light sources achieve maximum energy savings when they are off or reduced to the minimum required by the task. For 120 volt incandescent/halogen sources, dimming reduces energy use, increases lamp life, and dimmers are inexpensive. Automatic controls turn lighting off when not being used. (See reference documentation listed below.)

Cost implications: In most cases, the required high efficiency Fluorescent and LED light fixtures are more expensive than their low efficiency 120 volt incandescent equivalents simply because fluorescent and LED have additional required components such as ballasts and drivers. Dimmers vary significantly in cost, but a 120v incandescent dimmer can be purchased for as little as \$15. When installed with the less expensive 120v incandescent lighting, this combination can be less expensive than purchasing many fluorescent or LED versions controlled by a switch. There

are many options for owners and adding dimmers does not necessarily equal adding dollars when comparing low efficiency and high efficiency luminaires. Also, in residential, dimming is important for reasons other than energy savings and dimming fluorescent and LED sources can significantly increase dimming costs.

Residential is not commercial. In residences, it is very common for decorative lighting to be the main lighting source in a room. Decorative chandeliers are often only available in 120v incandescent medium or candelabra based sockets. Often times these chandeliers exceed the current allowance (25%) even when using high efficacy light sources for other types of architectural lighting such as down lights, task lighting, etc. These fixtures do not qualify for the Low Voltage Exception currently in the code. The proposed Exception 2 gives a greater allowance for 120v incandescent/halogen luminaires than the current code allows to accommodate these decorative products, but encourages energy savings through the use of controls.

4. Clarifies the low voltage lighting exception currently in the code and adds stringency by requiring lighting controls as an energy savings approach for these light fixture types. The current code allows for the use of low voltage with no limits. They are lower in VOLTAGE not WATTAGE. Adding controls will increase the overall energy efficiency of these products.
5. Exception to C405.1 is meant to make residential dwelling units inside commercial construction buildings consistent with the residential section 404.1. There is no reason why different lighting efficiency standards should apply to multi-family residential than to single-family homes.

References

Several reports document savings from using controls residentially, such as:

- <http://www.lrc.rpi.edu/programs/lightingTransformatio/economics/table2.asp> [shows 20% to 40% savings depending on space type for using occupancy sensors]
- [http://www.energy.ca.gov/title24/2013standards/prerulemaking/documents/current/Reports/Residential/Lighting/open Residential Lighting PDF](http://www.energy.ca.gov/title24/2013standards/prerulemaking/documents/current/Reports/Residential/Lighting/open%20Residential%20Lighting.pdf) and see page 32 [shows 10% savings from dimmers, 30% savings from occupancy sensors]
- Heschong Mahone Group Lighting Efficiency Technology Report Vol. 1, see page 83. www.energy.ca.gov/efficiency/lighting/VOLUME01.PDF [shows 20% savings from dimmers and 54% savings from occupancy sensors]

Cost Impact: The code change proposal will not increase the cost of construction.

RE149-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R404.1-EC-FRANHOUSER.DOC

RE150-13

R202 (NEW) (IRC N1101.9 (NEW)), R404.1 (IRC N1104.1)

Proponent: Don Surrena, CBO, National Association of Home Builders (NAHB) (dsurrena@nahb.org)

Revise as follows:

R404.1 (N1104.1) Lighting equipment (Mandatory). ~~A minimum of seventy-five percent of the Lamps in permanently installed lighting fixtures shall be high efficacy lamps or a minimum of seventy-five percent of the permanently installed lighting fixtures shall contain only high efficacy lamps.~~

Exceptions:

1. Lamps in low-voltage lighting.
2. Lamps controlled by a dimmer or an *automatic control device*.
3. Lamps of 10 watts or less.
4. Lamps contained in appliances

Add new definition as follows:

AUTOMATIC CONTROL DEVICE. A device or system capable of automatically turning lighting loads off without manual intervention. Automatic control devices often include a feature for turning lights on manually.

Reason: Builder installed lighting represents roughly 7% of residential electricity use. This proposal has the potential to reduce household energy use by over 1%.

By requiring lamps (rather than fixtures) to be high efficacy, leaves open the ability for innovative new lighting technologies which can be used in a standard lighting base.

Durability of fixture ballasts is also a concern. Ballast repairs are not generally done by a consumer and will typically require an electrician replace the fixture at a significant cost increase to the consumer.

The new language is simpler, more enforceable and more stringent. It makes the code require 100% high efficacy lighting with an allowance for standard efficacy when special lighting controls are used.

Exceptions still maintain the stringency, but provide reasonable allowances for small lighting loads.

Cost Impact: The code change proposal will not increase the cost of construction.

RE150-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R404.1-EC-SURRENA.DOC

RE151-13

R404.2 (New) (IRC N1104.2 (NEW))

Proponent: Ellen Eggerton, representing Fairfax County, Virginia

Add new text as follows:

R404.2 (N1104.2) Electrical power use display. For dwelling units where the occupant is billed by the electric provider for electric used in the unit, an electrical energy monitoring device shall be installed on the electrical conductors serving the main electrical panel for each dwelling unit. The monitoring device shall be provided with a display indicating the current electrical energy consumption rate of the dwelling unit in kWh and the total electrical energy use of the dwelling unit in kW since the display device was last reset. The display shall be within 100 feet (64.5 m) distance of travel from the main electric panel for the dwelling unit.

Reason: This suggested change provides a homeowner real time electrical energy consumption and related cost information to make informed decisions on the operation of their home. Being able to monitor the energy consumption of plug, lighting and HVAC loads in real time provides immediate feedback information on their actions. The installation of sensors would be too difficult for homeowners but only a ten minute effort for the electrician when wiring the panel. The idea is that if people know exactly how much energy they are consuming and when, they can change old habits and reduce consumption.

The now popular dashboard display providing the miles per gallon rate in cars was a luxury feature and now is in many cars in response to interest by consumers to have useful energy consumption information.

Early adopters are buying individual plug monitors and only able to see the operation of individual appliance. But installing a whole-house sensor during building construction would provide better information and cost much less than sensors at each plug or appliance. Real time energy consumption information would be a very cost effective tool to get energy savings.

Cost Impact: In the current marketplace, the cost rate is about \$80-120 per unit but with higher nationwide demand, the cost per unit could decrease.

RE151-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R404.1.1-EC-EGGERTON.DOC

RE152-13

R404.2 (NEW) (N1105.2 (NEW))

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

Add new text as follows:

R404.2 (N1105.2) Lamp efficacy. Lamps 5 watts or greater shall have a manufacturer's designation of efficacy.

Exception: Lamps less than 5 watts, UV lamps, black lights, bug lamps, germicidal lamps and lamps in appliances.

Reason: This requires a "manufacturer's designation" of efficacy on light bulb, light spec sheet, or packaging. Efficacy is a code requirement for lamps, but a hard value to find on many lamps. Without such a designation, how does the user of the lamp know the efficacy? How does one inspect for light efficacy?

Cost Impact: The code change proposal will not increase the cost of construction.

RE152-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R404.2-EC-CONNER.DOC

RE153-13

R405.2 (IRC N1105.2)

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

Revise as follows:

R405.2 (N1105.2) Mandatory requirements. Compliance with this section requires that the mandatory provisions identified in Section 401.2 be met. ~~All supply and return ducts not completely inside the building thermal envelope shall be insulated to a minimum of R-6.~~

Reason: Duct insulation is labeled both “prescriptive” in Section R403.2.1 and “mandatory” in R405.2. It can’t be both.

Cost Impact: The code change proposal will not increase the cost of construction.

RE153-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R405.2-EC-CONNER.DOC

RE154-13

R405.2 (IRC N1105.2), R405.2.1 (NEW) (IRC N1105.2.1 (NEW))

Proponent: Robby Schwarz, EnergyLogic Inc., representing EnergyLogic, Inc. (robby@nrglogic.com)

Revise as follows:

R405.2 (N1105.2) Mandatory requirements. Compliance with this section requires that the mandatory provisions identified in Section R401.2 be met. All supply and return ducts not completely inside the *building thermal envelope* shall be insulated to a minimum of ~~R-6~~ R-8. Ductwork, that is either partially or completely within the thermal layer of the wall system of the *building thermal envelope*, shall have insulation of a *R-value* of not less than R-10 on the side of the duct that is away from the conditioned space. Where the duct is in a wall cavity and the R-10 insulation does not completely fill the cavity, the remaining cavity space shall be filled with insulation to the extent that the requirement for insulating the exterior wall of the building is met or the cavity space is completely filled, whichever is less. Ductwork, that is either partially or completely within the thermal layer of a floor system of the *building thermal envelope*, shall have insulation of a *R-value* of not less than R-19 on the side of the duct that is away from the conditioned space. Floor cavity insulation shall be installed in accordance with Section R402.2.7. Where the duct is in a floor cavity and the R-19 insulation does not completely fill the cavity, the remaining cavity space shall be filled with insulation to the extent that the requirement for insulating the floor system of the building is met or the cavity space is completely filled, whichever is less.

R405.2.1 (N1105.2.1) In process inspection requirement. Inspections of the code-required energy specifications documented in the simulated performance code-compliance reports shall be verified to demonstrate that the as-built conditions meet or exceed the specified parameters used for the code-compliance reports. The entity or persons who performed the analysis shall perform the inspections or where approved, other approved entities or persons shall perform the inspection.

Reason: Field inspection, in order to create an accurate computer generated energy analysis, should be required for following reasons:

1. For production building, a plan is often mastered and that one plan may be built over 100 times. To ensure that each house meets the performance analysis, each home must be inspected.
2. Computer generated energy analyses utilize worst case configuration of the proposed design and requires evaluations and inputs that must be confirmed in the specific home that is built to ultimately determine if the actually built home meets the intent of the energy code. Examples of this are worst case air leakage and duct leakage numbers but also orientation, window square footage, number of bedrooms and foundation type.
3. The reality is that houses built from a set of plans change. The actual built home may generally reflect the homes plans but window square footage, orientation, and even insulation and mechanical equipment are often different from what was proposed. The inspection process ensures that the energy analysis is addressed and site specific which ultimately ensures that the home that received its permit from the proposed design's energy analysis has carried out what they have proposed, which is to meet the intent of the code, even if each component of the home is not exactly the same as what was on the set of plans.

Cost Impact: On a national basis there could be a cost impact as most jurisdiction's would allow third party inspections and not do the energy analysis themselves. However, this is one of many code compliance pathways the builder may choose and it is important that the builder realize that when this option is chosen that they in essence are locking themselves into a code compliance path that requires energy analysis and inspection. In Colorado, many builders utilize this path and are seeing value due to increased quality assurance, consistency across jurisdictional boundaries in a home rule state, and measured quantification of compliance.

RE154-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R405.2-EC-SCHWARZ.DOC

RE155-13

R405.3 (IRC N1105.3)

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

Revise as follows:

R405.3 (N1105.3) Performance-based compliance. Compliance based on simulated energy use performance requires that a proposed residence (*proposed design*) be shown to have an annual energy ~~cost~~use that is less than or equal to the annual energy ~~cost~~ use of the *standard reference design*. To equate electricity with other fuels, the electricity use shall be multiplied by 2.9.

Compliance based on energy cost shall be permitted. Energy prices shall be taken from an approved source approved by the code official, such as the Department of Energy, Energy Information Administration's State Energy Price and Expenditure Report. Code officials shall be permitted to require time-of-use pricing in energy cost calculations.

~~**Exception:** The energy use based on source energy expressed in Btu or Btu per square foot of conditioned floor area shall be permitted to be substituted for the energy cost. The source energy multiplier for electricity shall be 3.16. The source energy multiplier for fuels other than electricity shall be 1.1.~~

Reason. Energy costs change over time. Using a specific value means any calculation will remain constant. This makes the constant value the main metric, but allows energy costs, just the reverse of the current. The multiplier, 2.9, is the result of 3.16 divided by 1.1.

Cost Impact: The code change proposal will not increase the cost of construction.

RE155-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R405.3 #1-EC-CONNER.DOC

RE156-13

R405.3 (New) (IRC N1105.3 (New))

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

Add new text as follows:

R405.3 (N1105.3) Additional performance options. *Where approved, performance calculations shall include the impact of controls and energy distribution systems provided that such controls and systems are a physical part of the building. Performance calculations shall consider only energy use within the scope of this code. The calculations shall not consider occupant behavior changes or switching between fossil and electric fuels.*

Reason: As the thermal shell and equipment get more efficient, more of the remaining efficiency will be found in control systems for energy use devices and in the distribution systems for air and water. This establishes a broad principal that permits, but does not require, consideration of a variety of elements that may contribute to the energy efficiency of a residence.

Cost Impact: The code change proposal will not increase the cost of construction.

RE156-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R405.3 #2-EC-CONNER.DOC

RE157-13

R405.3 (IRC N1105.3)

Proponent: Brian Dean, Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition.

Revise as follows:

R405.3 (N1105.3) Performance-based compliance. Compliance based on simulated energy performance requires that a proposed residence (*proposed design*) be shown to have an ~~annual~~ energy cost over a 30 year useful life of the building, on a present value basis, that is less than or equal to the ~~annual~~ energy cost over a 30 year useful life of the building, on a present value basis, of the *standard reference design*. Improvements in energy efficiency in the *proposed design* over the *standard reference design* shall be assumed to revert to the *standard reference design* at the end of the useful life of the improvement. Energy prices, energy price escalation rates, discount rates, the useful life of specific building features and components including installed energy efficiency measures in the building and all other necessary assumptions for the analysis shall be taken from a *approved* sources. ~~approved by the code official, such as the Department of Energy, Energy Information Administration's *State Energy Price and Expenditure Report*.~~ Code officials shall be permitted to require time-of-use pricing in energy cost calculations.

Exception: The energy use based on source energy expressed in Btu or Btu per square foot of *conditioned floor area* shall be permitted to be substituted for the energy cost. The source energy multiplier for electricity shall be 3.16. The source energy multiplier for fuels other than electricity shall be 1.1.

Reason: The purpose of this code change is to improve the efficiency of buildings by modifying the methodology to incorporate useful life and present value concepts for calculating energy cost under the Section R405 Simulated Performance Alternative. The current section R405.3 calculates the annual energy cost in the first year of a proposed new home and compares it against a baseline Standard Reference Design home to determine compliance. A major problem with this approach is the comparison of energy cost only in the first year. The home is designed to last for many years and over such period energy costs will change and various components of the home and energy efficiency measures will be required to be replaced due to shorter useful lives. This fact is recognized in the Intent of the IECC, Section R101.3 which is directed at regulating "the design and construction of buildings for the effective use and conservation of energy over the useful life of each building."

A more sophisticated analysis would account for these changes over time. The proposed change is intended to require this more sophisticated analysis. Specifically, the proposed changes require:

- the use of a 30-year useful building life;
- energy costs to be escalated over time;
- incorporation of the useful life of each feature of the building constituting an energy efficiency improvement over the standard reference design, by requiring that the analysis assume that the feature revert to the standard reference design at the end of its useful life;
- the use of the present value of energy costs for comparison purposes; and the assumptions for the analysis be derived from a source approved by the code official.

Cost Impact: The code change proposal will not increase the cost of construction.

RE157-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R405.3-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE.DOC

RE158-13

R405.3 (IRC N1105.3)

Proponent: Keith Dennis, P.E., National Rural Electric Cooperative Association (NRECA) representing NRECA. (Keith.Dennis@nreca.coop)

Revise as follows:

R405.3 (N1105.3) Performance-based compliance. Compliance based on simulated energy performance requires that a proposed residence (*proposed design*) be shown to have an annual energy cost that is less than or equal to the annual energy cost of the *standard reference design*. Energy prices shall be taken from a source *approved by the code official*, such as the Department of Energy, Energy Information Administration's *State Energy Price and Expenditure Report*. *Code officials* shall be permitted to require time-of-use-pricing in energy cost calculations.

Exception: The energy use based on site or source energy expressed in Btu or Btu per square foot of *conditioned floor area* shall be permitted to be substituted for the energy cost. The source energy multiplier for electricity shall be 1.89 ~~3.46~~. The source energy multiplier for fuels other than electricity shall be 1.1.

Reason: This revision provides more flexibility for code officials, and updates the energy source multiplier for electricity to a more current number developed by DOE for appliance energy efficiency standards for 2015 in recent rulemakings (for dishwashers and furnace fans) in Technical Support Documents. The current code includes an outdated factor and does not allow the ability to use site energy, which is the metric that can best be directly affected during construction. The inclusion of site energy would not be setting any precedents. Site energy was originally allowed in this exception and used by code officials. Unfortunately, it was removed in 2009. (See the following sources):

Furnace Fan Technical Support Document, June 2012:

http://www1.eere.energy.gov/buildings/appliance_standards/rulemaking.aspx/ruleid/41

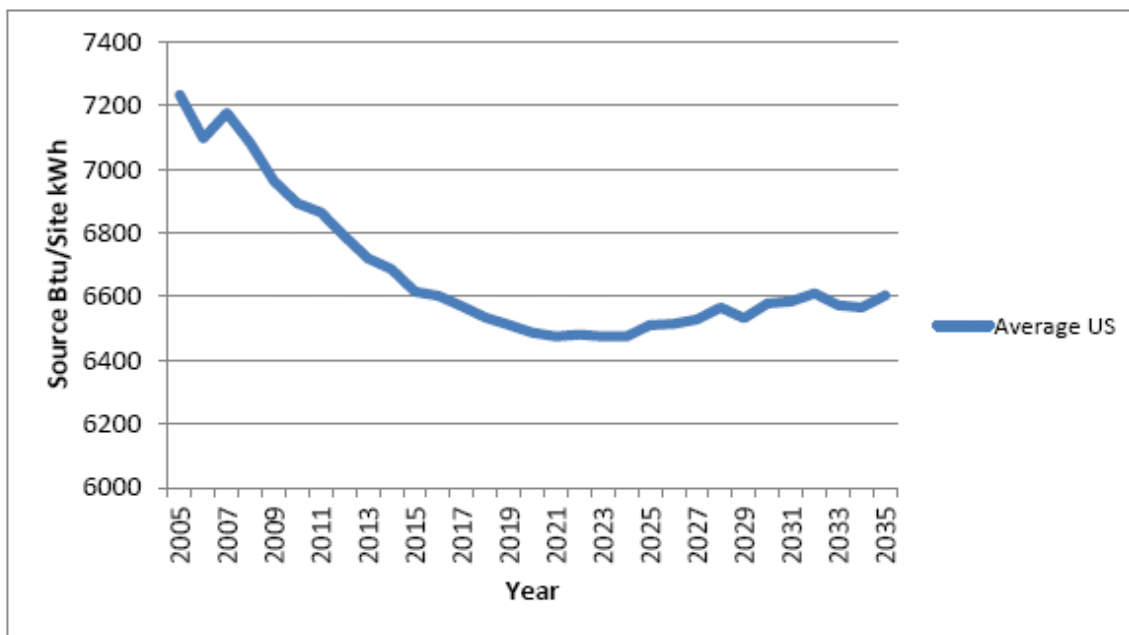


Figure 10.3.1 Site-to-Source Conversion Factors for Electricity

Table 10.3.3 Site-to-Source Conversion Factors for Electricity and Natural Gas

Year	Electricity <u>Btu/kWh</u>	Natural Gas <u>Btu/Btu</u>	Year	Electricity <u>Btu/kWh</u>	Natural Gas <u>Btu/Btu</u>
2010	7,009	1.07	2023	6,506	1.07
2011	6,827	1.07	2024	6,534	1.07
2012	6,651	1.07	2025	6,534	1.07
2013	6,549	1.07	2026	6,538	1.07
2014	6,486	1.07	2027	6,552	1.07
2015	6,448	1.07	2028	6,555	1.07
2016	6,443	1.07	2029	6,551	1.07
2017	6,433	1.07	2030	6,548	1.07
2018	6,427	1.07	2031	6,552	1.07
2019	6,425	1.07	2032	6,551	1.07
2020	6,436	1.07	2033	6,548	1.07
2021	6,468	1.07	2034	6,550	1.07
2022	6,483	1.07	2035–2047	6,561	1.07

Source: NEMS, 2011.

Using the 2015 value, 6,448 Btu / 3,413 Btu/kWh = 1.889246997 = 1.89

Cost Impact: The code change proposal will not increase the cost of construction. There is no cost impact to updating the source energy multiplier for electricity and increasing flexibility.

RE158-13

Public Hearing: Committee: AS AM D
 Assembly: ASF AMF DF

R405.3-EC-DENNIS.DOC

RE159-13

R405.3 (IRC N1105.3)

Proponent: Chuck Foster, Foster and Jamison representing self (cfoster20187@yahoo.com)

Revise as follows:

R405.3 (N1105.3) Performance-based compliance. Compliance based on simulated energy performance requires that a proposed residence (*proposed design*) be shown to have an annual energy cost that is less than or equal to the annual energy cost of the *standard reference design*. Energy prices shall be taken from a source *approved by the code official*, such as the Department of Energy, Energy Information Administration's *State Energy Price and Expenditure Report*. *Code officials* shall be permitted to require time-of-use-pricing in energy cost calculations.

Exception: The Energy use based on source energy expressed in total annual Btu's or annual Btu's per square foot of *conditioned floor area* shall be permitted to be substituted for ~~the~~ energy cost. The source energy multiplier for electricity shall be ~~3.16~~ 1.89. The source energy multiplier for fuels other than electricity shall be 1.1.

Reason: This code proposal changes the source energy multiplier for electricity from its existing value of 3.16 Btu's to 1.89 Btu's. It also clarifies that the Btu or Btu/square foot value should be estimated on an annual basis.

While there are several jurisdictions in the United States that use source energy as the basis of their energy codes, the overwhelming majority use either site energy or cost. This exception (in R405.3) was originally offered to accommodate those few jurisdictions that have chosen to use source energy.

One of the challenges for use of source energy in codes is that the relationship between site and "source energy" consumption is not well defined. For instance, the 3.16 value currently in the code assumes that electricity produced from wind, solar, hydro and other forms of renewable energy is equivalent to the consumption of fossil fuels. The same assumption holds for electricity derived from nuclear energy. Thus, from a source energy perspective an unbiased observer would be relatively indifferent between choosing electricity from 100% renewable sources (wind or hydro for instance) and diesel, fuel oil, or gas. This outcome does not seem helpful.

In addition, the mix of sources for the production of electricity (wind, solar, hydro, nuclear, coal, oil, gas, geothermal, etc.) changes – and will continue to change dramatically going into the future with the proliferation of additional renewable energy resources (especially wind) into the national mix. Even if the 3.16 source energy multiplier was a good number when it was originally adopted (something this proposal disagrees with as argued above), it is surely not still valid.

Finally, it is important to recognize that the impact of the IECC will be realized in the future – codes considered today will have marketplace impacts starting in 2015 so looking at electric source energy multipliers today (2013) that are based on data from 2011 (or earlier) for use in 2015 (or later) is likely to convey to users inaccurate pictures of actual resource impacts.

The U.S. Department of Energy recognized this time lag problem in a recent rulemaking. Per Federal legislation, DOE makes appliance efficiency standards for many residential and commercial products like water heaters and furnaces based on *site* energy consumption.

In addition, however, DOE *estimates* the *source* energy impacts based on data prepared by the Energy Information Agency. In a rulemaking in 2012 on dishwashers, DOE used EIA generation data for the year 2015 going forward as it explained the marketplace impact would be observed in the future and use of current (or past) electric generation data would not be appropriate.

Specifically, DOE used the value of 1.89 for a source energy multiplier in 2015 and this proposal would adopt for the IECC the same source energy value used by DOE. (Dishwasher Technical Support Document, May 2012 http://www1.eere.energy.gov/buildings/appliance_standards/product.aspx/productid/67)

Cost Impact: This proposed code change proposal will not increase the cost of construction. There is no cost impact to increasing flexibility in the performance path.

RE159-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R405.3-EC-FOSTER.DOC

RE160-13

R405.3 (IRC N1105.3)

Proponent: Steve Rosenstock, Edison Electric Institute, representing Edison Electric Institute (srosenstock@eei.org)

Revise as follows:

R405.3 (N1105.3) Performance-based compliance. Compliance based on simulated energy performance requires that a proposed residence (*proposed design*) be shown to have an annual energy cost that is less than or equal to the annual energy cost of the *standard reference design*. Energy prices shall be taken from a source *approved* by the *code official*, such as the Department of Energy, Energy Information Administration's *State Energy Price and Expenditure Report*. *Code officials* shall be permitted to require time-of-use-pricing in energy cost calculations.

Exception: The energy use based on *site* or source energy expressed in Btu or Btu per square foot of *conditioned floor area* shall be permitted to be substituted for the energy cost. The source energy multipliers ~~shall be determined by the code official. for electricity shall be 3.16. The source energy multiplier for fuels other than electricity shall be 1.4.~~

Reason: This proposal will make the provision more flexible for building designers, building owners, and code officials.

Part I: Site Energy

Site energy was part of the exception for many years until it was recently removed. There are many reasons to allow site energy to be used instead of energy costs:

- 1) Site energy is an actual metric that can be measured and verified by code officials, while source energy is an estimate.
- 2) Site energy information is credible, as it is shown on customers' energy bills on a monthly basis and used in other consensus-based code documents, such as ASHRAE 90.1, ASHRAE 90.2, and ICC-700 use site energy metrics for efficiency requirements.
- 3) DOE uses site energy information in many of its energy efficiency and energy consumption publications, such as the Residential Energy Consumption Survey. DOE uses site energy for its appliance energy efficiency standards program and the FTC uses site energy on the yellow EnergyGuide labels found on consumer appliances. EPA uses site energy to determine if an appliance or home qualifies for the Energy Star program.
- 4) Site energy is reliable, since it can be measured by utilities, consumers, and independent 3rd parties. In terms of energy efficiency upgrades, consumers rely on site energy information (amount used by older appliance or equipment compared to new appliance or equipment) to help them make energy efficiency decisions.
- 5) Site energy is replicable, as the units of measurement (kWh, therms, gallons, Btu's) can be used throughout the United States and are familiar to consumers on their monthly energy bills. Source energy is not replicable, as different estimates must be used for different energy sources, and different entities can make different assumptions about upstream production and delivery of different energy sources.
- 6) Site energy is transparent and easy to understand. It can be based on meter readings or DOE test procedures or FTC EnergyGuide labels or Energy Star labels. It is the metric that allows people to easily compare energy efficiency options in the marketplace. It is the metric that allows people to make good economic choices when faced with competitive alternatives.

Part II – Revision of Source Energy Estimates

There are many ways to estimate upstream energy losses. The energy production industry is very dynamic and subject to significant changes. In the United States in 2012 and 2013, there was and will be record amounts of natural gas produced from hydraulic fracturing production techniques. In 2012 and 2013, there will be record amounts of oil produced and imported from oil sands production. In 2012, there was a record amount of electricity produced from renewable forms of energy and a record amount of electricity produced by combined-cycle natural gas turbines.

The values that are currently shown should be deleted and not used for the following reasons:

- 1) The values shown are not consistent with values shown in other published documents.

Many documents and articles have been published over the past several years with source energy estimates. Among them are:

National Renewable Energy Laboratory NREL/TP-550-38617 "Source Energy and Emission Factors for Energy Use in Buildings" (June 2007)

American Gas Association EA 2009-3 "A Comparison of Energy Use, Operating Costs, and Carbon Dioxide Emissions of Home Appliances" (October 2009)

Environmental Protection Agency "Energy Star Performance Ratings Methodology for Incorporating Source Energy Use" (August 2009)

National Renewable Energy Laboratory NREL/TP-550-47246 "Building America Research Benchmark Definition" (January 2010)

International Code Council "International Green Construction Code" (March 2012)

U.S. Department of Energy Residential Dishwasher Energy Efficiency Technical Support Document, May 2012:
http://www1.eere.energy.gov/buildings/appliance_standards/product.aspx/productid/67

U.S. Department of Energy Residential Furnace Fan Technical Support Document, June 2012:
http://www1.eere.energy.gov/buildings/appliance_standards/rulemaking.aspx/ruleid/41

The values in the IECC do not match and cannot be substantiated with any of these published documents.

2) Different fossil fuels have different upstream source estimates.

In the IECC, all fossil fuels are assumed to have the same multiplier. In other documents, there is a large variation in the upstream estimates that will have a significant impact on energy performance results. As one example, for fuel oil and propane, EPA Portfolio Manager uses a factor of 1.01 for both, while NREL used estimated values of 1.158 and 1.151.

3) The use of 3.16 for electricity is overstated for many parts of the United States and does not account for significant regional differences or the increase in the use of renewable power generation and combined cycle gas turbines.

In other publications and web sites, the estimates for electricity are shown on a national basis, a regional basis, or a state by state basis. This is due to the variety of electric generation techniques which have upstream energy losses that can vary by orders of magnitude based on local conditions, regional conditions, physical location, season, month, week, or day, as well as hourly fluctuations in the amount of sunlight or wind speed.

In the IGCC Table 602.1.2.1, there are 26 values shown for electricity, based on the power pool sub-region in which a building is located. The values in the IGCC table (which are based on outdated 2005 electric generation data) range from 1.76 to 3.82. Using the value of 3.16 will overstate the source estimate for electricity in 18 (or 69.2%) of the 26 power pool sub-regions shown in the table (that uses 2005 data). Using 2011 or 2012 data would show that the current values is more overstated for the 18 regions and likely to be overstated for other regions as well.

In summary, this code change will allow the code official to use the most recent data for current or projected source energy estimates, rather than use static and outdated values that do not correspond to the rapidly changing nature of energy production in the United States, and worldwide.

Cost Impact: This proposed code change proposal will not increase the cost of construction. There is no cost impact to increasing flexibility in the performance path.

RE160-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R405.3-EC-ROSENSTOCK.DOC

RE161-13

R405.3 (IRC N1105.3), Chapter 5

Proponent: Robby Schwarz EnergyLogic Inc. representing EnergyLogic, Inc. (robby@nrglogic.com)

Revise as follows:

R405.3 (N1105.3) Performance-based compliance. Compliance based on simulated energy performance requires that a proposed residence *proposed design* be shown to have an annual energy cost that is less than or equal to the annual energy cost of the *standard reference design*. Energy prices shall be taken from a source *approved* by the *code official*, such as the Department of Energy, Energy Information Administration's *State Energy Price and Expenditure Report*. *Code officials* shall be permitted to require time-of-use pricing in energy cost calculations.

Exceptions:

1. The energy use based on source energy expressed in Btu or Btu per square foot of *conditioned floor area* shall be permitted to be substituted for the energy cost. The source energy multiplier for electricity shall be 3.16. The source energy multiplier for fuels other than electricity shall be 1.1.
2. Compliance shall be based on comparative analyses between the *proposed design* and the *standard reference design* using scoring generated by RESNET Mortgage Industry National Home Energy Rating Standards. The *proposed design* shall comply with the code where the score of the *proposed design* is less than or equal to the score of the *standard reference design* provided that the analyses use identical geometry and the energy efficiency features for the *standard reference design* in Table R405.5.2(1) are used for the *standard reference design* analysis.

Add new standard to Chapter 5 as follows:

RESNET Residential Energy Services Network, Inc.
P.O. Box 4561
Oceanside, CA 92052-4561

RESNET Standards-2013 RESNET Mortgage Industry National Home Energy Rating Standards.

Reason: The current annual energy cost matrix for demonstrating code compliance is flawed and may demonstrate that a house that should pass the energy code, based on actual geometry and energy specifications, may not only because the energy costs in a region have changed. More and more jurisdiction and builders across the country are turning to performance scores to represent the efficiency of a home and to demonstrate code compliance. Performance scores in and of themselves do not necessarily demonstrate code compliance. However, if the score is imposed on the existing structure of the code as Exception #2 does, the score can reflect code compliance simply as a means of demonstrating passing and failing.

The current structure of the simulated performance path requires that the mandatory sections of the IECC be complied with, thus ensuring that house performance is maintained and that the score is only a measure to demonstrate compliance. In addition, exception #2 utilizes the code reference home as described in table 405.5.2(1) and therefore energy code compliance utilizing this pathway will have a score that is variable for each qualified home. This is accomplished through the 2015 IECC Reference Design outlined in table 405.5.2(1). When the builders proposed designed home is configured with the IECC reference design features and modeled using approved software, the resulting score becomes the basis for the performance score target for that home. The EPA Energy Star program and the DOE Challenge Home program utilize this same matrix for demonstrating qualification for their programs and have demonstrated that the compliance path described in exception #2 will set the score target for the performance path equal to the performance that would be achieved if the prescriptive path was followed for each individual home. In this way jurisdictions can avoid developing a fixed value, or performance score, which really has no bearing on compliance and instead set the score threshold required for energy code compliance at the same value that the same house would earn if configured to the IECC prescriptive path, as outlined in table 405.5.2(1) Reference Design.

** Footnote to Energy Star and DOE Challenge Home program documents

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standards proposed for inclusion in the code, RESNET Standards, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

RE161-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R405.3-EC-SCHWARZ.DOC

RE162-13

R405.4 (NEW) (IRC N1105.4 (NEW))

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

Add new text as follows:

R405.4 (N1105.4) Renewable energy. On-site energy production from renewables and waste shall be treated as a reduction in energy use. This includes, but is not limited to, photovoltaic and solar hot water systems that are standalone or integrated into the building, as well as renewable energy located on or adjacent to the building site. Both energy generated for use on the building site and energy sent back to the energy supply system shall be considered reductions in energy use.

Reason: This provides a mechanism for treating renewable energy generated at residences as an energy savings for that residence.

Cost Impact: The code change proposal will not increase the cost of construction.

RE162-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R405.4-EC-CONNER.DOC

RE163-13

R405.4.2 (IRC N1105.4.2), R405.4.2.1 (NEW) (IRC N1105.4.2.1 (NEW)), R405.2.2 (NEW) (IRC N1105.4.2.2 (NEW))

Proponent: Robby Schwarz EnergyLogic Inc., representing EnergyLogic, Inc. (robby@nrglogic.com)

Revise as follows:

R405.4.2 (N1105.4.2) Compliance report. Compliance software tools shall generate a report that documents that the *proposed design* complies with Section R405.3. A compliance report on the *proposed design* shall be submitted with the application for the building permit. Upon completion of the building, a compliance report based upon the as-built condition of the building, shall be submitted to the *code official* before a certificate of occupancy is issued by the *code official*. Batch sampling of buildings to determine energy code compliance for all buildings in the batch shall be prohibited.

Compliance reports shall include information in accordance with Sections R405.4.2.1 and R405.4.2.2. The compliance documentation shall include the following information: Where the *proposed design* of a building could be built on different sites where the cardinal orientation of the building on each site is different, compliance of the *proposed design* for the purposes of the application for the building permit, shall be based upon the worst case orientation, worst case configuration, worst case building air leakage and worse case duct leakage. Such worse case parameters shall be used as inputs to the compliance software for energy analysis.

- ~~1. Address or other identification of the residence;~~
- ~~2. An inspection checklist documenting the building component characteristics of the *proposed design* as listed in Table R405.5.2(1). The inspection checklist shall show results for both the *standard reference design* and the *proposed design*, and shall document all inputs entered by the user necessary to reproduce the results;~~
- ~~3. Name of individual completing the compliance report; and~~
- ~~4. Name and version of the compliance software tool.~~

R405.4.2.1 (N1105.4.2.1) Compliance report for permit application. A compliance report submitted with the application for building permit shall include all of the following:

1. Building street address, or other building site identification.
2. A statement indicating that the *proposed design* complies with Section R405.3.
3. An inspection checklist documenting the building component characteristics of the *proposed design* as indicated in Table R405.5.2(1). The inspection checklist shall show results for both the *standard reference design* and the *proposed design* with all user inputs to the compliance software to generate the results.
4. A site-specific energy analysis report that is in compliance with Section R405.3
5. Name of the individual performing the analysis and generating the report.
6. Name and version of the compliance software tool.

R405.4.2.2 (N1105.4.2.2) Compliance report for certificate of occupancy. A compliance report submitted for obtaining the certificate of occupancy shall include all of the following:

1. Building street address, or other building site identification
2. A statement indicating that the as-built building complies with Section R405.3.
3. A certificate indicating that the building passes the performance matrix for code compliance and the energy saving features of the buildings.
4. A site-specific energy analysis report that is in compliance with Section R405.3.
5. Name of the individual performing the analysis and generating the report.

6. Name and version of the compliance software tool.

Exception: ~~Multiple orientations. When an otherwise identical building model is offered in multiple orientations, compliance for any orientation shall be permitted by documenting that the building meets the performance requirements~~

Reason: Jurisdictions, Builders, third party inspection companies and others are not clear of the process for completing and utilizing the simulated performance path. With all pathways through the energy code one must in essence declare how they will meet the intent of the code. For the prescriptive path they simply say they are going prescriptive, for the UA trade off path they submit a document such as a RESCheck report, and for the simulated performance path they must currently submit a document demonstrating that the annual energy cost of the proposed design are less than or equal to the same home if it were built with the reference design specification. It becomes unclear how one demonstrates that they have carried out their proposed design. The revisions proposed for this section clearly outlines a process by which the proposed design is submitted, inspections take place, and additional analysis is preformed to ensure that the proposed design was achieved or bettered for the purposes of compliance.

Cost Impact: The code change proposal will not increase the cost of construction.

RE163-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R405.4.2-EC-SCHWARZ.DOC

RE164-13

Table R405.5.2(1) (IRC Table N1105.5.2(1))

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

Revise as follows:

TABLE R405.5.2(1) (N1105.5.2(1))
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Glazing ^a	Total area^b = (a) The proposed glazing area; where proposed glazing area is less than 15% of the conditioned floor area. (b) 15% of the conditioned floor area; where the proposed glazing area is 15% or more of the conditioned floor area.	As proposed
	<u>As proposed</u>	
	Orientation: equally distributed to four cardinal compass orientations (N, E, S & W).	As proposed
	U-factor: from Table R402.1.3	As proposed
	SHGC: From Table R402.1.1 except that for climates with no requirement (NR) SHGC = 0.40 shall be used. Interior shade fraction: 0.92-(0.21 × SHGC for the standard reference design) External shading: none	As proposed 0.92-(0.21 × SHGC as proposed) As proposed

For SI: 1 square foot = 0.93 m², 1 British thermal unit = 1055 J, 1 pound per square foot = 4.88 kg/m², 1 gallon (U.S.) = 3.785 L, °C = (°F-3)/1.8, 1 degree = 0.79 rad.

(Portions of Table not shown remain unchanged)

- a. Glazing shall be defined as sunlight-transmitting fenestration, including the area of sash, curbing or other framing elements, that enclose conditioned space. Glazing includes the area of sunlight-transmitting fenestration assemblies in walls bounding conditioned basements. For doors where the sunlight-transmitting opening is less than 50 percent of the door area, the glazing area is the sunlight transmitting opening area. For all other doors, the glazing area is the rough frame opening area for the door including the door and the frame.
- b. ~~For residences with conditioned basements, R-2 and R-4 residences and townhouses, the following formula shall be used to determine glazing area:~~
- ~~$AF = A_s \times FA \times F$~~
- ~~where:~~
- ~~AF = Total glazing area.~~
- ~~A_s = Standard reference design total glazing area.~~
- ~~$FA = (\text{Above-grade thermal boundary gross wall area}) / (\text{above-grade boundary wall area} + 0.5 \times \text{below-grade boundary wall area}).$~~
- ~~$F = (\text{Above-grade thermal boundary wall area}) / (\text{above-grade thermal boundary wall area} + \text{common wall area})$ or 0.56, whichever is greater.~~
- ~~and where:~~
- ~~Thermal boundary wall is any wall that separates conditioned space from unconditioned space or ambient conditions.~~
- ~~Above-grade thermal boundary wall is any thermal boundary wall component not in contact with soil.~~
- ~~Below-grade boundary wall is any thermal boundary wall in soil contact.~~
- ~~Common wall area is the area of walls shared with an adjoining dwelling unit.~~
- ~~L and CFA are in the same units.~~

Reason: The principals should be: Keep it simple. Keep it energy efficient. Simple is setting a specific window requirement and having it apply to the whole performance approach, as is done in the prescriptive approach. Simple is presuming that the glass area

for the performance calculation is the same as the glass area in the proposed new home. Simple is removing unneeded calculations. This change also has the effect of allowing changes from plans to the home as constructed without recalculation.

As windows get more efficient, the window area matters less. In some situations more glass better. In northern climates windows at the edge of what is now in the market may be as good as a "normal" wall. Therefore the impact of window area is decreased and not worth the calculation.

Removal of the window area calculation was the major simplification in the 2003 IECC simplification needed to get to the 2006 IECC. The 2006 IECC simply says use as much window as you want, just make it energy efficient windows. Requiring a specific window for each climate zone created huge markets for those specific levels of efficiency. Window makers respond by making a energy efficient windows a commodity, with a significant fall in the cost for energy efficient windows. The effect has been so strong that the building code has repeatedly pushed Energy Star to move to new levels.

Cost Impact: The code change proposal will not increase the cost of construction.

RE164-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R405.5.2(1)T #1-EC-CONNER.DOC

RE165-13

202 (NEW) (IRC N1101.9 (NEW)), Table R405.5.2(1) (IRC Table N1105.5.2(1))

Proponent: Gary MacFadden, National Electrical Manufacturers Association (NEMA)
(gary.macfadden@Nema.org)

Revise as follows:

TABLE R405.5.2(1) (N1105.5.2(1)) SPECIFICATIONS FOR THE STANDARD REFERENCE DESIGN AND PROPOSED DESIGNS		
BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Heating systems ^{f, g}	<p>As proposed for other than electric heating without a heat pump.</p> <p><u>Where a proposed design utilizes grid-interactive electric thermal storage, the standard reference design shall be as proposed.</u></p> <p><u>Where the proposed design utilizes electric heating without a heat pump, electric heating design does not utilize a heat pump or grid-interactive electric thermal storage, the standard reference design shall be an air source heat pump in accordance with Section C403 of the International Energy Conservation Code.</u></p> <p>Capacity: sized in accordance with Section R403.6</p>	As proposed

(Portions of Table not shown remain unchanged)

Add new definition as follows:

GRID-INTERACTIVE ELECTRIC THERMAL STORAGE (ETS). A device designed for the storage of electrical energy that has been converted into heat, and that has the ability to turn on or off in response to the needs of the utility or the electric grid.

Reason: As it is written, Table R405.5.2(1) requires a modeler to assume a heat pump system whenever a designer proposes to use "... other than electric heating without a heat pump," *i.e.*, electric resistance or electric radiant heating in a new residence. While perhaps serving a valuable function in some fashion in the past (elimination of gaming where a modeler assumes an electric furnace for the reference house and then proposes a heat pump allowing a less stringent envelope), the limitation on use of ERH in the modeling is overly restrictive, particularly as it relates to Grid-interactive electric thermal storage ("ETS"). The definition is being added because the IECC does not currently have a definition for grid-interactive electric thermal storage.

Substantiation: ETS systems have significantly different operational and energy consumption characteristics versus other types of heating systems. These differences are at the core of the rationale behind this code change proposal. In particular, ETS systems have the ability to respond to the needs of the utility and electric grid by storing energy during preferential times of the day or night and turn on or off as needed. This is very beneficial in improving efficiency of power generation, transmission and distribution, for integration of renewable energy and for providing grid power balancing services. Unfortunately, ETS systems are generally lumped together with traditional heating systems (as they are in the existing code language).

Language like that found currently in Table R405.5.2(1) that requires a modeler to assume a heat pump in the reference house, even if the designer intends to use electric resistance heating, including an ETS in the proposed house, has been in the IECC for many years. The justification cited historically for that modeling limitation is:

- That modelers will game the system by assuming ERH in the reference house but a heat pump in the proposed house, thereby allowing a less stringent envelope, and/or

- That a heat pump will consume on the order of half the energy of an electric furnace installed in the same house so the code should discourage designers from specifying ERH and instead should specify a heat pump.

With respect to the former of these justifications, the current language requiring the same equipment to be modeled in both the reference and the proposed designs denies any opportunity to game the system as described above.

That leaves the latter as the potential justification for the restriction against modeling the use of electric resistance heating in the reference house. To some extent, this seems appropriate. If, for instance, in some heating dominated climates, a designer is proposing to install a ducted electric furnace with central air-conditioning, then incenting that designer to use a heat pump instead of an electric furnace might be expected to save some amount of energy at a relatively modest cost.

But there are significant operational and energy consumption characteristics that distinguish ETS from traditional heating systems (whether fueled by electricity, gas, oil or other fuel) as described in more detail below.

Grid-interactive electric thermal systems ("ETS"). ETS have significantly different operational and energy consumption characteristics from traditional electric and fossil heating systems.

Thermal battery. Electric utilities dispatch their generators in the order from the most cost efficient (base load generation) to the least cost efficient (peaking load generation). ETS complements the efficient dispatch of generation by utilities by allowing the storage of energy that is produced more efficiently for use later, and by avoiding the requirement to operate less efficient generators at peak load conditions. ETS accomplishes this feat by charging (heating bricks, water, or other storage media) at times when utilities have excess capacity. Often this is at night but it can vary between utilities. Because the system is grid-interactive, an ETS can charge at times that are optimum for the utility, allowing utilities to efficiently manage their peak demands and their customer costs. Heat that is stored for later use effectively makes ETS a thermal battery.

Renewable energy. ETS is a unique complement to the generation of electricity from renewable energy like wind and solar. Many times peak power production from renewable energy sources does not coincide with a utility's demand for electricity. As an example, wind generation usually peaks at night when demand for energy is not usually the greatest. For that reason, Bonneville Power last year was forced to curtail the generation from wind generators at certain times because it didn't need all the electricity the wind generators were producing! ETS is a good fit for storing excess renewable energy and has been successfully deployed in Bonneville's service territory as well as the service territory of other electric utilities.

Reduces winter peak. When electrical demands on a utility's system grow, it is forced to dispatch less efficient generators to meet that demand, so to the extent demand is *reduced* the utility avoids costs (that would ultimately be passed on to customers) and saves energy. ETS allows the storage of energy produced by more efficient generators.

Replaces fossil fuel in utility grid control. When electrical demand on a utility's grid changes (up or down), the most immediate system response is for the grid's frequency to drift away from ideal (60 cycles per second). To control these frequency excursions, utilities have traditionally operated fossil fuels generators to add voltage to the grid to raise the frequency as it falls away from 60 cycles. Grid-interactive ETS can be dispatched in lieu of fossil fuel generators to remedy frequency excursions, thereby saving energy and costs. According to a Kema report, usage of a non-carbon emitting resource such as ETS for providing regulation services can reduce carbon emissions for regulation by nearly 65%.

ETS offer significant benefits to customers, including the ability to store renewable energy, the ability to reduce utility costs, and the ability to reduce the consumption of fossil fuel by utilities in the regulation of system frequency.

Bibliography

See article at <http://www.pjm.com/about-pjm/exploring-tomorrows-grid/electricity-storage.aspx?p=1> for information on the value of ETS in the PJM Interconnection service territory.

See article at <http://www.sustainablebusinessoregon.com/articles/2012/04/bonneville-power-calls-for-first-wind.html?page=all> for information on Bonneville Power curtailment of wind generation amounting to almost 100,000 MWH's in 2011.

See Kema Consulting report (Commissioned by the U.S. Department of Energy under the supervision of Sandia National Laboratory) noting significant reduction in carbon emissions at <http://prod.sandia.gov/techlib/access-control.cgi/2008/088229.pdf>.

See <http://www.steffes.com/off-peak-heating/ets.html> for more information on utility benefits of WTS, including energy savings associated with thermal storage and frequency regulation.

See Sandia National Laboratory website at <http://www.sandia.gov/ess/> for information on the contributions of energy storage to electric grid stability.

For a detailed description of frequency regulation in North America see Department of Energy / National Energy Technology Laboratory Report **Frequency Instability Problems in North American Interconnections, DOE/NETL-2011/1473, Final Report dated May 1, 2011** found at <http://www.netl.doe.gov/energy-analyses/pubs/TransmissionFreqProb.pdf>

Cost Impact: The code change proposal will not increase the cost of construction.

RE165-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R405.5.2(1)T #1-EC-MCFADDEN.DOC

RE166-13

Table R405.5.2(1) (IRC Table N1105.5.2(1))

Proponent: Don Surrena, CBO, National Association of Home Builders (NAHB) (dsurrena@nahb.org)

Revise as follows:

**TABLE R405.5.2(1) (N1105.5.2(1))
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS**

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Heating systems ^{f, g}	<p>As proposed for other than electric heating without a heat pump. Where the proposed design utilizes electric heating without a heat pump the standard reference design shall be an air-source heat pump meeting the requirements of Section R403 of the IECC-Commercial Provisions.</p> <p><u>Fuel type: same as proposed design</u></p> <p><u>Efficiencies:</u></p> <p><u>Electric: air-source heat pump with prevailing federal minimum standards</u></p> <p><u>Non-electric furnaces: natural gas furnace with prevailing federal minimum standards</u></p> <p><u>Non-electric boilers: natural gas boiler with prevailing federal minimum standards</u></p> <p>Capacity: sized in accordance with Section R403.6</p>	<p>As proposed</p> <p><u>As proposed</u></p> <p><u>As proposed</u></p> <p><u>As proposed</u></p> <p><u>As proposed</u></p>
Cooling systems ^{f, h}	<p>As proposed</p> <p><u>Fuel type: Electric</u></p> <p><u>Efficiency: in accordance with prevailing federal minimum standards</u></p> <p>Capacity: sized in accordance with Section R403.6</p>	<p>As proposed</p> <p><u>As proposed</u></p>
Service water heating ^{f, g, h, i}	<p>As proposed</p> <p><u>Fuel type: same as proposed design</u></p> <p><u>Efficiency: in accordance with prevailing federal minimum standards</u></p> <p><u>Use: gal/day = 30 + (10 × Nbr)</u></p> <p><u>Nbr = Number of bedrooms</u></p> <p><u>Tank temperature: 120°F</u></p> <p><u>Use: same as proposed design</u></p>	<p>As proposed</p> <p><u>As proposed</u></p> <p><u>Same as standard reference</u></p> <p><u>Same as standard reference</u></p> <p><u>gal/day = 30 + (10 × Nbr)</u></p>

(Portions of table not shown remain unchanged)

Reason: This amendment serves to retain energy neutral equipment trade-off provisions from the 2006 International Energy Conservation Code (IECC) for the heating systems, cooling systems, and service water heating. By retaining these, builders have an opportunity to optimize a code-compliant house design by using energy efficient equipment. Quite often, the use of this high efficiency equipment provides a more cost effective solution to achieve code compliance. Eliminating this ability discourages the concept of the "house as a system" approach which is a cornerstone of building science.

Rejecting this amendment will create a negative impact on the installation of state-of-the-art, energy efficient equipment. It will increase the cost of construction by driving builders to often use less efficient equipment while increasing the cost of construction.

Significant improvements in the efficiency of HVAC and water heating equipment have been made in the last 20 years. With the increased emphasis on new and improved technologies, this trend is expected to continue and will result in even higher energy savings in future years. If builders are forced to comply with the energy code by installing requirements which are not cost-effective, there will be a resistance to install higher efficiency equipment. This could end up hurting energy efficiency in the long term, consumers which have non-condensing furnaces will be less likely to install a higher efficiency condensing replacement furnace because of the additional cost to run an exhaust vent.

Industries such as log home manufacturers may no longer be able to construct to projected higher envelope requirements. The combination of increases in envelope thermal requirements, building tightness and duct tightness combined with the elimination of energy neutral trade-offs pose a serious threat to the viability of the log home industry. There are practical limitations to the thickness of log home walls, increases in the log diameter has a exponential increase in the cost of the logs making log walls with a U-factor of 0.082 or lower prohibitively expensive.

Cost Impact: The code change proposal will not increase the cost of construction.

RE166-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R405.5.2(1)T #1-EC-SURRENA.DOC

RE167-13

Table R405.5.2(1) (IRC Table B1105.5.2(1))

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

TABLE R405.5.2(1) (N1105.5.2(1))
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Thermal distribution systems	<p>None</p> <p><u>Duct insulation: From Section R403.2.1.</u></p> <p><u>A thermal distribution system efficiency (DSE) of 0.88 shall be applied to both the heating and cooling system efficiencies for all systems other than tested duct systems. For tested duct systems, the leakage rate shall be 4 cfm (113.3 L/min) per 100 ft² (9.29 m²) of conditioned floor area at a pressure differential of 0.1 inches w.g. (25 Pa).</u></p>	Thermal distribution system efficiency shall be as tested or as specified in Table R405.5.2(2) if not tested. Duct insulation shall be as proposed.

(Portions of table not shown remain unchanged)

Reason: The specification for the STANDARD REFERENCE DESIGN was inadvertently deleted from DOE's EC13 change proposal in the last code cycle. EC13 was approved, leaving the table with no specifications for thermal distribution systems in the standard reference design. This proposal restores the missing cell with text from EC13-09/10.

Cost Impact: The code change proposal will not increase the cost of construction.

RE167-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R405.5.2(1)T #1-EC-WILLIAMS.DOC

RE168-13

Table R405.5.2(1) (IRC Table N1105.5.2(1))

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

TABLE R405.5.2(1) (N1105.5.2(1))
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Heating systems ^{f,g}	<p>As proposed for other than electric heating without a heat pump. Where the proposed design utilizes electric heating without a heat pump the standard reference design shall be an air-source heat pump meeting the requirements of Section R403 of the IECC-Commercial Provisions.</p> <p><u>Fuel type: same as proposed design</u></p> <p><u>Efficiencies:</u> <u>Electric: air-source heat pump with prevailing federal minimum standards</u></p> <p><u>Nonelectric furnaces: natural gas furnace with prevailing federal minimum standards</u></p> <p><u>Nonelectric boilers: natural gas boiler with prevailing federal minimum standards</u></p> <p>Capacity: Sized in accordance with Section R403.6</p>	<p>As proposed</p> <p><u>As proposed</u></p> <p><u>As proposed</u></p> <p><u>As proposed</u></p> <p><u>As proposed</u></p>
Cooling systems ^{f,h}	<p>As proposed</p> <p>Fuel type: Electric</p> <p>Efficiency: in accordance with prevailing federal minimum standards</p> <p>Capacity: sized in accordance with Section R403.6</p>	<p>As proposed</p> <p><u>As proposed</u></p>
Service Water Heating ^{f,g,h,i}	<p>As proposed</p> <p><u>Fuel type: same as proposed design</u></p> <p><u>Efficiency: in accordance with prevailing federal minimum standards</u></p> <p><u>Use: gal/day = 30 + 10 × Nbr</u></p> <p><u>Tank temperature: 120°F</u></p> <p>Use: same as proposed design</p>	<p>As proposed</p> <p><u>As proposed</u></p> <p><u>Same as standard reference</u></p> <p><u>Same as standard reference</u></p> <p><u>gal/day = 30 + (10 × Nbr)</u></p>

For SI: 1 square foot = 0.93 m², 1 British thermal unit = 1055 J, 1 pound per square foot = 4.88 kg/m², 1 gallon (U.S.) = 3.785 L, °C = (°F-3)/1.8, 1 degree = 0.79 rad.

(Portions of Table not shown remain unchanged)

Reason: Energy efficient buildings need high efficiency equipment. Efficient equipment is one of the largest remaining and most cost-effective options. Some think we need efficient equipment, OR efficient envelopes (insulation, air tightness, and windows). No. Energy-efficient residences need both efficient equipment and efficient envelopes.

Not recognizing high efficiency equipment treats outstanding equipment as no better than minimum efficiency equipment. A 95 AFUE gas furnace is no better than the least efficient furnace? A ground source heat pump is the same as an air source heat pump? A 16 SEER air conditioner is the same as the least efficient air conditioner? Not true.

The basic deal we make with the builders is "You deliver an efficient home and we will untie your hands to construct that home the best way you know how." Don't reduce the efficiency in the IECC, empower the builders to deliver it.

Cost Impact: The code change proposal will not increase the cost of construction.

RE168-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R405.5.2(1)T #2-EC-CONNER.DOC

RE169-13

Table R405.5.2(1) (IRC Table N1105.5.2(1))

Proponent: Gary MacFadden, National Electrical Manufacturers Association (NEMA)
(gary.macfadden@Nema.org)

Revise as follows:

TABLE R405.5.2(1) (N1105.5.2(1))
SPECIFICATIONS FOR THE STANDARD REFERENCE DESIGN AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Heating systems ^{f, g}	<p>As proposed for other than electric heating without a heat pump.</p> <p>Where the proposed design utilizes <u>ducted electric heating without a heat pump</u>, the standard reference design shall be an air source heat pump meeting the requirements of Section R403 of the IECC—Commercial Provisions. <u>Where the proposed design is for an electric heating system that does not use a duct system, the standard reference design shall be as proposed.</u></p> <p>Capacity: sized in accordance with Section R403.6</p>	As proposed

(Portions of table not shown remain unchanged)

Reason: As it is written, Table R405.5.2(1) requires a modeler to assume a heat pump system whenever a designer proposes to use "... other than electric heating without a heat pump," *i.e.*, electric resistance or electric radiant heating (collectively "ERH") in a new residence. While perhaps serving a valuable function in some fashion (elimination of gaming where a modeler assumes an electric furnace for the reference house and then proposes a heat pump allowing a less stringent envelope), the limitation on use of ERH in the modeling is overly restrictive. ERH is available in many different applications and the performance characteristics of non-ducted ERH are very different from the performance characteristics of ducted heating systems, whether fueled by electricity, gas, or any other fuel. In addition to no duct energy losses, non-ducted ERH also enjoys significant energy savings from zoning. This proposal attempts to preserve the benefit of eliminating gaming while still recognizing the energy savings potential of non-ducted ERH.

Substantiation: ERH is available in a number of different configurations, including electric furnace, baseboard, radiant and PTAC. For purposes of this proposal, however, only non-ducted ERH is being considered. The operational and energy consumption characteristics of ducted vs. non-ducted ERH are significant and are at the core of the rationale behind this code change proposal. Unfortunately, ducted and non-ducted ERH systems are often grouped together (as they are in the existing code language).

Language like that found currently in Table R405.5.2(1) that requires a modeler to assume a heat pump in the reference house, even if the designer intends to use electric baseboard heating in the proposed house, has been in the IECC for many years. The justification cited historically for that modeling limitation is:

- That modelers will game the system by assuming ERH in the reference house but a heat pump in the proposed house, thereby allowing a less stringent envelope, and/or
- That a heat pump will consume on the order of half the energy of an electric furnace installed in the same house so the code should discourage designers from specifying ERH and instead should specify a heat pump.

With respect to the former of these justifications, the current language requiring the same equipment to be modeled in both the reference and the proposed designs denies any opportunity to game the system as described above.

That leaves the latter as the sole justification for the modeling restriction against using electric resistance heating as the equipment assumption in the reference house. To some extent, this seems appropriate. If, for instance, in a heating dominated climate, a designer is proposing to install a ducted electric furnace with central air-conditioning, then incenting that designer to use a heat pump instead would probably be expected to save significant amounts of energy at a relatively modest cost.

But there are significant operational and energy consumption characteristics that distinguish **ducted from non-ducted** ERH as described in more detail below.

Ducted vs. non-ducted heating systems. Non-ducted ERH has significantly different operational and energy consumption characteristics from ducted heating systems.

Fan Power. Numerous studies over the last decade have identified furnace fan energy usage as more significant than before believed. As a result, the U.S. Department of Energy has initiated a rulemaking to establish a test procedure for determining furnace fan energy. Likewise, the Environmental Protection Agency now has an Energy Star rating for efficient furnace fans. Of course, non-ducted ERH like baseboard or radiant doesn't use a fan. On this basis, a reasonable person could conclude that, all other things being held constant, a non-ducted ERH system (without a fan) would consume less energy than a ducted electric furnace with a fan.

Duct loss and fan induced infiltration. Energy losses through ductwork are recognized as significant and come from two distinct sources; air lost through ductwork to the outside and induced infiltration/exfiltration caused by duct pressurization. Air lost to the outside is self-explanatory and is, in fact, already recognized by the 2012 IECC (and earlier versions) in Table R405.5.2(2) where distribution system efficiency is discounted under certain common conditions. In addition, there is growing recognition that ductwork design can have a significant impact on infiltration/exfiltration. On this basis, a reasonable person could conclude that, all other things being held constant, a non-ducted ERH system would consume less energy than a ducted electric furnace.

Zoning. Ducted, central heating, whether it be a ducted heat pump, electric furnace, gas furnace or other, is designed to serve large areas, most often an entire house. Non-ducted ERH, on the other hand, generally divides a house up into numerous independently controlled zones. The energy efficiency benefits of zoning are well documented as it allows users to heat only those areas that are occupied resulting in significant savings. On this basis, a reasonable person could conclude that, all other things being held constant, a zoned, non-ducted ERH system would consume less energy than a ducted electric furnace.

Additional considerations. Few people would argue that, at the margin, a zoned, non-ducted ERH would be expected to consume fewer btu's over the course of a winter than a ducted electric furnace. In addition to these operational differences, however, (no fan energy, no duct losses, benefits of zoning), there are other reasons why ERH should be treated differently from ducted heating systems as noted below.

Cooling. There are still a non-trivial amount of new homes built in the United States every year without central cooling. According to the EIA, over 800,000 new homes were built between 2000 and 2009 without air-conditioning. A recent study in the Pacific Northwest revealed a relationship between increased use of cooling energy in homes that use heat pumps vis-à-vis electric furnaces. While there are a number of potential explanations, at least one explanation is that people using ERH consciously decline to install air conditioning. Thus, incenting the use of heat pumps over ERH may have the unintended result of increasing summer cooling energy.

Cooling dominated climate. In cooling dominated climates, with relatively few heating degree days (DOE Climate Zones 1 & 2), driving a builder to use a heat pump which would save relatively little – if any – heating energy due to the warm climate would result in fewer dollars for that builder to spend on other things like more attic insulation or higher SEER air-conditioning – something that would actually result in energy savings.

Non-ducted ERH has significantly different operating characteristics than ducted heating systems.

With respect to the assumption that a heat pump system will consume less than half the btu's of an electric resistance heating system because the heat pump has a COP of 2 or better, this assumption may be valid for a comparison between a ducted heat pump and a ducted electric resistance furnace, but it not accurate for non-ducted, zoned ERH (See Note 1 below)

In a study conducted by the National Association of Home Builders Research Center for the U.S. Department of Energy, an occupied house in the Washington, D.C. area was monitored for performance over a winter. The house contained three distinct heating systems; central electric heat pump, electric radiant heat, and electric baseboard heat. After the data was weather normalized, it revealed that, under actual homeowner controlled conditions, the electric radiant system used 33% percent less energy than the heat pump system and 52% less than the electric baseboard system. Thus, the heat pump only saved about 36% the energy consumed by the electric baseboard system.

Heat pumps are a great option when a person wants a central, ducted heating and cooling system but they having different operating characteristics from a non-ducted ERH system.

Note 1. Recent field data from a large survey of homes suggests that the actual (vs. theoretical) relationship may not be as well understood as previously believed. See study at http://www.nwcouncil.org/energy/rtf/meetings/2009/04/Draft%202008%20NEEM%20Study_040608.pdf (p. 21) where observed heat pump energy savings were far short of expectations and the report said

"For the heat pump cases, however, the apparent similarity between electric resistance and heat pump systems suggest minimal savings for the more efficient heat pump option. Some form of behavioral —takebackll, poor heat pump installations or increased summer cooling load for heat pumps vis-à-vis resistance houses seem the likeliest explanations. Given that a number of the zone 1 sites (e.g.: Medford, Oregon; Yakima, Washington; and The Dalles, Oregon), have cooling climates, the latter seems plausible. A possible alternate contributing explanation is that these heat pump units do not in fact achieve an average COP of as much as 2 under actual operating conditions. Field notes from heat pump cases in the Oregon sample (a high percentage of heat pumps) mentioned occupants who complained about a lack of comfort to their heating contractor and were told by their heating contractors to switch the heat pumps to run in electric resistance heating mode."

Bibliography

Study of manufactured housing in the Pacific Northwest,

http://www.nwcouncil.org/energy/rtf/meetings/2009/04/Draft%202008%20NEEM%20Study_040608.pdf

NAHB Radiant Heat Study, http://www.toolbase.org/PDF/CaseStudies/enerjoy_case_study.pdf

For an Alliance to Save Energy video on the benefits of zoning see <http://www.energynow.com/video/2011/11/16/home-efficiency-tips-heating-and-cooling-zones> where the moderator quotes the Department of Energy as saying that zoning can save up to 30% on home heating and cooling bills.

For information on duct leakage see <http://www.greenbuildingadvisor.com/blogs/dept/musings/duct-leakage-testing>. Also see EPA Energy Star guidance at http://www.energystar.gov/index.cfm?c=home_improvement.hm_improvement_ducts.

For information on fan induced infiltration into buildings see http://www.buildingscience.com/documents/digests/bsd-014-air-flow-control-in-buildings/files/bsd-014_air-flow-control_ed.pdf.

For an article on the significance of furnace fan energy see <http://aceee.org/proceedings-paper/ss08/panel02/paper09>. Also see U.S. Department of Energy Appliance Efficiency furnace fan docket at http://www1.eere.energy.gov/buildings/appliance_standards/residential/furnace_fans.html.

Cost Impact: The code change proposal will not increase the cost of construction.

RE169-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R405.5.2(1)T #2-EC-MCFADDEN.DOC

RE170-13

Table R405.5.2(1) (IRC Table N1103.5.2(1))

Proponent: Don Surrena, CBO, National Association of Home Builders (NAHB) (dsurrena@nahb.org)

Revise as follows:

**TABLE R405.5.2(1) (N1103.5.2(1))
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS**

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Glazing ^a	Total area ^b =	As proposed
	(a) The proposed glazing area; where proposed glazing area is less than 15% of the conditioned floor area.	
	(b) 15% of the conditioned floor area; where the proposed glazing area is 15% or more of the conditioned floor area.	As proposed
	Orientation: equally distributed to four cardinal compass orientations (N, E, S, & W)	As proposed
	U-factor: from Table R402.1.3	As proposed
	SHGC: From Table R402.1.1 except that for climates with no requirement (NR) SHGC = 0.40 shall be used.	0.92-(0.21 × SHGC as proposed)
	Interior shade fraction: 0.92-(0.21 × SHGC for the standard reference design)	As proposed
	External shading: none	

(Portions of table not shown remain unchanged)

Reason: Walls generally perform better thermally than windows. Currently in the code there is no incentive in the performance path for the building designer to optimize the window area in order to save energy and provide daylighting, egress and views that makes for a safe and comfortable house. These modifications will provide the building designer the ability to reduce window area and get credit for the energy saved. As this section is currently written, the house is penalized for having more than 15% window area yet receives no credit toward code compliance when the window area is reduced below 15%. This change rectifies this disparity and makes the performance path a more representative of actual energy use.

Cost Impact: The code change proposal will not increase the cost of construction.

RE170-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R405.5.2(1)T #2-EC-SURRENA.DOC

RE171-13

Table R405.5.2(1) (IRC Table N1105.5.2(1))

Proponent: Jeremiah Williams / U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

TABLE R405.5.2(1) (N1105.5.2(1))
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Glazing ^a	Total area (exclusive of glazing of thermally isolated sunrooms) ^b =	As proposed
	(a) The proposed glazing area; where proposed glazing area is less than 15% of the conditioned floor area.	
	(b) 15% of the conditioned floor area; where the proposed glazing area is 15% or more of the conditioned floor area.	
	Orientation: equally distributed to four cardinal compass orientations (N, E, S & W).	As proposed
	U-factor: from Table R402.1.3	As proposed
	SHGC: From Table R402.1.1 except that for climates with no requirement (NR) SHGC = 0.40 shall be used.	As proposed 0.92-(0.21 × SHGC as proposed)
Thermally isolated sunrooms	Interior shade fraction: 0.92-(0.21 × SHGC for the standard reference design)	As proposed
	External shading: none	
	None <u>Geometry and orientation: same as proposed</u>	As proposed
	<u>Opaque ceiling and wall insulation: in accordance with Section R402.2.12</u>	<u>As proposed</u>
	<u>Opaque wall solar absorptance = 0.75</u>	<u>As proposed</u>
	<u>Opaque wall emittance = 0.90</u>	<u>As proposed</u>
	<u>Fenestration U-factor: in accordance with Section R402.3.5</u>	<u>As proposed</u>

(Portions of table not shown remain unchanged)

Reason: In the current code, there is no connection between the performance path and the prescriptive requirements for thermally isolated sunrooms. Including thermally isolated sunrooms in the standard reference design, if present in the proposed design, ensures a proper comparison against the code's associated prescriptive requirements and minimizes confusion about the applicability of the sunroom specifications for homes complying via the performance path.

Cost Impact: The code change proposal will not increase the cost of construction.

RE171-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R405.5.2(1) #3-EC-WILLIAMS.DOC

RE172-13

**R405.1 (IRC N1105.1), Table R405.5.2(1) (IRC Table N1105.5.2(1)),
R405.7 (NEW) (N1103.7 (NEW)), R405.8 (NEW) (N1103.8 (NEW)),
R405.9 (NEW) (N1103.9 (NEW)), R405.10 (NEW) (N1103.10 (NEW))**

Proponents: Craig Conner, Building Quality, representing self (craig.conner@mac.com), Gary Klein, Affiliated International Management, LLC, representing self (gary@aim4sustainability.com), Gerald Van Decker, RenewABILITY, representing self (gerald@renewability.com), Philip Fairey, Deputy Director, Florida Solar Energy Center (pfairey@fsec.ucf.edu)

Revise as follows:

R405.1 Scope. This section establishes criteria for compliance using simulated energy performance analysis. ~~Such analysis shall include heating, cooling, and service water heating energy only.~~

**TABLE R405.5.2(1) (N1105.5.2(1))
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS**

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN ^m
Internal gains	$\text{IGain} = 17,900 + 23.8 \times CFA + 4104 \times N_{br}$ $\frac{16,600 + 12 \times CFA + 8080 \times N_{br}}{(\text{Btu/day per dwelling unit})}$ <p><u>N_{br} = Number of bedrooms</u></p>	Same as standard reference design.
Service Water Heating ^{f,g,h,i,j,k,m}	<p>As proposed <u>Fuel type: same as proposed design</u></p> <p><u>Efficiency: in accordance with prevailing federal minimum standards</u></p> <p><u>Use: gal/day = 20 + (10 × N_{br})</u></p> <p><u>Tank temperature: 120°F</u> <u>Use: same as proposed design</u></p> <p><u>N_{br} = Number of bedrooms</u></p>	<p>As proposed</p> <p><u>As proposed</u></p> <p><u>Use: Standard reference x SWHF</u> <u>gal/day = 30 + (10 × N_{br})</u></p> <p><u>Same as standard reference Design</u></p>
Clothes washer ^{k,n}	550 kWh/yr	<p><u>Either of the following:</u></p> <p><u>Same as standard reference design</u></p> <p><u>or</u></p> <p><u>(300 × IMEF), kWh</u></p>

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN ^m
<u>Lighting</u>	$300 + (0.43 \times \text{CFA}), \text{ kWh/yr}$ <u>CFA = Conditioned floor area (ft²)</u>	<u>Either of the following:</u> <u>Same as standard reference design and lighting is in compliance with Section R404.1</u> <u>or</u> <u>1 kWh/yr per watt of installed lighting</u>
<u>Refrigeratorⁿ</u>	<u>500 kWh / year</u>	<u>Either of the following:</u> <u>Same as standard reference design</u> <u>or</u> <u>As proposed</u>

(Portions of table not shown remain unchanged)

j. SWHF = Service water heating factor. SWHF is the product of multiplying the hot water distribution efficiency factor and the drain water heat recovery factor.

Hot water distribution efficiency factor:

= 0.80

where a demand recirculation water system is installed for the hot water distribution system and the volume in the piping from the circulating hot water piping to the termination of the fixture supply for every fixture is less than or equal to 0.19 gallons (0.71 liters).

= 0.9

where the water volume in the piping from the water heater to the termination of the fixture supply for every fixture is less than or equal to 0.5 gallons (1.89 liters).

= 1.0

where the other conditions are not met.

Drain water heat recovery factor:

= (1 – (Drain water heat recovery unit efficiency x 0.36))

where one or more DWHR units receive the drain water from all showers in the building and the DHWR units are in accordance with Section R405.10.

= (1 – (Drain water heat recovery unit efficiency x 0.18))

where a DWHR unit receives the drain water from the primary shower but not all showers in the building and the DHWR unit is in accordance with Section R405.10.

= 1.0

where the other conditions are not met.

k. IMEF = integrated modified energy factor for the proposed clothes washer

l. Where more than one drain water heat recovery unit is used, the average efficiency of all drain water heater recovery units shall be used in the performance calculation.

m. Proposed design equipment and device efficiencies shall be in accordance with Section R405.7.

n. Where the proposed design includes more than one refrigerator or clothes washer, the energy use shall be summed.

Add new text as follows:

R405.7 (N1103.7) Equipment and device verification. The efficiency of the equipment and devices used for the proposed design shall be specified in the construction documents. The installed equipment and devices shall not be less than the efficiency specified in the construction documents. The efficiency of equipment and devices shall be indicated by the manufacturer on a label or on a specification sheet attached to the equipment or device. The equipment or device efficiency shall be readily observable for inspection after the equipment or device is installed. This section shall apply only to equipment and devices where the proposed design is different than the standard reference design for that equipment or device.

R405.8 (N1103.8) Hot water distribution verification. The construction documents for the building shall show plumbing diagrams that indicate water heaters, plumbing fixtures, plumbing appliances, pipe sizes and layouts for hot water supply and hot water circulating system piping. The layouts shall indicate the volume of water in the branches of the piping from the nearest source of hot water piping to the termination of the fixture supply pipe. This section shall apply only where the proposed design for the hot water distribution system is different than the standard reference design for the hot water distribution system.

R405.9 (N1103.9) Lighting verification. A schedule, by room, of lighting fixtures and lamps indicating the wattage of each fixture shall be provided for interior lighting and garage lighting. The sum of wattages on the schedule shall be used for the proposed design. This section shall apply only where the proposed design for lighting is different than the standard reference design for lighting.

R405.10 (N1103.10) Drain water heat recovery units. Drain water heat recovery units shall be tested by the manufacturer for efficiency and pressure loss at a flow rate of 2.5 gpm (9.5 L/m) through each water side flow path. The water side pressure loss shall not exceed 3 psi (20.7 kPa) for each flow path. The manufacturer shall indicate the efficiency and pressure loss of the unit on a label or specification sheet attached to the unit. This section shall apply only where the efficiency of drain water heat recovery is used in the performance calculation.

Reason: This code change proposal

- expands the performance calculation to include options for energy savings from water heating, lighting, refrigerators and clothes washers.
- updates water use, lighting and internal gains equations in the performance calculation table to reflect current equipment, and
- specifies efficiency measures in a way that makes them enforceable.

The options in this proposal were picked because they have significant impact, can be specified in simple terms, and can be specified based on existing tests or standards. The performance section user can choose to use or not use any of these options. Options not used become neutral in the performance calculation, because the standard reference design and the proposed design become the same.

This proposed change includes four options for saving the energy used for service water heating:

- efficient water heater,
- efficient water heating distribution, also know as efficient hot water pipe layout,
- recovery of heat from drain water, and
- efficient clothes washer

The first hot water energy saving option is a water heater that exceeds the minimum Federal efficiency standard for water heaters. The efficient water heater is computed as it was in the 2006 IECC. Water heaters exceeding minimum Federal efficiency are widely available.

The second source of hot water savings is limiting the waste in delivering hot water to the point of water use. This does not limit hot water use, rather it limits hot water waste. Hot water must first flow through the pipes from the water heater to the point of use. Unless hot is water already in the pipes, the cool water in the pipes must be emptied and replaced by hot water, which wastes water. After use the hot water left in the pipes cools down, unless there is another use within about an hour. The cool down is wasted heat. Thus hot water distribution routinely wastes both energy and water. Piping layouts with less water volume between the water heater and water use inherently waste less heat and less water. The two "distribution efficiency factors" and their savings for limiting wasted hot water are adapted for the IECC from the ANSI consensus standard ICC 700-2012 (National Green Building Standard). The factors, 0.90 and 0.80, represent a 10% and 20% savings respectively. As an additional benefit, limiting hot water waste means better performance, because the hot-water-user's wait for the "cold water to get hot" is the time it takes to replace cool water in the pipes with hot water and smaller water volumes are replaced more quickly.

The third source of hot water energy savings is heat recovery from drain water. Drain water heat recovery (DWHR) works particularly well where heated water flows down the drain at the same time as water flows in that needs to be heated; this “coincident flow” occurs in homes with showering and lavatory use. Performance of a DWHR unit is characterized by both efficiency and pressure loss. It is important to ensure that DWHR devices do not have high pressure loss in order to minimize the impact on water pressure in the home. Given the available DWHR efficiencies, savings are typically 10% to 35% of the energy used for heating water. To put the “0.36” in the equation in perspective, the “coincident flow” in a residence is typically 50%-70% of the hot water use, so 0.36 (36%) times the device’s efficiency is similar to saying the unit works well on showers and lavatories, and may also recover a portion of the rest of the hot water use in the home. The 0.36 also covers natural drain water heat loss and assumes the “worst-case” plumbing scenario for DWHR devices. This calculation of savings is conservative. Over 25,000 drain water heat recovery units have been installed in homes in Canada and the United States.

The fourth source of water heating savings is clothes washers. Clothes washer efficiency is rated by the Federally required IMEF rating.¹ The minimum Federal requirement at the time of the 2015 IECC will be an IMEF of 1.84.² IMEF is energy use divided by washer volume. The Federal standard presumes 295 loads per year. So the base case, the standard reference design, for a typical 3.5 cubic foot washer is $1.84 \times 3.5 \times 295 = 550$ kWh/yr (rounded). One of the biggest savings in new clothes washers comes from the reduced water in washed clothes, which saves energy in clothes drying. The effect of reduced clothes dryer energy is included in the Federally required IMEF rating.

The hot water use equation in the IECC is updated to reflect lower water use rates. The IECC water use equation has not been updated since the 1995 Model Energy Code, making the equation over 20 years old by the time of the 2015 IECC. Water use per residence has been falling for a long time.³ Various sources estimate the decline in water use at 0.5 to 3% per year. The reduction in water use is expected to continue.⁴ The primary factors that contribute to the reduction in hot water use since the 1995 IECC are more efficient washing machines and dishwashers, and water-use efficient faucets and showers, all a result of the National Appliance Energy Conservation Act that took effect in the mid 1990s.

This proposal adds lighting as an optional part of the performance calculation. Lighting requires a “base case” in the standard reference design and a calculation based on the proposed design. The standard reference design lighting energy use is based on the RESNET equation⁶ for interior lighting energy use in homes, including garages. The standard reference equation is adjusted⁶ for the higher percentage of efficient lighting (high efficacy lighting) required by the IECC.

The proposed lighting energy use is calculated as hours of use times watts. An average use of 1000 hours per year (2.75 hours per day) is within the reported range for actual light use⁵ and is presumed. The proposed lighting annual energy use is simply 1 kWh per watt of installed lighting.

To “opt out” of the lighting calculation, the code user meets the Section R404.1 lighting requirements, then the performance calculation presumes the standard reference design and the proposed design are the same for lighting.

This proposal adds a refrigerator option as part of the performance calculation. It requires a “base case” in the standard reference design and a proposed refrigerator. The refrigerator base case is fixed at 600 kWh/yr. For comparison, a 3 bedroom house in the RESNET procedures would have a base case energy use of 691 kWh/yr. Federal minimum refrigerator efficiency standards will increase in 2014.^{8,9} Refrigerators are reduced about 25% in 2014 by the upcoming Federal standard, so 600 kWh/yr is reasonable as a “base case”.

The internal gains equation is updated by this change. Internal gains are heat from various sources besides the heating system, including heat produced as a byproduct of lighting and refrigeration. The IECC internal gains equation has not been updated since the 2003 IECC, so it will be more than 10 years old in the 2015 IECC. Big reductions have come from more efficient lighting, as required by Section R404.1. Refrigerators have also reduced their energy use greatly in the last ten years, with a further reduction coming in 2014. The new internal gains equation is revised based on the lighting and refrigeration specifications in this proposed change.¹⁰

One big issue with having options for more efficient equipment and devices is inspection and verification. The efficiency used must be easy to verify. A new section, Section R405.7, requires that the efficiency used in the proposed design be specified on construction documents. Any equipment or device that meets or exceeds the efficiency marked on construction documents will be acceptable. Code enforcement staff does not have the time to look up equipment or device model numbers to find an efficiency rating in a data base or book; therefore, the new Section R405.7 requires that the installed efficiency be “readily observable”, which is very similar to “readily accessible”. “Readily observable” is the term used in Section R303.1.2 and C303.1.2 for the insulation R-value.

The performance calculation user may choose to calculate lighting energy use based on the installed watts of lighting. Lighting wattage will need to be verifiable, as lighting savings are based on the watts of installed lighting. Code officials are unlikely to have the time to count watts in a house. Where the proposed lighting energy use is calculated, this change requires a schedule of lighting fixture/lamp watts divided by rooms, which gives enough detail to spot check a house. If the proponents of this proposal were verifying lighting, they would pick a room and spot check it.

The performance calculation user may choose to use a more efficient hot water distribution system based on limiting the hot water volume in pipes. Hot water piping volume will need to be verified. Code officials are unlikely to have the time to check all the pipe volume calculations in a house. This change requires plumbing layouts with pipe sizes on the construction documents. For each branch the fixture with the largest hot water supply volume and that fixture’s volume is identified on the plans. This level of detail will enable spot checking of a plumbing branch. If the proponents of this proposal were verifying efficient plumbing layout, they would pick one of the plumbing branches and check it.

The measures of efficiency in this change are based on existing tests and standards. The water heater efficiency is measured by the EF (energy factor), which is a rating required by Federal law. The clothes washer efficiency is measured by the IMEF (integrated modified energy factor), which is a rating required by Federal law. The refrigerator efficiency is measured by annual energy use (kWh), which is a Federal rating required to be on the Energy Guide label (yellow labels). The hot water distribution efficiency (efficient piping) is adapted from ICC 700-2012.

Overall, this proposed change allows residences to achieve the energy efficiency in the IECC in a variety of ways. It comes with the philosophy of keeping the energy efficiency goal high, but allowing that goal to be reached in many ways. This change provides options that are practical in the context of the code.

References:

1. IMEF (integrated modified energy factor) is MEF plus standby electricity use and will be the required Federal rating in 2015. The "IMEF" will be used for both the Federal requirements and Energy Star.
2. Upcoming Federal requirement is described at: <https://www.federalregister.gov/articles/2012/05/31/2012-12320/energy-conservation-program-energy-conservation-standards-for-residential-clothes-washers#h-9>
3. "North America Residential Water Usage Trends Since 1992". Paul Coomes, Tom Rockaway, Josh Rivard, and Barry Kornstein, Civil and Environmental Engineering, University of Louisville, Louisville, Kentucky. 2009.
4. "Declining Residential Water Use". Maureen Duffy. American Water. http://www.ela-iet.com/EMD/declining_residential_water_usage_final.pdf
5. *Updated Miscellaneous Electricity Loads and Appliance Energy Usage Profiles for Use in Home Energy Ratings, the Building America Benchmark Procedures and Related Calculations*. Danny Parker and Philip Fairey, Florida Solar Energy Center. Robert Hendron, National Renewable Energy Laboratory. FSEC-CR-1837-10 Revised June 10, 2011. Page 39.
6. The RESNET equation ($\text{kWh/yr} = 445 + 0.8 \times \text{CFA}$)⁵ presumes 10% of the lighting is fluorescent, while the IECC specifies 75% is high efficacy lighting. The most common light size is a 60 watt incandescent with an efficacy of about 13.3 lumens per watt (800/60). This can be replaced by a 14 watt compact fluorescent delivering the same level of light (lumens). The IECC requires lights of this size have an efficacy of 40 lumens per watt. Therefore high efficacy lamps use 13.3/40, or about 1/3 the power for the same lumen output. Overall, the RESNET equation is reduced by about 46% to account for the more efficient lighting. A short discussion of lumens per watt for incandescent and compact fluorescent lights is at: http://www.energystar.gov/index.cfm?c=cfls.pr_cfls_lumens
7. This will favor, but not require, refrigerators without though the door ice, with freezer on the top rather than side-to-side, and smaller refrigerators. Many 18 ft³ models easily exceed this. A variety of large (25 ft³ or more) models also qualify; examples of large refrigerators that easily exceed this are at: <http://www.toptenusa.org/Top-Ten-Refrigerators/Top-Ten-XL-Refrigerators>
8. An announcement and overview of the new refrigerator standard is at: <http://energy.gov/articles/departments-energy-joins-manufacturers-environmentalists-announce-new-efficiency-standards>
9. The requirements for different types of refrigerators are at: http://www1.eere.energy.gov/buildings/appliance_standards/product.aspx/productid/43
10. Personal communication, Philip Fairey, Deputy Director, Florida Solar Energy Center.

Cost Impact: This code change proposal is expected to decrease the cost of construction by allowing the most cost-effective technologies and practices to be used in new homes.

RE172-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R405.5.2(1)T-EC-CONNER-KLEIN-VANDECKER.DOC

RE173-13

Table R405.5.2(1) (IRC Table N1105.5.2(1))

Proponent: Dr. Thomas D. Culp, Birch Point Consulting LLC, representing the Glazing Industry Code Committee (culp@birchpointconsulting.com)

Revise as follows:

TABLE R405.5.2(1) (N1105.5.2(1))
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT
<u>Opaque Doors</u>
<u>Glazing^a Vertical Fenestration other than Opaque Doors</u>
Skylights

(Portions of table not shown remain unchanged)

a. Glazing shall be defined as sunlight-transmitting fenestration, including the area of sash, curbing or other framing elements, that enclose conditioned space. Glazing includes the area of sunlight-transmitting fenestration assemblies in walls bounding conditioned basements. For doors where the sunlight-transmitting opening is less than 50 percent of the door area, the glazing area is the sunlight transmitting opening area. For all other doors, the glazing area is the rough frame opening area for the door including the door and the frame.

Reason: This corrects the terminology in the performance path table to be consistent with the rest of the chapter. "Doors" can include both glazed and opaque doors, but the intent was clearly meant to be opaque doors, since it is referring to only the U-factor in Table R402.1.3. It is then unclear where to put glazed doors. This proposal clarifies the three fenestration rows as "opaque doors", "vertical fenestration other than opaque doors", and "skylights".

Cost Impact: This proposal will not increase the cost of construction.

RE173-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R405.5.2(1)T-EC-CULP.DOC

RE174-13

Table R405.5.2(1) (IRC Table N1105.5.2(1))

Proponent: Brian Dean, Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition.

Revise table as follows:

TABLE R405.5.2(1) (N1105.5.2(1))
SPECIFICATION FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

Heating systems ^{1,9}	As proposed for <u>all heating systems</u> other than electric heating without a heat pump. Where the proposed design utilizes electric heating without a heat pump, the standard reference design shall be an air source heat pump <u>with an efficiency rating equal to the minimum required by federal law for the geographic location where the equipment is installed</u> . meeting the requirements of Section R403 of the IECC— Commercial Provisions. Capacity: sized in accordance with Section R403.6	As proposed
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(Portions of Table not shown remain unchanged)

Reason: The purpose of this code change is to clarify the code. This proposal clarifies the baseline for heating systems contained in the Standard Reference Design in the section R405 Simulated Performance Alternative as follows:

1. Where an electrical heating system in the proposed design is something other than a heat pump, the baseline is more clearly described as an "air source heat pump with an efficiency rating equal to the minimum required by Federal law for the geographic location where the equipment is installed." (See 10 C.F.R. 430.32). This language is more accurate than the current language, which attempts to refer to the commercial provisions of the IECC, which may not reflect the most current federal residential equipment standard and/or do not apply to most residential buildings.
2. For "all heating systems other than electric heating without a heat pump", the new proposed language removes any possible ambiguity in specifying that the baseline in the Standard Reference Design is the same as in the Proposed Design. This is consistent with the approach the code utilizes for all cooling and service water heating equipment as well, which was adopted first for the 2009 IECC. Use of the "as proposed" equipment in both the Standard Reference Design and the Proposed Design properly precludes any trade-off of mechanical equipment against other code requirements. This approach reflects the fact that the code cannot, under federal law, regulate the level of efficiency for most residential heating, cooling and hot water equipment, which is exclusively regulated by the federal government.

It is important to specify that the air source heat pump that is the baseline for all electric heating without a heat pump must meet the federal requirement for that location because it is likely that the federal minimums will improve and shift from a national efficiency requirement to a state- and region-based requirement in the years ahead. It also important to better clarify that for all other heating systems, that the Standard Reference Design is the same as the Proposed Design.

A summary of the reasons for the change in approach to equipment in the Standard Reference Design (and its effect on trade-offs) in the 2009 IECC will provide some helpful background when potential changes to these provisions in Table R405.5.2(1) are considered. Efficient heating, cooling, and water heating equipment is important in a well-designed energy efficient home. The treatment of equipment efficiency in building codes, however, is complicated, and historically has created a number of unintended consequences. The elimination of the equipment trade-off in the 2009 IECC closed a compliance loophole that had been used for many years to weaken the long-term effectiveness of the building thermal envelope. Higher efficiency equipment can be an important energy saver. However, Federal law preempts states and local jurisdictions from setting efficiency requirements any higher than the federal minimums (which typically lag behind common builder practice by years, even decades). By tying the hands

of states and local jurisdictions so that they may not set higher equipment efficiency requirements, federal law leaves a “trade-off gap” within any code that allows equipment trade-offs – a gap that has been exploited to install insufficient insulation and low-quality fenestration in houses nationwide for many years.

If the IECC specified particular efficiency levels for equipment in the Standard Reference Design in the performance path, the code could only specify inefficient equipment consistent with current federal minimum standards (e.g., 78 AFUE furnace, 13 SEER cooling equipment). By comparison, 96 AFUE or better furnaces and 16 SEER or better cooling equipment are readily available and utilized frequently. Any builder who would otherwise use this better equipment, typically because of utility incentives or consumer demand, is actually given a strong incentive to reduce the efficiency of insulation, windows or other measures in a trade-off.

This is the definition of a free-rider, and the home with better equipment and weaker envelope would use far more energy (and cost the homeowner more) over its lifetime than if the trade-off were not available. Thermal envelope components such as insulation have long useful lifetimes and are most cost-effective to install at initial construction. By comparison, equipment is often easy to upgrade at times of replacement and will need to be replaced several times over the lifetime of the building.

A simple example well illustrates the concept that the value of envelope measures over time is far greater than equipment measures that save comparable energy at the time of installation. Assume that two homes are built side-by-side, one with better equipment and one with better insulation, both using the same total energy for heating, cooling and water heating at the time of construction. Assume that the equipment is replaced in both homes after 15 years at the federal minimum standard in place at that time. After fifteen years, the first home will have new equipment with weaker insulation, while the second home will have the same new equipment but better insulation, thereby using less energy going forward. This situation could continue into the foreseeable future. In other words, after the first equipment replacement, the home with the better envelope would outperform the home with the better equipment, perhaps over what could be a 70 to 100+ year lifetime.

The U.S. Department of Energy recognized some of the benefits from elimination of the equipment trade-offs in its Final Determination on the 2009 IECC: “Because building envelopes have substantially longer lives than HVAC and/or water heating equipment, energy savings from envelope improvements may persist for many more years than comparable equipment improvements. Also, because high-efficiency equipment is already the predominant choice in many markets, disallowing envelope/equipment tradeoffs is likely to result in improved overall efficiency in many situations.” 76 Fed. Reg. 42688, 42697 (Jul. 19, 2011) Congress also endorsed the 2009 IECC (with its elimination of the trade-offs) by reference in the 2009 American Recovery and Reinvestment Act, setting it as the starting point for state code adoption and implementation, and has spent billions of taxpayer dollars to encourage adoption and compliance activity. In little more than three years, more than half of the states have adopted an energy code (2009 IECC or better) without an equipment trade-off, saving substantial additional energy over the life of the homes covered by these codes.

Prior to the 2009 improvement, the amount of energy efficiency lost through equipment trade-off free-ridership was substantial. According to a comprehensive analysis by ICF International conducted when the trade-off was first eliminated in 2009, the efficiency impact of equipment at the federal minimum efficiency, versus more common equipment typically installed in the various climate zones, if allowed as a trade-off, was staggering (national weighted average savings):

- Upgrade to a 90 AFUE natural gas furnace = 7.0% free-rider tradeoff savings.
- Upgrade to a 16 SEER air conditioner = 3.9% free-rider tradeoff savings.
- Upgrade to a 9.0 HSPF heat pump = 5.8% free-rider tradeoff savings.
- Upgrade to a 0.82 EF hot water heater = 6.4% free-rider tradeoff savings.

Efforts made by some stakeholders to revert back to allowing equipment trade-offs in the 2012 IECC were rebuffed by the Code Development Committee and at the Final Action Hearing. There is simply no justification for altering the current treatment of equipment efficiencies in the Simulated Performance Alternative.

Cost Impact: The code change proposal will not increase the cost of construction.

RE174-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R405.5.2(1)T-EC-DEAN-HARRIS-MISURIELLO-PRINDLE-STONE.DOC

RE175-13

Table R405.5.2(1) (IRC Table N1105.5.2(1))

Proponent: Shirley Ellis, Energy Systems Laboratory, Texas A&M Engineering Experiment Station representing the Texas A&M University System Energy Systems Laboratory (shirleyellis@tamu.edu)

Revise as follows:

<p align="center">Table R405.5.2(1) (N1105.5.2(1)) SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS</p>		
BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Heating systems ^{f,g}	As proposed for other than electric heating without a heat pump. Where the proposed design utilizes electric heating without a heat pump the standard reference design shall be an air source heat pump meeting the requirements of Section R403 of the IECC – Commercial Provisions.	
	Fuel type: same as proposed design	As proposed
	Efficiencies:	As proposed
	Electric: air-source heat pump with prevailing federal minimum efficiency	As proposed
	Nonelectric furnaces: natural gas furnace with prevailing federal minimum efficiency	As proposed
	Nonelectric boilers: natural gas boiler with prevailing federal minimum standards.	As proposed
	Capacity: Sized in accordance with Section R403.6.	
Cooling systems ^{f, h}	As proposed Fuel type: Electric	As proposed
	Efficiency: in accordance with prevailing federal minimum standards	As proposed
	Capacity: Sized in accordance with Section R403.6	

Service water Heating ^{f,g,h,i}	<p>As proposed <u>Fuel type: same as proposed design</u></p> <p><u>Efficiency: in accordance with prevailing Federal minimum standards</u></p> <p><u>Use: gal/day = 30 + 10 × Nbr</u></p> <p><u>Tank temperature: 120°F</u> Use: same as proposed design</p>	<p>As proposed</p> <p><u>As proposed</u></p> <p><u>Same as standard reference</u></p> <p><u>Same as standard reference</u></p> <p>gal/day = 30 + (10 × N_{br})</p>
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(Portions of table not shown remain unchanged)

Reason: Disallowing equipment tradeoffs violates the concept of minimum standards and restrict design flexibility. Removing the equipment efficiency tradeoff is decreasing the performance aspect of this section of the code and moving it closer the Total UA alternative. While increasing efficiency is important, it is equally necessary to not and to establish baseline, minimum requirements.

Utilizing equipment efficiency toward energy code compliance has been part of the energy code since the beginning as well as in beyond code programs, such as Energy Star and the National Green Building Standard (ICC 700). To require higher building performance levels and simultaneously take away the tools to achieve this goal is counterproductive.

Not allowing equipment efficiency in code compliance unnecessarily increases construction costs, discourages the use of newly evolving high-efficiency equipment and gives preferential treatment for the use of insulation and fenestration alternatives.

Cost Impact: The code change proposal will not increase the cost of construction.

RE175-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R405.5.2(1)T-EC-ELLIS.DOC

RE176-13

Table R405.5.2(1) (IRC Table N1105.5.2(1))

Proponent: Philip Fairey, Florida Solar Energy Center representing the Florida Solar Energy Center (pfairey@fsec.ucf.edu)

Revise as follows:

Table R405.5.2(1) (N1105.5.2(1)) SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS		
BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Thermal distribution systems	<p><u>Thermal distribution system location: Entirely within the conditioned space.</u></p> <p><u>Duct insulation: In accordance with Section R403.2.1.</u></p> <p><u>Thermal distribution system efficiency (DSE) of 0.88 shall be applied to both the heating and cooling system efficiencies for all systems.</u></p>	<p><u>Thermal distribution system location: As proposed</u></p> <p><u>Duct insulation: As proposed</u></p> <p>Thermal distribution system efficiency (DSE) shall be as tested in accordance with Section R403.2 or if not tested, as specified in Table R405.5.2(2) if not tested. Duct insulation shall be as proposed.</p>

(Portions of Table not shown remain unchanged.)

Reason: Table R405.5.2(1) of the 2012 IECC does not contain a specification for the *Standard Reference Design* thermal distribution system. This proposal provides a specification consistent with that of the 2009 IECC but with greater specificity as to the location of the thermal distribution system and the insulation of the ductwork for the *Standard Reference Design*. Based on other provisions of the 2012 IECC, there are two allowed possibilities for thermal distribution systems:

- 1) Exterior to the conditioned space and tested to have thermal distribution system leakage equal to or less than 4 cfm per 100 square feet of conditioned floor area at a pressure difference of 25 Pascal across the entire thermal distribution system, or
- 2) Interior to the conditioned space and untested, having a default thermal distribution system efficiency of 0.88 in accordance with Table R405.5.2(2).

The first provision indicates that ducts are allowed outside the conditioned space only if their air leakage is limited to 4 cfm/25 per 100 ft² of conditioned floor area. The second provision strongly indicates that the specification for the *Standard Reference Design* thermal distribution system should be as it is specified in the 2009 IECC – thermal distribution system efficiency (DSE) = 0.88. Of these two provisions, the second (DSE=0.88) is both more consistent across climates and more energy efficient. A simulation study using EnergyGauge USA and 1-story, 2000 ft², 3-bedroom homes that configured in accordance with the 2012 IECC *Standard Reference Design* specification has been conducted by the proponent. Seventeen TMY3 locations across all eight IECC climate zones are used to examine differences between the two allowed thermal distribution system configurations. Table A presents results for the total energy use for space heating, cooling and mechanical ventilation (in accordance with the 2012 IMC) from these simulations. The data show that DSE = 0.88 is the more energy efficient of the two alternatives. For homes using natural gas heating, the differences in source energy use are relatively small but for a number of the all-electric home configurations (heat pump heating and cooling) the differences are significant. Based on these data it is highly recommended that the 2015 IECC *Standard Reference Design* Thermal distribution system specification be as proposed above.

Table A. Total Space Heating, Cooling and Mechanical Ventilation Energy Use

CZ	Location	DSE=0.88; Ducts in Cond. Sp.			Qn=0.04; Ducts in Attic			Difference (Qn - DSE)		
		kWh	Therms	Source MBtu	kWh	Therms	Source MBtu	kWh	Therms	Source MBtu
1A	Miami, FL	3104		35.64	4204		48.27	1100		12.63
2A	Orlando, FL	2340		26.87	2730		31.34	390		4.48
2A	Houston, TX	2989		34.32	3548		40.74	559		6.42

2B	Phoenix, AZ	4824		55.39	5132		58.92	308		3.54
3A	Charleston, SC	4153		47.68	5230		60.05	1077		12.37
3A	Charlotte, NC	2050	262	26.40	2055	297	26.84	5	35	0.44
3A	Oklahoma City, OK	2747	396	35.86	2662	441	35.38	-85	45	-0.48
3B	Las Vegas, NV	3448	152	41.25	3357	165	40.34	-91	13	-0.90
4A	Baltimore, MD	1865	397	25.75	1859	447	26.23	-6	50	0.48
4A	Kansas City, KS	2131	503	29.96	2064	581	30.04	-67	78	0.08
4C	Seattle, WA	3659		42.01	5432		62.37	1773		20.36
5A	Chicago, IL	1357	525	21.31	1336	606	21.96	-21	81	0.64
5B	Denver, CO	1036	351	15.73	1083	402	16.82	47	51	1.10
6A	Minneapolis, MN	1280	635	21.63	1261	750	22.67	-19	115	1.04
6B	Billings, MT	987	484	16.62	995	562	17.56	8	78	0.94
7A	Fargo, ND	1208	788	22.47	1175	957	23.94	-33	169	1.47
8	Fairbanks, AK	1262	1234	27.96	1163	1560	30.39	-99	326	2.42

Cost Impact: The code change proposal will not increase the cost of construction.

RE176-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R405.5.2(1)T-EC-FAIREY

RE177-13

Table R405.5.2(1) (IRC Table N1105.5.2(1))

Proponent: Mark Halverson, APA-The Engineered Wood Association & Loren Ross, The American Wood Council. (help@apawood.org)

Revise as follows:

TABLE R405.5.2(1) (N1105.5.2(1)) SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS		
BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Glazing ^a	Total area ^b = (a) The proposed fenestration area; where the proposed fenestration area is less than 15% of the conditioned floor area. (b) 15% of the conditioned floor area; where the proposed fenestration area is 15% or more of the conditioned floor area.	As proposed
	Orientation: equally distributed to four cardinal compass orientations (N, E, S & W).	As proposed
	U-factor: from Table 402.1.3	As proposed
	SHGC: From Table 402.1.1 except that for climates with no requirement (NR) SHGC = 0.40 shall be used.	As proposed
	Interior shade fraction: 0.92-(0.21 x SHGC for the standard reference design)	0.92-(0.21 x SHGC as proposed)
	External shading: none	As proposed

(Portions of Table not shown remain unchanged)

Reason: The greatest thermal break in our wall systems is glazing. While glazing areas greater than 15% of the floor area are penalized for reduced energy efficiency, glazing areas less than 15% are not recognized for increasing energy efficiency. Homes with a lower percentage of windows and doors generally perform better than the code minimum (15%); therefore, these homes should get credit for the additional energy efficiency. This will enhance the readability of the code while making it easier to understand, more equitable, and provide flexibility to builders and architects.

Every avenue must be explored when elevating energy code efficiency to the next level, and this offers an efficiency increase that has not yet been recognized in the code.

We ask the support of the committee for this proposal.

Cost Impact: The code change proposal will not increase the cost of construction.

RE177-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R405.5.2(1)T-EC-HAVERSON-ROSS.DOC

RE178-13

Table R405.5.2(1) (IRC Table N1105.5.2(1)).

Proponent: Tom Kositzky, Coalition for Fair Energy Codes. info@fairenergycodes.org

Revise as follows:

TABLE R405.5.2(1) (N1105.5.2(1)) SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS		
BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Heating systems ^{f,g}	<p>As proposed for other than electric heating without a heat pump. Where the proposed design utilizes electric heating without a heat pump the standard reference design shall be an air source heat pump meeting the requirements of Section R403 of the IECC—Commercial Provisions.</p> <p><u>Fuel type: same as proposed design</u></p> <p><u>Efficiencies:</u></p> <p><u>Electric: Air-source heat pump in accordance with prevailing federal minimum efficiency standards</u></p> <p><u>Nonelectric furnaces: natural gas furnace in accordance with prevailing federal minimum efficiency standards</u></p> <p><u>Nonelectric boilers: Boiler in accordance with prevailing federal minimum efficiency standards.</u></p> <p>Capacity: Sized in accordance with Section R403.6.</p>	<p>As proposed</p> <p><u>As proposed</u></p> <p><u>As proposed</u></p> <p><u>As proposed</u></p>
Cooling systems ^{f, h}	<p>As proposed</p> <p><u>Fuel type: Electric</u></p> <p><u>Efficiency: In accordance with prevailing federal minimum efficiency standards</u></p> <p>Capacity: sized in accordance with Section R403.6</p>	<p>As proposed</p> <p><u>As proposed</u></p>

Service water Heating _{f,g,h,j}	<p><u>As proposed</u></p> <p><u>Fuel type: same as proposed design</u></p> <p><u>Efficiency: in accordance with prevailing Federal minimum efficiency standards</u></p> <p><u>Use: same as proposed design</u></p> <p><u>Same as Proposed design</u></p>	<p>As proposed</p> <p><u>As proposed</u></p> <p><u>Use: gal/day = 30 + (10 x N_{br})</u></p> <p><u>N_{br} = Number of bedrooms</u></p> <p><u>Tank temperature: 120°F</u></p>
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(Portions of Table not shown remain unchanged)

Reason: The purpose of this code change proposal is to reestablish the allowance of equipment efficiency tradeoffs. National model building codes are widely accepted as the minimum requirements for compliance. Disallowing tradeoffs of this nature increases the difficulty for all stakeholders with regards to compliance with increasingly more restrictive energy codes. Increasing energy efficiency is important and it is equally necessary to allow design flexibility and establish baseline, minimum requirements.

Utilizing equipment efficiency toward energy code compliance has been part of the energy code since the inception of the IECC. Although the energy neutral tradeoffs were unfortunately removed from the performance path in Chapter 4 in the 2009 IECC, they are still ingrained in the Preface of the IECC. Equipment efficiencies are a part of Chapter 5 of the IECC as well as in beyond code programs, including Energy Star, DOE's Builders Challenge and the National Green Building Standard (ICC 700). It is counterproductive and less efficient to require higher building performance levels and simultaneously take away the means to achieve this goal.

The disallowance of equipment efficiency in code compliance unnecessarily increases construction costs, discourages the use of newly evolving high-efficiency equipment, and gives preferential treatment for the use of insulation and fenestration alternatives.

Energy neutral equipment efficiency considerations must be returned to the energy code in order to provide flexibility and cost-effective methods to achieve an energy efficient home.

We ask the support of the committee for this proposal.

Cost Impact: The code change proposal will not increase the cost of construction.

RE178-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R405.5.2(1)T-EC-KOSITZKY.DOC

RE179-13

Table R405.5.2(1) (IRC Table N1105.5.2(1)), Table R405.5.2(3) (NEW) (IRC Table N1105.5.2(3) (NEW)), Chapter 5

Proponent: Neil Leslie, Gas Technology Institute representing self (Neil.Leslie@gastechnology.org)

Revise as follows:

**Table R405.5.2(1) (N1105.5.2(1))
SPECIFICATION FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS**

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Heating systems ^{f, g}	<p>As proposed for other than electric heating without a heat pump. Where the proposed design utilizes electric heating without a heat pump the standard reference design shall be an air source heat pump meeting the requirements of Section R403 of the IECC—Commercial Provisions.</p> <p><u>Equipment type: in accordance with Table R405.5.2(3)</u></p> <p><u>Efficiency: in accordance with Table C403.2.3 (4)</u></p> <p>Capacity: sized in accordance with Section R403.6</p>	<p>As proposed</p> <p><u>As proposed</u></p>
Cooling systems ^{f, h, g}	<p>As proposed</p> <p><u>Equipment type: in accordance Table R405.5.2(3)</u></p> <p><u>Efficiency: in accordance with Table C403.2.3(1)</u></p> <p>Capacity: sized in accordance with Section R403.6.</p>	<p>As proposed</p> <p>As proposed</p>
Service water heating ^{f, g, h, i}	<p>As proposed</p> <p>Use: same as proposed</p> <p><u>Equipment type: in accordance with Table R405.5.2(3)</u></p> <p><u>Efficiency: in accordance with Table C404.2</u></p> <p><u>Capacity: same as proposed</u></p>	<p>As proposed</p> <p><u>As proposed</u></p> <p>gal/day=30 + (10 × N_{br})</p> <p><u>N_{br} = Number of bedrooms</u></p>

(Portions of table not shown remain unchanged)

f. For a proposed design with multiple heating, cooling or water heating systems using different fuel types, the applicable standard reference design system capacities and fuel types shall be weighted in accordance with their respective loads as calculated by accepted engineering practice for each equipment and fuel type present.

f g. For a proposed design without a proposed heating system, a heating system with the prevailing federal minimum efficiency shall be assumed for both the standard reference design and proposed design.

g h. For a proposed design home without a proposed cooling system, an electric air conditioner with the prevailing federal minimum efficiency shall be assumed for both the standard reference design and the proposed design.

i. For a proposed design with a nonstorage-type water heater, a 40-gallon storage-type water heater with the prevailing federal minimum energy factor for the same fuel as the predominant heating fuel type shall be assumed. For the case of a proposed design without a proposed water heater, a 40-gallon storage-type water heater with the prevailing federal minimum efficiency for the same fuel as the predominant heating fuel type shall be assumed for both the proposed design and standard reference design.

TABLE R405.5.2(3) (N1105.5.2(3))

EQUIPMENT MAP

<u>SYSTEM</u>	<u>EQUIPMENT TYPE</u>
<u>Heating^a</u>	<u>Warm air furnaces, natural gas fired</u>
<u>Cooling^a</u>	<u>Air conditioners, air cooled</u>
<u>Service Water Heating^a</u>	<u>Storage water heaters, natural gas</u>

a. Systems meeting current National Appliance Energy Conservation Act minimum efficiency requirements.

Add new standard to Chapter 5 as follows:

DOE U.S Department of Energy
c/o Superintendent of Documents
U.S. Government Printing Office
Washington, D.C 20402-9325

NAECA 87-(88) National Appliance Energy Conservation Act 1987 [Public Law 100-12 (with Amendments of 1988-P.L. 100-357)]

Reason: The intent of the IECC is clearly defined.

“Intent. This code shall regulate the design and construction of buildings for the effective use and conservation of energy over the useful life of each building. This code is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve this objective. This code is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.”

Source: 2012 IECC. Sections C101.3 and R101.3.

The code focus is “energy use... over the useful life of the building”. Buildings will perform to the requirements of this code for a long time. So the intent of the code focuses on “energy use” over the life of the building. Under the performance path, the IECC compares the energy use of a baseline building to the energy use of a proposed building.

This proposal addresses a lingering weakness in the code for those seeking to use innovative energy efficient systems. Simulations provide the means and methods to more fully understand, quantify and model actual energy use, whatever its form. This revision specifies a single standard reference design for heating, cooling, and service water heating systems, using technologies with low energy costs and high source energy efficiency as the baseline in each building component category.

The revised text and tables:

- Establish a single baseline building performance requirement
 - for all service hot water (SHW) and HVAC systems
 - independent of making the system choice for the proposed building
 - at a realistic and achievable level using code-compliant technologies.
- Addresses the inconsistent mix of multiple prescriptive baseline building technology performance requirements in the current standard.
- Provides equitable and consistent treatment of all SHW and HVAC system options, including conventional, renewable energy, hybrid technology, and waste heat recovery options.
- Is indifferent to the SHW and HVAC system choice in the proposed building, comparing all SHW and HVAC system options against a single energy efficient baseline building energy cost or source energy performance requirement.
- Aligns the SHW and HVAC system performance requirement methodology with the envelope single baseline performance requirement methodology.
- Achieves the goal of reducing the site energy cost, consumption of primary energy resources, and global greenhouse gas emissions related to the operation of the building in a cost-effective and equitable manner.

A single technology-blind baseline performance requirement is the most technically defensible methodology for performance path calculations, and it is critical for equitable implementation of the IECC Performance Alternative requirements Section R405. Shifting to a single baseline design provides an equitable credit to all technologies that have lower annual energy costs or source energy consumption compared to the single baseline level irrespective of energy form or technology design.

The current code structure does not facilitate equitable comparison of mechanical systems based energy cost or source energy consumption.

IECC Section R405 currently uses multiple baseline mechanical system performance requirements. The mechanical systems are compared using multiple baselines by separating both categories of equipment and fuel types used within each equipment category. For example, the current code has 14 different baseline configurations across the five SHW system categories that may be relevant to the residential sector, none of which results in the same annual energy cost or source energy budget for performance path calculations. This mix of equivalencies is a counter-productive and inconsistent approach that can be mitigated by shifting to a single baseline building design for all proposed building design alternatives. The existing Section R405 also may be subject to various interpretations on the appropriate baseline design building for advanced multi-fuel appliance options, waste heat recovery options, or emerging technologies that reduce energy costs or source energy consumption significantly compared to options that currently qualify.

The baseline mechanical systems in the revised Table R405 use a single efficient baseline design for all proposed building configurations. The revised Table R405.5.2(1) and additional Table R405.5.2(3) apply a single baseline energy cost requirement consistently to any proposed mechanical system. The baseline does not prohibit any technology options. It correctly allows all options, including higher operating cost options, but considers their strong energy cost or source energy consumption disadvantages compared to the single baseline performance requirement. A designer who chooses a higher energy cost or source energy consumption option for the proposed building would only need to reduce the overall building energy cost or source energy consumption to the baseline level, and could do so through any combination of improved energy performance options, including HVAC, SHW, and envelope improvements.

The existing HVAC and SHW provisions are also inconsistent with standard reference baseline design criteria for envelope building components. Those building element provisions do not prescribe specific technology categories or subcategories, but are true performance based requirements (e.g., envelope requirements in overall U value) that give the designer maximum flexibility BEFORE making technology choices in the design. The designer is free to choose the most cost-effective envelope technology (fiberglass, polyurethane foam) to meet the single energy target for the building without arbitrary technology class prescriptive requirements for fiberglass or foam insulation. Unfortunately, the existing provisions of HVAC and SHW tables impose technology category and subcategory prescriptive requirements when using the performance path instead of true performance-based requirements. The impact is to establish the reference design building AFTER prescriptive technology category and energy design choices are made. This is an inequitable application of prescriptive requirements in the performance path. This constraint eliminates the credit for creative design choices that would significantly reduce energy cost, primary energy use, and greenhouse gas emissions.

The revised tables and text completely decouple the proposed building design choices from the standard reference design building's energy cost or source energy performance requirement. The reference energy and technology choices in the revised section were selected to provide a practical and effective requirement to meet the intent of the standard while still offering appropriate incentives for the best available technologies based on their energy cost benefits. Encouraging rather than discouraging this design flexibility aligns closely with the IECC stated goal of reducing energy costs by 30 percent compared to the 2012 version.

Cost Impact: The code change proposal will not increase the cost of construction.

RE179-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R405.5.2(1)T-EC-LESLIE.DOC

RE180-13

Table R405.5.2(1) (IRC Table N1105.5.2(1))

Proponent: Mark Nowak, M Nowak Consulting LLC representing the Steel Framing Alliance

Revise as follows:

**TABLE R405.5.2(1) (N1105.5.2(1))
SPECIFICATIONS FOR THE STANDARD REFERENCE DESIGN AND PROPOSED DESIGNS**

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Heating systems ^{f, g}	<p>As proposed for other than electric heating without a heat pump.</p> <p>Where the proposed design utilizes electric heating without a heat pump the standard reference design shall be an air source heat pump meeting the requirements of Section R403 of the IECC — Commercial Provisions.</p> <p><u>Efficiency: In accordance with prevailing federal minimum standards</u></p> <p>Capacity: sized in accordance with Section R403.6</p> <p><u>Fuel type: same as proposed</u></p>	<p>As proposed</p> <p><u>As proposed</u></p> <p><u>As proposed</u></p>
Cooling systems ^{f, h}	<p>As proposed</p> <p>Capacity: sized in accordance with Section R403.6.</p> <p><u>Efficiency: In accordance with prevailing federal minimum standards</u></p>	<p>As proposed</p> <p><u>As proposed</u></p>
Service water heating ^{f, g, h, i}	<p>As proposed</p> <p>Use: same as proposed design</p> <p><u>Efficiency: In accordance with prevailing federal minimum standards</u></p>	<p>As proposed</p> <p>gal/day = $30 + (10 \times N_{br})$</p> <p><u>N_{br} = number of bedrooms</u></p> <p><u>As proposed</u></p>

(Portions of the Table not shown remain unchanged.)

Reason This proposal restores equipment efficiency as a variable in the simulated performance alternative of the IECC, consistent with the code prior to the 2009 edition. In the past, resistance to similar proposals to restore this language have been based partly on an argument that this somehow weakens the code. This proposal does not decrease the level of performance required of

buildings but offers the designer or builder the opportunity to design the building in the most cost effective manner. They will still be required to meet the same level of overall performance as for a building complying prescriptively.

Cost Impact: The code change proposal will not increase the cost of construction.

RE180-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R405.5.2(1)T-EC-NOWAK.DOC

RE181-13

Table R405.5.2(1) (IRC N1105.5.2(1))

Proponent: Jeff Sonne, Florida Solar Energy Center representing the Florida Solar Energy Center (jeff@fsec.ucf.edu)

Revise as follows:

TABLE R405.5.2(1) (N1105.5.2(1)) SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS		
BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Glazing ^a	Total area ^b = (a) The proposed glazing area; where proposed glazing area is less than 15% of the conditioned floor area. (b) 15% of the conditioned floor area; where the proposed glazing area is 15% or more of the conditioned floor area.	As proposed
	Orientation: equally distributed to four cardinal compass orientations (N, E, S & W).	As proposed
	U-factor: from Table R402.1.3	As proposed
	SHGC: From Table R402.1.1 except that for climates with no requirement (NR) SHGC = 0.40 shall be used.	As proposed
	Interior shade fraction: 0.92 - (0.21 × SHGC for the standard reference design)	0.92 - (0.21 × SHGC as proposed)
	<u>Summer: 0.70</u>	<u>Same as Standard Reference Design</u>
	<u>Winter: 0.85</u>	<u>Same as Standard Reference Design</u>
	External shading: none	As proposed

(Portions of Table not shown remain unchanged)

Reason:

Glazing Area

Glazed areas are the least efficient and most costly components of homes. Even the best windows and glass doors admit much more solar heat gain than walls, roofs and floors. And even the best windows and doors have thermal conductances that are far inferior to walls, roofs and floors.

Table 1 below presents the 2012 IECC requirements for envelope components in IECC climate zone 2. While there are no IECC requirements for the SHGC of opaque envelope components like walls, ceilings and floors, an equivalent SHGC can be calculated using the component U-Factor, a reasonable sol-air temperature, a reasonable interior temperature (75 °F) and a reasonable incident solar radiation, as follows:

$$SHGC_{equiv} = U-Factor \cdot (T_{sol-air} - T_{int}) / (Solar_{Incident})$$

For Table 1, the assumed sol-air temperatures were 140 °F for walls and 160 °F for roofs (ceilings) and the assumed incident solar radiation was 250 Btu/h for walls and 300 Btu/h for roofs (ceilings). Floors receive no solar radiation and thus do not experience heat gains due to direct solar radiation as do fenestration, walls and roofs (ceilings).

Table 1. Envelope Component Efficacies

Envelope Component	IECC* U-Factor	U-Factor Ratio	IECC* SHGC	SHGC Ratio
Fenestration	0.400	1.00	0.250	1.00
Frame walls	0.082	4.88	0.021**	11.73
Mass walls	0.165	2.42	0.043**	5.83
Ceilings	0.030	13.33	0.009**	29.41
Floors	0.064	6.25	0.000**	∞

* IECC U-Factor and SHGC values for Climate Zone 2

** Computed estimate

The U-Factor and SHGC ratios in Table 1 compare the heat retardation efficacy of each of the other envelope components to the heat retardation efficacy of fenestrations. These ratios show that the opaque envelope components are 2.42 to 13.33 times as efficacious in retarding heat flow by conductance as fenestrations and 5.83 to 29.41 times as efficacious in retarding solar heat gains as fenestrations.

Per unit area, fenestrations are also the most expensive envelope components in new homes. Estimates from the 2011 R.S. Means Residential Cost Data show typical code compliant concrete block wall construction prices to be about \$15/ft² while typical code compliant window prices are somewhat more than double this amount, at about \$32/ft².

The data show that fenestrations are relatively costly home amenities, which are not particularly energy efficient compared with other envelope components. The principle function of fenestration is to visually bring the outdoors into the comfort conditioned interior living space. Thus, cost is the principle determinant of fenestration area as a percentage of conditioned floor area, with larger fenestration percentages much more likely in high-end, expensive homes than in low-end, smaller homes.

Reductions in glazing area improve the energy performance of homes. If homes are evaluated on an energy performance basis then, all other things being equal, the home with the smaller window area will have less energy consumption. That being the case, a simulated performance alternative should recognize this smaller energy consumption rather than adjust the Standard Reference Design glazing area such that this smaller energy use is effectively disallowed as an energy performance characteristic of the home.

Most homes that choose smaller fenestration area are small, low-cost homes. Thus, the choice to incorporate less fenestration area is an economic decision – made to reduce the cost of the home. The fact that these homes are smaller than the typical new home also significantly reduces the energy use of the home compared to the more typical larger new home. As a result, this “sliding” glazing area in the 2012 IECC Standard Reference Design actually requires the smaller, low-cost home with less window area to meet a higher energy performance standard than the larger more energy intensive typical home. This constitutes a strong affirmation of the old saw that “no good deed shall go unpunished.”

For reasons of cost effectiveness and the equitable treatment of smaller, low-cost homes, the Code should set a single standard for glazing area in the Standard Reference Design and not allow it to “float down” with the window area of the Proposed Design.

Interior Shading Coefficient

The 2012 IECC modifies the interior shading coefficient of fenestrations as a function of the SHGC of the fenestration. It does this in both the Standard Reference Design and the Proposed Design. The equation for the 2012 IECC interior shading coefficient is as follows:

$$\text{Interior Shade} = 0.92 * (0.21 * \text{SHGC})$$

Compared with the 2009 IECC interior shading coefficients, which were not dependent on the SHGC of the fenestration but were based on the likely behavior of the home occupants, this equation effectively penalizes high performance windows in climates like Florida where lower SHGCs are desirable. The equation shows that the better the SHGC (lower is better in Florida), the lower the interior shading coefficient. Thus, a window with a SHGC of 0.5 would have an interior shading coefficient of 0.82 while a window with a SHGC of 0.2 would have an interior shading coefficient of 0.88. This results in the poorer performing window getting more energy performance credit from interior shading than the better performing window.

Table 2 examines how the change from the 2009 IECC interior shading coefficients to the 2012 IECC interior shading coefficients impact projected performance. A 2-story, 2400 ft², slab-on-grade frame wall IECC 2012 Standard Reference Design home is used for both sets of simulations. The only change is the manner in which interior shading is treated. The values in the table are the annual kWh for heating and cooling in the cities specified.

Table 2. H&C Interior Shading Example

Condition	Miami	Orlando	Tally
IECC 2009	4981	3507	3426
IECC 2012	5237	3685	3579
kWh change	256	178	153
% change	5.1%	5.1%	4.5%

Table 2 shows that these high performance (SHGC-0.25) windows show 4.5% - 5.1% greater energy use for the IECC 2012 interior shading coefficient specification than for the 2009 IECC interior shading coefficient specification. This means that these high-performance windows will achieve less energy performance credit using the 2012 IECC specification than they do using the 2009 IECC specification. Surely this was not the intent of the 2012 change to the IECC interior shading coefficient.

In addition to the performance differences shown in Table 2, the 2012 IECC interior shading coefficients also do not reflect the likely behavior of the occupants. Occupants are more likely to use shades and blinds principally for privacy reasons but are also likely to use somewhat more shades and blinds during the air conditioning season to keep the sun out of the living space and use

somewhat less shades and blinds during the heating season to let the sun into the living space. This occupant behavior is reflected in the 2009 IECC interior shading coefficient specification but abandoned for unknown reasons in the 2012 IECC interior shading coefficient specification.

Based on this analysis, the proponent recommends that the IECC set a single, non-floating window area to conditioned floor area ratio of 15% for the Standard Reference Design and that the IECC 2009 specification for interior shading coefficient be maintained for both the Standard Reference Design and the Proposed Design.

Cost Impact: The code change proposal will not increase the cost of construction.

RE181-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R405.5.2(1)T-EC-SONNE.DOC

RE182-13

Table R405.5.2(1) (IRC Table N1105.5.2(1))

Proponent: Brenda A. Thompson, Clark County Development Services, Las Vegas NV, representing ICC Sustainability, Energy & High Performance Building Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

TABLE R405.5.2(1) (N1105.5.2(1))
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Heating systems ^{f,g}	<p>As proposed for other than electric heating without a heat pump. Where the proposed design utilizes electric heating without a heat pump the standard reference design shall be an air source heat pump meeting the requirements of Section R403 of the IECC—Commercial Provisions.</p> <p><u>Fuel type: same as proposed design</u></p> <p><u>Efficiencies:</u> <u>Electric: Air-source heat pump in accordance with prevailing federal minimum efficiency standards</u> <u>Non-electric furnaces: Furnace in accordance with prevailing federal or regional minimum efficiency standards</u> <u>Non-electric boilers: Boiler in accordance with prevailing federal minimum efficiency standards</u></p> <p>Capacity: sized in accordance with Section R403.6.</p>	<p>As proposed</p> <p><u>As proposed</u></p> <p><u>As proposed</u></p> <p><u>As proposed</u></p>
Cooling system ^{f,h}	<p>As proposed</p> <p><u>Fuel type: Electric</u></p> <p><u>Efficiency: In accordance with prevailing federal minimum efficiency standards</u></p> <p>Capacity: sized in accordance with Section R403.6.</p>	<p>As proposed</p> <p><u>As proposed</u></p>

Service Water Heating ^{f,g,h,i}	As proposed	
	<u>Fuel type: same as proposed design</u>	As proposed
	<u>Efficiency: in accordance with prevailing federal minimum efficiency standards</u>	As proposed
	Use: Same_as proposed design	<u>Use:</u> gal/day = 30 + (10 × N_{br}) <u>N_{br}</u> = Number of bedrooms
	<u>Same as proposed design</u>	<u>Tank temperature: 120°F</u>

(Portions of Table not shown remain unchanged)

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: <http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx>.

Reasons for this specific proposal:

The ability to include high efficiency mechanical equipment in the performance path was removed in the 2009 IECC. However, this is counter to the entire premise of the performance path, which is to allow flexibility to use any number of different means to achieve the same level of energy performance. This limits adaptability for local circumstances and alternative designs, and also discourages integrated design and use of innovative new HVAC and hot water technologies. It is also in contrast with every other building energy code, standard, and green program. As a result, this issue has encountered resistance from a diverse group of academics, builders, building officials, and industry representatives, and in some cases, has hindered local adoption of the code.

One of the primary reasons that equipment trade-offs were removed was that the federal minimum equipment efficiencies were lagging in the market. Specifically, there were concerns that builders were taking credit for putting in a high efficiency condensing furnace over the old baseline 78 AFUE furnaces, although the large majority of the northern market was already using condensing furnaces – so they were getting "free" credit for something they would have done anyway. However, new federal standards will take effect between May 1, 2013 and January 1, 2015 that will upgrade equipment efficiencies, including addressing this specific example by setting a new baseline that will require condensing furnaces in the north.

Therefore, this proposal would reinstate the ability to include high efficiency heating, cooling, and service water heating equipment in the performance path, using similar language as was previously in the 2006 IECC but using the new minimum equipment efficiency standards.

Cost impact: None, or decrease in cost by enabling whole building design to optimize cost and energy efficiency.

RE182-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R405.5.2(1)T-EC-THOMPSON-SEHPCAC.DOC

RE183 – 13

R401.2 (IRC N1101.15), R401.3 (IRC N1101.16), R402.1 (IRC N1102.1), R402.2 (IRC N1102.2), R402.3 (IRC N1102.3), R402.4 (IRC N1102.4), R402.5 (IRC N1102.5), R403.1 (IRC N1103.1), R403.1.2 (IRC N1103.1.2), R403.2.1 (IRC N1103.2.1), R403.2.2 (IRC N1103.2.2), R403.2.3 (N1103.2.3), R403.3 (IRC N1103.3), R403.4 (IRC N1103.4), R403.5 (IRC N1103.5), R403.6 (IRC N1103.6), R403.7 (IRC N1103.7), R403.8 (IRC N1103.8), R403.9 (IRC N1103.9), R404 (IRC N1104), R404.1 (IRC N1104.1), R404.1.1 (IRC N1104.1.1), R405 (IRC N1105), R405.2 (IRC N1105.2)

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

Revise as follows:

R401.2 (N1101.15) Compliance. ~~Projects shall comply with Sections identified as “mandatory” and with either sections identified as “prescriptive” or the performance approach in Section R405.~~ Compliance shall be demonstrated by meeting the applicable provisions of this chapter.

R401.3 (N1101.16) Certificate. ~~(Mandatory)~~ (Prescriptive). *(Portions of text not shown remains unchanged)*

R402.1 (N1102.1) General. ~~(Prescriptive)~~. *(Portions of text not shown remains unchanged)*

R402.2 (N1102.2) Specific insulation requirements. ~~(Prescriptive)~~ *(Portions of text not shown remains unchanged)*

R402.3 (N1102.3) Fenestration. ~~(Prescriptive)~~ *(Portions of text not shown remains unchanged)*

R402.4 (N1102.4) Air leakage. ~~(Mandatory)~~ *(Portions of text not shown remains unchanged)*

R402.5 (N1102.5) Maximum fenestration U-factor and SHGC. ~~(Mandatory)~~ *(Portions of text not shown remains unchanged)*

R403.1 (N1103.1) Controls. ~~(Mandatory)~~ *(Portions of text not shown remains unchanged)*

R403.1.2 (N1103.1.2) Heat pump supplementary heat. ~~(Mandatory)~~ *(Portions of text not shown remains unchanged)*

R403.2.1 (N1103.2.1) Insulation. ~~(Prescriptive)~~ *(Portions of text not shown remains unchanged)*

R403.2.2 (N1103.2.2) Sealing. ~~(Mandatory)~~ *(Portions of text not shown remains unchanged)*

R403.2.3 (N1103.2.3) Building cavities. ~~(Mandatory)~~ *(Portions of text not shown remains unchanged)*

R403.3 (N1103.3) Mechanical system piping insulation. ~~(Mandatory)~~ *(Portions of text not shown remains unchanged)*

R403.5 (N1103.5) Mechanical ventilation. ~~(Mandatory)~~ *(Portions of text not shown remains unchanged)*

R403.6 (N1103.6) Equipment sizing. ~~(Mandatory)~~ *(Portions of text not shown remains unchanged)*

R403.7 (N1103.7) Systems serving multiple dwelling units. ~~(Mandatory)~~ *(Portions of text not shown remains unchanged)*

R403.8 (N1103.8) Snow melt system controls. ~~(Mandatory)~~ *(Portions of text not shown remains unchanged)*

R403.9 (N1103.9) Pools and inground permanently installed spas. (~~Mandatory~~) *(Portions of text not shown remains unchanged)*

SECTION R404 (N1104)
ELECTRICAL POWER AND LIGHTING SYSTEMS
(~~MANDATORY~~)

R404.1 (N1104.1) Lighting equipment (~~Mandatory~~) *(Portions of text not shown remains unchanged)*

R404.1.1 (N1104.1.1) Lighting equipment (~~Mandatory~~) *(Portions of text not shown remains unchanged)*

SECTION R405 (N1105)
SIMULATED PERFORMANCE ALTERNATIVE
(~~Performance~~)

R405.2 (N1105.2) Mandatory requirements. Compliance with this Section requires that ~~the mandatory provisions identified in Section R401.2 be met~~ projects comply with Sections R401.3, R402.4, R402.5, R403.1, R403.2.2, R403.2.3, R403.4 through R403.9, and R404. All Supply and return ducts not completely inside the building thermal envelope shall be insulated to a minimum of R-6.

Reason: This change corrects the erroneous use of the term “mandatory”. This moves the specification of what can be traded off with the performance approach into the code text about the performance approach, rather than spreading that information throughout the code, as was in energy codes prior to 2006.

The word “shall” and the concept of “mandatory” is woven throughout the I-codes. It is important that the energy code use “shall” correctly. The IRC definition is

SHALL. *The term, when used in this code, is construed to mean “mandatory”.*

Since the IECC inherits the IRC definitions, IECC use of “shall” implies “mandatory”. Implying sections with the word “prescriptive” is not “mandatory” is at the very least confusing, if not wrong.

Why are these labels even in the IECC? The “prescriptive” and “mandatory” labels are intended separate what could from what could not be traded off in the performance path. A simpler and clearer way approach is to list what the performance section is applicable to in the performance section itself. Section R405 (Performance) already has a subsection defining what the performance approach applies to (currently titled “Mandatory Requirements”).

The existing code incorrectly lists some requirements as “prescriptive”, meaning they can be traded off under the performance approach. Requirements incorrectly listed as “tradable” include eve baffle R402.2.3, the definition of “mass walls” R402.2.5, installing insulation to be permanently attached in the floor and crawlspace (Sections 402.2.7 and 402.2.10), and the crawl space vapor retarder (Section 402.2.9). Permanent attachment of the insulation and important vapor retarders should not be traded away in a performance calculation. This change corrects the items incorrectly labeled as tradable.

This change moves the list of requirements that cannot be traded into a single location in the performance section. It removes over 20 instances unnecessary and confusing uses of “mandatory”, “prescriptive” and “performance” from section and subsection heading, and corrects errors in labeling requirements that can be traded; all without any change to section or subsection content.

Cost Impact: The code change proposal will not increase the cost of construction.

RE183-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

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RE184 – 13

R101.4.3, R202, R406 (NEW), (IRC N1101. 3, N1101.9, N1106(NEW))

Proponent: Eric Makela, Britt Makela Group, Inc., representing Institute for Market Transformation (eric@brittmakela.com), Ryan Meres, Institute for Market Transformation

Delete and substitute as follows:

~~R101.4.3 (N1101.3) Additions, alterations, renovations or repairs.~~ Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

~~Exception:~~ The following need not comply provided the energy use of the building is not increased:

- ~~1. Storm windows installed over existing fenestration.~~
- ~~2. Glass only replacements in an existing sash and frame.~~
- ~~3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.~~
- ~~4. Construction where the existing roof, wall or floor cavity is not exposed.~~
- ~~5. Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.~~
- ~~6. Replacement of existing doors that separate conditioned space from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a conditioned space from the exterior shall not be removed.~~
- ~~7. Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.~~
- ~~8. Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the alteration does not increase the installed interior lighting power.~~

R101.4.3 (N1101.3) Additions, alterations, or repairs. Additions, alterations, or repairs to an existing building, building system or portion thereof shall comply with Section R406.

Revise definition as follows:

REPAIR. The reconstruction or renewal of any part of an existing building for the purpose of its maintenance.

Add new text as follows:

SECTION R406 (IRC N1106) **ADDITIONS, ALTERATIONS, OR REPAIRS**

R406.1 (IRC N1106.1) Scope. The provisions of this section shall control the *alteration, repair and addition* of existing buildings and structures for compliance with this code.

R406.2 (IRC N1106.2) Existing buildings. Except as specified in this chapter, this code shall not be used to require the removal, *alteration* or abandonment of, nor prevent the continued use and maintenance of, an existing building or building system lawfully in existence at the time of adoption of this code.

R406.4 (IRC N1106.4) Additions, alterations, or repairs. Additions, alterations, or repairs to an existing building, building system or portion thereof shall comply with Sections R406.4.1, R406.4.2 or R406.4.3. Unaltered portions of the existing building or building supply system shall not be required to comply with this code. Additions, alterations, or repairs shall not create an unsafe or hazardous condition or overload existing building systems.

R406.4.1 (IRC N1106.4.1) Additions. An addition shall be deemed to comply with this code if the addition alone complies, if the existing building and addition comply as a single building, or if the building with the addition uses no more energy than the existing building. Additions shall be in accordance with Section 406.4.1.1 or Section 406.4.1.2.

406.4.1.1 (IRC N1106.4.1.1) Prescriptive compliance. Additions shall comply with Sections 406.4.1.1.1 through 406.4.1.1.4.

406.4.1.1.1 (IRC N1106.4.1.1.1) Building envelope. New building envelope assemblies that are part of the addition shall comply with Sections R402.1, R402.2, R402.3.1 through R402.3.5, and R402.4.

Exception. Where nonconditioned space is changed to conditioned space the building envelope of the addition shall comply where the UA, as determined in Section 402.1.4, of the existing building and the addition, and any alterations that are part of the project, is less than or equal to UA generated for the existing building.

R406.4.1.1.2 (IRC N1106.4.1.1.2) Heating and cooling systems. New heating, cooling and duct systems that are part of the addition shall comply with Sections R403.1, R403.2, R403.3, R403.5 and R403.6.

Exception: Where ducts from an existing heating and cooling system are extended to an addition, duct systems with less than 40 linear feet in unconditioned spaces shall not be required to be tested in accordance with Section R403.2.2.

R406.4.1.1.3 (IRC N1106.4.1.1.3) Service hot water systems. New service hot water systems that are part of the addition shall comply with Section R403.4.

R406.4.1.1.4 (IRC N1106.4.1.1.4) Lighting. New lighting systems that are part of the addition shall comply with Section 404.1.

R406.4.1.2 (IRC N1106.4.1.2) Existing plus addition compliance (Simulated Performance Alternative). Where nonconditioned space is changed to conditioned space the addition shall comply where the annual energy cost or energy use of the addition and the existing building, and any alterations that are part of the project, is less than or equal to the annual energy cost of the existing building when modeled in accordance with Section R405. The addition and any alterations that are part of the project shall comply with Section R405 in its entirety.

406.4.2 (IRC N1106.4.2) Alterations. Alterations to existing buildings shall comply with Section R406.4.2.1 through R406.4.2.4. Alterations shall be such that the existing building or structure uses no more energy than the existing building or structure prior to the alteration.

406.4.2.1 (IRC N1106.4.2.1) Building envelope. Building envelope assemblies that are part of the alteration shall comply with Sections R402.1.1 or R402.1.3, R402.2.1 through R402.2.11, R402.3.1, R402.3.2, R402.3.6, R402.4.3 and R402.4.4.

Exceptions: The following building envelope alterations are exempt from Section 406.1.2.1.

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.

3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
4. Construction where the existing roof, wall or floor cavity is not exposed.
5. Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.

R406.4.2.2 (IRC N1106.4.2.2) Heating and cooling systems. New heating, cooling and duct systems that are part of the alteration shall comply with Sections R403.1, R403.2, R403.3 and R403.6.

Exception: Where ducts from an existing heating and cooling system are extended, duct systems with less than 40 linear feet in unconditioned spaces shall not be required to be tested in accordance with Section R403.2.2.

R406.4.2.3 (IRC N1106.4.2.3) Service hot water systems. New service hot water systems that are part of the alteration shall comply with Section R403.4.

R406.4.2.4 (IRC N1106.4.2.4) Lighting. New lighting systems that are part of the alteration shall comply with Section 404.1.

R406.4.3 Repairs. (IRC N1106.4.3) Work on nondamaged components that is necessary for the required *repair* of damaged components shall be considered part of the *repair* and shall not be subject to the requirements for *alterations* in this section. Routine maintenance, ordinary repairs exempt from *permit*, and abatement of wear due to normal service conditions shall not be subject to the requirements for *alterations*.

Reason: The residential provisions of the 2012 IECC require that additions, alterations renovations or repairs comply with the provisions of the energy code without providing a clear "roadmap" on the specific requirements that apply to these projects. The goal of this code change proposal is to provide clear direction to the code user on what provisions must be complied with based on the type of project. Increasing the clarity of the code will increase the compliance rate and result in increased energy savings for these projects.

This proposal places all of the requirements for additions, alterations, renovations and repairs into a new section in the residential provisions of the IECC and builds off the work conducted by the ICC SEHPCAC in the development of their existing building proposal. The additions portion of the proposal provides an energy neutral method for demonstrating compliance for difficult to comply projects by basically saying that the building with the addition uses no more energy than the existing building. This will allow projects to take advantage of energy efficient alterations on the existing building to offset difficult to comply with features on the addition. For example, garage conversions in Climate Zone 5, where the walls are framed with 2 X 4's, will be forced to increase the insulation levels of the wall system to levels that are difficult to meet without significant cost. Allowing this type of trade-off will increase the overall efficiency of the entire building at a lower potential first cost than insulating the wall system.

An allowance is also included for adding a short duct run in unconditioned space by exempting up to 40 feet of new duct work. Currently the code would require this duct to be tested even though the entire system is very leaky. This allowance is from the Washington State Residential Energy Code.

Exceptions currently included in Section C101.4.3 of the 2012 IECC have been moved into this new section and linked to the applicable references to the building envelope, systems or lighting section. Repairs have been clearly identified and essentially exempted from the requirements of the IECC if they fall within certain defined parameters.

Cost Impact: The code change proposal will not increase the cost of construction.

RE184-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

NNN.NN-NAME

RE185 – 13

R401.2 (IRC N1101.15), R401.3 (IRC N1101.16), R402.1 (IRC N1102.1), R402.2 (IRC N1102.2), R402.3 (IRC N1102.3), R402.4 (IRC N1102.4), R402.5 (IRC N1102.5), R403.1 (IRC N1103.1), R403.1.2 (IRC N1103.1.2), R403.2.1 (IRC N1103.2.1), R403.2.2 (IRC N1103.2.2), R403.2.3 (N1103.2.3), R403.3 (IRC N1103.3), R403.4 (IRC N1103.4), R403.5 (IRC N1103.5), R403.6 (IRC N1103.6), R403.7 (IRC N1103.7), R403.8 (IRC N1103.8), R403.9 (IRC N1103.9), R404 (IRC N1104), R404.1 (IRC N1104.1), R404.1.1 (IRC N1104.1.1), R405 (IRC N1105), R405.2 (IRC N1105.2)

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

Revise as follows:

R401.2 (N1101.15) Compliance. Projects shall comply with Sections identified as “mandatory” and with either sections identified as “prescriptive” or the performance approach in Section R405. Compliance shall be demonstrated by meeting the applicable provisions of this chapter.

R401.3 (N1101.16) Certificate. ~~(Mandatory)~~ (Prescriptive). (Portions of text not shown remains unchanged)

R402.1 (N1102.1) General. ~~(Prescriptive)~~. (Portions of text not shown remains unchanged)

R402.2 (N1102.2) Specific insulation requirements. ~~(Prescriptive)~~. (Portions of text not shown remains unchanged)

R402.3 (N1102.3) Fenestration. ~~(Prescriptive)~~. (Portions of text not shown remains unchanged)

R402.4 (N1102.4) Air leakage. ~~(Mandatory)~~. (Portions of text not shown remains unchanged)

R402.5 (N1102.5) Maximum fenestration U-factor and SHGC. ~~(Mandatory)~~. (Portions of text not shown remains unchanged)

R403.1 (N1103.1) Controls. ~~(Mandatory)~~. (Portions of text not shown remains unchanged)

R403.1.2 (N1103.1.2) Heat pump supplementary heat. ~~(Mandatory)~~. (Portions of text not shown remains unchanged)

R403.2.1 (N1103.2.1) Insulation. ~~(Prescriptive)~~. (Portions of text not shown remains unchanged)

R403.2.2 (N1103.2.2) Sealing. ~~(Mandatory)~~. (Portions of text not shown remains unchanged)

R403.2.3 (N1103.2.3) Building cavities. ~~(Mandatory)~~. (Portions of text not shown remains unchanged)

R403.3 (N1103.3) Mechanical system piping insulation. ~~(Mandatory)~~. (Portions of text not shown remains unchanged)

R403.5 (N1103.5) Mechanical ventilation. ~~(Mandatory)~~. (Portions of text not shown remains unchanged)

R403.6 (N1103.6) Equipment sizing. ~~(Mandatory)~~. (Portions of text not shown remains unchanged)

R403.7 (N1103.7) Systems serving multiple dwelling units. ~~(Mandatory)~~. (Portions of text not shown remains unchanged)

R403.8 (N1103.8) Snow melt system controls. ~~(Mandatory)~~. (Portions of text not shown remains unchanged)

R403.9 (N1103.9) Pools and inground permanently installed spas. (~~Mandatory~~) *(no change to code text)*

SECTION R404 (N1104)
ELECTRICAL POWER AND LIGHTING SYSTEMS
(~~MANDATORY~~)

R404.1 (N1104.1) Lighting equipment (~~Mandatory~~) *(Portions of text not shown remains unchanged)*

R404.1.1 (N1104.1.1) Lighting equipment (~~Mandatory~~) *(Portions of text not shown remains unchanged)*

SECTION R405 (N1105)
SIMULATED PERFORMANCE ALTERNATIVE
(~~Performance~~)

R405.2 (N1105.2) Mandatory requirements. Compliance with this Section requires that ~~the mandatory provisions identified in Section R401.2 be met~~ projects comply with Sections R401.3, R402.4, R402.5, R403.1, R403.2.2, R403.2.3, R403.4 through R403.9, and R404. All Supply and return ducts not completely inside the building thermal envelope shall be insulated to a minimum of R-6.

Reason: This change corrects the erroneous use of the term “mandatory”. This moves the specification of what can be traded off with the performance approach into the code text about the performance approach, rather than spreading that information throughout the code, as was in energy codes prior to 2006.

The word “shall” and the concept of “mandatory” is woven throughout the I-codes. It is important that the energy code use “shall” correctly. The IRC definition is

SHALL. *The term, when used in this code, is construed to mean “mandatory”.*

Since the IECC inherits the IRC definitions, IECC use of “shall” implies “mandatory”. Implying sections with the word “prescriptive” is not “mandatory” is at the very least confusing, if not wrong.

Why are these labels even in the IECC? The “prescriptive” and “mandatory” labels are intended separate what could from what could not be traded off in the performance path. A simpler and clearer way approach is to list what the performance section is applicable to in the performance section itself. Section R405 (Performance) already has a subsection defining what the performance approach applies to (currently titled “Mandatory Requirements”).

The existing code incorrectly lists some requirements as “prescriptive”, meaning they can be traded off under the performance approach. Requirements incorrectly listed as “tradable” include eve baffle R402.2.3, the definition of “mass walls” R402.2.5, installing insulation to be permanently attached in the floor and crawlspace (Sections 402.2.7 and 402.2.10), and the crawl space vapor retarder (Section 402.2.9). Permanent attachment of the insulation and important vapor retarders should not be traded away in a performance calculation. This change corrects the items incorrectly labeled as tradable.

This change moves the list of requirements that cannot be traded into a single location in the performance section. It removes over 20 instances unnecessary and confusing uses of “mandatory”, “prescriptive” and “performance” from section and subsection heading, and corrects errors in labeling requirements that can be traded; all without any change to section or subsection content.

Cost Impact: The code change proposal will not increase the cost of construction.

RE185-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

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RE186 – 13

R202 (IRC N1101.9), R401.2 (IRC N1101.15), R406 (NEW) (IRC N1106 (NEW))

Proponent: William Fay, Energy Efficient Codes Coalition; Brian Dean, Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition

Revise follows:

SECTION R401 (N1101) GENERAL

R401.2 (IRC N1101.15) Compliance. Projects shall comply with Sections identified as "mandatory" and with either sections identified as "prescriptive" or the simulated performance alternative approach in Section R405. In addition, all projects shall comply with Section R406.

SECTION R406 (N1106) ADDITIONAL ENERGY EFFICIENCY (MANDATORY)

R406.1 (N1106.1) Scope. This section establishes additional mandatory requirements applicable to all compliance approaches to achieve additional energy efficiency.

R406.2 (N1106.2) Points-based compliance. One or more energy efficiency measure(s) shall be installed in accordance with Section R406.3 that cumulatively equal or exceed 5 (five) Flex Points for the appropriate Climate Zone. Projects complying under the simulated performance alternative outlined in Section R405 shall demonstrate compliance with Section R405 without including in the proposed design any features that will be utilized to comply with Section R406.

Exceptions: The requirements of this section shall not apply to:

1. Projects complying under the performance approach outlined in Section R405, where the *proposed design* under section R405.3 is shown to have an annual energy cost that is less than or equal to 95% of the annual energy cost of the *standard reference design*.
2. Projects with an on-site or building integrated renewable energy system installed that provides not less than 0.50 watts per square foot (5.4 W/m²) of conditioned floor area.
3. Additions with a conditioned floor area equal to or less than 1,000 square feet.
4. Alterations, renovations and repairs to an existing building.

R406.3 (N1106.3) Flex Points for additional energy efficiency. Measures shall be selected from the applicable Flex Points Table based on the applicable federal minimum equipment efficiency established by federal rule for that state that applies to the specified heating and cooling equipment on the date that a permit is issued. Each measure chosen shall receive credit for the Flex Points as indicated in the applicable Table for the specific Climate Zone. Interpolation of points between measures shall not be permitted.

R406.3.1 (N1106.3.1) Use of Flex Points Table R406.3.1. In states where the applicable federal minimum efficiencies are less than or equal to 80 AFUE for non-weatherized gas residential furnaces, equal to 7.7 HSPF for split system heat pumps, and equal to 13 SEER for split system air conditioners, Table R406.3.1 shall be used.

TABLE R406.3.1 (N1106.3.1)
FLEX POINTS FOR ADDITIONAL ENERGY EFFICIENCY

Measure Number	Measure Description	Flex Point Value								
		<u>CZ</u> 1	<u>CZ</u> 2	<u>CZ</u> 3	<u>CZ</u> 4	<u>CZ</u> 4C a	<u>CZ</u> 5	<u>CZ</u> 6	<u>CZ</u> 7	<u>CZ</u> 8

<u>1a</u>	<u>≥ 2.5% reduction in total UA ^b</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>4</u>
<u>1b</u>	<u>≥ 5% reduction in total UA ^b</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>5</u>	<u>5</u>
<u>1c</u>	<u>≥ 7.5% reduction in total UA ^b</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>8</u>
<u>1d</u>	<u>≥ 10% reduction in total UA ^b</u>	<u>6</u>	<u>7</u>	<u>7</u>	<u>7</u>	<u>8</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>10</u>
<u>2a</u>	<u>≥ 10% reduction in glazed fenestration area-weighted average SHGC</u>	<u>2</u>	<u>1</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>
<u>2b</u>	<u>≥ 20% reduction in glazed fenestration area-weighted average SHGC</u>	<u>4</u>	<u>1</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>
<u>3a</u>	<u>≤ 4 ACH50 air leakage rate with ERV or HRV installed^c</u>	<u>1</u>	<u>2</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>
<u>3b</u>	<u>≤ 3 ACH50 air leakage rate with ERV or HRV installed^c</u>	<u>2</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>7</u>	<u>7</u>	<u>8</u>	<u>8</u>
<u>3c</u>	<u>≤ 2 ACH50 air leakage rate with ERV or HRV installed^c</u>	<u>2</u>	<u>5</u>	<u>7</u>	<u>9</u>	<u>9</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>11</u>
<u>4a</u>	<u>≤ 2 CFM of total duct leakage per 100 square feet of conditioned floor area when tested in accordance with Section R403.2.2</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>-</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>
<u>4b</u>	<u>100% of duct thermal distribution system located in <i>passively conditioned space</i> and/or <i>actively conditioned space</i></u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>2</u>	<u>2</u>	<u>2</u>
<u>4c</u>	<u>100% of duct thermal distribution system located in <i>actively conditioned space</i> ^d</u>	<u>8</u>	<u>8</u>	<u>9</u>	<u>11</u>	<u>8</u>	<u>12</u>	<u>15</u>	<u>17</u>	<u>17</u>
<u>4d</u>	<u>100% of ductless thermal distribution system located in <i>passively conditioned space</i> and/or <i>actively conditioned space</i> ^d</u>	<u>8</u>	<u>8</u>	<u>9</u>	<u>11</u>	<u>8</u>	<u>12</u>	<u>15</u>	<u>17</u>	<u>17</u>
<u>4e</u>	<u>100% of hydronic thermal distribution system located in <i>actively conditioned space</i> ^d</u>	<u>8</u>	<u>8</u>	<u>9</u>	<u>11</u>	<u>8</u>	<u>12</u>	<u>15</u>	<u>17</u>	<u>17</u>
<u>5a</u>	<u>≥ 15 SEER and ≥ 12.5 EER cooling system efficiency ^e</u>	<u>4</u>	<u>3</u>	<u>1</u>	<u>1</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>
<u>5b</u>	<u>≥ 16 SEER and ≥ 13 EER cooling system efficiency ^e</u>	<u>7</u>	<u>5</u>	<u>2</u>	<u>1</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>
<u>5c</u>	<u>≥ 18 SEER and ≥ 14 EER cooling system efficiency ^e</u>	<u>11</u>	<u>8</u>	<u>3</u>	<u>2</u>	<u>-</u>	<u>1</u>	<u>-</u>	<u>-</u>	<u>-</u>
<u>5d</u>	<u>≥ 16 EER cooling system efficiency ^e</u>	<u>11</u>	<u>8</u>	<u>3</u>	<u>2</u>	<u>-</u>	<u>1</u>	<u>-</u>	<u>-</u>	<u>-</u>
<u>5e</u>	<u>≥ 18 EER cooling system efficiency ^e</u>	<u>15</u>	<u>11</u>	<u>4</u>	<u>3</u>	<u>-</u>	<u>1</u>	<u>-</u>	<u>-</u>	<u>-</u>
<u>5f</u>	<u>≥ 20 EER cooling system efficiency ^e</u>	<u>17</u>	<u>13</u>	<u>5</u>	<u>3</u>	<u>-</u>	<u>1</u>	<u>1</u>	<u>-</u>	<u>-</u>
<u>6a</u>	<u>≥ 90 AFUE heating system efficiency ^f</u>	<u>-</u>	<u>1</u>	<u>4</u>	<u>6</u>	<u>6</u>	<u>7</u>	<u>7</u>	<u>8</u>	<u>9</u>
<u>6b</u>	<u>≥ 92 AFUE heating system efficiency ^f</u>	<u>-</u>	<u>2</u>	<u>5</u>	<u>7</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>
<u>6c</u>	<u>≥ 95 AFUE heating system efficiency ^f</u>	<u>-</u>	<u>2</u>	<u>6</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>
<u>6d</u>	<u>≥ 96 AFUE heating system efficiency ^f</u>	<u>-</u>	<u>2</u>	<u>6</u>	<u>9</u>	<u>10</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>14</u>
<u>6e</u>	<u>≥ 98 AFUE heating system efficiency ^f</u>	<u>-</u>	<u>3</u>	<u>7</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>	<u>14</u>	<u>15</u>
<u>7a</u>	<u>≥ 8.8 HSPF heating system efficiency ^f</u>	<u>-</u>	<u>-</u>	<u>1</u>	<u>1</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>1</u>
<u>7b</u>	<u>≥ 9.5 HSPF heating system efficiency ^f</u>	<u>-</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>3</u>	<u>4</u>	<u>4</u>	<u>4</u>	<u>3</u>
<u>7c</u>	<u>≥ 10.5 HSPF heating system efficiency ^f</u>	<u>-</u>	<u>1</u>	<u>3</u>	<u>6</u>	<u>6</u>	<u>7</u>	<u>6</u>	<u>5</u>	<u>5</u>
<u>7d</u>	<u>≥ 3 COP heating system efficiency ^f</u>	<u>-</u>	<u>1</u>	<u>3</u>	<u>5</u>	<u>5</u>	<u>6</u>	<u>5</u>	<u>5</u>	<u>4</u>
<u>7e</u>	<u>≥ 3.5 COP heating system efficiency ^f</u>	<u>-</u>	<u>2</u>	<u>5</u>	<u>8</u>	<u>8</u>	<u>9</u>	<u>9</u>	<u>9</u>	<u>7</u>

<u>7f</u>	<u>≥ 4 COP heating system efficiency ^f</u>	<u>1</u>	<u>3</u>	<u>6</u>	<u>10</u>	<u>10</u>	<u>12</u>	<u>11</u>	<u>10</u>	<u>8</u>
<u>8a</u>	<u>≥ 0.7 EF for fossil fuel service water heating system</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>
<u>8b</u>	<u>≥ 0.8 EF for fossil fuel service water heating system</u>	<u>4</u>	<u>3</u>	<u>3</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>1</u>	<u>1</u>	<u>1</u>
<u>8c</u>	<u>≥ 0.95 EF for electric service water heating system</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>
<u>8d</u>	<u>≥ 1.15 EF for electric service water heating system</u>	<u>7</u>	<u>7</u>	<u>7</u>	<u>4</u>	<u>5</u>	<u>3</u>	<u>3</u>	<u>2</u>	<u>1</u>
<u>8e</u>	<u>≥ 0.4 Solar Fraction for service water heating system</u>	<u>6</u>	<u>7</u>	<u>9</u>	<u>7</u>	<u>9</u>	<u>6</u>	<u>5</u>	<u>4</u>	<u>3</u>

a. Climate Zone 4C is Climate Zone Marine 4.

b. The Total UA shall be calculated in accordance with Section R402.1.4 Total UA alternative.

c. Minimum Heat Recovery Ventilator (HRV) and Energy Recovery Ventilator (ERV) requirements, measured at the lowest tested net supply airflow, shall be ≥ 75% Sensible Recovery Efficiency (SRE), ≤ 1.1 W/CFM Fan Energy and shall not use recirculation as a defrost strategy. In addition, the Energy Recovery Ventilator (ERV) shall be ≥ 50% Latent Recovery/Moisture Transfer (LRMT).

d. To achieve 100% of the thermal distribution located in the actively conditioned space, no ducts or pipes used for the heating and cooling systems shall be located within walls or ceilings where losses are not directly regained into the conditioned space.

e. For multiple cooling systems, all systems shall meet or exceed the minimum efficiency requirements in Table R406.3.1 and shall be sized to serve 100% of the cooling design load. As an alternative, each system installed shall receive credit for the percentage of the Flex Points for the measure equal to the percentage of the cooling design load served by the system.

f. For multiple heating systems, all systems shall meet or exceed the minimum efficiency requirements in Table R406.3.1 and shall be sized to serve 100% of the heating design load. As an alternative, each system installed shall receive credit for the percentage of the Flex Points for the measure equal to the percentage of the heating design load served by the system.

R406.3.2 (N1106.3.2) Use of Flex Points Table R406.3.2. In states where the applicable federal minimum efficiencies are less than or equal to 80 AFUE for non-weatherized gas residential furnaces, equal to 8.2 HSPF for split system heat pumps, and less than or equal to 14 SEER for split system air conditioners, Table R406.3.2 shall be used.

TABLE R406.3.2 (N1106.3.2)
FLEX POINTS FOR ADDITIONAL ENERGY EFFICIENCY

<u>Measure Number</u>	<u>Measure Description</u>	<u>Flex Point Value</u>									
		<u>CZ 1</u>	<u>CZ 2</u>	<u>CZ 3</u>	<u>CZ 4</u>	<u>CZ 4C_a</u>	<u>CZ 5</u>	<u>CZ 6</u>	<u>CZ 7</u>	<u>CZ 8</u>	
<u>1a</u>	<u>≥ 2.5% reduction in total UA^b</u>	<u>1</u>	<u>1</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>4</u>	
<u>1b</u>	<u>≥ 5% reduction in total UA^b</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>5</u>	<u>5</u>	
<u>1c</u>	<u>≥ 7.5% reduction in total UA^b</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>8</u>	
<u>1d</u>	<u>≥ 10% reduction in total UA^b</u>	<u>6</u>	<u>7</u>	<u>7</u>	<u>7</u>	<u>8</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>10</u>	
<u>2a</u>	<u>≥ 10% reduction in glazed fenestration area-weighted average SHGC</u>	<u>2</u>	<u>1</u>	-	-	-	-	-	-	-	
<u>2b</u>	<u>≥ 20% reduction in glazed fenestration area-weighted average SHGC</u>	<u>4</u>	<u>1</u>	-	-	-	-	-	-	-	
<u>3a</u>	<u>≤ 4 ACH50 air leakage rate with ERV or HRV installed^c</u>	<u>1</u>	<u>2</u>	-	-	-	-	-	-	-	
<u>3b</u>	<u>≤ 3 ACH50 air leakage rate with ERV or HRV installed^c</u>	<u>2</u>	<u>4</u>	<u>5</u>	<u>7</u>	<u>7</u>	<u>7</u>	<u>7</u>	<u>8</u>	<u>8</u>	
<u>3c</u>	<u>≤ 2 ACH50 air leakage rate with ERV or HRV installed^c</u>	<u>2</u>	<u>5</u>	<u>7</u>	<u>9</u>	<u>9</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>11</u>	

4a	<u>≤ 2 CFM of total duct leakage per 100 square feet of conditioned floor area when tested in accordance with Section R403.2.2</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>-</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>
4b	<u>100% of duct thermal distribution system located in <i>passively conditioned space</i> and/or <i>actively conditioned space</i></u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>2</u>	<u>2</u>	<u>2</u>
4c	<u>100% of duct thermal distribution system located in <i>actively conditioned space</i>^d</u>	<u>8</u>	<u>8</u>	<u>9</u>	<u>11</u>	<u>8</u>	<u>12</u>	<u>15</u>	<u>17</u>	<u>17</u>
4d	<u>100% of ductless thermal distribution system located in <i>passively conditioned space</i> and/or <i>actively conditioned space</i>^d</u>	<u>8</u>	<u>8</u>	<u>9</u>	<u>11</u>	<u>8</u>	<u>12</u>	<u>15</u>	<u>17</u>	<u>17</u>
4e	<u>100% of hydronic thermal distribution system located in <i>actively conditioned space</i>^d</u>	<u>8</u>	<u>8</u>	<u>9</u>	<u>11</u>	<u>8</u>	<u>12</u>	<u>15</u>	<u>17</u>	<u>17</u>
5a	<u>≥ 15 SEER and ≥ 12.5 EER cooling system efficiency^e</u>	<u>2</u>	<u>2</u>	<u>1</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>
5b	<u>≥ 16 SEER and ≥ 13 EER cooling system efficiency^e</u>	<u>5</u>	<u>4</u>	<u>1</u>	<u>1</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>
5c	<u>≥ 18 SEER and ≥ 14 EER cooling system efficiency^e</u>	<u>9</u>	<u>7</u>	<u>3</u>	<u>2</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>
5d	<u>≥ 16 EER cooling system efficiency^e</u>	<u>10</u>	<u>7</u>	<u>3</u>	<u>2</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>
5e	<u>≥ 18 EER cooling system efficiency^e</u>	<u>13</u>	<u>10</u>	<u>4</u>	<u>2</u>	<u>-</u>	<u>1</u>	<u>-</u>	<u>-</u>	<u>-</u>
5f	<u>≥ 20 EER cooling system efficiency^e</u>	<u>16</u>	<u>12</u>	<u>5</u>	<u>3</u>	<u>-</u>	<u>1</u>	<u>-</u>	<u>-</u>	<u>-</u>
6a	<u>≥ 90 AFUE heating system efficiency^f</u>	<u>-</u>	<u>2</u>	<u>4</u>	<u>6</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>8</u>	<u>9</u>
6b	<u>≥ 92 AFUE heating system efficiency^f</u>	<u>-</u>	<u>2</u>	<u>5</u>	<u>7</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>
6c	<u>≥ 95 AFUE heating system efficiency^f</u>	<u>-</u>	<u>2</u>	<u>6</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>
6d	<u>≥ 96 AFUE heating system efficiency^f</u>	<u>-</u>	<u>2</u>	<u>6</u>	<u>9</u>	<u>10</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>14</u>
6e	<u>≥ 98 AFUE heating system efficiency^f</u>	<u>-</u>	<u>3</u>	<u>7</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>	<u>14</u>	<u>15</u>
7a	<u>≥ 8.8 HSPF heating system efficiency^f</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>
7b	<u>≥ 9.5 HSPF heating system efficiency^f</u>	<u>-</u>	<u>-</u>	<u>1</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>1</u>
7c	<u>≥ 10.5 HSPF heating system efficiency^f</u>	<u>-</u>	<u>1</u>	<u>2</u>	<u>4</u>	<u>4</u>	<u>5</u>	<u>4</u>	<u>3</u>	<u>3</u>
7d	<u>≥ 3 COP heating system efficiency^f</u>	<u>-</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>3</u>	<u>4</u>	<u>3</u>	<u>3</u>	<u>2</u>
7e	<u>≥ 3.5 COP heating system efficiency^f</u>	<u>-</u>	<u>2</u>	<u>4</u>	<u>6</u>	<u>6</u>	<u>8</u>	<u>7</u>	<u>6</u>	<u>5</u>
7f	<u>≥ 4 COP heating system efficiency^f</u>	<u>-</u>	<u>2</u>	<u>5</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>10</u>	<u>9</u>	<u>7</u>
8a	<u>≥ 0.7 EF for fossil fuel service water heating system</u>	<u>2</u>	<u>2</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>
8b	<u>≥ 0.8 EF for fossil fuel service water heating system</u>	<u>7</u>	<u>5</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>1</u>	<u>1</u>
8c	<u>≥ 0.95 EF for electric service water heating system</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>
8d	<u>≥ 1.15 EF for electric service water heating system</u>	<u>7</u>	<u>7</u>	<u>7</u>	<u>4</u>	<u>5</u>	<u>3</u>	<u>3</u>	<u>2</u>	<u>2</u>
8e	<u>≥ 0.4 Solar Fraction for service water heating system</u>	<u>8</u>	<u>9</u>	<u>9</u>	<u>7</u>	<u>9</u>	<u>6</u>	<u>5</u>	<u>4</u>	<u>3</u>

a. Climate Zone 4C is Climate Zone Marine 4.

b. The Total UA shall be calculated in accordance with Section R402.1.4 Total UA alternative.

c. Minimum Heat Recovery Ventilator (HRV) and Energy Recovery Ventilator (ERV) requirements, measured at the lowest tested net supply airflow, shall be ≥ 75% Sensible Recovery Efficiency (SRE), ≤ 1.1 W/CFM Fan Energy and shall not use recirculation as a defrost strategy. In addition, the Energy Recovery Ventilator (ERV) shall be ≥ 50% Latent Recovery/Moisture Transfer (LRMT).

d. To achieve 100% of the thermal distribution located in the actively conditioned space, no ducts or pipes used for the heating and cooling systems shall be located within walls or ceilings where losses are not directly regained into the conditioned space.

e. For multiple cooling systems, all systems shall meet or exceed the minimum efficiency requirements in Table R406.3.2 and shall be sized to serve 100% of the cooling design load. As an alternative, each system installed shall receive credit for the percentage of the Flex Points for the measure equal to the percentage of the cooling design load served by the system.

f. For multiple heating systems, all systems shall meet or exceed the minimum efficiency requirements in Table R406.3.2 and shall be sized to serve 100% of the heating design load. As an alternative, each system installed shall receive credit for the percentage of the Flex Points for the measure equal to the percentage of the heating design load served by the system.

R406.3.3 (N1106.3.3) Use of Flex Points Table R406.3.3. In states where the applicable federal minimum efficiencies are equal to 90 AFUE for non-weatherized gas residential furnaces, equal to 8.2 HSPF for split system heat pumps, and less than or equal to 14 SEER for split system air conditioners, Table R406.3.3 shall be used.

TABLE R406.3.3 (N1106.3.3)
FLEX POINTS FOR ADDITIONAL ENERGY EFFICIENCY

Measure Number	Measure Description	Flex Point Value								
		<u>CZ</u> <u>1</u>	<u>CZ</u> <u>2</u>	<u>CZ</u> <u>3</u>	<u>CZ</u> <u>4</u>	<u>CZ</u> <u>4C</u> <u>a</u>	<u>CZ</u> <u>5</u>	<u>CZ</u> <u>6</u>	<u>CZ</u> <u>7</u>	<u>CZ</u> <u>8</u>
<u>1a</u>	<u>≥ 2.5% reduction in total UA ^b</u>	<u>1</u>	<u>1</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>4</u>
<u>1b</u>	<u>≥ 5% reduction in total UA ^b</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>4</u>	<u>4</u>	<u>5</u>	<u>5</u>
<u>1c</u>	<u>≥ 7.5% reduction in total UA ^b</u>	<u>4</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>8</u>
<u>1d</u>	<u>≥ 10% reduction in total UA ^b</u>	<u>6</u>	<u>7</u>	<u>7</u>	<u>7</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>10</u>
<u>2a</u>	<u>≥ 10% reduction in glazed fenestration area-weighted average SHGC</u>	<u>2</u>	<u>1</u>	-	-	-	-	-	-	-
<u>2b</u>	<u>≥ 20% reduction in glazed fenestration area-weighted average SHGC</u>	<u>4</u>	<u>2</u>	-	-	-	-	-	-	-
<u>3a</u>	<u>≤ 4 ACH50 air leakage rate with ERV or HRV installed^c</u>	<u>1</u>	<u>2</u>	-	-	-	-	-	-	-
<u>3b</u>	<u>≤ 3 ACH50 air leakage rate with ERV or HRV installed^c</u>	<u>2</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>7</u>	<u>7</u>	<u>8</u>	<u>8</u>
<u>3c</u>	<u>≤ 2 ACH50 air leakage rate with ERV or HRV installed^c</u>	<u>2</u>	<u>5</u>	<u>7</u>	<u>9</u>	<u>9</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>11</u>
<u>4a</u>	<u>≤ 2 CFM of total duct leakage per 100 square feet of conditioned floor area when tested in accordance with Section R403.2.2</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	-	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>
<u>4b</u>	<u>100% of duct thermal distribution system located in <i>passively conditioned space</i> and/or <i>actively conditioned space</i></u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>2</u>	<u>2</u>	<u>2</u>
<u>4c</u>	<u>100% of duct thermal distribution system located in <i>actively conditioned space</i> ^d</u>	<u>8</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>8</u>	<u>12</u>	<u>15</u>	<u>17</u>	<u>17</u>
<u>4d</u>	<u>100% of ductless thermal distribution system located in <i>passively conditioned space</i> and/or <i>actively conditioned space</i> ^d</u>	<u>8</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>8</u>	<u>12</u>	<u>15</u>	<u>17</u>	<u>17</u>
<u>4e</u>	<u>100% of hydronic thermal distribution system located in <i>actively conditioned space</i> ^d</u>	<u>8</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>8</u>	<u>12</u>	<u>15</u>	<u>17</u>	<u>17</u>
<u>5a</u>	<u>≥ 15 SEER and ≥ 12.5 EER cooling system efficiency^e</u>	<u>2</u>	<u>2</u>	<u>1</u>	-	-	-	-	-	-
<u>5b</u>	<u>≥ 16 SEER and ≥ 13 EER cooling system efficiency^e</u>	<u>5</u>	<u>4</u>	<u>1</u>	<u>1</u>	-	-	-	-	-
<u>5c</u>	<u>≥ 18 SEER and ≥ 14 EER cooling system</u>	<u>9</u>	<u>7</u>	<u>3</u>	<u>2</u>	-	-	-	-	-

	efficiency ^e								
5d	≥ 16 EER cooling system efficiency ^e	10	7	3	2	-	-	-	-
5e	≥ 18 EER cooling system efficiency ^e	13	10	4	2	-	1	-	-
5f	≥ 20 EER cooling system efficiency ^e	16	12	5	3	-	1	-	-
6a	≥ 90 AFUE heating system efficiency ^f	-	-	-	-	-	-	-	-
6b	≥ 92 AFUE heating system efficiency ^f	-	-	-	1	1	1	1	1
6c	≥ 95 AFUE heating system efficiency ^f	-	-	2	2	3	3	3	4
6d	≥ 96 AFUE heating system efficiency ^f	-	1	2	3	3	4	4	5
6e	≥ 98 AFUE heating system efficiency ^f	-	1	3	4	4	5	5	6
7a	≥ 8.8 HSPF heating system efficiency ^f	-	-	-	-	-	-	-	-
7b	≥ 9.5 HSPF heating system efficiency ^f	-	-	1	2	2	2	2	1
7c	≥ 10.5 HSPF heating system efficiency ^f	-	1	2	4	4	5	4	3
7d	≥ 3 COP heating system efficiency ^f	-	1	2	3	3	4	3	2
7e	≥ 3.5 COP heating system efficiency ^f	-	2	4	6	6	8	7	6
7f	≥ 4 COP heating system efficiency ^f	-	2	5	8	9	10	10	9
8a	≥ 0.7 EF for fossil fuel service water heating system	2	2	1	-	-	-	-	-
8b	≥ 0.8 EF for fossil fuel service water heating system	7	5	4	3	2	2	2	1
8c	≥ 0.95 EF for electric service water heating system	-	-	-	-	-	-	-	-
8d	≥ 1.15 EF for electric service water heating system	7	7	7	4	5	3	3	2
8e	≥ 0.4 Solar Fraction for service water heating system	8	9	9	7	9	6	5	4

a. Climate Zone 4C is Climate Zone Marine 4.

b. The Total UA shall be calculated in accordance with Section R402.1.4 Total UA alternative.

c. Minimum Heat Recovery Ventilator (HRV) and Energy Recovery Ventilator (ERV) requirements, measured at the lowest tested net supply airflow, shall be ≥ 75% Sensible Recovery Efficiency (SRE), ≤ 1.1 W/CFM Fan Energy and shall not use recirculation as a defrost strategy. In addition, the Energy Recovery Ventilator (ERV) shall be ≥ 50% Latent Recovery/Moisture Transfer (LRMT).

d. To achieve 100% of the thermal distribution located in the actively conditioned space, no ducts or pipes used for the heating and cooling systems shall be located within walls or ceilings where losses are not directly regained into the conditioned space.

e. For multiple cooling systems, all systems shall meet or exceed the minimum efficiency requirements in Table R406.3.3 and shall be sized to serve 100% of the cooling design load. As an alternative, each system installed shall receive credit for the percentage of the Flex Points for the measure equal to the percentage of the cooling design load served by the system.

f. For multiple heating systems, all systems shall meet or exceed the minimum efficiency requirements in Table R406.3.3 and shall be sized to serve 100% of the heating design load. As an alternative, each system installed shall receive credit for the percentage of the Flex Points for the measure equal to the percentage of the heating design load served by the system.

Revise as follows:

SECTION R202 (IRC N1101.9) GENERAL DEFINITIONS

CONDITIONED SPACE. An area or room within a building that is either *actively conditioned space* or *passively conditioned space* being heated or cooled, containing uninsulated ducts, or with a fixed opening directly into an adjacent conditioned space.

ACTIVELY CONDITIONED SPACE. An area within a *building thermal envelope* that is directly heated or cooled, including any habitable room.

PASSIVELY CONDITIONED SPACE. An area within a *building thermal envelope* that is not directly heated or cooled, including wall cavities, floor cavities, ceiling cavities, storage rooms, closets, non-habitable attic, non-habitable basement, crawlspace, spaces or cavities that contain uninsulated ducts or thermal distribution systems or have an opening directly into an adjacent conditioned space.

Reason: The purpose of this code change is to establish a new mandatory section to achieve additional energy efficiency. This proposal will allow builders the flexibility to choose from a menu of options to achieve 5% or more in energy savings beyond compliance with the current prescriptive or performance paths in the 2012 *IECC*. The new mandatory set of points-based options are predicated on the notion that because the current residential I-Codes require a solid foundation of “whole house” efficiency features, builders should have flexibility to determine the improvements that add onto that foundation. In addition to bringing about a reasonable, but modest, improvement in energy efficiency in the 2015 *IECC*, the proposal will also lay the groundwork for emerging technologies and future improvements to the code. Similar options-based approaches are currently found in both the commercial provisions of the 2012 *IECC* (section C406) and in residential codes adopted in a number of states. As discussed below, this proposal improves the *IECC* in at least five important ways:

The proposal improves the overall energy efficiency of the *IECC* and *IRC* by about five percent, reducing the home’s energy consumption and homeowner operating costs.

From a national energy policy standpoint, the need to improve the efficiency of America’s buildings has not changed. Because buildings continue to consume over 50% of the natural gas and over 70% of the electricity consumed in America, the nation’s building codes should incorporate reasonable measures to reduce energy use and peak demand wherever feasible. The residential requirements of the 2012 *IECC* represent significant improvements over previous editions of the code, and we believe that an additional 5% improvement in efficiency in the 2015 *IECC* is not only feasible, but is crucial to sound national energy policy and our nation’s energy future. Each new building and substantial addition should bring the country one step closer to our national goal of energy independence.

In addition, energy efficient construction generates significant operating savings that quickly recoup the incremental cost of these improvements to new homebuyers. For example, when the US Department of Energy compared homes built to the 2012 *IECC* with homes built to the 2006 *IECC*, average homeowner life-cycle (30-year) cost savings ranged from \$4,763 in Climate Zone 2 (the lowest savings in all climate zones) to \$33,105 in Climate Zone 8 (the highest savings). And, even after accounting for the incremental up-front costs of mortgage fees and down payment, a homeowner’s cumulative cash flow became positive within a year or two in all eight climate zones.

The proposal creates a highly flexible method to achieve additional energy savings that would be difficult to require in the current *IECC* and *IRC* structure.

Although there are many possible improvements beyond the 2012 *IECC*, some of these improvements would be impractical or difficult to include as prescriptive requirements at this time. For example, some emerging technologies may save energy, but because of limited availability, high cost, or federal laws, it may not be reasonable – or even legal – to require these technologies in every building. The *IECC* does not currently have an organized method for recognizing specific prescriptive options beyond the baseline requirements.

This proposal creates an approach and format that recognizes the energy savings potential of a range of systems and building features that otherwise would not be feasible to include in the baseline requirements at this time. For example, the proposal includes high-efficiency heating, cooling, and water heating options that could not be required outright because of federal preemption issues. The proposal also includes envelope-only measures that reward builders for going well beyond the current code requirements. The result is a reasonably flexible system of options that builders can choose from that goes beyond the 2012 *IECC* and *IRC*, provides incentives for good building practice and technologies, and gives jurisdictions an easily-adaptable, and easy to administer method to set ever-improving efficiency requirements.

The proposal lays the groundwork for future improvement in the code by establishing a structure for both prescriptive- and performance-based compliance options.

In order to maximize flexibility and prepare for future improvements to the code, this proposal establishes multiple methods of compliance for new buildings and additions of more than 1,000 square feet (smaller additions, alterations, renovations and repairs are currently proposed to be exempt to keep the proposal simpler).

- For code users who prefer a straightforward points-based approach to code compliance, Section R406 outlines a number of options for each climate zone that can be combined for a total of at least 5 points. Each point represents roughly a one percent decrease in the present value of energy costs over the life of the building (so 5 points equal roughly a 5% improvement in efficiency over the 2012 *IECC*).
- For code users who wish to use the simulated performance alternative in Section R405, the proposal also allows compliance where the proposed design demonstrates an energy cost less than or equal to 95% of the standard reference design. The proposal also allows compliance with the points system so long as the user does not “double count” in its performance analysis any improvements used in points compliance.
- Section R406 also creates a new option to demonstrate compliance through installation of renewable energy systems.

These compliance options can be easily updated in the future. For example, as additional technologies and building practices are improved in the future, these technologies can be added to the table, along with a corresponding point value, without a total rewrite of the code.

Points have been calculated based on the present value of energy cost savings over the current code (with recognition of relevant federal equipment standards), after reflecting the estimated useful life of each measure and an assumed 30-year life of the building for purposes of the analysis (consistent with a 30-year mortgage). This approach factors in the durability and useful life of each additional option chosen, recognizing that it is not the energy cost savings in the first year that is critical, but the cost savings over the life of the home that is most important. Although no building energy simulation on this scale will be perfect, the analysis behind the Flex Points tables is among the most sophisticated and detailed of its type. The analysis used the Department of Energy building analysis and present value calculation methodology, which will allow for easy updates to the table in the future. The analysis includes 105 TMY3 weather locations and 12 building types to account for varying stories, foundations and fuel types for each of the baseline and upgrade measures.

The proposal creates incentives for code users to consider installing high-efficiency heating, cooling, and water heating systems, as well as other alternatives, without degrading the thermal building envelope or violating federal law.

Code-writing organizations have long wrestled with the dilemma of how to incorporate high-efficiency heating, cooling, and water heating requirements into the code without violating federal law and without sacrificing improvements to the thermal envelope in return. In past code cycles, EECC was instrumental in removing the equipment trade-offs from the code to resolve the issues these trade-offs and the federal laws created. We remain strongly committed to that approach today. However, this proposal takes the next step by leaving the 2012 IECC baseline requirements intact, while offering code users the choice of equipment upgrades among several other potential improvements beyond the baseline requirements.

The proposal includes three Flex Points tables that correspond with current requirements and expected changes to HVAC equipment efficiency in the coming years. Although we hope to see improvements in federal efficiency standards for heating and cooling equipment take effect in the near future, it is not yet clear when (or in some cases if) new requirements that have been developed by U.S. DOE will actually become effective. It would not be appropriate to award "credit" for a measure already required by federal law. And U.S. DOE is working to replace national standards with regional-based standards that will vary from one region to the next.

The proposal addresses these complications in a relatively simple way. The point values in each table under Section R406 have been set according to the energy savings that would result based on a specific equipment efficiency baseline in all climate zones. The first table, Table R406(a), establishes a baseline set of the heating and cooling equipment efficiencies reflective of current efficiencies. When federal minimum efficiencies are increased for specific heating and/or cooling equipment, as is reflected under the latest federal rule, states will apply the appropriate table. The choice of tables will allow states to apply the appropriate Flex Points without recalculating the savings for each individual measure.

The proposal allows jurisdictions to "try out" a wide variety of efficiency measures that would be difficult to require as prescriptive requirements.

Innovative building practices or emerging technologies can benefit from being listed in state and local building codes. However, states may have difficulty prescriptively requiring new technologies or building practices for all homes that are not yet widely available. For example, ground-source heat pumps can offer significant energy savings, but because of geological features or regulatory issues, they may not be appropriate in all circumstances. The proposal above provides an incentive to consider installing a ground source heat pump as one of several compliance options under Section R406, but also offers many other comparable options or combinations of such options to achieve the same level of savings.

By incorporating several of these practices and technologies among the multiple options of Section R406, the proposal above essentially gives these emerging technologies and practices a foothold, and allows consumers and the market to determine the most feasible options for any given project. As emerging technologies become more mainstream, Section R406 may also be a good source for additional improvements to the prescriptive baseline in future code editions.

Cost Impact: The code change proposal will increase the cost of construction.

RE186-13

Public Hearing: Committee:
Assembly:

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R401.2-EC-DEAN-HARRIS-MISURELLO-PRINDLE-STONEFNF-bd2(2).DOC

RE187 – 13

R401.2 (IRC N1101.15), R406 (NEW) (IRC N1106 NEW), R406.1 (NEW) (IRC N1106.1 NEW), Table R406.1 (NEW) (IRC N1106.1 NEW)

Proponent: Eric Makela, Britt/Makela Group, Inc., representing Northwest Energy Codes Group (Eric@BrittMakela.com)

Revise as follows:

R401.2 (N1101.15) Compliance. ~~Projects shall comply with Sections identified as “mandatory” and with either sections identified as “prescriptive” or performance approach in Section R405.~~ Residential buildings shall comply with one of the following:

1. The requirements of Section R402.1, Section 406, and all sections identified as “mandatory”.
2. The requirements of Section R405 and all sections identified as “mandatory”. The proposed design shall be equal to or less than 95 percent of the standard reference design building.

SECTION R406 **ADDITIONAL PRESCRIPTIVE EFFICIENCY MEASURES**

R406.1 (N1106.1) Additional efficiency measures. Each dwelling unit shall include one of the measures described in Table R406.1.

Exceptions:

1. Residential buildings which include a ground or water source heat pump with minimum COP meeting the requirements of Table C403.2.3(2).

TABLE R406.1 (N1106.1)
ADDITIONAL EFFICIENCY MEASURES
CLIMATE ZONES 1, 2 and 3

<u>MEASURE</u>	
1	<u>HIGH EFFICIENCY HVAC SYSTEM:</u> <u>SEER 16 Air Conditioner and 95 percent AFUE or</u> <u>SEER 18 and 10.5 HSPF</u>
2	<u>HIGH EFFICIENCY WATER HEATING:</u> <u>Gas water heater for all water heater end uses, EF – 0.80, or</u> <u>Electric water heater for all water heater end uses, EF – 1.15</u>
3	<u>SOLAR HOT WATER</u> <u>Solar Domestic Hot Water with a minimum 0.4 Solar Fraction</u>
4	<u>ENVELOPE AND LIGHTING OPTION::</u> <u>Total UA 10% above the minimum code UA</u>
5	<u>ENVELOPE OPTION:</u> <u>Ceiling with cool roof with the following characteristics:</u> <ul style="list-style-type: none">• <u>Three-year aged solar reflectance^b of 0.55 and three-year aged thermal emittance^b of 0.75, or</u>• <u>Initial solar reflectance^b of 0.70 and initial thermal emittance^b of 0.75, or</u>• <u>Three-year-aged solar reflectance index^c of 64, or</u>• <u>Initial solar reflectance index^c of 82</u>
6	<u>HIGH EFFICIENCY HVAC DISTRIBUTION SYSTEM:</u> <u>All heating and cooling system components installed inside the conditioned space. All combustion equipment shall be direct vent or sealed combustion.</u> <u>Not qualifying: Systems utilizing electric resistant heat, including baseboard and furnace, as the primary heat source.</u>

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CLIMATE ZONES 4, MARINE 4, and 5	
MEASURE	
1	<u>HIGH EFFICIENCY HVAC SYSTEM:</u> <u>Air-source heat pump with minimum HSPF of 10.5</u>
2	<u>ENVELOPE UA:</u> <u>The proposed building envelope shall have a total UA at least 10 percent less than the code target UA as calculated using Table 402.1.4 and Section 402.1.4 Total UA alternative.</u>
3	<u>REDUCED AIR LEAKAGE ENVELOPE:</u> <u>AIR LEAKAGE CONTROL AND EFFICIENT VENTILATION:</u> <u>Reduce the tested air leakage to 2.0 air changes per hour maximum.</u> <u>and</u> <u>All whole house ventilation requirements as determined by Section M1507.3 of the International Residential Code shall be met with a heat recovery ventilation system with minimum sensible heat recovery efficiency of 0.75.</u>
4	<u>HIGH EFFICIENCY HVAC DISTRIBUTION SYSTEM:</u> <u>All heating and cooling system components installed inside the conditioned space. All combustion equipment shall be direct vent or sealed combustion.</u> <u>Not qualifying: Systems utilizing electric resistant heat, including baseboard and furnace, as the primary heat source.</u>
5	<u>HIGH EFFICIENCY WATER HEATING.</u> <u>Water heating system includes one of the following:</u> <u>Gas, propane, or oil water heater with a minimum EF of 0.80 or</u> <u>Electric water heater with a minimum EF of 1.15</u>
6	<u>SOLAR HOT WATER</u> <u>Solar Domestic Hot Water with a minimum 0.4 Solar Fraction</u>
CLIMATE ZONES 6, 7 & 8	
MEASURE	
1	<u>HIGH EFFICIENCY HVAC SYSTEM:</u> <u>Gas propane or oil-fired furnace or boiler with minimum AFUE of 98 percent, or</u> <u>Air-source heat pump with minimum HSPF of 10.5</u>
2	<u>ENVELOPE UA:</u> <u>The proposed building envelope shall have a total UA at least 10 percent less than the code target UA as calculated using Table 402.1.4 and Section 402.1.4 Total UA alternative</u>
3	<u>REDUCED AIR LEAKAGE ENVELOPE:</u> <u>Reduce the tested air leakage to 2.0 air changes per hour maximum.</u> <u>and</u> <u>All whole house ventilation requirements as determined by Section M1507.3 of the International Residential Code shall be met with a heat recovery ventilation system with minimum sensible heat recovery efficiency of 0.75.</u>
4	<u>HIGH EFFICIENCY HVAC DISTRIBUTION SYSTEM:</u> <u>All heating and cooling system components installed inside the conditioned space. All combustion equipment shall be direct vent or sealed combustion.</u> <u>Not qualifying: Systems utilizing electric resistant heat, including baseboard and furnace, as the primary heat source.</u>
5	<u>HIGH EFFICIENCY WATER HEATING AND HIGH EFFICACY LIGHTING:</u> <u>Water heating system includes one of the following:</u> <u>Gas, propane, or oil water heater with a minimum EF of 0.80 or</u> <u>Electric Heat Pump Water Heater with a minimum EF of 1.15.</u> <u>and</u>

	<u>90% High efficacy lighting in accordance with Section R404.1</u>
<u>6</u>	<u>SOLAR HOT WATER</u> <u>Solar Domestic Hot Water with a minimum 0.4 Solar Fraction</u>

Reason: This proposal increases the efficiency of new residential construction approximately 5% above that of a base-case residence meeting the 2012 IECC. The innovative feature of this proposal is the inclusion of menus from which users must pick a fixed number of items. This approach was successfully incorporated into the Oregon residential code and also is the basis for the Washington State residential code. There have been no problems to date implementing the Oregon code.

The current prescriptive format in the IECC has significant limitations on increases to residential building efficiency. Only minimal gains are available for envelope, mechanical, water heating, and lighting efficiency. In order for future versions of the IECC to advance increased efficiency in residential construction, new user-friendly and enforceable code formats must be considered. This proposed code format provides the following benefits:

- Provides flexibility for designers and builders;
- Contains a limited number of discrete option items that are understandable and enforceable which will result in high compliance rates.
- Has a proven track record in Oregon

The options in this table include technologies that are currently available in the market. The code user can have the option of increasing the efficiency of the building envelope, installing a more efficient heating and/or cooling system, or installing a more efficient water heating system or solar hot water systems. Projects that include a ground or water source heat pump system already are not required to select an additional option. Analysis of the energy savings for each of the features was taken from extensive work in developing the Washington State Points system or from ICF analysis.

Cost Impact: The code change proposal will increase the cost of construction but will reduce the cost of operation.

RE187-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R401.2-EC-MAKELA

RE188 – 13

R202 (NEW) (IRC N1101.9 (NEW)), R401.2 (IRC N1101.15), R406 (NEW) (IRC N1106 NEW)

Proponent: Eric Makela, Britt Makela Group, Inc., David Goldstein, National Resource Defense Council (Eric@BrittMakela.com)

Revise as follows:

R401.2 (N1101.15) Compliance. Projects shall comply with Sections identified as “mandatory” and with either sections identified as “prescriptive”, ~~or the performance approach in Section R405-~~ or an Energy Rating Index (ERI) approach in Section R406.

SECTION R406 (N1106) **ENERGY RATING INDEX COMPLIANCE ALTERNATIVE**

R406.1 (N1106.1) Scope. This section establishes criteria for compliance using an Energy Rating Index analysis.

R406.2 (N1106.2) Mandatory requirements. Compliance with this section requires that the mandatory provisions identified in Section R401.2 and R403.4.2 be met. The building thermal envelope shall be greater than or equal to levels of efficiency and Solar Heat Gain Coefficient in Table 402.1.1 or 402.1.3 of the 2009 *International Energy Conservation Code*.

Exception: Supply and return ducts not completely inside the building thermal envelope shall be insulated to a minimum of R-6.

R406.3 (N1106.3) Energy rating index. The energy rating index (ERI) shall be a numerical integer value that is based on a linear scale constructed such that the *ERI reference design* has an Index value of 100 and a residential building that uses no net purchased energy has an Index value of 0. Each integer value on the scale shall represent a one percent (1%) change in the total energy use of the *rated design* relative to the total energy use of the *ERI reference design*. The ERI shall consider all energy used in the residential building.

R406.3.1 (N1106.3.1) ERI reference design. The *ERI reference design* shall be configured such that it meets the minimum requirements of the 2006 *International Energy Conservation Code* prescriptive requirements

The proposed residential building shall be shown to have an annual total normalized Modified Loads that are less than or equal to the annual total Loads of the *ERI reference design*.

R406.4 (N1106.4) ERI based compliance. Compliance based on an ERI analysis requires that the *rated design* be shown to have an ERI less than or equal to the appropriate value listed in Table R406.3, when compared to the *ERI reference design*.

TABLE R406.4 (N1106.4)
MAXIMUM ENERGY RATING INDEX

<u>Climate Zone</u>	<u>Energy Rating Index</u>
<u>1</u>	<u>52</u>
<u>2</u>	<u>52</u>
<u>3</u>	<u>51</u>
<u>4</u>	<u>54</u>
<u>5</u>	<u>55</u>

<u>6</u>	<u>54</u>
<u>7</u>	<u>53</u>
<u>8</u>	<u>53</u>

R406.5 (N1106.5) Verification by approved agency. Verification of compliance with Section R406 shall be completed by an approved third party.

R406.6 (N1106.6) Documentation. Documentation of the software used to determine the energy rating index and the parameters for the residential building shall be in accordance with Sections R406.6.1 through R406.6.3.

R406.6.1 (N1106.6.1) Compliance software tools. Documentation verifying that the methods and accuracy of the compliance software tools conform to the provisions of this section shall be provided to the code official.

R406.6.2 (N1106.6.2) Compliance report. Compliance software tools shall generate a report that documents that the energy rating index of the *rated design* complies with Sections R406.3 and R406.4. The compliance documentation shall include the following information:

1. Address or other identification of the residential building;
2. An inspection checklist documenting the building component characteristics of the *rated design*. The inspection checklist shall show results for both the *ERI reference design* and the *rated design*, and shall document all inputs entered by the user necessary to reproduce the results;
3. Name of individual completing the compliance report; and
4. Name and version of the compliance software tool.

Exception: Multiple orientations. When an otherwise identical building model is offered in multiple orientations, compliance for any orientation shall be permitted by documenting that the building meets the performance requirements in each of the four cardinal (north, east, south and west) orientations.

R406.6.3 (N1106.6.3) Additional documentation. The code official shall be permitted to require the following documents:

1. Documentation of the building component characteristics of the *ERI reference design*.
2. A certification signed by the builder providing the building component characteristics of the *rated design*.
3. Documentation of the actual values used in the software calculations for the *rated design*.

R406.7 (N1106.7) Calculation software tools. Calculation software, where used, shall be in accordance with Sections R406.7.1 through R406.7.3.

R406.7.1 (N1106.7.1) Minimum capabilities. Calculation procedures used to comply with this section shall be software tools capable of calculating the energy rating index as described in Section R406.3, and shall include the following capabilities:

1. Computer generation of the *ERI reference design* using only the input for the *rated design*. The calculation procedure shall not allow the user to directly modify the building component characteristics of the *ERI reference design*.
2. Calculation of whole-building, as a single *zone*, sizing for the heating and cooling equipment in the *ERI reference design* residence in accordance with Section R403.6.
3. Calculations that account for the effects of indoor and outdoor temperatures and part-load ratios on the performance of heating, ventilating and air-conditioning equipment based on climate and equipment sizing.

4. Printed *code official* inspection checklist listing each of the *rated design* component characteristics determined by the analysis to provide compliance, along with their respective performance ratings.

R406.7.2 (N1106.7.2) Specific approval. Performance analysis tools meeting the applicable sections of Section R406 shall be *approved*. Tools are permitted to be *approved* based on meeting a specified threshold for a jurisdiction. The *code official* shall approve tools for a specified application or limited scope.

R406.7.3 (N1106.7.3) Input values. When calculations require input values not specified by Sections R402, R403, R404 and R405, those input values shall be taken from an *approved* source.

Add new definitions as follows:

RATED DESIGN. A description of the proposed building used to determine the energy rating index.

ERI REFERENCE DESIGN. A version of the *rated design* that meets the minimum requirements of the 2006 *International Energy Conservation Code*.

Reason: The residential provisions of the IECC allows for varying methods for demonstrating compliance with the code. This includes both a prescriptive and simulated performance option in addition to allowing efficiency programs that are designed to go above the minimum code levels as “deemed to comply” programs. These above code programs must be approved by the code official to be used in the jurisdiction. Alternative programs that depend on an Energy Rating Index (ERI) have been approved as an alternative code or above code program in at least 6 states and in over 130 jurisdictions. These types of programs typically take the form of a Home Energy Rating System (HERS) program. Under the current code there is no guidance on setting Energy Rating Index scores, which will lead to inconsistent application of these types of programs based on climate zones.

The goal of this proposal is to introduce an Energy Rating Index with established rating numbers into the code that will allow alternative programs to be designed to meet these criteria. The proposal provides guidelines for the development of the index, documentation provided to ensure compliance and a requirement that an approved 3rd party verify that the building complies with the applicable Energy Rating Index. The reference house is based on a home built to the 2006 IECC which is consistent with ERI based programs.

The 2009 IECC residential envelope requirements have been set as the least efficient level of efficiency for potential trade-offs to ensure that minimum levels of efficiency that have proven to be cost effective are installed in all buildings and that some flexibility is allowed in the approach to alternative designs. This proposal also requires complying with the applicable mandatory requirements to be consistent with the Above Code section in the IECC. And because energy losses in the domestic hot water distribution system fall outside the scope of the energy rating index as it can be calculated with 2013 methodology, current code provisions relating to hot water pipe insulation are mandatory as well. We anticipate that these requirements can be folded into the energy rating index for the 2018 IECC and thus removed from the mandatory sections then.

This proposal is intended to produce substantial additional energy savings compared to the current or proposed levels of prescriptive requirements in the 2015 IECC while allowing considerably greater flexibility to builders using a method with which a large segment of the market is already familiar. This flexibility is likely to result in lower construction costs for any given level of energy efficiency. Builders who do not make use of this proposed method are still able to comply with the Code can still use any of the existing compliance pathways.

Cost Impact: The code change proposal will not increase the cost of construction.

RE188-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R401.2-EC-GOLDSTEIN-MAKELA.DOC

RE189 – 13

R405.7 (NEW) (IRC N1105.7 (NEW))

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

Add new text as follows:

R405.7 (N1105.7) Optional performance compliance. This section establishes an alternative performance criteria. Compliance under Section R405.7 shall be as otherwise given in Section R405, except as specified in Section R405.7.

R405.7.1 (N1105.7.1) Annual energy cost. The annual energy cost for the proposed design shall be less than or equal to 98 percent of the annual energy cost for the standard reference design.

R405.7.2 (N1105.7.2) Modified standard reference design. Equipment efficiency in the standard reference design for Section R405.7 shall be modified as specified in Sections R405.7.2.1 through R405.7.2.3.

R405.7.2.1 (N1105.7.2.1) Heating. Electric heating systems shall utilize an air source heat pump with the efficiency of the prevailing federal minimum standard. Nonelectric furnace and boiler heating systems shall utilize the same fuel type as the proposed design with the efficiency of the prevailing federal minimum standard.

R405.7.2.2 (N1105.7.2.2) Cooling. Cooling systems shall be electric with the efficiency of the prevailing federal minimum standard.

R405.7.2.3 (N1105.7.2.3) Service water heating. Service water heating systems shall utilize the same fuel type as the proposed design with the efficiency of the prevailing federal minimum standard.

R405.7.3 (N1105.7.3) Modified mandatory requirements. The maximum envelope and duct leakage rates for the proposed design in Section R405.7 shall be as specified by R405.7.3.1 and R405.7.3.2. This section shall not modify the annual energy cost specified in Section R405.7.1.

R405.7.3.1 (N1105.7.3.1) Envelope leakage. The maximum building thermal envelop leakage rate shall be 7 air changes per hour at a pressure of 0.2 inches w.g (50 Pa).

R405.7.3.2 (N1105.7.3.2) Duct leakage. The maximum duct leakage shall be 8 cfm (113.3 L/min) per 100 square feet (9.29 m²) of conditioned floor area. Duct leakage shall be permitted to be measured as either total leakage or leakage to outside of conditioned space.

Reason: Many homeowners are interested in energy-efficient homes. Many builders are interested in constructing energy-efficient homes. Builders need to be permitted to construct homes that achieve the energy efficiency goal in the best way they know how.

The IECC's performance section has come to include artificial constraints that do not increase energy efficiency. At best these constraints force what some deem good energy-efficient design. At worst, these constraints are product manufacturer's attempts to increase their market share. The code should not determine the product market shares. Mandatory requirements should be driven by health, safety or durability. The overall energy use goal should be the main criteria for compliance based on performance.

This change makes three modifications to the performance calculation. This change allows the use of efficient heating, cooling, and service water heating equipment to achieve energy savings (new Section R405.7.2). This change relaxes the maximum envelope leakage and duct leakage requirements, without lowering the energy efficiency goals (R405.7.3). The energy costs allowed by the new R405.7 are reduced by 2% (R405.7.1).

The changes proposed here may be accomplished by other proposals. If so, this change would not be needed.

Cost Impact: This proposal adds options for cost-effective ways to achieve energy efficiency.

RE189-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R401.2 #2-EC-CONNER.DOC

RE190-13

R406 (New) (IRC N1106 (New))

Proponent: Robby Schwarz, EnergyLogic Inc., Representing EnergyLogic, Inc. (robby@nrglogic.com)

Add new text as follows:

SECTION R406 (N1106) **SIMULATED PERFORMANCE BY** **INDEX SCORE METHOD** **(PERFORMANCE)**

R406.1 (N1106.1) Scope. The simulated performance index score method in Section R406 shall be used for determining that a building complies with this code. Such methods shall include a whole house energy analysis resulting in comparative index scores.

R406.2 (N1106.2) Mandatory requirements. Use of the simulated performance index score alternative method for compliance to this code shall require all of the following:

1. Design and construction of the building in compliance with sections in this code that are indicated as mandatory.
2. Inspections, required for the generation of an index score, are performed including, but not limited to, inspection, by the entity or person performing the energy analysis, of insulation systems and air barriers prior to concealment.
3. Supply and return ducts not completely inside the *building thermal envelope* are insulated with not less than an *R-value* of R-8.
4. Ductwork, that is either partially or completely within the thermal layer of the wall system of the *building thermal envelope*, shall have insulation of a *R-value* of not less than R-10 on the side of the duct that is away from the conditioned space. Where the duct is in a wall cavity and the R-10 insulation does not completely fill the cavity, the remaining cavity space shall be filled with insulation to the extent that the requirement for insulating the exterior wall of the building is met or the cavity space is completely filled, whichever is less. Ductwork, that is either partially or completely within the thermal layer of a floor system of the *building thermal envelope*, shall have insulation of a *R-value* of not less than R-19 on the side of the duct that is away from the conditioned space. Floor cavity insulation shall be installed in accordance with Section R402.2.7. Where the duct is in a floor cavity and the R-19 insulation does not completely fill the cavity, the remaining cavity space shall be filled with insulation to the extent that the requirement for insulating the floor system of the building is met or the cavity space is completely filled, which ever is less.

R406.3 (N1106.3) Performance-based compliance. The proposed building (*proposed design*) shall be complaint with this code where the index score generated by the energy analysis is less than or equal to the index score of the *standard reference design*. The *standard reference design* index score shall be determined by analyzing a building of identical geometry to the proposed building that has the features indicated in the *standard reference design* column of Table R405.5.2(1). The index score of the proposed design shall be calculated in accordance with RESNET Standards.

R406.3.1 (N1106.3.1) Compliance software tools. Software tools used to determine code compliance by the simulated performance index score method shall be accredited by the Residential Energy Services Network organization. Documentation showing the software accreditation shall be provided to the *code official*.

R406.4 (N1106.4) Compliance report and other documentation. Compliance reports and other documentation shall be provided in accordance with Sections R406.4.1 through R406.4.3. A compliance

report on the *proposed design* shall be submitted with the application for the building permit. Upon completion of the building, a compliance report based upon the as-built condition of the building, shall be submitted to the *code official* before a certificate of occupancy is issued by the *code official*. Batch sampling of buildings to determine energy code compliance for all buildings in the batch shall be prohibited.

Compliance reports shall include information in accordance with Sections R405.4.2.1 and R405.4.2.2. Where the *proposed design* of a building could be built on different sites where the cardinal direction orientation of the building on each site is different, compliance of the *proposed design* for the purposes of the application for the building permit, shall be based upon the worst case orientation worst case configuration, worst case building air leakage and worse case duct leakage. Such worse case parameters shall be used as inputs to the compliance software for energy analysis.

R406.4.1 (N1106.4.1) Compliance report for permit application. A compliance report submitted with the application for building permit shall include all of the following:

1. Building street address, or other building site identification.
2. A statement indicating that the *proposed design* complies with Section R405.3.
3. An inspection checklist documenting the building component characteristics of the *proposed design* as indicated in Table R405.5.2(1). The inspection checklist shall show results for both the *standard reference design* and the *proposed design* with all user inputs to the compliance software to generate the results.
4. A site-specific energy analysis report that is in compliance with Section R405.3
5. Name of the individual performing the analysis and generating the report.
6. Name and version of the compliance software tool.

R406.4.2 (N1106.4.2) Compliance report for certificate of occupancy. A compliance report submitted for obtaining the certificate of occupancy shall include all of the following:

1. Building street address, or other building site identification
2. A statement indicating that the as-built building complies with Section R405.3.
3. A certificate indicating that the building meets the requirements of the home energy rating system, HERS, index matrix of the RESNET Standards for code compliance and the energy saving features of the buildings.
4. A site-specific energy analysis report that is in compliance with Section R405.3.
5. Name of the individual performing the analysis and generating the report.
6. Name and version of the compliance software tool.

R406.4.3 (N1106.4.3) Additional documentation. Upon request by the *code official*, the following documentation shall be provided along with compliance reports to the *code official*:

1. Documentation of the building component characteristics of the *standard reference design*.
2. A certification statement, signed by the builder, that lists the *proposed design* building component characteristics indicated in Table R405.5.2(1).

R406.5 (N1106.5) Calculation procedure. Calculations of the energy performance of a building design shall be in accordance with Sections R406.5.1 and R406.5.2.

R406.5.1 (N1106.5.1) Identical methods. The *standard reference design* and *proposed design* shall be configured and analyzed using identical methods and techniques to generate a separate index score for each configuration of the building. The methods and techniques shall be in accordance with the home energy efficiency rating system, HERS, guidelines in the RESNET Standards.

R406.5.2 (N1106.5.2) Building design specifications. The *standard reference design* and *proposed design* shall be configured and analyzed as indicated in Table R405.5.2(1).

R406.6 (N1106.6) Calculation software tools. Calculation software shall be in accordance with Sections R406.6.1 through R406.6.3.

R405.6.1 (N1106.6.1) Minimum capabilities. Software tools shall be capable of calculating the index score of all building elements that differ between the *standard reference design* and the *proposed design*. The software shall have the following capabilities:

1. Computer generation of a report for the *standard reference design* using only the input for the *proposed design*. The calculation software shall prohibit the user from directly modifying the building component characteristics of the *standard reference design*.
2. Calculation of whole-building sizing, as a single zone, for the heating and cooling equipment in the *standard reference design* building in accordance with Section R403.6.
3. Calculations that account for the effects of indoor and outdoor temperatures and part-load ratios on the performance of heating, ventilating and air-conditioning equipment based on climate and equipment sizing.
4. Printing an inspection checklist for the *code official* that lists the characteristic of each of the *proposed design* components indicated in Table R405.5.2(1) that was used to determine compliance. The component characteristics shall include the performance rating for the component such as, but not limited to, *R-value*, *U-factor*, *SHGC*, heating seasonal performance factor-HSPF, annual fuel utilization efficiency-AFUE, seasonal energy efficiency ratio-SEER and energy factor-EF.

R406.6.2 (N1106.6.2) Specific approval. Energy performance analysis tools that do not have accreditation by the Residential Energy Services Network organization shall comply with all other requirements of Section 406 and such tools shall only be used where the tool is *approved*.

R406.6.3 (N1106.6.3) Input values. Where calculations or software programs require input values that are not specified in Sections R402, R403, R404, R405 and R406, the input values used shall be only from *approved sources*.

Add new standard to Chapter 5 as follows:

Residential Energy Services Network, Inc.
P.O. Box 4561
Oceanside, CA 92052-4561

RESNET

RESNET Standards-2013 RESNET Mortgage Industry National Home Energy Rating Standards.

Reason: The current annual energy cost matrix for demonstrating code compliance is flawed and may demonstrate that a house that should pass the energy code, based on actual geometry and energy specifications, may not only because the energy costs in a region have changed. More and more jurisdiction and builders across the country are turning to performance index scores to represent the efficiency of a home and to demonstrate code compliance. Performance scores in and of themselves do not necessarily demonstrate code compliance. However, if the score is imposed on the existing structure of the code as this new alternative compliance path section 406 does, the score can reflect code compliance simply as a means of demonstrating passing and failing.

The current structure of the simulated performance path requires that the mandatory sections of the IECC be complied with, thus ensuring that house performance is maintained and that the score is only a measure to demonstrate compliance. In addition, this new section 406 utilizes the code reference home as described in table 405.5.2(1) and therefore energy code compliance utilizing this pathway will have a score that is variable for each qualified home. This is accomplished through the 2015 IECC Reference Design outlined in table 405.5.2(1). When the builder's proposed designed home is configured with the IECC reference design features and modeled using approved software, the resulting score becomes the basis for the performance score target for that home.

The EPA Energy Star program and the DOE Challenge Home program utilize this same matrix for demonstrating qualification for their programs and have demonstrated that the compliance path described in this new section 406 will set the score target for the performance path equal to the performance that would be achieved if the prescriptive path was followed for each individual home.

In this way jurisdictions can avoid developing a fixed value, or performance index score, which really has no bearing on compliance and instead set the index score threshold required for energy code compliance at the same value that the same house would earn if configured to the IECC prescriptive path, as outlined in table 405.5.2(1) Reference Design.

** Footnote to Energy Star and DOE Challenge Home program documents

Jurisdiction, Builders, third party inspection companies and others are not clear of the process for completing and utilizing the simulated performance path. With all pathways through the energy code one must in essence declare how they will meet the intent of the code. For the prescriptive path they simply say they are going prescriptive, for the UA trade off path they submit a document such as a RESCheck report, and for the simulated performance path they must currently submit a document demonstrating that the annual energy cost of the proposed design are less than or equal to the same home if it were built with the reference design specification. It becomes unclear how one demonstrates that they have carried out their proposed design. The revisions proposed for this section clearly outlines a process by which the proposed design is submitted, inspections take place, and additional analysis is preformed to ensure that the proposed design was achieved or bettered for the purposes of compliance.

Field inspection, in order to create an accurate computer generated energy analysis, should be required for following reasons:

1. For production building a plan is often mastered and that one plan may be built over 100 times. To ensure that each house meets the performance analysis each home must be inspected.
2. Computer generated energy analysis' utilizes worst case configuration of the proposed design and requires evaluations and inputs that must be confirmed in the specific home that is built to ultimately determine if the actually built home meets the intent of the energy code. Examples of this are worst case air leakage and duct leakage numbers but also orientation, window square footage, number of bedrooms, and foundation type.
3. The reality is that houses built from a set of plans change. The actual built home may generally reflect the homes plans but window square footage, orientation, and even insulation and mechanical equipment are often different from what was proposed. The inspection process ensures that the energy analysis is address and site specific which ultimately ensures that the home that received its permit from the proposed design's energy analysis has carried out what they have proposed, which is to meet the intent of the code, even if each component of the home is not exactly the same as what was on the set of plans.

Cost Impact: The code change proposal will not increase the cost of construction more than is already done by the current section R405 simulated performance path.

Analysis: A review of the standards proposed for inclusion in the code, RESNET Standards, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

RE190-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R406T (NEW)-EC-SCHARZ.DOC

RE191 – 13

R402.1.2, R402.1.4 (IRC N1102.1.2, N1102.1.4)

Proponent: Darren Meyers, P.E., International Energy Conservation Consultants, LLC, consultant to Illinois Energy Office – Department of Commerce & Economic Opportunity (dmeyers@ieccode.com)

Revise as follows:

R402.1.2 (N1102.1.2) Sum of the R-values computation of insulation only. Only the insulation material used in layers, such as framing cavity insulation and continuous insulating sheathing, shall be summed to compute the component R-value. The manufacturer's settled R-value shall be used for blown or loose-fill insulation. Computed R-values shall not include an R-value for other building materials or air films or the thermal bridging effects of framing materials. Fenestration U-factors and SHGC requirements shall comply with Table R402.1.1.

R402.1.3 (N1102.1.3) U-factor alternative. An assembly with a U-factor equal to or less than that specified in Table R402.1.3 shall be permitted as an alternative to the R-value in Table R402.1.1.

R402.1.4 (N1102.1.4) Total UA alternative. If the total *building thermal envelope* UA (sum of U-factor times assembly area) is less than or equal to the total UA resulting from using the U-factors in Table R402.1.3 (multiplied by the same assembly area as in the proposed building), the building shall be considered in compliance with Table R402.1.1. The UA calculation shall be done using a method consistent with the ASHRAE *Handbook of Fundamentals* with R-values and U-factors consistent with ASHRAE 90.1 Normative Appendix 'A', and shall include the thermal bridging effects of framing materials in accordance with ASHRAE 90.1, Normative Appendix 'A'. The U-factor and SHGC requirements shall be met in addition to UA compliance.

Reason: The additions further clarify the intentions of the framers of the 2004 IECC Supplement Edition that Section R402.1.2 expressly prohibits the use of computed R-values of materials "other than insulation as tested" in accordance with the U.S. Federal Trade Commission R-value Rule (CFR Title 16, Part 460) [R303.1.4], or framing correction factors rooted in accepted engineering practice and the use of *approved* consensus standards. This specifically precludes Authorities Having Jurisdiction from employing Section R102 "Alternate Materials and Methods" to permit a solicitor to gain advantage outside the public forum and debate of the *ICC Code Development Process for the International Codes* (CP-28), or through an ICC-ES-facilitated, environmental criteria, to condone the use of R-values for other building materials or air films or the thermal bridging effects of framing materials under IECC Section R402.1.2.

Reference to the ASHRAE 90.1 Standard establishes neutral measurements of the efficiency of thermal envelope components, either "as tested" in accordance with the U.S. Federal Trade Commission R-value Rule (CFR Title 16, Part 460) [R303.1.4], including ASHRAE's research into established framing correction factors based on in-situ studies and accepted engineering practice.

In February 2012, at the conclusion of Illinois' required 9-month review process of the 2012 IECC, the Illinois Energy Code Advisory Council (ECAC) performed an analysis of four (4) alternative proposals submitted the Coalition for Fair Energy Codes (CFEC). American Plywood Association (APA) Trustees representing structural panel producing members of the APA, and including participation by the American Wood Council (AWC) formed the coalition in January 2011 to address the perceived notion that the 2012 IECC has the potential to reduce annual demand for OSB and plywood wall sheathing by approximately 20 percent, or close to 1 billion sq. ft. in a normal housing demand year.

The premise of these proposals was to seek alternative criteria for various wall configurations on the basis of equivalence with the prescriptive residential building thermal envelope R-value requirements of Table 402.1.1 using R-value computations and framing correction factors unrecognized by Section 402.1.1.

It was the conclusion of IECC LLC that CFEC methodologies made use of assumptions predisposed to product-bias or preferential treatment of particular materials, or assemblies of materials, and were not, in the end, neutral measurements of the efficiency of thermal envelope components, either "as tested" in accordance with the U.S. Federal Trade Commission R-value Rule (CFR Title 16, Part 460) [R303.1.4], or based on accepted engineering practice and the use of *approved* consensus standards.

It was also the conclusion of Illinois ECAC that the CFEC approach sought to re-argue a few of the unsuccessful public comments in opposition to code change proposals (EC13-09/10 and EC47-09/10) debated in public forum at the *ICC Code Development Process for the International Codes*.

On May 31, 2012, the ICC-Evaluation Service (ICC-ES) issued a peculiar and lesser publicized 30-day request for comment on a proposal for a new environmental criteria under the alternative criteria process entitled: *Environmental Criteria for Determination of Opaque Framed Wall Assemblies Deemed as Equivalent to the Prescriptive Building Thermal Envelope Tables of the International Energy Conservation Code*® (Subject EC115-0612-R1).

At hearings of the ICC-ES Environmental Committee, held October 1, 2012 at the Hilton St. Louis Frontenac, the Environmental Committee approved Subject EC115-1012-R2 by a vote of 4 -2 with one vote In Abstentia, despite clear language in

Section 402.1.2 to the contrary, and Interpretations from ICC-ES's parent company, the International Code Council and its technical staff as follows:



2009 IECC, Section
402.1.2 - R-value Coi



2009 IECC, Section
402.1.2 - R-value Coi



2009 IECC, Sections
402.1.3-402.1.4 - U-I

It was identified later that the proposal was solicited by Weyerhaeuser Company, one of the world's largest forest products companies, and a contributing company to CFEC.

In summary, without this change, the proposed Subject EC115, having been solicited by a proponent with bias, has the potential to create unnecessary loopholes and weaknesses in the *International Energy Conservation Code* (potentially dating to its former editions, circa IECC 2004). Furthermore, the proposed Subject EC115-0612-R1 could distance the IECC and Illinois (as with other states and U.S. territories adopting the 2009 or 2012 IECC Editions) from our Governors' assurances to the U.S. Department of Energy under Section 410 of the American Recovery and Reinvestment Act of 2009 (H.R. 1) (ARRA) as a condition of receiving funding for State Energy Programs (SEP).

Cost Impact: The code change proposal will not increase the cost of construction.

RE191-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.1.2-EC-MEYERS

RE192 – 13

R202, R403.5, R403.5.2 (New) through R403.5.7 (New) , Table R403.5.6(1) (New) (IRC Table N1103.5.6(1)(New), Table R403.5.6(2) (New)

Proponent: Darren Meyers, P.E., International Energy Conservation Consultants, LLC, consultant to Illinois Energy Office – Department of Commerce & Economic Opportunity (dmeyers@ieccode.com)

Revise as follows:

SECTION R202 GENERAL DEFINITIONS

LOCAL EXHAUST. An exhaust system that uses one or more fans to exhaust air from a specific room or rooms within a dwelling.

WHOLE HOUSE MECHANICAL VENTILATION SYSTEM. An exhaust system, supply system, or combination thereof that is designed in accordance with Section R403.5 to mechanically exchange indoor air for outdoor air when operating continuously or through a programmed intermittent schedule to satisfy the whole house ventilation rate. Outdoor air intakes and exhausts shall have automatic or gravity dampers that close when the ventilation system is not operating.

Revise as follows:

R403.5 Mechanical ventilation (Mandatory). The building shall be provided with ventilation that meets the requirements of ~~the International Residential Code~~ this section or for Group R-2, R-3 and R-4 buildings, ventilation that meets the requirements of the International Mechanical Code, as applicable. Outdoor air intakes and exhausts shall have automatic or gravity dampers that close when the ventilation system is not operating.

R403.5.1 Whole-house mechanical ventilation system fan efficacy. Mechanical ventilation system fans shall meet the efficacy requirements of Table R403.5.1.

Exception: Where mechanical ventilation fans are integral to tested and listed HVAC equipment, they shall be powered by an electronically commutated motor.

R403.5.2 Recirculation of air. Exhaust air from bathrooms and toilet rooms shall not be recirculated within a residence or to another dwelling unit and shall be exhausted directly to the outdoors. Exhaust air from bathrooms and toilet rooms shall not discharge into an attic, crawl space or other areas inside the building.

R403.5.3 Whole-house mechanical ventilation system. Whole-house mechanical ventilation systems shall be designed in accordance with Sections R403.5.4 through R403.5.6.

R403.5.4 System design. The whole-house ventilation system shall consist of one or more supply or exhaust fans, or a combination of such, and associated ducts and controls. Local exhaust or supply fans are permitted to serve as such a system. Outdoor air ducts connected to the return side of an air handler shall be considered to provide supply ventilation.

R403.5.5 System controls. The whole-house mechanical ventilation system shall be provided with controls that enable manual override.

R403.5.6 Mechanical ventilation rate. The whole house mechanical ventilation system shall provide outdoor air at a continuous rate of not less than that determined in accordance with Table R403.5.6(1).

Exception: The whole-house mechanical ventilation system is permitted to operate intermittently where the system has controls that enable operation for not less than 25-percent of each 4-hour

segment and the ventilation rate prescribed in Table R403.5.6(1) is multiplied by the factor determined in accordance with Table R403.5.6(2).

TABLE R403.5.6(1)
CONTINUOUS WHOLE-HOUSE MECHANICAL VENTILATION SYSTEM AIRFLOW RATE REQUIREMENTS

DWELLING UNIT FLOOR AREA (square feet)	NUMBER OF BEDROOMS				
	0 – 1	2 – 3	4 – 5	6 – 7	> 7
	Airflow in CFM				
< 1,500	30	45	60	75	90
1,501 – 3,000	45	60	75	90	105
3,001 – 4,500	60	75	90	105	120
4,501 – 6,000	75	90	105	120	135
6,001 – 7,500	90	105	120	135	150
> 7,500	105	120	135	150	165

For SI: 1 square foot = 0.0929 m², 1 cubic foot per minute = 0.0004719 m³/s.

[RMP] TABLE R403.5.6(2) (Table N1103.5.6(1))

INTERMITTENT WHOLE-HOUSE MECHANICAL VENTILATION RATE FACTORS^{a, b}

RUN-TIME PERCENTAGE IN EACH 4-HOUR SEGMENT	25%	33%	50%	66%	75%	100%
Factor ^a	4	3	2	1.5	1.3	1.0

a. For ventilation system run time values between those given, the factors are permitted to be determined by interpolation.

b. Extrapolation beyond the table is prohibited.

R403.5.7 Local exhaust rates. *Local exhaust* systems shall be designed to have the capacity to exhaust the minimum air flow rate determined in accordance with Table R403.5.7.

TABLE R403.5.7
**MINIMUM REQUIRED LOCAL EXHAUST RATES FOR
ONE- AND TWO-FAMILY DWELLINGS**

AREA TO BE EXHAUSTED	EXHAUST RATES
Kitchens	100 cfm intermittent or 25 cfm continuous
Bathrooms-Toilet Rooms	Mechanical exhaust capacity of 50 cfm intermittent or 20 cfm continuous

For SI: 1 cubic foot per minute = 0.0004719 m³/s.

Reason: As of January 1, 2013, the state of Illinois has made effective the 2012 Illinois Energy Conservation Code (2012 IECC) through the *Illinois Energy Efficient Building Act* [20 ILCS 3125], similar to what the States of Maryland and Minnesota, and various jurisdictions in Arizona (Glendale, Peoria, Pima County), Colorado (Vail), Kansas (Overland Park), Missouri (Kansas City), New Hampshire (Durham) and Texas (El Paso) have done ... *[[Not an all-inclusive list.]]*

For Illinois, The Act takes precedence over home-rule declarations in our state; even those of the City of Chicago. However, The Act does not usurp municipal or county authority to adopt a building code, more specifically the *International Residential Code* (IRC). As such, and over Illinois' required 9-month review process of the 2012 IECC, the Illinois Energy Code Advisory Council (ECAC) concluded that a technical infeasibility would amount from adopting energy efficiency codes like the 2012 IECC which require whole-house mechanical ventilation, coupled with existing and/or delayed municipal ordinances tied to editions of the IRC prior to 2012. The 2012 IRC is the only edition of the IRC which provides a whole-house mechanical ventilation solution for homes with air leakage rates less than 5 ACH50.

Accordingly for Illinois adoption of the 2012 IECC, and we suspect other states and municipalities considering 2015 IECC adoptions, the economy, coupled with an overall lack of political will and municipal indifference to the mandatory residential sprinkler requirements of the 2009 and 2012 editions of the IRC, a disconnect results for new homes subject to 2012 IECC for air tightness (5

ACH50 or less)—thus, whole-house mechanical ventilation—and antiquated IRC editions which have not kept pace with this approach and the resultant whole-house mechanical ventilation solution.

In summary, this change merely reproduces the appropriate technical provisions and appropriate code development committee maintenance duties to the 2015 IECC.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis. The provisions in this proposal are duplicated from Section M1507.3. The proponent chooses to propose this change only to the IECC-R, and not Chapter 11 of the IRC, to avoid possible ~~coordination problems~~ divergence of matching provisions already present with in the IRC – For example, Section M1507.3 of the IRC.

RE192-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.5-EC-MEYERS

RE193 – 13

R202 (IRC N1101.9), 403.10 (New) (IRC N1103.10 (New))

Proponent: Darren Meyers, P.E., International Energy Conservation Consultants, LLC, consultant to Illinois Energy Office – Department of Commerce & Economic Opportunity (dmeyers@ieccode.com)

Revise as follows:

SECTION R202 (N1101.9) GENERAL DEFINITIONS

COMBUSTION APPLIANCE ZONE (CAZ). A contiguous air volume within a building that contains a containing a Category I or II atmospherically-vented appliance or a Category III or IV direct vent or integral vent appliance drawing combustion air from inside of the building or dwelling unit. The CAZ includes but is not limited to, a mechanical closet, mechanical room, or the main body of a house or dwelling unit.

DRAFT. The pressure difference existing between the *appliance* or any component part and the atmosphere, that causes a continuous flow of air and products of *combustion* through the gas passages of the *appliance* to the atmosphere.

Mechanical or induced draft. The pressure difference created by the action of a fan, blower or ejector that is located between the *appliance* and the *chimney* or vent termination.

Natural draft. The pressure difference created by a vent or *chimney* because of its height, and the temperature difference between the *flue gases* and the atmosphere.

SPILLAGE. Combustion gases emerging from an appliance or venting system into the combustion appliance zone during burner operation.

Add new text as follows:

R403.10 (N1103.10) Worst-case testing of atmospheric venting systems. Buildings or dwelling units containing a Category I or II atmospherically-vented appliance; or a Category III or IV direct vent or integral vent appliance drawing combustion air from inside of the building or dwelling unit, shall have the Combustion Appliance Zone (CAZ) tested for spillage, acceptable draft and carbon monoxide (CO) in accordance with this Section. Where required by the *code official*, testing shall be conducted by an *approved* third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the *code official*. Testing shall be performed at any time after creation of all penetrations of the *building thermal envelope* and prior to final inspection.

Exception: Buildings or dwelling units containing only Category III or IV direct vent or integral vent appliances that do not draw combustion air from inside of the building or dwelling unit.

1. The enumerated test procedure below shall be followed during testSet all combustion appliances to the pilot setting or turn off the service disconnects for all combustion appliances. Close all exterior doors and windows and the fireplace damper. With the building or dwelling unit in this configuration, measure and record the baseline ambient pressure inside the building or dwelling unit CAZ. Compare the baseline ambient pressure of the CAZ to that of the outside ambient pressure, and record the difference (Pa).
2. Establish worst case by turning on the *clothes dryer* and all exhaust fans. Close all interior doors that make the CAZ pressure more negative. Turn on the air handler, where present, and leave on if as a result, the pressure in the CAZ becomes more negative. Check interior door positions again, closing only the interior doors that make the CAZ pressure more negative. Measure net change in pressure from the CAZ to outdoor ambient pressure,

correcting for the base ambient pressure inside the home. Record “worst case depressurization” pressure and compare to Table R403.10(1).

3. Where CAZ depressurization limits are exceeded under worst-case conditions according to Table R403.10(1), additional combustion air must be provided or other modifications to building air-leakage performance or exhaust appliances such that depressurization is brought within the limits prescribed in Table R403.10(1).

TABLE R403.10(1) (N1103.10(1))
CAZ DEPRESSURIZATION LIMITS

<u>VENTING CONDITION</u>	<u>LIMIT (Pa)</u>
<u>Category I, atmospherically-vented water heater</u>	<u>-2.0</u>
<u>Category I or II atmospherically-vented boiler or furnace common-vented with a Category I atmospherically-vented water heater</u>	<u>-3.0</u>
<u>Category I or II atmospherically-vented boiler or furnace, equipped with a flue damper, and common-vented with a Category I atmospherically-vented water heater</u>	<u>-5.0</u>
<u>Category I or II atmospherically-vented boiler or furnace alone</u>	
<u>Category I or II atmospherically-vented, fan-assisted boiler or furnace common-vented with a Category I atmospherically-vented water heater</u>	
<u>Decorative vented, gas appliance</u>	
<u>Power vented or induced-draft boiler or furnace alone, or fan assisted water heater alone</u>	<u>-15.0</u>
<u>Category IV direct vented appliances and sealed combustion appliances</u>	<u>-50.0</u>

For SI: 6894.76 Pa = 1.0 psi.

1. Measure worst case spillage, acceptable draft, and carbon monoxide (CO) by firing the fuel-fired appliance with the smallest Btu capacity first.
 - a. Test for spillage at the draft diverter with a mirror or smoke puffer. An appliance that continues to spill flue gases for more than 60 seconds fails the spillage test.
 - b. Test for CO measuring undiluted flue gases, in the throat or flue of the appliance using a digital gauge in parts per million (ppm) at the 10 minute mark. Record CO ppm readings to be compared with Table R403.10(3) upon completion of Step 4. Where the spillage test fails under worst case, go to Step 4.
 - c. Where spillage ends within 60 seconds, test for acceptable draft in the connector no less than one foot, but no more than two feet downstream of the draft diverter. Record draft pressure and compare to Table R403.10(2).
 - d. Fire all other connected appliances simultaneously and test again at the draft diverter of each appliance for spillage, CO and acceptable draft using procedures 3a through 3c.

TABLE R403.10(2) (N1103.10(2))
ACCEPTABLE DRAFT TEST CORRECTION

<u>OUTSIDE TEMPERATURE (°F)</u>	<u>MINIMUM DRAFT PRESSURE REQUIRED (Pa)</u>
<u>< 10</u>	<u>-2.5</u>
<u>10 – 90</u>	<u>(Outside Temperature ÷ 40) – 2.75</u>
<u>> 90</u>	<u>-0.5</u>

For SI: 6894.76 Pa = 1.0 psi.

1. Measure spillage, acceptable draft, and carbon monoxide (CO) under natural conditions—without *clothes dryer* and exhaust fans on—according to the procedure outlined in Step 3, measuring the net change in pressure from worst case condition in Step 3 to natural in the CAZ to confirm the

- worst case depressurization taken in Step 2. Repeat the process for each appliance, allowing each vent system to cool between tests.
2. Monitor indoor ambient CO in the breathing zone continuously during testing, and abort the test where indoor ambient CO exceeds 35 ppm by turning off the appliance, ventilating the space, and evacuating the building. The CO problem must be corrected prior to completing combustion safety diagnostics.
 3. Make recommendations based on test results and the retrofit action prescribed in Table R403.10(3).

TABLE R403.10(3) (N1103.10(3))
ACCEPTABLE DRAFT TEST CORRECTION

<u>CARBON DIOXIDE LEVEL (ppm)</u>	<u>AND OR</u>	<u>SPILLAGE AND ACCEPTABLE DRAFT TEST RESULTS</u>	<u>RETROFIT ACTION</u>
<u>0 – 25</u>	<u>and</u>	<u>Passes</u>	<u>Proceed with work</u>
<u>25 < x ≤ 100</u>	<u>and</u>	<u>Passes</u>	<u>Recommend that CO problem be resolved</u>
<u>25 < x ≤ 100</u>	<u>and</u>	<u>Fails in worst case only</u>	<u>Recommend an appliance service call and repairs to resolve the problem</u>
<u>100 < x ≤ 400</u>	<u>or</u>	<u>Fails under natural conditions</u>	<u>Stop! Work shall not proceed until appliance is serviced and problem resolved</u>
<u>> 400</u>	<u>and</u>	<u>Passes</u>	<u>Stop! Work shall not proceed until appliance is serviced and problem resolved</u>
<u>> 400</u>	<u>and</u>	<u>Fails under any condition</u>	<u>Emergency! Shut off fuel to appliance and call for service immediately</u>

Reason: Energy efficiency improvements often have a direct impact on the building pressure boundary affecting the safe operation of combustion equipment. Routinely sealing up buildings without looking at the combustion equipment risk sooner or later will result in harming someone with back-drafted flue gas conditions.

This proposal is intended to provide clear guidance to builders, code officials and home performance contractors for worst-case testing of atmospheric venting systems where air-sealing techniques and air-leakage performance testing requirements of the 2015 IECC are employed. Worst case testing is used by home performance contractors to identify problems that weaken draft and restrict combustion air. Worst case vent testing uses the home's exhaust fans, air handling appliances and chimneys to create worst case depressurization in the combustion appliance zone (CAZ).

Language that is proposed for R403.10 is basically a distilled version of predominant combustion safety test procedures for atmospherically vented appliances found in readily available home performance programs across the country, such as EPA's Healthy Indoor Environments Protocols, EPA's Home Performance with Energy Star, DOE's Workforce Guidelines for Home Energy Upgrades, HUD's Community Development Block Grants and Weatherization Assistance Programs, BPI's Technical Standards for the Building Analyst Professional, and RESNET's Interim Guidelines for Combustion Appliance Testing and Writing Work Scopes. The proposed language is intended to take the combustion safety test procedures that are used most commonly by these home performance, weatherization, and beyond code programs, and reduce them to their simplest and most straightforward form for the purpose of combustion safety in IECC compliance and field assessment through the use of building diagnostic tools.

For Illinois, our required 9-month review process of the 2012 IECC resulted in the Illinois Energy Code Advisory Council (ECAC) concluding that reductions in building envelope air-leakage from 7 ACH50 (2009 IECC) to 5 ACH50 was a more conservative approach to take for the construction industry in our state than the more "aggressive" 7 ACH50 (2009 IECC) to 3 ACH50, as is the case with the 2012 IECC for Climate Zones 4 and 5.

While part of ECAC's consideration was the decision to insert the 2012 IRC's whole-house ventilation provisions based on ASHRAE 62.2 directly into the Illinois Energy Conservation Code, this proposal recognizes that under certain conditions, perhaps even those of forthcoming 2015 IECC, reduced natural air-leakage coupled with the installation of atmospheric combustion appliances will reduce air exchange to the outside with the potential to contribute to poor indoor air quality and possible health problems due to spillage, inadequate draft, or carbon monoxide concerns.

We suspect other states and municipalities considering 2015 IECC adoptions will seek similar building diagnostic-based solutions to combustion safety.

Cost Impact: The code change proposal will increase the cost of construction.

RE193-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.10 (NEW)-EC-MEYERS

2013 PROPOSED CHANGES TO THE INTERNATIONAL FIRE CODE

INTERNATIONAL FIRE CODE COMMITTEE

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TENTATIVE ORDER OF DISCUSSION 2013 PROPOSED CHANGES TO THE INTERNATIONAL FIRE CODE AND INTERNATIONAL WILDLAND-URBAN INTERFACE CODE

The following is the tentative order in which the proposed changes to the code will be discussed at the public hearings. Proposed changes which impact the same subject have been grouped to permit consideration in consecutive changes.

Proposed change numbers that are indented are those which are being heard out of numerical order. Indentation **does not** necessarily indicate that one change is related to another. Proposed changes may be grouped for purposes of discussion at the hearing at the discretion of the chair. Note that some IFC code change proposals may not be included on this list, as they are being heard by other committees. Please consult the Cross Index of Proposed Changes. Note also that in this cycle, the hearing order places the code changes affecting hazardous materials first to give them proper attention.

F249: Withdrawn by proponent

WILDLAND-URBAN

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WUIC2-13	G9-13	F324-13	F17-13
WUIC3-13	G10-13	F6-13	F18-13
WUIC4-13	G11-13	G14-13	F19-13
WUIC5-13	F298-13	F7-13	F20-13
WUIC6-13	G7-13	F8-13	F21-13
WUIC7-13	F299-13	F325-13	F22-13
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	F304-13	F330-13	F27-13
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	F311-13	ADM 33	F36-13
	F312-13	ADM 34	F37-13
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ICC PERFORMANCE

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F1 – 13 202

Proponent: Anthony C. Apfelbeck, Fire Marshal/Building Official, City of Altamonte Springs, FL representing Himself (ACApfelbeck@Altamonte.org)

Revise as follows:

Add the following IBC definitions to IFC Section 202.

SECTION 202 GENERAL DEFINITIONS

ACCESSIBLE UNIT. A dwelling unit or sleeping unit that complies with this code and the provisions for Accessible units in ICC A117.1.

[A] ADDITION. An extension or increase in floor area or height of a building or structure.

BUILDING ELEMENT. A fundamental component of building construction, listed in Table 601, which may or may not be of fire-resistance-rated construction and is constructed of materials based on the building type of construction.

CELL (Group I-3 occupancy). A room within a housing unit in a detention or correctional facility used to confine inmates or prisoners.

DEAD LOAD. The weight of materials of construction incorporated into the building, including but not limited to walls, floors, roofs, ceilings, stairways, built-in partitions, finishes, cladding and other similarly incorporated architectural and structural items, and the weight of fixed service equipment, such as cranes, plumbing stacks and risers, electrical feeders, heating, ventilating and air-conditioning systems and automatic sprinkler systems.

DESIGN PROFESSIONAL, REGISTERED. See “Registered design professional.”

EMPLOYEE WORK AREA. All or any portion of a space used only by employees and only for work. Corridors, toilet rooms, kitchenettes and break rooms are not employee work areas.

FLOOD or FLOODING. A general and temporary condition of partial or complete inundation of normally dry land from:

1. The overflow of inland or tidal waters.
2. The unusual and rapid accumulation or runoff of surface waters from any source.

INTERIOR SURFACES. Surfaces other than weather exposed surfaces.

JOINT. The opening in or between adjacent assemblies that is created due to building tolerances, or is designed to allow independent movement of the building in any plane caused by thermal, seismic, wind or any other loading.

LIVE LOAD. A load produced by the use and occupancy of the building or other structure that does not include construction or environmental loads such as wind load, snow load, rain load, earthquake load, flood load or dead load.

MEMBRANE PENETRATION. A breach in one side of a floor-ceiling, roof-ceiling or wall assembly to accommodate an item installed into or passing through the breach.

OCCUPIABLE SPACE. A room or enclosed space designed for human occupancy in which individuals congregate for amusement, educational or similar purposes or in which occupants are engaged at labor, and which is equipped with *means of egress* and light and *ventilation* facilities meeting the requirements of this code.

PLATFORM. A raised area within a building used for worship, the presentation of music, plays or other entertainment; the head table for special guests; the raised area for lecturers and speakers; boxing and wrestling rings; theater-in-the-round *stages*; and similar purposes wherein there are no overhead hanging curtains, drops, scenery or stage effects other than lighting and sound. A temporary platform is one installed for not more than 30 days.

PUBLIC ENTRANCE. An entrance that is not a *service entrance* or a *restricted entrance*.

ROOF COVERING. The covering applied to the *roof deck* for weather resistance, fire classification or appearance.

ROOFTOP STRUCTURE. A structure erected on top of the *roof deck* or on top of any part of a building.

SHAFT. An enclosed space extending through one or more *stories* of a building, connecting vertical openings in successive floors, or floors and roof.

SHAFT ENCLOSURE. The walls or construction forming the boundaries of a *shaft*.

SPECIAL INSPECTION. Inspection of construction requiring the expertise of an *approved special inspector* in order to ensure compliance with this code and the *approved construction documents*.

STAGE. A space within a building utilized for entertainment or presentations, which includes overhead hanging curtains, drops, scenery or stage effects other than lighting and sound.

STRUCTURE. That which is built or constructed.

SWIMMING POOL. Any structure intended for swimming, recreational bathing or wading that contains water over 24 inches (610 mm) deep. This includes in-ground, aboveground and on-ground pools; hot tubs; spas and fixed-inplace wading pools.

veneer. A facing attached to a wall for the purpose of providing counted as adding strength to the wall.

WALKWAY, PEDESTRIAN. A walkway used exclusively as a pedestrian trafficway.

WALL. A vertical element with a horizontal length-to-thickness ratio greater than three, used to enclose space.

Reason: The above terms are utilized in the IFC. However, they are not defined in the IFC. They are defined in the IBC. If the term is utilized in the IFC, and there is an appropriate definition in the IBC, that definition should be extracted into the IFC for better use ability. The following lists the IFC locations using each of the above defined terms:

ACCESSIBLE UNIT. Used in IFC Section(s):

1008.1.1 Exception 7.
1008.1.5 Exception 3.
1008.1.7 Exception 3.
1010.7.3 Exception 1.
1010.7.4 Exception.

[A] ADDITION. Used in IFC Section(s):

202 - Definition of ALTERATION.
311.3 Exception 1.
507.5.2
510.6.1
3311.2

BUILDING ELEMENT. Used in IFC Section(s):

202 - Definition of BLEACHERS.
202 - Definition of FIRE-RESISTANCE RATING.
202 - Definition of FOLDING AND TELESCOPIC SEATING.
202 - Definition of GRANDSTAND.
1003.6
1028.1.1

CELL (Group I-3 occupancy). Used in IFC Section 907.2.6.3.3 Exception 1.

DEAD LOAD. Used in IFC Section 1104.16.5

DESIGN PROFESSIONAL, REGISTERED. See "Registered design professional."

EMPLOYEE WORK AREA. Used in IFC Section 907.5.2.3.2

FLOOD or FLOODING. Used in IFC Section(s):

913.2
5303.16.1
5303.16.5
5504.3.1.1.4
5704.2.7.8
5704.2.8.1
5704.2.8.5
5706.3.2.1
6104.3.2

INTERIOR SURFACES. Used in IFC Sections 202 - Definition of INTERIOR WALL AND CEILING FINISH. and 2404.3.2.2

JOINT. Used in IFC Section(s):

202 - Definition of Fire-Resistant Joint System
308.1.6.2
311.2.3
603.6.1
Section 703
909.10.2
909.13.1
910.3.5.1
1009.3.1.6
2307.9.1.4
2405.3.4.1
And numerous other sections

LIVE LOAD. Used in IFC Sections:

503.2.6
605.11.3.2.1
605.11.3.3.2
1104.16.5

MEMBRANE PENETRATION. Used in IFC Sections 1022.5 and 1026.3.

OCCUPIABLE SPACE. Used in IFC Sections 202 - Definition of DRY CLEANING ROOM. And Section 907.5.2.1.1

PLATFORM. Used in IFC Section(s):

202 – Definition of STAIRWAY
308.3 Exception 1.2
Table 1004.1.2
1009.3 Exception 8.

1009.4 Exception 4.
1009.13.2
1013.2 Exception 2, 3, 4 and 5.
1021.3.1
Numerous other locations.

PUBLIC ENTRANCE. Used in IFC Section(s):

905.3.3 (2) and (3)
905.4 (4)

ROOF COVERING. Used in IFC Section 105.6.23 (5)

ROOFTOP STRUCTURE. Used in IFC Sections 202 - Definition of PENTHOUSE and Section 317.3

SHAFT. Used in IFC Section(s):

316.2 as it refers to "shaftway."
316.2.1
316.2.2
703.1
704
704.1
704.2
908.7 Exception 2.
909.5 (3)
909.16.2 (1)
911.2 (2) Exception.
1007.4 Exception 3.
1007.6
1022.6 (1)
Numerous other locations.

SHAFT ENCLOSURE. Used in IFC Section(s):

703.1
1022.6
5306.2.2

SPECIAL INSPECTION. Used in IFC Section(s):

909.3
909.18.8
909.18.8.1
909.18.8.2
909.18.8.3
5303.16.1
5704.2.8.1

STAGE. Used in IFC Section(s):

308.3 Exception 1 (1.2)
807.4.2.1
Table 903.2.11.6
905.3.4
905.3.4.1
905.5.1
914.6
1004.1.2
Numerous other locations.

STRUCTURE. Used in IFC Section(s):

202 - Definition of TENT and Definition of WHARF
301.1
303.2
304.1
304.3
304.3.3 Exception 2
Throughout 307

308.1.1
308.2
403.2
501.1
505.1
506.1
Numerous other locations.

SWIMMING POOL. Used in IFC Section(s):

202 - Definition of ASSEMBLY GROUP A-3 and Definition of ASSEMBLY GROUP A-4
Table 1004.1.2

VENEER. Used in IFC Section(s):

202 - Definition of GYPSUM BOARD and Definition of PLYWOOD AND VENEER MILLS
907.2.17
2801.1
2804.1
2805
2809.4 Exception

WALKWAY, PEDESTRIAN. Used in IFC Table 1016.2, Note a and Section1025.2 , Exception

WALL. Used in IFC Section(s):

304.3.3
304.3.4
305.2
311.2.3
503.1.1
508.1.5 (13.3)
Numerous other locations.

Cost Impact: None

F1-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

202-ACCESSIBLE UNIT (NEW)-F-APFELBECK.doc

F2 – 13

202 (IBC 202)

Proponent: Kirk Mitchell, Kirk Mitchell & Associates, LLC representing Isocyanurates Industry Ad Hoc Committee (IIAHC) (pkmitchell@bellsouth.net)

Revise as follows:

SECTION 202 (IBC 202)

GENERAL DEFINITIONS

CORROSIVE. A chemical that causes visible destruction of, or irreversible alterations in, living tissue by chemical action at the point of contact. A chemical shall be considered corrosive if, when tested using one of the *in vivo* or *in vitro* OECD test methods authorized on the intact skin of albino rabbit by the method described in DOTn 49 CFR 173.137, such chemical destroys or changes irreversibly the structure of the tissue at the point of contact following an exposure period of 4 hours. This term does not refer to action on inanimate surfaces.

Reason: Current IFC definition limited to albino rabbit testing exclusively does not comport with currently recognized methodologies (See *NFPA 400 – Hazardous Materials Code 2013 Edition*)

Cost Impact: This proposed code change will not increase the cost of construction and/or operation. It is likely to reduce the cost of hazard classification of unknown and re-evaluation of assumed known health hazards by employing simpler pre-emptive testing methodologies and reduce the burden of animal testing.

F2-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

202-CORROSIVE-F-MITCHELL

F3 – 13

202 (IBC [F] 202)

Proponent: Marcelo M Hirschler, GBH International (gbhint@aol.com)

Revise as follows:

SECTION 202 (IBC [F] 202) GENERAL DEFINITIONS

DECORATIVE MATERIALS. All materials applied over the building interior finish for decorative, acoustical or other effect ~~(such as including, but not limited to,~~ curtains, draperies, fabrics, and streamers ~~and surface coverings)~~, and all other materials utilized for decorative effect ~~(such as including, but not limited to,~~ bulletin boards, artwork, posters, photographs, paintings, batting, cloth, cotton, hay, stalks, straw, vines, leaves, trees, moss and similar items~~)~~, including foam plastics and materials containing foam plastics. Decorative materials do not include wall coverings, ceiling coverings, floor coverings, ordinary window shades, interior finish and materials 0.025 inch (0.64 mm) or less in thickness applied directly to and adhering tightly to a substrate.

Reason: This is just a small cleanup in the definition of decorative materials to be consistent with section 807 of the code.

Cost Impact: Minimal

F3-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

202-DECORATIVE MATERIALS-F-HIRSCHLER

F4 – 13

202 (IBC [F] 202)

Proponent: Amy Carpenter, AIA, Pioneer Network Long Term Care Code Task Force

Revise as follows:

SECTION 202 (IBC [F] 202) GENERAL DEFINITIONS

DECORATIVE MATERIALS. All materials applied over the building *interior finish* for decorative, acoustical or other effect (~~such as including but not limited to~~ curtains, draperies, fabrics, streamers and surface coverings), and all other materials utilized for decorative effect (~~such as including but not limited to, photographs, paintings, bulletin boards, artwork, posters,~~ batting, cloth, cotton, hay, stalks, straw, vines, leaves, trees, moss and similar items), including foam plastics and materials containing foam plastics. Decorative materials do not include floor coverings, ordinary window shades, *interior finish* and materials 0.025 inch (0.64 mm) or less in thickness applied directly to and adhering tightly to a substrate.

Reason: Companion proposal to IFC Section 807. Clarifying and expanding definition of decorative materials, to include paper-based products and for correlation.

Cost Impact: None

F4-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

202-DECORATIVE MATERIALS- F-CARPENTER

F5 – 13

202 (New)

Proponent: Ronald Marts, Telcordia, representing AT&T, Verizon, CenturyLink (rmarts@telcordia.com)

Add new text as follows:

SECTION 202 GENERAL DEFINITIONS

ELECTROLYTE. The medium that provides the ion transport mechanism between the positive and negative electrodes of a cell.

SECTION 602 DEFINITIONS

602.1 Definitions. The following terms are defined in Chapter 2:

BATTERY SYSTEM, STATIONARY LEAD-ACID.

BATTERY TYPES.

COMMERCIAL COOKING APPLIANCES.

ELECTROLYTE.

HOOD.

 Type I.

 Type II.

REFRIGERANT.

REFRIGERATION SYSTEM.

Reason: This term, used in Section 608, needs to be defined. The definition comes from the IEEE Stationary Battery Standards Glossary.

Cost Impact: None.

F5-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

202-ELECTROLYTE (NEW)-MARTS

F6 – 13

202 (IBC [F] 202)

Proponent: Elley Klausbruckner representing Klausbruckner & Associates Inc (ek@klausbruckner.com)

Revise as follows:

SECTION 202 (IBC [F] 202) GENERAL DEFINITIONS

FLAMMABLE SOLID. A solid, other than a blasting agent or *explosive*, that is capable of causing fire through friction, absorption of moisture, spontaneous chemical change or retained heat from manufacturing or processing, or which has an ignition temperature below 212°F (100°C) or which burns so vigorously and persistently when ignited as to create a serious hazard. A chemical shall be considered a flammable solid as determined in accordance with the test method of CPSC 16 CFR Part 1500.44, if it ignites and burns with a self-sustained flame at a rate greater than ~~0.4~~ 0.0866 inch (~~2.5 mm~~ 2.2 mm) per second along its major axis.

Reason: The definition proposed is in line with GHS [Globally Harmonized System] which is now adopted by OSHA. When an MSDS is prepared today, a material classified as "Flammable Solids" is typically based on this definition and not the previous definition [existing language in the Fire Code]. For additional details please see <http://www.osha.gov/dsg/hazcom/ghs.html>.

Cost Impact: The code change proposal will not increase the cost of construction.

F6-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

202-FLAMMABLE SOLID-F-KLAUSBRUCKNER

F7 – 13

202 (IBC [F] 202)

Proponent: Kirk Mitchell, Kirk Mitchell & Associates, LLL, representing Isocyanurates Industry Ad Hoc Committee (IIAHC) (pkmitchell@bellsouth.net)

Revise as follows:

SECTION 202 (IBC [F] 202) GENERAL DEFINITIONS

HIGHLY TOXIC. A material that produces a lethal dose or lethal concentration which falls within any of the following categories:

1. A chemical that has a median lethal dose (LD₅₀) of 50 milligrams or less per kilogram of body weight when administered orally to albino rats weighing between 200 g and 300 g each.
2. A chemical that has a median lethal dose (LD₅₀) of 200 milligrams or less per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between 2 and 3 kilograms each.
3. A chemical that has a median lethal concentration (LC₅₀) in air of 200 parts per million by volume or less of gas or vapor, or 2 milligrams per liter or less of mist, fume or dust, when administered by continuous inhalation for one hour (or less if death occurs within 1 hour) to albino rats weighing between 200 and 300 grams each.

Existing inhalation toxicity data which has been generated for 4 hour exposure should be multiplied by a factor of 2 for gases and vapors or a factor of 4 for dusts and mists to convert to the value for 1 hour exposure.

~~Mixtures of these materials with ordinary materials, such as water, may not warrant classification as highly toxic. While this system is basically simple in application, any hazard evaluation that is required for the precise categorization of this type of material shall be performed by experienced, technically competent persons.~~

While categorization is basically simple in application, any hazard evaluation that is required for the precise categorization of this type of material shall be performed by experienced, technically competent persons. The degree of hazard depends on many variables which should be carefully considered individually and in combination. Some examples include:

1. Materials wherein the highly toxic component or mixtures thereof are inextricably bound and cannot be released present little or no potential for exposure.
2. Non-volatile, non-frangible solid hazardous materials existing in product forms and in the demonstrated absence of inhalable particles would not present the same inhalation hazard as the chemical components existing in a volatile, frangible state.
3. Mixtures of these materials with ordinary materials, such as water, may not warrant classification as highly toxic.

Reason: Most acute inhalation studies are run for 4 hr, as preferred in OECD 403 Acute Inhalation Toxicity and in OPPTS 870.1300 Acute Inhalation Toxicity. Conversion of 4 hr data to 1 hr data is given in GHS Purple Book, 4th Edition, 2011, Chapter 3.1 and in NFPA 704, section B.4.

Revised last paragraph includes language added to NFPA 400 in A.3.3.61.9.1.

Cost Impact: This proposed code change will not increase the cost of construction and/or operation. It is intended to provide descriptive clarification aligned with conventional acute test methods, GHS Purple Book, etc.

F7-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

202-HIGHLY TOXIC-F-MITCHELL

F8 – 13

202 (IBC [F] 202)

Proponent: Kirk Mitchell, Kirk Mitchell & Associates, LLL, representing Isocyanurates Industry Ad Hoc Committee (IIAHC) (pkmitchell@bellsouth.net)

Revise as follows:

SECTION 202 (IBC [F] 202) GENERAL DEFINITIONS

TOXIC. A chemical falling within any of the following categories:

1. A chemical that has a median lethal dose (LD₅₀) of more than 50 milligrams per kilogram, but not more than 500 milligrams per kilogram of body weight when administered orally to albino rats weighing between 200 g and 300 g each.
2. A chemical that has a median lethal dose (LD₅₀) of more than 200 milligrams per kilogram, but not more than 1,000 milligrams per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between 2 and 3 kilograms each.
3. A chemical that has a median lethal concentration (LC₅₀) in air of more than 200 parts per million but not more than 2,000 parts per million by volume of gas or vapor, or more than 2 milligrams per liter but not more than 20 milligrams per liter of mist, fume or dust, when administered by continuous inhalation for one hour (or less if death occurs within 1 hour) to albino rats weighing between 200 and 300 grams each.

Existing inhalation toxicity data which has been generated for 4 hour exposure should be multiplied by a factor of 2 for gases and vapors or a factor of 4 for dusts and mists to convert to the value for 1 hour exposure.

While categorization is basically simple in application, any hazard evaluation that is required for the precise categorization of this type of material shall be performed by experienced, technically competent persons. The degree of hazard depends on many variables which should be carefully considered individually and in combination. Some examples include:

1. Materials wherein the highly toxic component or mixtures thereof are inextricably bound and cannot be released present little or no potential for exposure.
2. Non-volatile, non-frangible solid hazardous materials existing in product forms and in the demonstrated absence of inhalable particles would not present the same inhalation hazard as the chemical components existing in a volatile, frangible state.
3. Mixtures of these materials with ordinary materials, such as water, may not warrant classification as highly toxic.

Reason: Most acute inhalation studies are run for 4 hr, as preferred in OECD 403 Acute Inhalation Toxicity and in OPPTS 870.1300 Acute Inhalation Toxicity. Conversion of 4 hr data to 1 hr data is given in GHS Purple Book, 4th Edition, 2011, Chapter 3.1 and in NFPA 704, section B.4.

Second added paragraph includes language added to NFPA 400 in A.3.3.61.9. It should be added to this definition to be consistent with the definition for Highly Toxic.

Cost Impact: This proposed code change will not increase the cost of construction and/or operation. It is intended to provide descriptive clarification aligned with conventional acute test methods, GHS Purple Book, etc.

F8-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

202-TOXIC-F-MITCHELL

F9 – 13

305.5 (New)

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Add new text as follows:

305.5 Unwanted Fire Ignitions. Where acts or processes have caused repeated ignitions of unwanted fires, the act or process shall be modified to prevent future ignitions.

Reason: Many industrial processes have the potential to produce nuisance fires that generate unwanted alarms necessitating emergency responses which risk health and safety of firefighters and citizens. No other section of the code currently empowers the fire code official to mitigate such nuisance fires.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

Cost Impact: This code change will not increase the cost of construction

F9-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

305.5 (NEW)-F-ZUBIA-FCAC

F10 – 13

306.1

Proponent: Mark Ritchie, Houston, TX Fire Department, representing self

Revise as follows:

306.1 Motion picture projection rooms. Electric arc, xenon or other light source projection equipment which develops hazardous gases, dust or radiation and the projection of ribbon-type cellulose ~~nitrate~~ acetate film, regardless of the light source used in projection, shall be operated within a motion picture projection room complying with Section 409 of the *International Building Code*.

Reason: This section was not intended to address the projection of cellulose nitrate film. This section was intended to address projection of cellulose acetate film (safety film). The requirements of Section 409 of IBC are intended to provide construction requirements for a projection room where safety film is used and would not be compliant for use of the more hazardous cellulose nitrate film.

Cost Impact: The code change proposal will not increase the cost of construction.

F10-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

306.1-F-RITCHIE

F11 – 13

307.2, 202

Proponent: Mark D. Lenhart, Greensteads Nonprofit, representing self (info@greensteads.org)

Revise as follows:

307.2 Permit required. A permit shall be obtained from the *fire code official* in accordance with Section 105.6 prior to kindling a fire for recognized silvicultural or range or wildlife management practices, prevention or control of disease or pests, or a bonfire. Application for such approval shall only be presented by and permits issued to the *owner* of the land upon which the fire is to be kindled.

Exception: Outdoor fires in totally enclosed, low emission, pyrolysis-based char-producing stoves, where the fuel consist of dry, solid, biomass-based organic matter, with the purpose of capturing carbon in the form of char, charcoal, or biochar. Fires so contained shall not be considered open burns.

Add new text as follows:

SECTION 202 GENERAL DEFINITIONS

PYROLYSIS BASED CHAR PRODUCING STOVE. A low emission, pyrolysis-based fire contained in an enclosed chamber, burning dry, solid biomass-based organic matter for the purpose of capturing carbon in the form of char, charcoal, or biochar. Pyrolysis-based stoves may also additionally be used for cooking, heating or other recreational purposes.

Reason: There is an emerging need for regulatory guidance for the public and for public city, fire and safety officials for the installation and operation of small scale pyrolysis based stoves that produce charcoal/biochar. There is a great interest among the agriculture/silviculture/horticultural community as well as gardeners to use charcoal/biochar to augment the soil for crop production, the long term capture of atmospheric carbon, extremely efficient and low emission energy harnessing from renewable biomass materials, and the minimization of toxic agricultural and urban run-off.

Charcoal/biochar is the solid carbon residue resulting from the pyrolysis (carbonization or destructive distillation) of carbonaceous raw materials/feedstock (i.e. wood and/or green biomass material) in an oxygen deficient environment or chamber. The heat causes the feedstock to release much of its water and other organic compounds (off gassing) leaving behind the residue (charcoal/biochar), which is rich in carbon. Charcoal/biochar is then crushed into smaller pieces or pulverized and added to soil. Charcoal/biochar production units vary in construction material, size, fuel type, feedstock and complexity. A typical simple unit consists of combustion chamber, pyrolysis chamber and a stack or chimney. The units can be made from steel, brick and/or cinder blocks or a combination of these materials. The commercial biochar producing industry is in it's infancy, forcing many individuals and small organizations to create their own biochar stocks. Additionally, production of Biochar is ideally a local effort, with a minimum of transportation of the main biomass fuel. For these reasons, home and community gardeners, farmers, university researchers, and landscapers are building small biochar producing stoves.

Given the novelty of the practice and technology, public fire officials are suggesting to public community garden managers that there be uniform guidelines for the use of these types of devices in the International Fire Code to avoid endless replicated efforts at every local municipality across the country.

There exists a strong need to provide a simple, unified code for small scale, small entity, non-commercial pyrolysis stoves to simplify the adoption of this environmentally friendly technology.

Cost Impact: The code change proposal will not increase the cost of construction.

F11-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

307.2-F-LENHART

F12 – 13

308.1.1

Proponent: Bob D. Morgan, P.E., Fort Worth Fire Department, representing Fire Advisory Board to North Central Texas Council of Governments

Revise as follows:

308.1.1 Where prohibited. A person shall not take or utilize an open flame or light in a structure, vessel, boat or other place where highly flammable, combustible or explosive material is utilized or stored. Lighting appliances shall be well-secured in a glass globe and wire mesh cage or a similar *approved* device. Unmanned free-floating devices containing an open flame or other heat source including, but not limited to, sky lanterns shall be prohibited.

Reason: This issue of sky lanterns has become a serious concern among fire officials with many different amendments being adopted in an attempt to address the issue.

Cost Impact: The code change proposal will not increase the cost of construction.

F12-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

308.1.1-F-MORGAN

F13 – 13

308.1.6.3 (New), 202 (New)

Proponent: Anthony C. Apfelbeck, City of Altamonte Springs Building/Fire Safety Division, representing self (ACApfelbeck@Altamonte.org)

Add new text as follows:

308.1.6.3 Sky lanterns. No person shall release or cause to be released an untethered sky lantern.

Add new definition as follows:

SECTION 202 GENERAL DEFINITIONS

SKY LANTERN. An unmanned device with a combustible fuel source that incorporates an open flame in order to make the device airborne.

Reason: Sky lanterns contain an open flame used to heat the air inside the device to make it airborne. Once airborne, these devices are subject to winds and other atmospheric conditions so that the location of the landfall is completely unknown and uncontrolled by the user. Obviously, uncontrolled open flame devices descending out of the sky have the significant potential to start wildfires and structural fires.

Cost Impact: This code change will not increase the cost of construction

F13-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

308.1.6.3 (NEW)-F-APFELBECK

F14 – 13

310.3.1 (New)

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care (john.williams@doh.wa.gov) and Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee (cbaldassarra@RJAGroup.com)

Revise as follows:

310.3.1 Group I-2. In Group I-2 occupancies where smoking is prohibited, “No Smoking “ signs are not required in interior locations of the facility where signs are displayed at all major entrances into the facility.

Reason: This proposal will provide correlation with NFPA 101 Section 19.7.4.2 which contains an exception for healthcare occupancies that allows for a facility to not install secondary “No Smoking Signs” throughout a facility if primary signs are prominently displayed at all major entrances. This exception is not currently included in the IFC. Since healthcare facilities already prohibit smoking, where signs are posted at the entrances it is redundant and unnecessary to also require the signs to be posted throughout a facility that does not permit smoking, has a staff trained to monitor and policies in place to quickly stop or prevent the action.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>

This proposal is being co-sponsored by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as “areas of study”. Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public. In 2012, three of the 25 face-to face meetings were held. In addition to the CTC meetings, the CTC established Study Groups (SG) of interested parties for each of the areas of study. These SG's are responsible for reviewing the available information and making recommendations to the CTC. All totaled, the SG's held over 70 conference calls in 2012.

Cost impact: This proposal will not increase the cost of construction.

F14-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

310.3.1 (NEW)-F-BALDASSARRA-WILLIAMS-ADHOC-CTC

F15 – 13

312.3

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

SECTION 312 VEHICLE IMPACT PROTECTION

312.1 General. Vehicle impact protection required by this code shall be provided by posts that comply with Section 312.2 or by other *approved* physical barriers that comply with Section 312.3.

312.2 Posts. Guard posts shall comply with all of the following requirements:

1. Constructed of steel not less than 4 inches (102 mm) in diameter and concrete filled.
2. Spaced not more than 4 feet (1219 mm) between posts on center.
3. Set not less than 3 feet (914 mm) deep in a concrete footing of not less than a 15-inch (381 mm) diameter.
4. Set with the top of the posts not less than 3 feet (914 mm) above ground.
5. Located not less than 3 feet (914 mm) from the protected object.

312.3 Other barriers. ~~Physical barriers shall be a minimum of 36 inches (914 mm) in height and shall resist a force of 12,000 pounds (53 375 N) applied 36 inches (914 mm) above the adjacent ground surface.~~ Barriers other than posts specified in Section 312.2 that are designed to resist, deflect or visually deter vehicular impact commensurate with an anticipated impact scenario shall be permitted when approved.

Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

Contrary to what one might assume by reading the code, the current text of Section 312.3 is not a performance-based alternative design basis for the prescriptive provisions in Section 312.2. Instead, the two sections provide redundant and unrelated approaches to providing impact barriers, and there is no known technical relationship between the two design approaches. Section 312.2 was sourced from the Uniform Fire Code, and it was included in the IFC so that jurisdictions transitioning from the Uniform Fire Code to the IFC would not be forced into having to follow new barrier design criteria. Likewise, Section 312.3 was sourced from the BOCA National Fire Prevention Code, and it was included in the IFC so that jurisdictions transitioning from the BOCA National Fire Prevention Code to the IFC would not be forced into having to follow new barrier design criteria. Given that the 2015 IFC will be the 6th IFC edition following the consolidation of legacy codes; it no longer makes sense to retain this inconsistency. The prescriptively specified bollards specified by Section 312.2 are well-established as the default norm for compliance.

This change revises Section 312.3 so that it is truly a performance option to Section 312.2. The text deliberately establishes a broad set of goals that must be achieved by the designer to fit a site-specific application, and the requirement places the onus on the designer to demonstrate selection of a satisfactory design scenario and a suitable solution to achieve approval by the fire code official. Although one might argue that Section 312.3 might simply be deleted in favor of relying on Section 104.9 (alternate materials and methods), it makes more sense to include the suggested guidance in Section 312.3.

In reviewing this proposal, some may wonder whether it is appropriate to maintain the currently specified 12,000 pound “force” criteria. The answer is “no.” This was deliberately deleted for a couple reasons. First, the 12,000-pound “force” is actually specified as a static load, i.e. a load with no associated impact velocity or acceleration. Without knowing an intended impact velocity, the kinetic energy resistance for a barrier cannot be accurately calculated. It is more appropriate for a performance requirement to accommodate determination of a suitable vehicle weight and impact speed as a design basis.

Cost Impact: This code change proposal will not increase the cost of construction

F15-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

312.3-F-ZUBIA-FCAC

F16 – 13

315.3.2

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azumiamia@yahoo.com)

Revise as follows:

315.3.2 Means of egress. Combustible materials shall not be stored in exits, corridors or enclosures for stairways and ramps.

Reason: The code presently does not address storage of combustible materials in exit access corridors. The code prohibits storage in the exit, but says nothing about the corridor. This will provide the inspector with a tool to regulate the storage of combustible materials in a corridor.

Cost Impact: The code change will not increase the cost of construction.

F16-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

315.3.2-F-ZUBIA-FCAC

F17 – 13

315.3.5 (New), 903.3.1.1.1 (IBC [F] 903.3.1.1.1)

Proponent: Adolf Zubia, Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Add new text as follows:

315.3.5 Rooms and areas exempted from automatic sprinkler system requirements. Storage shall not be permitted in any room or area where automatic sprinklers have been omitted in accordance with Section 903.3.1.1.1.

Revise as follows:

903.3.1.1.1 (IBC [F] 903.3.1.1.1) Exempt locations. Automatic sprinklers shall not be required in the following rooms or areas where such rooms or areas are protected with an approved automatic fire detection system in accordance with Section 907.2 that will respond to visible or invisible particles of combustion. Sprinklers shall not be omitted from any room merely because it is damp, of fire-resistance-rated construction or contains electrical equipment. Storage shall not be permitted in any room or area omitting automatic sprinklers.

Reason: These exceptions in the IBC go beyond the requirements of NFPA 13 by inserting a heat detection system. Storage needs to be specifically addressed by this section as this exemption can be interpreted to allow storage in an unsprinklered room. Sprinkler systems adjacent to these rooms are not mandated to increase design criteria to accommodate this unsprinklered space. Fires in unsprinklered rooms with unknown or unpermitted storage could overcome the sprinkler system.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

Cost Impact: This code change will not increase the cost of construction

F17-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

315.3.5 (NEW)-F-ZUBIA-FCAC

F18 – 13

315.6 (New), 202 (New)

Proponent: Marcelo M Hirschler, GBH International (gbhint@aol.com)

Add new text as follows:

315.6 Storage in Plenums in Group I Occupancies. Storage shall not be permitted in plenums in Group I occupancies. Abandoned material in plenums in Group I occupancies shall be deemed to be storage and shall be removed. The accessible portion of abandoned cables in plenums in Group I occupancies that are not identified for future use with a tag shall be deemed storage and shall be removed.

SECTION 202

GENERAL DEFINITIONS

[M] PLENUM. An enclosed portion of the building structure, other than an occupiable space being conditioned, that is designed to allow air movement, and thereby serve as part of an air distribution system.

Reason: This new section is intended to introduce a concept that has been in the National Electrical Code (as well as in NFPA 90A) for a long time: plenums are intended for a specific use (see definition below), namely to be a part of the air distribution system so as to allow air movement. Plenums are also used (legitimately) for stringing communications and data cables as well as pipes and sprinkler pipes and other similar products. However, in actual fact, it is a common practice not to make the effort to remove products when they become obsolete. Examples include when an updated data system is being installed in the facility (and that typically occurs every 18-24 months). Normally, as the building is being rewired the old wires are cut off the grid but they are left in place and a new wiring system is added on top of them.

The tiles that often support plenums are not intended to support any significant weight and they can, therefore easily be overwhelmed by the added weight of storage or abandoned materials (such as abandoned cables). Recently, Bob Davidson and Sean DeCrane (Plenum Space Fuel Load, NFPA Annual Meeting 2009, M33) did an analysis that showed how the safety of firefighters is compromised by the weight of these abandoned cables. They point out that: "Plenum space fuel loads and wiring issues are a serious concern for fire fighters during interior firefighting operations." Their key recommendation was: "Take out the abandoned wiring!!"

Although the primary reason to recommend the removal of abandoned materials in plenums is weight, fire safety should also be taken into account.

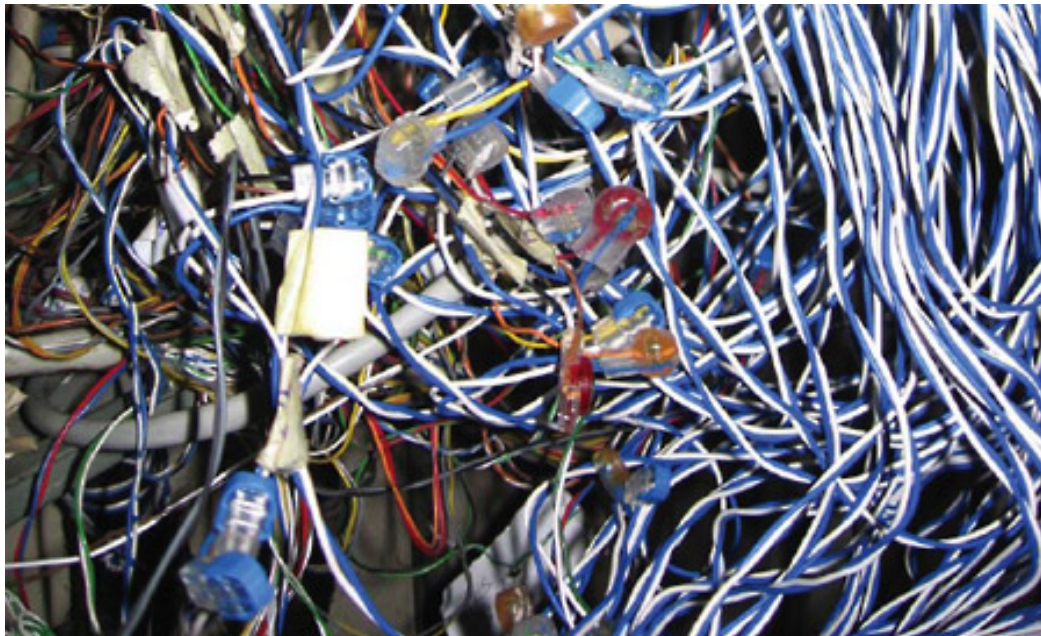
The introduction of a requirement such as the one being proposed here has long been believed not to be enforceable. This is probably true if it were to apply to all occupancies, primarily because fire code inspectors would rarely spend their time looking into plenums in existing buildings. However, the inspection of I occupancies occurs with enough regularity that there should be no significant difficulty in having inspectors identify the existence of abandoned products, especially abandoned cables, classify them as storage and demand their removal.

The proposal recommends that only the "accessible portions" of abandoned cables be removed, because there is no intent to cause potential damage to the building or facility by attempting to remove cables or circuits that are strung through walls, floors or other building elements.

This is a safety issue associated with the safety of firefighters and not an issue of the construction of the plenums (or of the use of materials installed in plenums) and is, therefore, suitable for the IFC and not the IMC. Note that the IMC does not specifically prohibit the use of plenums for storage, presumably because such a requirement would not be associated with the construction of the plenums. This issue is associated with General Safety Provisions and is, therefore, primarily suitable for the IFC.

Duplicating the IMC definition of PLENUM in the IFC will assist the fire code official in enforcement of this section.

Photographs of typical wiring in plenums, as found by Davidson and DeCrane, follow:



Cost Impact: Minimal

F18-12

Public Hearing: Committee:
Assembly:

AS
ASF

AM
AMF

D
DF

315.6 (NEW)-F-HIRSCHLER

F19 – 13

318.1

Proponent: Marcelo M Hirschler, GBH International (gbhint@aol.com)

Revise as follows:

318.1 Laundry carts with a capacity of 1 cubic yard or more. Laundry carts with an individual capacity of 1 cubic yard [200 gallons (0.76 m³)] or more, used in laundries within Group B, E, F-1, I, M and R-1 occupancies shall be constructed of noncombustible materials or materials having a peak rate of heat release not exceeding 300 kW/m² at a flux of 50 kW/m² when tested in a horizontal orientation in accordance with ASTM E 1354.

Exceptions:

1. Laundry carts in areas protected by an *approved automatic sprinkler system* installed throughout in accordance with Section 903.3.1.1.
2. Laundry carts in coin-operated laundries.
3. Laundry carts in day care facilities.

Reason: Laundry carts are likely to be equally (if not more) hazardous in Group E and M occupancies as in B occupancies. The addition of these occupancies should improve fire safety.

Cost Impact: Minimal

F19-12

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

318.1-F-HIRSCHLER

F20 – 13

319 (New), 202 (New)

Proponent: Anthony C. Apfelbeck, City of Altamonte Springs Building/Fire Safety Division, representing self (ACApfelbeck@Altamonte.org)

Add new text as follows:

SECTION 319

WILDLAND-URBAN INTERFACE AREAS

319.1 General. Buildings, structures or premises within wildland-urban interface areas shall comply with the *International Wildland-Urban Interface Code*.

SECTION 202

GENERAL DEFINITIONS

WILDLAND-URBAN INTERFACE AREA. That geographical area where structures and other human development meets or intermingles with wildland or vegetative fuels.

Reason: This code change:

1. Provides a definition for a "Wildland-Urban Interface Area" in the IFC Section 202 extracted from the definition in the IWUIC.
2. Provides a direct referral to the "Wildland-Urban Interface Code" in a new Section 319 within the IFC.

This code change will integrate the designation of a "Wildland-Urban Interface Area" and the reference International Wildland-Urban Interface Code as an integral part of the IFC. Rather than forcing a local jurisdiction to adopt the IWUIC separately, the IWUIC will be adopted as a reference when the IFC is adopted. The reason for this is two fold:

1. The base IFC should contain Wildland-Urban Interface requirements as an integral part of the document due to the expanding prevalence of these types of hazards that are confronted by the fire official. Users should not be forced to adopt a second document to be able to utilize the IWUIC and effectively address these types of conditions. Wildland-urban interface fire prevention is no different from the other base fire prevention requirements of the IFC and should be included as part of the model fire prevention code.
2. Adding the direct reference to the IWUIC into the IFC will not burden any jurisdiction with the requirement of the document unless there is an actual "Wildland-Urban Interface Area" within the jurisdiction. If there is a "Wildland-Urban Interface Area" within the jurisdiction, then the code should be specifying that the WUIA needs to be protected appropriately and set the standard of protection.

Cost Impact: This code change proposal will increase the cost of construction. Some WUIA that are not currently protected with a code, but should be protected, will end up with protection under this code change.

F20-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

319 (NEW)-F-APFELBECK

F21 – 13

401.3.3, 907.6.5.3 (New)

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

401.3.3 Delayed notification. A person shall not, by verbal or written directive, require any delay in the reporting of a fire to the fire department.

Exception: Where permitted by the Fire Chief, an approved supervising station shall be allowed to verify an alarm signal prior to reporting it to the public safety communications center. The verification process shall be in accordance with NFPA 72.

Add new text as follows:

907.6.5.3 Alarm Signal Verification. Where permitted by the Fire Chief, an approved supervising station shall be allowed to verify an alarm signal prior to reporting it to the public safety communications center. The verification process shall be in accordance with NFPA 72.

Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

The intent is to allow fire departments to require verification on both commercial and residential alarm signals in order to assist in effective dispatching of resources and/or reducing nuisance alarms. Currently NFPA 72 allows verification on residential systems (but gives choice of using it to the monitoring company). This would give discretion to the fire chief, and expand use to include commercial alarms which accounts for the majority of false alarms in the U.S.

These provisions allow fire departments to require that alarm monitoring centers attempt to verify an alarm signal before reporting to the 9-1-1 center. Having better information about the cause of alarm activation is critical as many departments have much smaller responses for an automatic alarm signal than for a working structure fire. Additionally, verification has been proven effective in reducing unwanted nuisance alarms. Alarm Verification is already performed extensively on residential fire alarms; this would allow it to be mandated on some or all systems, including commercial occupancies, when required by the Chief.

Cost Impact: This code change will not increase the cost of construction

F21-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

401.3.3-F-ZUBIA-FCAC

F22 – 13

403.2

Proponent: Stephen DiGiovanni, Clark County, NV Fire Department, representing self.

Revise as follows:

403.2 Public safety plan. ~~In other than Group A or E occupancies, w~~Where the fire code official determines that an indoor or outdoor gathering of persons has an adverse impact on public safety through diminished access to buildings, structures, fire hydrants and fire apparatus access roads or where such gatherings adversely affect public safety services of any kind, the fire code official shall have the authority to order the development of, or prescribe a plan for, the provision of an approved level of public safety.

Reason: The exception that eliminates this section from applying to Group A and E occupancies is removed. The majority of crowd management issues occur in places that are considered assembly occupancies. As such, this section would most reasonably apply to Group A occupancies. In addition, Group E occupancy buildings typically are public buildings that are used for a variety of functions that involve gathering of persons. These may be school functions or other community functions, such as voting locations, religious functions, etc. As such, this section would also apply to Group E occupancies. Removing this phrase permits the fire code official to address safety concerns stemming from public gatherings in all buildings, not just a select few.

Cost Impact: This proposal would increase the costs of holding indoor and outdoor gatherings in Group A and Group E occupancies where required by the fire code official to have a public safety plan.

F22-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

403.2-F-DIGIOVANNI

F23 – 13

403.3

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

403.3 Crowd managers. Trained crowd managers shall be provided for facilities or events where more than 4,000 ~~250 or more~~ persons congregate. The minimum number of crowd managers shall be established at a ratio of one crowd manager to every 250 persons. ~~Where approved by the fire code official, the ratio of crowd managers shall be permitted to be reduced where the facility is equipped throughout with an approved automatic sprinkler system or based upon the nature of the event.~~

Exceptions:

1. Where approved, the number of crowd managers shall be permitted to be reduced by up to 50 percent where the fire and life safety protection provided and the nature of the event warrant a reduction.
2. Gatherings exclusively for religious worship with an occupant load not exceeding 1,000.

Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

The current code has no requirement for crowd managers until the occupant load in a public assembly reaches 1,000, then the code requires five trained crowd managers for an occupant load of 1001. This is illogical, especially since one of the events that generated this requirement, the Station Nightclub Fire, had an occupant load of less than 500. Smaller venues sometimes place the public at greater risk than large ones for many reasons, including the fact that larger facilities have greater requirements for other fire protection features. NFPA 1 and NFPA 101 require crowd managers in all public assemblies (except churches), so approving this code change will bring the two regulations closer to conformity.

The formatting change to place the potential reduction in the number of crowd managers in an exception is editorial; the exception was also changed to limit the reduction to half of the required number of crowd managers. Recent events have again emphasized that fire is not the only reason people will need to quickly exit a facility, so reducing the number strictly on the basis of a sprinkler system may be problematic. The exception for places of worship with occupant loads up to 1,000 recognizes the fact that people who are in these places of assembly normally have a greater awareness of their surroundings, and are more familiar with egress routes because they attend the church on a more regular basis than those at performances, who tend to be more transient.

Cost Impact: This code change will not increase the cost of construction

F23-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

403.3-F-ZUBIA-FCAC

F24 – 13

403.3.1 (New), 403.3.2 (New)

Proponent: Adolf Zubia, Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Add new text as follows:

403.3.1 Training. Training for crowd managers shall be approved.

403.3.2 Duties. The duties of crowd managers shall include, but not be limited to:

1. Conduct an inspection of the area of responsibility and identify and address any egress barriers.
2. Conduct an inspection of the area of responsibility to identify and mitigate any fire hazards.
3. Verify compliance with all permit conditions, including those governing pyrotechnics and other special effects.
4. Direct and assist the event attendees in evacuation during an emergency.
5. Assist emergency response personnel where # requested.
6. Other duties required by the fire code official.
7. Other duties as specified in the fire safety plan

Reason: The Code requires “trained crowd managers”, but doesn’t provide any guidance or describe what that training should include. This has been an ongoing issue for enforcement personnel. This change is intended to address that void.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

Cost Impact: This code change will not increase the cost of construction

F24-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

403.3.1 (NEW)-F-ZUBIA-FCAC

F25– 13

403, 404, 405, 406.1.1, 406.3.3, 408, 311.6

Proponent: Adolf Zubia, Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

SECTION 403 408 **USE AND OCCUPANCY-RELATED EMERGENCY PREPAREDNESS REQUIREMENTS**

403.1 ~~408.1~~ General. In addition to the requirements of Section 401, occupancies, uses and outdoor locations shall comply with the emergency preparedness requirements set forth in Sections 403.2 through 403.11. Where a firesafety and evacuation plan is required by Sections 403.2 through 403.11, evacuation drills shall be in accordance with Section 405 and employee training shall be in accordance with Section 406. In addition to the other requirements of this chapter, the provisions of this section are applicable to specific occupancies listed herein.

403.2 ~~408.2~~ Group A occupancies. An approved fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for Group A occupancies, other than those occupancies used exclusively for purposes of religious worship with an *occupant load* less than 2,000, and for buildings containing both a Group A occupancy and an atrium. Group A occupancies shall also comply with the requirements of Sections 403.2.1 through 403.2.4 ~~408.2.1 and 408.2.2~~ and Sections 401 through 406.

403.2.1 ~~408.2.1~~ Seating plan. In addition to the requirements of Section 404.2, tThe fire safety and evacuation plans for assembly occupancies shall include the information required by Section 404.3 and a detailed seating plan, *occupant load* and *occupant load* limit. Deviations from the approved plans shall be allowed provided the *occupant load* limit for the occupancy is not exceeded and the *aisles* and exit accessways remain unobstructed.

403.2.2 ~~408.2.2~~ Announcements. *(No change to current text)*

403.2.3 Fire watch personnel. Fire watch personnel shall be provided where required by Section 403.11.1.

403.2.4 Crowd managers. Crowd managers shall be provided where required by Section 403.11.3.

403.3 Group B occupancies. An approved fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for buildings containing a Group B occupancy where the Group B occupancy has an *occupant load* of 500 or more persons or more than 100 persons above or below the lowest *level of exit discharge*.

403.4 Group E occupancies. An approved fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for Group E occupancies and for buildings containing both a Group E occupancy and an atrium. Group E occupancies shall also comply with Section 403.4.1

403.4.1 ~~408.3~~ Group E occupancies and Group R-2 college and university buildings. Group E occupancies shall comply with the requirements of Sections 403.4.1.1 through 403.4.1.3 ~~408.3.1 through 408.3.4~~ and Sections 401 through 406. Group R-2 college and university buildings shall comply with the requirements of Sections 408.3.1 and 408.3.3 and Sections 401 through 406.

403.4.1.1 ~~408.3.1~~ First emergency evacuation drill. *(No change to current text)*

408.3.2 Emergency evacuation drill deferral. ~~In severe climates, the fire code official shall have the authority to modify the emergency evacuation drill frequency specified in Section 405.2.~~

403.4.1.2 408.3.3 Time of day. Emergency evacuation drills shall be conducted at different hours of the day or evening, during the changing of classes, when the school is at assembly, during the recess or gymnastic periods, or during other times to avoid distinction between drills and actual fires. ~~In Group R-2 college and university buildings, one required drill shall be held during hours after sunset or before sunrise.~~

403.4.1.3 408.3.4 Assembly points. *(No change to current text)*

403.5 Group F occupancies. An approved fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for buildings containing a Group F occupancy where the Group F occupancy has an occupant load of 500 or more persons or more than 100 persons above or below the lowest level of exit discharge .

403.6 Group H Occupancies. An approved fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for Group H occupancies. Group H-5 occupancies shall also comply with Section 403.6.1.

403.6.1 408.4 Group H-5 occupancies. ~~Group H-5 occupancies shall comply with the requirements of Sections 403.6.1.1 through 403.6.1.4 408.4.1 through 408.4.4 and Sections 401 through 407.~~

403.6.1.1 408.4.1 Plans and diagrams. *(No change to current text)*

403.6.1.2 408.4.2 Plan updating. The plans and diagrams required by Section ~~404~~, 403.6.1.1 and ~~407.6~~ 408.4.4 shall be maintained up to date and the *fire code official* and fire department shall be informed of all major changes.

403.6.1.3 408.4.3 Emergency response team. Responsible persons shall be designated ~~the~~ as an on-site emergency response team and trained to be liaison personnel for the fire department. These persons shall aid the fire department in preplanning emergency responses, identifying locations where HPM is stored, handled and used, and be familiar with the chemical nature of such material. An adequate number of personnel for each work shift shall be designated.

403.6.1.4 408.4.4 Emergency drills. *(No change to current text)*

403.7 Group I occupancies. An approved fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for Group I occupancies. Group I occupancies shall also comply with Sections 403.7.1 through 403.7.3

403.7.1 408.5 Group I-1 occupancies. ~~Group I-1 occupancies shall comply with the requirements of Sections 403.7.1.1 through 403.7.1.6 408.5.1 through 408.5.5 and Sections 401 through 406.~~

403.7.1.1 408.5.1 Fire safety and evacuation plan. The fire safety and evacuation plan required by Section 404 shall include special ~~staff~~ employee actions, including fire protection procedures necessary for residents, and shall be amended or revised upon admission of any resident with unusual needs.

403.7.1.2 408.5.2 Staff-Employee training. Employees shall be periodically instructed and kept informed of their duties and responsibilities under the plan. Such instruction shall be reviewed by ~~the staff~~ employees at intervals not exceeding ~~least every~~ two months. A copy of the plan shall be readily available at all times within the facility.

403.7.1.3 408.5.3 Resident training. *(No change to current text)*

403.7.1.4 408.5.4 Drill frequency. *(No change to current text)*

403.7.1.5 Drill times. Drills times are not required to comply with ~~the time requirements of~~ Section 405.4.

403.7.1.6 ~~408.5.5~~ Resident participation in drills. (No change to current text)

403.7.2 ~~408.6~~ Group I-2 occupancies. Group I-2 occupancies shall comply with ~~the requirements of~~ Sections 403.7.2.1 through 403.7.2.3~~408.6.1 and 408.6.2 and Sections 401 through 406.~~

403.7.2.1 Drill times. Drills times are not required to comply with ~~the time requirements of~~ Section 405.4.

403.7.2.2 ~~408.6.1~~ Evacuation not required. (No change to current text)

403.7.2.3 ~~408.6.2~~ Coded alarm signal. (No change to current text)

403.7.3 ~~408.7~~ Group I-3 occupancies. Group I-3 occupancies shall comply with ~~the requirements of~~ Sections 403.7.3.1 through 403.7.3.4~~408.7.1 through 408.7.4 and Sections 401 through 406.~~

403.7.3.1 ~~408.7.1~~ Employee training. Employees shall be instructed in the proper use of portable fire extinguishers and other manual fire suppression equipment. Training of new ~~staff~~ employees shall be provided promptly upon entrance on duty. Refresher training shall be provided at least annually.

403.7.3.2 ~~408.7.2~~ Employee ~~s~~Staffing. Group I-3 occupancies shall be provided with 24-hour staffing. ~~Staff~~ An employee shall be within three floors or 300 feet (91 440 mm) horizontal distance of the access door of each resident housing area. In ~~Use~~ Conditions 3, 4 and 5, as defined in "Occupancy Classification – Institutional Group I-3" in Chapter 2, the arrangement shall be such that the ~~staff~~ employee involved can start release of locks necessary for emergency evacuation or rescue and initiate other necessary emergency actions within 2 minutes of an alarm.

Exception: An ~~employee~~ Staff shall not be required to be within three floors or 300 feet (9144 mm) in areas in which all locks are unlocked remotely and automatically in accordance with Section 408.4 of the *International Building Code*.

403.7.3.3 ~~408.7.3~~ Notification. Provisions shall be made for residents in ~~Use~~ Conditions 3, 4 and 5, as defined in "Occupancy Classification – Institutional Group I-3" in Chapter 2, to readily notify an employee~~staff~~ of an emergency.

403.7.3.4 ~~408.7.4~~ Keys. Keys necessary for unlocking doors installed in a *means of egress* shall be individually identifiable by both touch and sight.

403.8 Group M occupancies. An approved fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for buildings containing a Group M occupancy, where the Group M occupancy has an occupant load of 500 or more persons or more than 100 persons above or below the lowest level of exit discharge, and for buildings containing both a Group M occupancy and an atrium.

403.9 Group R occupancies.

403.9.1 ~~408.8~~ Group R-1 occupancies. An approved fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for Group R-1 occupancies. Group R-1 occupancies shall also comply with the requirements of Sections 403.9.1.1 through 403.9.1.3, 408.8.1 through 408.8.3 and Sections 401 through 406.

403.9.1.1 ~~408.8.1~~ Evacuation diagrams. (No change to current text)

403.9.1.2 ~~408.8.2~~ Emergency duties. (No change to current text)

403.9.1.3 ~~408.8.3~~ Fire safety and evacuation instructions. (No change to current text)

403.9.2 408.9 Group R-2 occupancies. Group R-2 occupancies shall comply with the requirements of Sections 403.9.2.1 through 403.9.2.3~~408.9.1 through 408.9.4 and Sections 401 through 406.~~

403.9.2.1. College and University Buildings. An approved fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for Group R-2 college and university buildings. Group R-2 college and university buildings shall also comply with Sections 403.9.2.1 and 403.9.2.2.

403.9.2.1.1 First emergency evacuation drill. The first emergency evacuation drill of each school year shall be conducted within 10 days of the beginning of classes.

403.9.2.1.2 Time of day. Emergency evacuation drills shall be conducted at different hours of the day or evening, during the changing of classes, when the school is at assembly, during the recess or gymnastic periods, or during other times to avoid distinction between drills and actual fires. One required drill shall be held during hours after sunset or before sunrise.

403.9.2.2 408.9.4 Emergency guide. Fire emergency guides shall be provided for Group R-2 occupancies. Guide contents, maintenance and distribution shall comply with Sections 403.9.2.2.1 through 403.9.2.2.3

403.9.2.2.1 Guide contents. A fire emergency guides shall be provided which describes the location, function and use of fire protection equipment and appliances accessible to residents, including fire alarm systems, smoke alarms, and portable fire extinguishers. The guides shall also include an emergency evacuation plan for each dwelling unit.

403.9.2.2.2 408.9.3 Emergency guide maintenance. Emergency guides shall be reviewed and approved by the fire code official in accordance with Section 401.2. Evacuation diagrams shall be reviewed and updated in accordance with Section 404.4.

403.9.2.2.3 408.9.4 Emergency guide distribution. (No change to current text)

403.9.2.3 Evacuation diagrams for dormitories. A diagram depicting two evacuation routes shall be posted on or immediately adjacent to every required egress door from each dormitory sleeping unit. Evacuation diagrams shall be reviewed and updated as needed to maintain accuracy.

403.9.3 408.10 Group R-4 occupancies. An approved fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for Group R-4 occupancies. Group R-4 occupancies shall also comply with the requirements of Sections 403.9.3.1 through 403.9.3.6~~408.10.1 through 408.10.5 and Sections 401 through 406.~~

403.9.3.1 408.10.4 Fire safety and evacuation plan. The fire safety and evacuation plan required by Section 404 shall include special staff-employee actions, including fire protection procedures necessary for residents, and shall be amended or revised upon admission of a resident with unusual needs.

403.9.3.2 408.10.2 Staff-employee training. Employees shall be periodically instructed and kept informed of their duties and responsibilities under the plan. Such instruction shall be reviewed by employees at intervals not exceeding the staff at least every two months. A copy of the plan shall be readily available at all times within the facility.

403.9.3.3 408.10.3 Resident training. (No change to current text)

403.9.3.4 408.10.4 Drill frequency. (No change to current text)

403.9.3.5 Drill times. Drills times are not required to comply with the time requirements of Section 405.4.

403.9.3.6 408.10.5 Resident participation in drills. Emergency evacuation drills shall involve the actual evacuation of residents to a selected assembly point and shall provide residents with experience in exiting through all required exits. All required exits shall be used during emergency evacuation drills.

Exception: Actual exiting from windows shall not be required. Opening the window and signaling for help shall be an acceptable alternative.

403.10 Special uses. Special uses shall be in accordance with Sections 403.10.1 through 403.10.3.

403.10.1 408.11 Covered and open mall buildings. Covered and open mall buildings shall comply with the provisions-requirements of Sections 403.10.1.1 through 403.10.1.6~~408.11.1 through 408.11.3.~~

403.10.1.1 Malls and mall buildings exceeding 50,000 square feet. An approved fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for covered malls exceeding 50,000 square feet (4645 m²) in aggregate floor area and for open mall buildings exceeding 50,000 square feet (4645 m²) in aggregate area within the perimeter line.

403.10.1.2 408.11.4 Lease plan. In addition to the requirements of Section 404.2.2, aA lease plan that includes the following information shall be prepared for each covered and open mall building:-The plan shall include the following information in addition to that required by Section 404.3.2:-

1. Each occupancy, including identification of tenant.
2. *Exits* from each tenant space.
3. Fire protection features, including the following:
 - 3.1. Fire department connections.
 - 3.2. *Fire command center.*
 - 3.3. Smoke management system controls.
 - 3.4. Elevators, elevator machine rooms and controls.
 - 3.5. Hose valve outlets.
 - 3.6. Sprinkler and standpipe control valves.
 - 3.7. Automatic fire-extinguishing system areas.
 - 3.8. Automatic fire detector zones.
 - 3.9. *Fire barriers.*

403.10.1.3 408.11.1.4 Lease plan approval. *(No change to current text)*

403.10.1.4 408.11.1.2 Lease plan revisions. *(No change to current text)*

403.10.1.5 408.11.2 Tenant identification. Tenant identification shall be provided for secondary exits from occupied tenant spaces that lead to an *exit corridor* or directly to the exterior of the building. Each occupied tenant space provided with a secondary exit to the exterior or *exit corridor* shall be provided with tenant identification by Tenant identification shall be posted on the exterior side of the exit or exit access door and shall identify the business name and/or address. Letters and numbers shall be posted on the *corridor* side of the door, be using plainly legible letters and numbers that and shall contrast with their background.

Exception: Tenant identification is not required for anchor stores.

(Section 408.11.3 Moved to new Section 311.6)

403.10.1.6 Unoccupied tenant spaces. The fire safety and evacuation plan shall provide for compliance with the requirements for unoccupied tenant spaces in Section 311.

403.10.2 High-rise buildings. An approved fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for high-rise buildings.

403.10.3 Underground buildings. An *approved* fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for underground buildings.

403.11 Special requirements for public safety. Special requirements for public safety shall be in accordance with Sections 403.11.1 through 403.11.3.1.

SECTION 403 PUBLIC ASSEMBLAGES AND EVENTS

403.11.1403.1 Fire watch personnel. When, in the opinion of the *fire code official*, it is essential for public safety in a place of assembly or any other place where people congregate, because of the number of persons, or the nature of the performance, exhibition, display, contest or activity, the *owner*, agent or lessee shall provide one or more fire watch personnel, as required and *approved*. Fire watch personnel shall comply with Sections 403.11.1.1 and 403.11.1.2. ~~to remain on duty during the times such places are open to the public, or when such activity is being conducted.~~

403.1.1 Duties. Fire watch personnel shall keep diligent watch for fires, obstructions to *means of egress* and other hazards during the time such place is open to the public or such activity is being conducted and take prompt measures for remediation of hazards, extinguishment of fires that occur and assist in the evacuation of the public from the structures.

403.11.1.1 Duty Times. Fire watch personnel shall remain on duty during the times places requiring a fire watch are open to the public, or when an activity requiring a fire watch is being conducted.

403.11.1.2 Duties. On-duty fire watch personnel shall have the following duties:

1. Keep diligent watch for fires, obstructions to *means of egress* and other hazards
2. Take prompt measures for remediation of hazards and extinguishment of fires that occur
3. Take prompt measures to assist in the evacuation of the public from the structures.

403.11.2 403.2 Public safety plan for gatherings. In other than Group A or E occupancies, where the *fire code official* determines that an indoor or outdoor gathering of persons has an adverse impact on public safety through diminished access to buildings, structures, fire hydrants and fire apparatus access roads or where such gatherings adversely affect public safety services of any kind, the *fire code official* shall have the authority to order the development of or prescribe a public safety plan that provides an approved level of public safety and addresses the following items: ~~or prescribe a plan for, the provision of an approved level of public safety.~~

403.2.1 Contents. The public safety plan, where required by Section 403.2, shall address such items

1. as Emergency vehicle ingress and egress
2. Fire protection
3. Emergency egress or escape routes
4. Emergency medical services
5. Public assembly areas
6. and The directing of both attendees and vehicles, (including the parking of vehicles)
7. Vendor and food concession distribution
8. and The need for the presence of law enforcement
9. and The need for fire and emergency medical services personnel at the event.

403.11.3 403.3 Crowd managers for gatherings exceeding 1,000 people. Trained crowd managers shall be provided for Where facilities or events involve a gathering of where more than 1,000 people, crowd managers shall be provided in accordance with Section 403.11.3.1 persons congregate. ~~The minimum number of crowd managers shall be established at a ratio of one crowd manager to every 250~~

persons. ~~Where approved by the fire code official, the ratio of crowd managers shall be permitted to be reduced where the facility is equipped throughout with an approved automatic sprinkler system or based upon the nature of the event.~~

403.11.3.1 Number of crowd managers. The minimum number of crowd managers shall be established at a ratio of one crowd manager ~~for~~ to every 250 persons.

Exception: ~~Where approved by the fire code official, the ratio number of crowd managers shall be permitted to be reduced where the facility is equipped throughout with an approved automatic sprinkler system or based upon the nature of the event.~~

SECTION 404 FIRE SAFETY, ~~AND~~ EVACUATION AND LOCKDOWN PLANS

404.1 General. Where required by Section 403, ~~Fire safety, evacuation and lockdown plans and associated drills shall comply with the requirements of Sections 404.2 through 404.4.1~~ 404.5.1.

404.2 Where required. ~~An approved fire safety and evacuation plan shall be prepared and maintained for the following occupancies and buildings.~~

- ~~1. Group A, other than Group A occupancies used exclusively for purposes of religious worship that have an occupant load less than 2,000.~~
- ~~2. Group B buildings having an occupant load of 500 or more persons or more than 100 persons above or below the lowest level of exit discharge.~~
- ~~3. Group E.~~
- ~~4. Group F buildings having an occupant load of 500 or more persons or more than 100 persons above or below the lowest level of exit discharge.~~
- ~~5. Group H.~~
- ~~6. Group I.~~
- ~~7. Group R-1.~~
- ~~8. Group R-2 college and university buildings.~~
- ~~9. Group R-4.~~
- ~~10. High-rise buildings.~~
- ~~11. Group M buildings having an occupant load of 500 or more persons or more than 100 persons above or below the lowest level of exit discharge.~~
- ~~12. Covered malls exceeding 50,000 square feet (4645 m²) in aggregate floor area.~~
- ~~13. Open mall buildings exceeding 50,000 square feet (4645 m²) in aggregate area within perimeter line.~~
- ~~14. Underground buildings.~~
- ~~15. Buildings with an atrium and having an occupancy in Group A, E or M.~~

SECTION 405 EMERGENCY EVACUATION DRILLS

405.1 General. Emergency evacuation drills complying with ~~the provisions of this section.~~ Sections 405.2 through 405.9 shall be conducted at least annually in the occupancies listed in Section 404.2 where firesafety and evacuation plans are required by Section 403 or when required by the fire code official. Drills shall be designed in cooperation with the local authorities.

405.2 Frequency. *(No change to current text)*

405.3 Leadership. *(No change to current text)*

405.4 Time. *(No change to current text)*

405.5 Record keeping. Records shall be maintained of required emergency evacuation drills and include the following information:

1. Identity of the person conducting the drill.
2. Date and time of the drill.
3. Notification method used.
4. ~~Staff members~~ Employees on duty and participating.
5. Number of occupants evacuated.
6. Special conditions simulated.
7. Problems encountered.
8. Weather conditions when occupants were evacuated.
9. Time required to accomplish complete evacuation.

**TABLE 405.2
FIRE AND EVACUATION DRILL
FREQUENCY AND PARTICIPATION**

GROUP OR OCCUPANCY	FREQUENCY	PARTICIPATION
Group A	Quarterly	Employees
Group B ^c	Annually	Employees
Group E	Monthly ^a	All occupants
Group F	Annually	Employees
Group I	Quarterly on each shift	Employees ^b
Group R-1	Quarterly on each shift	Employees
Group R-2 ^d	Four annually	All occupants
Group R-4	Quarterly on each shift	Employees ^b
High-rise buildings	Annually	Employees

- a. ~~In severe climates, the fire code official shall have the authority to modify the emergency evacuation drill frequency.~~ The frequency shall be allowed to be modified in accordance with Section 408.3.2.
- b. Fire and evacuation drills in residential care assisted living facilities shall include complete evacuation of the premises in accordance with Section ~~403.9.3.6~~ 408.10.5. Where occupants receive habilitation or rehabilitation training, fire prevention and fire safety practices shall be included as part of the training program.
- c. Group B buildings having an occupant load of 500 or more persons or more than 100 persons above or below the lowest level of exit discharge.
- d. Applicable to Group R-2 college and university buildings in accordance with Section ~~403.9.2.1~~ 408-3.

406.1 General. ~~Where fire safety and evacuation plans are required by Section 403, Employees in the occupancies listed in Section 404.2 shall be trained in the fire emergency procedures described in their fire evacuation and fire safety plans. Training shall be based on plans prepared in accordance with Section 404.~~ these plans and as described in Section 404.3.

406.3.3 Emergency lockdown training. ~~Where a facility has a lockdown plan, employees shall be trained on their assigned duties and procedures in the event of an emergency lockdown. (moved to Section 406.4)~~

406.3.4 406.3.3 Fire safety training. (No change to current text)

406.4 406.3.3 Emergency lockdown training. (No change to current text)

Revise as follows:

311.1 General. Temporarily unoccupied buildings, structures, premises or portions thereof, including tenant spaces, shall be safeguarded and maintained in accordance with Sections 311.1.1 through 311.5.65.

311.6. 408.11.3 MaintenanceUnoccupied tenant spaces in mall buildings. Unoccupied tenant spaces in covered and open mall buildings shall be:

1. Kept free from the storage of any materials.
2. Separated from the remainder of the building by partitions of at least 0.5-inch-thick (12.7 mm) gypsum board or an *approved* equivalent to the underside of the ceiling of the adjoining tenant spaces.
3. Without doors or other access openings other than one door that shall be kept key locked in the closed position except during that time when opened for inspection.
4. Kept free from combustible waste and be broomswept clean.

Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

This proposal restructures Chapter 4 to place all of the core requirements in the front of the chapter in Section 403. The current code splits such requirements between Section 404.2 and Section 408, making the code difficult to follow and apply. Section 403 in this proposal includes the requirements previously included in Sections 404.2 and 408, which have been merged by occupancy classification or as otherwise appropriate.

The overall intent of this proposal is editorial revision. Provisions have been relocated and text has been edited in an effort to clarify what is believed to be the current intent without technical change and to improve readability. One section dealing with maintenance of unoccupied tenant spaces in malls was determined to be improperly located in Chapter 4 and was moved to Chapter 3 with other vacant use regulations.

In preparing this proposal, it was noted that the provisions for emergency evacuation drills for Group I-1 (403.7.1.6 of the rewrite) and Group R-4 (403.9.3.6 of the rewrite) are not consistent. This may have been deliberate when Chapter 4 was originally written, but it warrants a review to determine if the inconsistency is appropriate.

One change that was made corrects an error made by the Code Correlation Committee when they made what was believed to be an editorial addition to the code in Section 408.9.3 of the 2012 edition. That addition referenced Section 404.4 for review and updating of evacuation diagrams for any Group R-2 dormitory. The reference to Section 404.4 was incorrect because that section only relates to fire safety and evacuation plans, which are not required for Group R-2 except for college and university buildings. This error has been fixed in Section 403.9.2.3.

Because of the complexity of these revisions in legislative format, a clean copy of the final text is provided below to allow an easier review of the proposed text for the 2015 code:

SECTION 403 EMERGENCY PREPAREDNESS REQUIREMENTS

403.1 General. In addition to the requirements of Section 401, occupancies, uses and outdoor locations shall comply with the emergency preparedness requirements set forth in Sections 403.2 through 403.11. Where a firesafety and evacuation plan is required by Sections 403.2 through 403.11, evacuation drills shall be in accordance with Section 405 and employee training shall be in accordance with Section 406.

403.2 Group A occupancies. An *approved* fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for Group A occupancies, other than those occupancies used exclusively for purposes of religious worship with an *occupant load* less than 2,000, and for buildings containing both a Group A occupancy and an atrium. Group A occupancies shall also comply with Sections 403.2.1 through 403.2.4.

403.2.1 Seating plan. In addition to the requirements of Section 404.2, the fire safety and evacuation plans for assembly occupancies shall include a detailed seating plan, *occupant load* and *occupant load* limit. Deviations from the *approved* plans shall be allowed provided the *occupant load* limit for the occupancy is not exceeded and the *aisles* and exit accessways remain unobstructed.

403.2.2 Announcements. In theaters, motion picture theaters, auditoriums and similar assembly occupancies in Group A used for noncontinuous programs, an audible announcement shall be made not more than 10 minutes prior to the start of each program to notify the occupants of the location of the exits to be used in the event of a fire or other emergency.

Exception: In motion picture theaters, the announcement is allowed to be projected upon the screen in a manner *approved by the fire code official.*

403.2.3 Fire watch personnel. Fire watch personnel shall be provided where required by Section 403.11.1.

403.2.4 Crowd managers. Crowd managers shall be provided where required by Section 403.11.3.

403.3 Group B occupancies. An *approved* fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for buildings containing a Group B occupancy where the Group B occupancy has an *occupant load* of 500 or more persons or more than 100 persons above or below the lowest *level of exit discharge*.

403.4 Group E occupancies. An *approved* fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for Group E occupancies and for buildings containing both a Group E occupancy and an atrium. Group E occupancies shall also comply with Section 403.4.1

403.4.1 Group E occupancies. Group E occupancies shall comply with Sections 403.4.1.1 through 403.4.1.3

403.4.1.1 First emergency evacuation drill. The first emergency evacuation drill of each school year shall be conducted within 10 days of the beginning of classes.

403.4.1.2 Time of day. Emergency evacuation drills shall be conducted at different hours of the day or evening, during the changing of classes, when the school is at assembly, during the recess or gymnastic periods, or during other times to avoid distinction between drills and actual fires.

403.4.1.3 Assembly points. Outdoor assembly areas shall be designated and shall be located a safe distance from the building being evacuated so as to avoid interference with fire department operations. The assembly areas shall be arranged to keep each class separate to provide accountability of all individuals.

403.5 Group F occupancies. An *approved* fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for buildings containing a Group F occupancy where the Group F occupancy has an *occupant load* of 500 or more persons or more than 100 persons above or below the lowest *level of exit discharge*.

403.6 Group H Occupancies. An *approved* fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for Group H occupancies. Group H-5 occupancies shall also comply with Section 403.6.1.

403.6.1 Group H-5 occupancies. Group H-5 occupancies shall comply with Sections 403.6.1.1 through 403.6.1.4

403.6.1.1 Plans and diagrams. In addition to the requirements of Section 404 and Section 407.6, plans and diagrams shall be maintained in *approved* locations indicating the approximate plan for each area, the amount and type of HPM stored, handled and used, locations of shutoff valves for HPM supply piping, emergency telephone locations and locations of exits.

403.6.1.2 Plan updating. The plans and diagrams required by Section 404, 403.6.1.1 and 407.6 shall be maintained up to date and the *fire code official* and fire department shall be informed of major changes.

403.6.1.3 Emergency response team. Responsible persons shall be designated as an on-site emergency response team and trained to be liaison personnel for the fire department. These persons shall aid the fire department in preplanning emergency responses, identifying locations where HPM is stored, handled and used, and be familiar with the chemical nature of such material. An adequate number of personnel for each work shift shall be designated.

403.6.1.4 Emergency drills. Emergency drills of the on-site emergency response team shall be conducted on a regular basis but not less than once every three months. Records of drills conducted shall be maintained.

403.7 Group I occupancies. An *approved* fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for Group I occupancies. Group I occupancies shall also comply with Sections 403.7.1 through 403.7.3

403.7.1 Group I-1 occupancies. Group I-1 occupancies shall comply with Sections 403.7.1.1 through 403.7.1.6

403.7.1.1 Fire safety and evacuation plan. The fire safety and evacuation plan required by Section 404 shall include special employee actions, including fire protection procedures necessary for residents, and shall be amended or revised upon admission of any resident with unusual needs.

403.7.1.2 Employee training. Employees shall be periodically instructed and kept informed of their duties and responsibilities under the plan. Such instruction shall be reviewed by employees at intervals not exceeding two months. A copy of the plan shall be readily available at all times within the facility.

403.7.1.3 Resident training. Residents capable of assisting in their own evacuation shall be trained in the proper actions to take in the event of a fire. The training shall include actions to take if the primary escape route is blocked. Where the resident is given rehabilitation or habilitation training, training in fire prevention and actions to take in the event of a fire shall be a part of the rehabilitation training program. Residents shall be trained to assist each other in case of fire to the extent their physical and mental abilities permit them to do so without additional personal risk.

403.7.1.4 Drill frequency. Emergency evacuation drills shall be conducted at least six times per year, two times per year on each shift. Twelve drills shall be conducted in the first year of operation.

403.7.1.5 Drill times. Drill times are not required to comply with Section 405.4.

403.7.1.6 Resident participation in drills. Emergency evacuation drills shall involve the actual evacuation of residents to a selected assembly point.

403.7.2 Group I-2 occupancies. Group I-2 occupancies shall comply with Sections 403.7.2.1 through 403.7.2.3.

403.7.2.1 Drill times. Drill times are not required to comply with Section 405.4.

403.7.2.2 Evacuation not required. During emergency evacuation drills, the movement of patients to safe areas or to the exterior of the building is not required.

403.7.2.3 Coded alarm signal. When emergency evacuation drills are conducted after visiting hours or when patients or residents are expected to be asleep, a coded announcement is allowed instead of audible alarms.

403.7.3 Group I-3 occupancies. Group I-3 occupancies shall comply with Sections 403.7.3.1 through 403.7.3.4.

403.7.3.1 Employee training. Employees shall be instructed in the proper use of portable fire extinguishers and other manual fire suppression equipment. Training of new employees shall be provided promptly upon entrance on duty. Refresher training shall be provided at least annually.

403.7.3.2 Employee staffing. Group I-3 occupancies shall be provided with 24-hour staffing. An employee shall be within three floors or 300 feet (91 440 mm) horizontal distance of the access door of each resident housing area. In Conditions 3, 4 and 5, as defined in "Occupancy Classification – Institutional Group I-3" in Chapter 2, the arrangement shall be such that the employee involved can start release of locks necessary for emergency evacuation or rescue and initiate other necessary emergency actions within 2 minutes of an alarm.

Exception: An employee shall not be required to be within three floors or 300 feet (9144 mm) in areas in which all locks are unlocked remotely and automatically in accordance with Section 408.4 of the *International Building Code*.

403.7.3.3 Notification. Provisions shall be made for residents in Conditions 3, 4 and 5, as defined in "Occupancy Classification – Institutional Group I-3" in Chapter 2, to readily notify an employee of an emergency.

403.7.3.4 Keys. Keys necessary for unlocking doors installed in a *means of egress* shall be individually identifiable by both touch and sight.

403.8 Group M occupancies. An *approved* fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for buildings containing a Group M occupancy, where the Group M occupancy has an *occupant load* of 500 or more persons or more than 100 persons above or below the lowest *level of exit discharge*, and for buildings containing both a Group M occupancy and an atrium.

403.9 Group R occupancies.

403.9.1 Group R-1 occupancies. An *approved* fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for Group R-1 occupancies. Group R-1 occupancies shall also comply with Sections 403.9.1.1 through 403.9.1.3.

403.9.1.1 Evacuation diagrams. A diagram depicting two evacuation routes shall be posted on or immediately adjacent to every required egress door from each hotel or motel sleeping unit.

403.9.1.2 Emergency duties. Upon discovery of a fire or suspected fire, hotel and motel employees shall perform the following duties:

1. Activate the fire alarm system, where provided.
2. Notify the public fire department.
3. Take other action as previously instructed.

403.9.1.3 Fire safety and evacuation instructions. Information shall be provided in the fire safety and evacuation plan required by Section 404 to allow guests to decide whether to evacuate to the outside, evacuate to an *area of refuge*, remain in place, or any combination of the three.

403.9.2 Group R-2 occupancies. Group R-2 occupancies shall comply with Sections 403.9.2.1 through 403.9.2.3.

403.9.2.1. College and University Buildings. An *approved* fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for Group R-2 college and university buildings. Group R-2 college and university buildings shall also comply with Sections 403.9.2.1 and 403.9.2.2.

403.9.2.1.1 First emergency evacuation drill. The first emergency evacuation drill of each school year shall be conducted within 10 days of the beginning of classes.

403.9.2.1.2 Time of day. Emergency evacuation drills shall be conducted at different hours of the day or evening, during the changing of classes, when the school is at assembly, during the recess or gymnastic periods, or during other times to avoid distinction between drills and actual fires. One required drill shall be held during hours after sunset or before sunrise.

403.9.2.2 Emergency guide. Fire emergency guides shall be provided for Group R-2 occupancies. Guide contents, maintenance and distribution shall comply with Sections 403.9.2.2.1 through 403.9.2.2.3

403.9.2.2.1 Guide contents. Fire emergency guides shall describe the location, function and use of fire protection equipment and appliances accessible to residents, including fire alarm systems, smoke alarms, and portable fire extinguishers. Guides shall also include an emergency evacuation plan for each *dwelling unit*.

403.9.2.2.2 Emergency guide maintenance. Emergency guides shall be reviewed and *approved* by the *fire code official*.

403.9.2.2.3 Emergency guide distribution. A copy of the emergency guide shall be given to each tenant prior to initial occupancy.

403.9.2.3 Evacuation diagrams for dormitories. A diagram depicting two evacuation routes shall be posted on or immediately adjacent to every required egress door from each dormitory sleeping unit. Evacuation diagrams shall be reviewed and updated as needed to maintain accuracy.

403.9.3 Group R-4 occupancies. An *approved* fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for Group R-4 occupancies. Group R-4 occupancies shall also comply with Sections 403.9.3.1 through 403.9.3.6.

403.9.3.1 Fire safety and evacuation plan. The fire safety and evacuation plan required by Section 404 shall include special employee actions, including fire protection procedures necessary for residents, and shall be amended or revised upon admission of a resident with unusual needs.

403.9.3.2 Employee training. Employees shall be periodically instructed and kept informed of their duties and responsibilities under the plan. Such instruction shall be reviewed by employees at intervals not exceeding two months. A copy of the plan shall be readily available at all times within the facility.

403.9.3.3 Resident training. Residents capable of assisting in their own evacuation shall be trained in the proper actions to take in the event of a fire. The training shall include actions to take if the primary escape route is blocked. Where the resident is given rehabilitation or habilitation training, training in fire prevention and actions to take in the event of a fire shall be a part of the rehabilitation training program. Residents shall be trained to assist each other in case of fire to the extent their physical and mental abilities permit them to do so without additional personal risk.

403.9.3.4 Drill frequency. Emergency evacuation drills shall be conducted at least six times per year, two times per year on each shift. Twelve drills shall be conducted in the first year of operation.

403.9.3.5 Drill times. Drills times are not required to comply with Section 405.4.

403.9.3.6 Resident participation in drills. Emergency evacuation drills shall involve the actual evacuation of residents to a selected assembly point and shall provide residents with experience in exiting through all required exits. All required exits shall be used during emergency evacuation drills.

Exception: Actual exiting from windows shall not be required. Opening the window and signaling for help shall be an acceptable alternative.

403.10 Special uses.

403.10.1 Covered and open mall buildings. Covered and open mall buildings shall comply with the requirements of Sections 403.10.1.1 through 403.10.1.6.

403.10.1.1 Malls and mall buildings exceeding 50,000 square feet. An *approved* fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for covered malls exceeding 50,000 square feet (4645 m²) in aggregate floor area and for open mall buildings exceeding 50,000 square feet (4645 m²) in aggregate area within perimeter line.

403.10.1.2 Lease plan. In addition to the requirements of Section 404.2.2, a lease plan that includes the following information shall be prepared for each covered and open mall building:

1. Each occupancy, including identification of tenant.
2. *Exits* from each tenant space.
3. Fire protection features, including the following:

- 3.1. Fire department connections.
- 3.2. *Fire command center*.
- 3.3. Smoke management system controls.
- 3.4. Elevators, elevator machine rooms and controls.
- 3.5. Hose valve outlets.
- 3.6. Sprinkler and standpipe control valves.
- 3.7. Automatic fire-extinguishing system areas.
- 3.8. Automatic fire detector zones.
- 3.9. *Fire barriers*.

403.10.1.3 Lease plan approval. The lease plan shall be submitted to the *fire code official* for approval, and shall be maintained on site for immediate reference by responding fire service personnel.

403.10.1.4 Lease plan revisions. The lease plans shall be revised annually or as often as necessary to keep them current. Modifications or changes in tenants or occupancies shall not be made without prior approval of the *fire code official* and building official.

403.10.1.5 Tenant identification. Tenant identification shall be provided for secondary exits from occupied tenant spaces that lead to an *exit corridor* or directly to the exterior of the building. Tenant identification shall be posted on the exterior side of the exit or exit access door and shall identify the business name and/or address using plainly legible letters and numbers that contrast with their background.

Exception: Tenant identification is not required for anchor stores.

403.10.1.6 Unoccupied tenant spaces. The fire safety and evacuation plan shall provide for compliance with the requirements for unoccupied tenant spaces in Section 311.

403.10.2 High-rise buildings. An *approved* fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for high-rise buildings.

403.10.3 Underground buildings. An *approved* fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for underground buildings.

403.11 Special requirements for public safety.

403.11.1 Fire watch personnel. When, in the opinion of the *fire code official*, it is essential for public safety in a place of assembly or any other place where people congregate, because of the number of persons or the nature of the performance, exhibition, display, contest or activity, the *owner*, agent or lessee shall provide one or more fire watch personnel, as required and *approved*. Fire watch personnel shall comply with Sections 403.11.1.1 and 403.11.1.2.

403.11.1.1 Duty Times. Fire watch personnel shall remain on duty during the times places requiring a fire watch are open to the public, or when an activity requiring a fire watch is being conducted.

403.11.1.2 Duties. On-duty fire watch personnel shall have the following duties:

1. Keep diligent watch for fires, obstructions to *means of egress* and other hazards
2. Take prompt measures for remediation of hazards and extinguishment of fires that occur
3. Take prompt measures to assist in the evacuation of the public from the structures.

403.11.2 Public safety plan for gatherings. In other than Group A or E occupancies, where the *fire code official* determines that an indoor or outdoor gathering of persons has an adverse impact on public safety through diminished access to buildings, structures, fire hydrants and fire apparatus access roads or where such gatherings adversely affect public safety services of any kind, the *fire code official* shall have the authority to order the development of or prescribe a public safety plan that provides an approved level of public safety and addresses the following items:

1. Emergency vehicle ingress and egress
2. Fire protection
3. Emergency egress or escape routes
4. Emergency medical services
5. Public assembly areas
6. The directing of both attendees and vehicles, including the parking of vehicles
7. Vendor and food concession distribution
8. The need for the presence of law enforcement
9. The need for fire and emergency medical services personnel.

403.11.3 Crowd managers for gatherings exceeding 1,000 people. Where facilities or events involve a gathering of more than 1,000 people, crowd managers shall be provided in accordance with Section 403.11.3.1.

403.11.3.1 Number of crowd managers. The minimum number of crowd managers shall be established at a ratio of one crowd manager for every 250 persons.

Exception: Where *approved* by the *fire code official*, the number of crowd managers shall be permitted to be reduced where the facility is equipped throughout with an *approved automatic sprinkler system* or based upon the nature of the event.

Revise Section 404 as follows:

SECTION 404 FIRE SAFETY, EVACUATION AND LOCKDOWN PLANS

404.1 General. Where required by Section 403, fire safety, evacuation and lockdown plans shall comply with Sections 404.2 through 404.4.1.

(existing Section 404.2 is relocated and merged into Section 403 with the remaining sections renumbered)

Revise Section 405 as follows:

SECTION 405 EMERGENCY EVACUATION DRILLS

405.1 General. Emergency evacuation drills complying with Sections 405.2 through 405.9 shall be conducted at least annually where firesafety and evacuation plans are required by Section 403 or when required by the *fire code official*. Drills shall be designed in cooperation with the local authorities.

405.2 Frequency. Required emergency evacuation drills shall be held at the intervals specified in Table 405.2 or more frequently where necessary to familiarize all occupants with the drill procedure.

405.3 Leadership. Responsibility for the planning and conduct of drills shall be assigned to competent persons designated to exercise leadership.

405.4 Time. Drills shall be held at unexpected times and under varying conditions to simulate the unusual conditions that occur in case of fire.

405.5 Record keeping. Records shall be maintained of required emergency evacuation drills and include the following information:

1. Identity of the person conducting the drill.
2. Date and time of the drill.
3. Notification method used.
4. Employees on duty and participating.
5. Number of occupants evacuated.
6. Special conditions simulated.
7. Problems encountered.
8. Weather conditions when occupants were evacuated.
9. Time required to accomplish complete evacuation.

**TABLE 405.2
FIRE AND EVACUATION DRILL
FREQUENCY AND PARTICIPATION
FIRE AND EVACUATION DRILL
FREQUENCY AND PARTICIPATION**

GROUP OR OCCUPANCY	FREQUENCY	PARTICIPATION
Group A	Quarterly	Employees
Group B ^c	Annually	Employees
Group E	Monthly ^a	All occupants
Group F	Annually	Employees
Group I	Quarterly on each shift	Employees ^b
Group R-1	Quarterly on each shift	Employees
Group R-2 ^d	Four annually	All occupants
Group R-4	Quarterly on each shift	Employees ^b
High-rise buildings	Annually	Employees

- a. In severe climates, the *fire code official* shall have the authority to modify the emergency evacuation drill frequency.
- b. Fire and evacuation drills in residential care assisted living facilities shall include complete evacuation of the premises in accordance with Section 403.9.3.6. Where occupants receive habilitation or rehabilitation training, fire prevention and fire safety practices shall be included as part of the training program.
- c. Group B buildings having an occupant load of 500 or more persons or more than 100 persons above or below the lowest level of exit discharge.
- d. Applicable to Group R-2 college and university buildings in accordance with Section 403.9.2.1.

405.6 Notification. Where required by the *fire code official*, prior notification of emergency evacuation drills shall be given to the *fire code official*.

405.7 Initiation. Where a fire alarm system is provided, emergency evacuation drills shall be initiated by activating the fire alarm system.

405.8 Accountability. As building occupants arrive at the assembly point, efforts shall be made to determine if all occupants have been successfully evacuated or have been accounted for.

405.9 Recall and reentry. An electrically or mechanically operated signal used to recall occupants after an evacuation shall be separate and distinct from the signal used to initiate the evacuation. The recall signal initiation means shall be manually operated and under the control of the person in charge of the premises or the official in charge of the incident. No one shall reenter the premises until authorized to do so by the official in charge.

Revise Section 406 as follows

406.1 General. Where fire safety and evacuation plans are required by Section 403, employees shall be trained in fire emergency procedures . based on plans prepared in accordance with Section 404.

406.2 Frequency. Employees shall receive training in the contents of fire safety and evacuation plans and their duties as part of new employee orientation and at least annually thereafter. Records shall be kept and made available to the *fire code official* upon request.

406.3 Employee training program. Employees shall be trained in fire prevention, evacuation and fire safety in accordance with Sections 406.3.1 through 406.3.4.

406.3.1 Fire prevention training. Employees shall be apprised of the fire hazards of the materials and processes to which they are exposed. Each employee shall be instructed in the proper procedures for preventing fires in the conduct of their assigned duties.

406.3.2 Evacuation training. Employees shall be familiarized with the fire alarm and evacuation signals, their assigned duties in the event of an alarm or emergency, evacuation routes, areas of refuge, exterior assembly areas and procedures for evacuation.

(moved to Section 406.4)

406.3.3 Fire safety training. Employees assigned firefighting duties shall be trained to know the locations and proper use of portable fire extinguishers or other manual fire-fighting equipment and the protective clothing or equipment required for its safe and proper use.

406.4 Emergency lockdown training. Where a facility has a lockdown plan, employees shall be trained on their assigned duties and procedures in the event of an emergency lockdown.

Delete Section 408 (existing Section 408 has been relocated to Section 403):

Revise Section 311.1 as follows:

311.1 General. Temporarily unoccupied buildings, structures, premises or portions thereof, including tenant spaces, shall be safeguarded and maintained in accordance with Sections 311.1.1 through 311.5.6.

Add a Section 311.6 as follows:

311.6. Unoccupied tenant spaces in mall buildings. Unoccupied tenant spaces in covered and open mall buildings shall be:

1. Kept free from the storage of any materials.
2. Separated from the remainder of the building by partitions of at least 0.5-inch-thick (12.7 mm) gypsum board or an *approved* equivalent to the underside of the ceiling of the adjoining tenant spaces.
3. Without doors or other access openings other than one door that shall be kept key locked in the closed position except during that time when opened for inspection.
4. Kept free from combustible waste and be broom swept clean.

Cost Impact: This code change will not increase the cost of construction

F25-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

408.1-F-ZUBIA-FCAC

F26 – 13

404.2, 404.3.1, 404.3.2, Table 405.2, 408.3 (New), 408.3.1 (New), 408.3.2 (New), 408.3.3 (New), 408.3.4 (New)

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care
(john.williams@doh.wa.gov)

Revise as follows:

404.2 Where required. An *approved* fire safety and evacuation plan shall be prepared and maintained for the following occupancies and buildings:

1. Group A, other than Group A occupancies used exclusively for purposes of religious worship that have an *occupant load* less than 2,000.
2. Group B.
 - 2.1. Buildings having an ambulatory care facility.
 - 2.2. Buildings having an *occupant load* of 500 or more *persons* or more than 100 *persons* above or below the lowest *level of exit discharge*.
- 3 through 15 (No change to current text)

404.3.1 Fire evacuation plans. Fire evacuation plans shall include the following:

1. Emergency egress or escape routes and whether evacuation of the building is to be complete, ~~or, where approved~~, by selected floors or areas only, or with a defend-in-place response.
- 2 through 9 (No change to current text)

404.3.2 Fire safety plans. Fire safety plans shall include the following:

1. The procedure for reporting a fire or other emergency.
2. The life safety strategy including the following:
 - 2.1 ~~and p~~ Procedures for notifying occupants, including areas with a private mode alarm system.
 - 2.2 Procedures for ~~relocating~~ occupants under a defend-in-place response.
 - 2.3 Procedures ~~or for~~ evacuating occupants, including occupants who need assistance in evacuation.
- 3 through 7 (No change to current text)

405.2 Frequency. Required emergency evacuation drills shall be held at the intervals specified in Table 405.2 or more frequently where necessary to familiarize all occupants with the drill procedure.

**TABLE 405.2
FIRE AND EVACUATION DRILL
FREQUENCY AND PARTICIPATION**

GROUP OR OCCUPANCY	FREQUENCY	PARTICIPATION
Group B ^{c,d}	Annually	Employees
Group R-2 ^{d,e}	Four annually	All occupants

(Portions of table not shown remain unchanged)

- a. The frequency shall be allowed to be modified in accordance with Section 408.3.2.
- b. Fire and evacuation drills in residential care assisted living facilities shall include complete evacuation of the premises in accordance with Section 408.10.5. Where occupants receive habilitation or rehabilitation training, fire prevention and fire safety practices shall be included as part of the training program.
- c. Emergency evacuation drills are required in Group B buildings having an occupant load of 500 or more persons or more than 100 persons above or below the lowest level of exit discharge.
- d. Emergency evacuation drills are required in ambulatory care facilities in accordance with Section 408.3.
- e. Applicable to Group R-2 college and university buildings in accordance with Section 408.3.

Add new text as follows:

408.3 Ambulatory Care Facilities. Ambulatory care facilities shall comply with the requirements of Sections 408.3.1 through 408.3.3 and Section 401 through 406.

408.3.1 Fire evacuation plan. The fire safety and evacuation plan required by Section 404 shall include a description of special staff actions. This shall include procedures for stabilizing patients in a defend in place response, staged evacuation, or full evacuation in conjunction with the entire building if part of a multi-tenant facility.

408.3.2 Fire safety plan. A copy of the plan shall be maintained at the facility at all times. Plan shall include the all of following in addition to the requirements of Section 404:

1. Locations where patients are located who are rendered incapable of self preservation.
2. Maximum number of patients rendered incapable of self preservation.
3. Area and extent of each Ambulatory Care Facility.
4. Location of adjacent smoke compartments or refuge areas, where required.
5. Path of travel to adjacent smoke compartments.
6. Location of any special locking, delayed egress or access control arrangements.

408.3.3 Staff training. Employees shall be periodically instructed and kept informed of their duties and responsibilities under the plan. Such instruction shall be reviewed by the staff at least every two months. A copy of the plan shall be readily available at all times within the facility.

408.3.4 Emergency Evacuation Drills. Emergency evacuation drills shall comply with Section 405. Emergency evacuation drills shall be conducted at least four times per year.

Exceptions: The movement of patients to safe areas or to the exterior of the building is not required.

(Renumber subsequent sections)

Reason: This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>

This code change proposal clarifies the code by accurately describing the documentation needed to understand the typical "defend in place" method of occupant protection. Defend-in-place is a widely used approach to protecting occupants who are bedridden, unconscious or otherwise unable to self-preserve in a fire event. The method relies on both active and passive fire protection systems as well as the actions of trained staff and responders. The heavy emphasis on staff action requires a comprehensive fire safety and evacuation plan.

Any building containing an ambulatory healthcare occupancy will, by definition, contain occupants who may be incapable of self-preservation. The intent of the current IBC requirements for ambulatory care is to create a type of defend-in-place environment. Fire safety and evacuation plans must be developed, reviewed and approved to support this strategy.

The reference to "defend-in-place" is added in Section 404.3.1 to recognize the defend-in-place method. This is not a new concept. The IBC and legacy codes have been written to support this concept for years, yet the code did not name or describe the concept until this cycle. Group A code change G68-12 was approved in 2012 to define the concept, with the understanding that this change would follow.

Fire safety plans should describe in the life safety strategy the method of notifying occupants, including the use of a private mode alarm system as allowed by code. Procedures for dealing with occupants in a defend-in-place strategy should also be described so that it is clear what the staff will be trained on and what the first responders should expect to encounter.

The new Section 408.3 adds requirements for how to create fire safety and evacuation plans for Ambulatory Care Facilities. This section does not include great detail, as there are many successful ways to approach a defend in place response. Rather, this section describes the minimum amount of information necessary aid in the review of facility and the plan. Fire evacuations plan are required to describe the special actions of staff, especially staff that must stabilize a patient prior to moving. This will be the basis of the staff education and training. This will also help the code official understand the expected performance of the building.

It is imperative that the building and fire official know the size and location of the facility as well as the number of patients who are incapable of self-preservation. This information will help the building official determine the proper classification and mitigations

required. It will also allow the fire official to preplan the response for a particular building. Any special characteristics of the means of egress, such as path to the adjacent smoke compartment and special locking arrangements should also be described to aid in verifying code compliance. Practically these documents will be the basis for staff training as well.

Fire safety plans are required to show the location of area where incapable patients are likely to be. They are required to show the location of smoke compartments, routes of travel, patient movement elevators and any locking constraints that might affect the horizontal evacuation of patients. All of these will be essential to robust staff training as well as operational planning for first responders.

Finally, the requirements for emergency evacuation drill have been merged into a single subsection for clarity. The only functional change is to delete the exception which would have allowed drills to not comply with the time requirements of Section 405.4. The committee felt that holding drill at unexpected time and varying conditions was a crucial component of staff training.

These requirements, while new to the fire code, have been a widely accepted practice in the facilities for years. This code change proposal has been reviewed by representatives from both the hospital and nursing home industry who have given their support to these changes.

Cost Impact: This proposal will not increase the cost of construction.

F26-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

404.2-F-WILLIAMS-ADHOC

F27 – 13

404.3.1, 404.3.2, 408.6, 408.6.1, 408.6.2, 408.6.3 (New)

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care (john.williams@doh.wa.gov) and Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee (cbaldassarra@RJAGroup.com)

Revise as follows:

404.3 Contents. Fire safety and evacuation plan contents shall be in accordance with Sections 404.3.1 and 404.3.2.

404.3.1 Fire evacuation plans. Fire evacuation plans shall include the following:

1. Emergency egress or escape routes and whether evacuation of the building is to be complete, ~~or, where approved, by selected floors or areas only, or with a defend-in-place response.~~
- 2 through 9 (No change to current text)

404.3.2 Fire safety plans. Fire safety plans shall include the following:

1. The procedure for reporting a fire or other emergency.
2. The life safety strategy including the following:
 - 2.1. and Procedures for notifying occupants, including areas with a private mode alarm system.
 - 2.2 Procedures for relocating occupants under a defend-in-place response.
 - 2.3 Procedures for evacuating occupants, including occupants who need assistance in evacuation.
- 3 through 7 (No change to current text)

408.6 Group I-2. Group I-2 occupancies shall comply with the requirements of Sections 408.6.1 through 408.6.3 and Section 401 through 406. ~~Drills are not required to comply with the time requirements of Section 405.4.~~

~~**408.6.1 Evacuation not required.** During emergency evacuation drills, the movement of patients to safe areas or to the exterior of the building is not required.~~

~~**408.6.2 Coded alarm signal.** When emergency evacuation drills are conducted after visiting hours or when patients or residents are expected to be asleep, a coded announcement is allowed instead of audible alarms.~~

Add new text as follows:

408.6.1 Fire evacuation plans. The fire safety and evacuation plans required by Section 404 shall include a description of special staff *actions*. Plan shall include all of the following in addition to the requirements of Section 404.

1. Procedures for evacuation for patients with needs for containment or restraint and post evacuation containment, where present.
2. A written plan for maintenance of the means of egress.
3. Procedure for a defend-in-place strategy.
4. Procedures for a full floor or building evacuation, where necessary.

408.6.2 Fire safety plans. A copy of the plan shall be maintained at the facility at all times. Plans shall include all of the following in addition to the requirements of Section 404:

1. Location and number of any patient sleeping rooms and operating rooms.

2. Location of adjacent smoke compartments or refuge areas.
3. Path of travel to adjacent smoke compartments.
4. Location of any special locking, delayed egress or access control arrangements.
5. Location of elevators utilized for patient movement in accordance with the fire safety plan, where provided.

408.6.3 Emergency Evacuation Drills. Emergency evacuation drills shall comply with Section 405.

Exceptions:

1. The movement of patients to safe areas or to the exterior of the building is not required.
2. Where emergency evacuation drills are conducted after visiting hours or where patients or residents are expected to be asleep, a coded announcement shall be an acceptable alternative to audible alarms.

Reason: This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>

This proposal is being co-sponsored by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/cc/ctc/index.html>. Since its inception in April, 2005, the CTC has held 25 meetings – all open to the public. In 2012, three of the 25 face-to-face meetings were held. In addition to the CTC meetings, the CTC established Study Groups (SG) of interested parties for each of the areas of study. These SG's are responsible for reviewing the available information and making recommendations to the CTC. All totaled, the SG's held over 70 conference calls in 2012.

This code change proposal clarifies the code by accurately describing the documentation needed to understand the typical "defend in place" method of occupant protection. Defend-in-place is a widely used approach to protecting occupants who are bedridden, unconscious or otherwise unable to self-preserve in a fire event. The method relies on both active and passive fire protection systems as well as the actions of trained staff and responders. The heavy emphasis on staff action requires a comprehensive fire safety and evacuation plan.

The reference to "defend-in-place" is added in Section 404.3.1 to recognize the defend-in-place method. This is not a new concept. The IBC and legacy codes have been written to support this concept for years, yet the code did not name or describe the concept until this cycle. Group A code change G68-12 was approved in 2012 to define the concept, with the understanding that this change would follow.

Fire safety plans should describe in the life safety strategy the method of notifying occupants, including the use of a private mode alarm system as allowed by code. Procedures for dealing with occupants in a defend-in-place strategy should also be described so that it is clear what the staff will be trained on and what the first responders should expect to encounter.

It is imperative that the building and fire code officials know the size and location of the facility as well as the number of patients who are incapable of self-preservation. This information will help the building official determine the proper classification and mitigations required. It will also allow the fire official to preplan the response for a particular building. Any special characteristics of the means of egress, such as path to the adjacent smoke compartment and special locking arrangements should also be described to aid in verifying code compliance. Practically these documents will be the basis for staff training as well.

Section 408.6 has been rewritten to accurately reflect the needs and the current practice for Group I-2 occupancies. This section requires the facility to describe the special actions of staff. Due to the special nature of some facilities, specific requirements are made locations where patients are restrained. Since these facilities contain a large number of carts, beds, and other mobile equipment a written plan for maintenance of the means of egress is required. This would address the practical operational needs of the facility while ensuring that the means of egress can be maintained free of obstructions. While these facilities are defend in place, catastrophic failure may require full evacuation. Facilities are asked to describe this procedure so that the first responders can preplan.

Fire safety plans are required to show the location of area where incapable patients are likely to be. They are required to show the location of smoke compartments, routes of travel, patient movement elevators and any locking constraints that might affect the horizontal evacuation of patients. All of these will be essential to robust staff training as well as operational planning for first responders.

Finally, the requirements for emergency evacuation drill have been merged into a single subsection for clarity. The only functional change is to delete the exception which would have allowed drills to not comply with the time requirements of Section 405.4. The committee felt that holding drill at unexpected time and varying conditions was a crucial component of staff training.

These requirements, while new to the fire code, have been a widely accepted practice in the facilities for years. This code

change proposal has been reviewed by representatives from both the hospital and nursing home industry who have given their support to these changes.

Cost Impact: This proposal will not increase the cost of construction.

F27-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

404.3.1-F-BALDASSARRA-WILLIAMS-ADHOC-CTC

F28 – 13

404.3.1

Proponent: Brian Black, BDBlack Codes, Inc., representing National Elevator Industry Inc.
(bdbblack@neii.org)

Revise as follows:

404.3.1 Fire evacuation plans. Fire evacuation plans shall include the following:

1. Emergency egress or escape routes and whether evacuation of the building is to be complete or, where *approved*, by selected floors or areas only.
2. Procedures for employees who must remain to operate critical equipment before evacuating.
3. Procedures for the use of elevators to evacuate the building where occupant evacuation elevators complying with Section 3008 of the *International Building Code* are provided.
- ~~34.~~ Procedures for assisted rescue for persons unable to use the general means of egress unassisted.
- ~~45.~~ Procedures for accounting for employees and occupants after evacuation has been completed.
- ~~56.~~ Identification and assignment of personnel responsible for rescue or emergency medical aid.
- ~~67.~~ The preferred and any alternative means of notifying occupants of a fire or emergency.
- ~~78.~~ The preferred and any alternative means of reporting fires and other emergencies to the fire department or designated emergency response organization.
- ~~89.~~ Identification and assignment of personnel who can be contacted for further information or explanation of duties under the plan.
910. A description of the emergency voice/alarm communication system alert tone and preprogrammed voice messages, where provided.

Reason: Where Occupant Evacuation Elevators are included in a building design, their use must be specifically spelled out in the building's fire evacuation plan.

Cost Impact: This code change proposal will not increase construction costs.

F28-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

404.3.1-F-BLACK

F29 – 13

404.3.2, 202

Proponent: Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency (Gregory.wilson2@fema.dhs.gov); Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency (rcquinn@earthlink.net).

Revise as follows:

404.3.2 Fire safety plans. Fire safety plans shall include the following:

1. The procedure for reporting a fire or other emergency.
2. The life safety strategy and procedures for notifying, relocating or evacuating occupants, including occupants who need assistance.
3. Site plans indicating the following:
 - 3.1. The occupancy assembly point.
 - 3.2. The locations of fire hydrants.
 - 3.3. The normal routes of fire department vehicle access.
 - 3.4. Whether the site or any portion thereof, or the normal routes of fire department vehicle access, is located in a flood hazard area.
4. through 7. *(No change to current text.)*

Add new text as follows:

SECTION 202 GENERAL DEFINITIONS

[B] FLOOD HAZARD AREA. The greater of the following two areas:

1. The area within a floodplain subject to a 1-percent or greater chance of flooding in any year.
2. The area designated as a flood hazard area on a community's flood hazard map, or otherwise legally designated.

Reason: Structure fire associated with flooding is fairly common. Most recently, many homes were damaged by fires after Hurricane Sandy. Significant structure fires occurred during flooding in Cedar Rapids, Iowa (2008) and Grand Forks, ND (1997). Although dwellings aren't required by the IFC to have Fire Safety and Evacuation Plans, the occupancies and buildings listed in Section 404.2 are vulnerable to fire following flood.

This proposal would require identification of flood hazard areas as part of Fire Safety and Evacuation Plans. Construction documents and site plans submitted with building permit applications already are required to show information about flood hazard areas, floodways, and design flood elevations (see Section 107.2.5).

The source of flood hazard information is the community's flood hazard map. Flood hazard area information is readily accessible. The Federal Emergency Management Agency has prepared maps for more than 21,000 local jurisdictions (counties, parishes, boroughs, cities, towns, villages, etc.). Jurisdictions that participate in the National Flood Insurance Program are required to make those maps accessible to the public, which means anyone responsible for preparing a fire safety and evacuation plan has access to the public information. In addition, FEMA's flood maps are available online <https://msc.fema.gov> (click on <Product Catalog>). For instruction on how make a PDF of a portion of a FEMA map, click on <FIRMette.>

Cost Impact: None.

F29-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

404.3.2-F-QUINN-WILSON

F30 – 13

404.3.2, Table 405.2, 408.5.1.1 (New), 408.5.1.2 (New), 408.5.3, 408.5.5, 408.5.6 (New), 408.10.1.1 (New), 408.10.5, 408.10.6 (New)

Proponent: Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee
(cbaldassarra@RJAGroup.com)

Revise as follows:

404.3.2 Fire safety plans. Fire safety plans shall include the following:

1. The procedure for reporting a fire or other emergency.
2. The life safety strategy and procedures for notifying, relocating or evacuating occupants, including occupants who need assistance.
3. Site plans indicating the following:
 - 3.1. The occupancy assembly point.
 - 3.2. The locations of fire hydrants.
 - 3.3. The normal routes of fire department vehicle access.
4. Floor plans identifying the locations of the following:
 - 4.1. Exits.
 - 4.2. Primary evacuation routes.
 - 4.3. Secondary evacuation routes.
 - 4.4. Accessible egress routes.
 - 4.5. Areas of refuge.
 - 4.6. Refuge areas
 - 4.7 4.6. Exterior areas for assisted rescue.
 - 4.8 4.7. Manual fire alarm boxes.
 - 4.9 4.8. Portable fire extinguishers.
 - 4.10 4.9. Occupant-use hose stations.
 - 4.11 4.10. Fire alarm annunciators and controls.
5. A list of major fire hazards associated with the normal use and occupancy of the premises, including maintenance and housekeeping procedures.
6. Identification and assignment of personnel responsible for maintenance of systems and equipment installed to prevent or control fires.
7. Identification and assignment of personnel responsible for maintenance, housekeeping and controlling fuel hazard sources.

**TABLE 405.2
FIRE AND EVACUATION DRILL
FREQUENCY AND PARTICIPATION**

GROUP OR OCCUPANCY	FREQUENCY	PARTICIPATION
Group A	Quarterly	Employees
Group B ^c	Annually	Employees
Group E	Monthly ^a	All occupants
Group F	Annually	Employees
Group I	Quarterly on each shift ^a	Employees ^b
Group R-1	Quarterly on each shift	Employees
Group R-2 ^d	Four annually	All occupants
Group R-4	Quarterly on each shift ^a	Employees ^b
High-rise buildings	Annually	Employees

a. The frequency shall be allowed to be modified in accordance with Sections 408.3.2, 408.5.6 and 408.10.6.

b. Fire and evacuation drills in residential care assisted living facilities shall include complete evacuation of the premises in accordance with Section 408.10.5. Where occupants receive habilitation or rehabilitation training, fire prevention and fire safety practices shall be included as part of the training program.

c. Group B buildings having an occupant load of 500 or more persons or more than 100 persons above or below the lowest level of exit

- discharge.
- d. Applicable to Group R-2 college and university buildings in accordance with Section 408.3.

408.5.1.1 Fire evacuation plan. The fire evacuation plan required by Section 404 shall include a description of special staff actions. Plans shall include the following in addition to the requirements of Section 404.

1. In Group I-1 Condition 2 occupancies, procedures for evacuation through a refuge area in an adjacent smoke compartment and then to an exterior assembly point.

408.5.1.2 Fire safety plans. A copy of the plan shall be maintained at the facility at all times. Plans shall include the following in addition to the requirements of Section 404:

1. Location and number of any residents sleeping rooms.
2. Location of any special locking or egress control arrangements.

408.5.3 Resident training. Residents capable of assisting in their own evacuation shall be trained in the proper actions to take in the event of a fire. In Group I-1 Condition 2 occupancies training shall include evacuation through an adjacent smoke compartment and then to an exterior assembly point. The training shall include actions to take if the primary escape route is blocked. Where the resident is given rehabilitation or habilitation training, training in fire prevention and actions to take in the event of a fire shall be a part of the rehabilitation training program. Residents shall be trained to assist each other in case of fire to the extent their physical and mental abilities permit them to do so without additional personal risk.

408.5.5 Resident participation. Emergency evacuation drills shall involve the actual evacuation of residents to a selected assembly point and shall provide residents with experience in exiting through all required exits. All required exits shall be used during emergency evacuation drills.

408.5.6 Emergency evacuation drill deferral. In severe climates, the *fire code official* shall have the authority to modify the emergency evacuation drill frequency specified in Section 405.2.

408.10.1.1 Fire safety plans. A copy of the plan shall be maintained at the facility at all times. Plans shall include the following in addition to the requirements of Section 404:

1. Location and number of any residents sleeping rooms.
2. Location of any special locking or egress control arrangements.

408.10.5 Resident participation. Emergency evacuation drills shall involve the actual evacuation of residents to a selected assembly point and shall provide residents with experience in exiting through all required exits. All required exits shall be used during emergency evacuation drills.

Exception: Actual exiting from emergency escape and rescue windows shall not be required. Opening the emergency escape and rescue window and signaling for help shall be an acceptable alternative.

408.10.6 Emergency evacuation drill deferral. In severe climates, the *fire code official* shall have the authority to modify the emergency evacuation drill frequency specified in Section 405.2.

Reason: The intent of this proposal is to clarify the requirements for Group I-1 and R-4 assembly points. It also clarifies the implementation of smoke compartments in the new Group I-1 Condition 2 as was approved for the 2015 IBC in the G 31-12. Finally it proposes severe climate flexibility for fire drill frequency.

The proposed change clarifies that Group I-1 Condition 2 "smoke compartment" refuge areas, as required in the G 31-12 Section 420, can be used as a temporary "refuge area" during evacuation prior to complete building evacuation..

The proposed code change allows for severe climate deferrals, similar to current Group E deferrals that are already allowed. This takes into consideration the possible danger to seniors inhabiting these occupancies, when they are required to go outside during fire drills when possible inclement weather is occurring. The proposal allows the fire code official to modify drill frequency. The provision is left as a general provision purposely due to the variations of severe climate throughout the country, whether it be hot or cold, winter or summer or from storms. It leaves up to local discretion, the opportunity to allow modifications.

(This is reflected in the additional section references in Note a to Table 405.2.) The modifications in actual practice may also include still conducting the drill, while not requiring residents to actually go outside during the drill at certain times of the year. The residents would still be trained to go outside to the outdoor assembly point during a real emergency situation.

The assembly point aspects of the proposed change are more clerical. The revisions are proposed essentially from the current wording in Group E clarifying that an assembly point is outdoors coinciding with the building evacuation concepts of both Group I-1 and R-4 irrelevant of the "Condition."

These changes are stand alone but have been coordinated with the Ad Hoc committee proposed IFC changes for Group I-2 so as not to conflict with those proposed changes. These changes have also been coordinated with the separate CTC proposed IFC changes for the Table 405.2 for fire and safety evacuation drills for both Groups I-1 and R-4.

The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

Cost Impact: None

F30-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

404.3.2-F-BALDASSARRA-CTC

F31 – 13

Table 405.2

Proponent: Dave Frable representing U.S. General Services Administration, Public Buildings Service

Revise as follows:

**TABLE 405.2
FIRE AND EVACUATION DRILL
FREQUENCY AND PARTICIPATION**

GROUP OR OCCUPANCY	FREQUENCY	PARTICIPATION
Group A	Quarterly	Employees
Group B ^e	Annually	Employees
Group B ^c (transient ^e)	Annually	Employees
Group B ^c (nontransient ^f)	Annually	All occupants
Group E	Monthly ^a	All occupants
Group F	Annually	Employees
Group I	Quarterly on each shift	Employees ^b
Group R-1	Quarterly on each shift	Employees
Group R-2 ^d	Four annually	All occupants
Group R-4	Quarterly on each shift	Employees ^b
High-rise buildings	Annually	Employees

a. through d. (No changes to current text)

e. Applicable to Group B occupancies primarily used by occupants for short term use for less than 30 days.

f. Applicable to Group B occupancies primarily used by occupants for long term use for more than 30 days.

Reason: The intent of this code change is to provide occupants who are working in a Group B occupancy for more than 30 days to have an opportunity to participate in an annual fire and evacuation drill. Currently, only the employees (i.e., building staff) in a Group B occupancy have an opportunity to participate in an annual fire and evacuation drill. Having building occupants participate in an annual drill will provide educational instruction and practice for the building occupants evacuating/relocating as well as serve as a verification tool that the fire safety and evacuation plan, as developed, is functional. An additional benefit is that practice makes perfect when it comes to effective occupant egress during an evacuation and enables occupants to be familiar with egress routes and the fire safety and evacuation plan's details.

It should also be emphasized it is not the intent of this code change to require occupants in all Group B occupancies to participate in fire and evacuation drills. In certain Group B occupancies where occupants are staying or working for less than 30 days, occupants will not be required to participate in an emergency egress and relocation drill. For example, it would not be practical or reasonable for patients in an ambulatory health care facility (considered a Group B occupancy) to participate in a periodic evacuation drill. For these types of circumstances, building employees will still provide the necessary procedures in case of fire to occupants prior to an emergency and facilitate and direct occupants during the emergency regardless of whether the occupants participate in the annual fire and emergency drill.

Cost Impact: The code change proposal will not increase the cost of construction.

F31-13

Public Hearing: Committee:

AS

AM

D

Assembly:

ASF

AMF

DF

405.2T #1-F-FRABLE

F32 – 13

Table 405.2, 408.5.4, 408.10.4

Proponent: Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee
(cbaldassarra@RJAGroup.com)

Revise as follows:

SECTION 405 EMERGENCY EVACUATION DRILLS

405.2 Frequency. Required emergency evacuation drills shall be held at the intervals specified in Table 405.2 or more frequently where necessary to familiarize all occupants with the drill procedure.

**TABLE 405.2
FIRE AND EVACUATION DRILL
FREQUENCY AND PARTICIPATION**

GROUP OR OCCUPANCY	FREQUENCY	PARTICIPATION
Group A	Quarterly	Employees
Group B ^{e b}	Annually	Employees
Group E	Monthly ^a	All occupants
Group F	Annually	Employees
Group I	Quarterly on each shift	Employees^b
Group I -1	Twice on each shift per year	All occupants
Group I -2	Quarterly on each shift	Employees
Group I -3	Quarterly on each shift	Employees
Group I -4	Monthly	All occupants
Group R-1	Quarterly on each shift	Employees
Group R-2 ^{d c}	Four annually	All occupants
Group R-4	Quarterly on each shift <u>Twice on each shift per year</u>	Employees^b <u>All occupants</u>
High-rise buildings	Annually	Employees

a. The frequency shall be allowed to be modified in accordance with Section 408.3.2.

b. Fire and evacuation drills in residential care assisted living facilities shall include complete evacuation of the premises in accordance with Section 408.10.5. Where occupants receive habilitation or rehabilitation training, fire prevention and fire safety practices shall be included as part of the training program.

b.c. Group B buildings having an occupant load of 500 or more persons or more than 100 persons above or below the lowest level of exit discharge.

c.d. Applicable to Emergency evacuation drills in Group R-2 college and university buildings shall be in accordance with Section 408.3. Other Group R-2 occupancies shall be in accordance with Section 408.9.

408.5.4 Drill frequency. ~~Emergency evacuation drills shall be conducted at least six times per year, two times per year on each shift.~~ In addition to the evacuation drills in required in Section 405.2, employees shall participate in an additional two times a year on each shift. Twelve drills with all occupants shall be conducted in the first year of operation. Drills are not required to comply with the time requirements of Section 405.4.

408.10.4 Drill frequency. ~~Emergency evacuation drills shall be conducted at least six times per year, two times per year on each shift.~~ In addition to the evacuation drills in required in Section 405.2, employees shall participate in an additional two times a year on each shift. Twelve drills with all occupants shall be conducted in the first year of operation. Drills are not required to comply with the time requirements of Section 405.4.

Reason: The intent is to clarify the requirements for Group I-1, I-4 and R-4 fire and safety evacuation drill requirements. Table 405.2 is expanded to indicate clearly when employees and residents/children are required to participate in the drills. Group I-1 and R-4 require resident's participation for 6 drills a year (common practice). The Group I-4 should have drills consistent with Group E facilities.

Current footnote b does not make logical sense to reference Group R-4 drill participation for residents for Group I facilities. The requirement has been specifically addressed in the appropriate use group section.

Revisions to current footnote d is a clarification for dorms vs. apartments.

Group I-1, must use the provisions in Section 404 in addition to the concerns specific to Group I-1. In Section 408.5.4, staff is required to have additional practice drills. This will equal what was in the table for staff to do quarterly drills on each shift. Section 408.5.5 resident participation is coordinated with Group R-4 language in Section 408.10.5.

In Section 408.10.4, staff is required to have additional practice drills. This will equal what was in the table for staff to do quarterly drills on each shift.

The Adhoc Health Care committee has proposals to fire and safety evacuation plans and drills for Group I-2 and Ambulatory Care Facilities. This proposal can be accepted independently, but would also work in conjunctions with these proposals.

The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

Cost Impact: None

F32-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

405.2T-F-BALDASSARRA-CTC

F33 – 13

Table 405.2

Proponent: Dave Frable representing U.S. General Services Administration, Public Buildings Service

Revise as follows:

**TABLE 405.2
FIRE AND EVACUATION DRILL
FREQUENCY AND PARTICIPATION**

GROUP OR OCCUPANCY	FREQUENCY	PARTICIPATION
Group A	Quarterly	Employees
Group B ^c	Annually	Employees
Group E	Monthly ^a	All occupants
Group F	Annually	Employees
Group I	Quarterly on each shift	Employees ^b
Group R-1	Quarterly on each shift	Employees
Group R-2 ^d	Four annually	All occupants
Group R-4	Quarterly on each shift	Employees ^b
<u>High-rise buildings</u>	<u>Annually</u>	<u>Employees</u>
<u>High-rise buildings (transient^e)</u>	<u>Annually</u>	<u>Employees</u>
<u>High-rise buildings (non transient^f)</u>	<u>Annually</u>	<u>All occupants</u>

- a. The frequency shall be allowed to be modified in accordance with Section 408.3.2.
- b. Fire and evacuation drills in residential care assisted living facilities shall include complete evacuation of the premises in accordance with Section 408.10.5. Where occupants receive habilitation or rehabilitation training, fire prevention and fire safety practices shall be included as part of the training program.
- c. Group B buildings having an occupant load of 500 or more persons or more than 100 persons above or below the lowest level of exit discharge.
- d. Applicable to Group R-2 college and university buildings in accordance with Section 408.3.
- e. Applicable to high-rise buildings primarily used by occupants for short term use for less than 30 days.
- f. Applicable to high-rise buildings primarily used by occupants for long term use for more than 30 days.

Reason: The intent of this code change is to provide occupants in high-rise buildings, for more than 30 days to have an opportunity to participate in an annual fire and evacuation drill. Currently, only the employees (i.e., building staff), have an opportunity to participate in an annual fire and evacuation drill. Having building occupants participate in an annual drill will provide educational instruction and practice for the building occupants evacuating/relocating as well as serve as a verification tool that the fire safety and evacuation plan, as developed, is functional. An additional benefit is that practice makes perfect when it comes to effective occupant egress during an evacuation and enables occupants to be familiar with egress routes and the fire safety and evacuation plan's details.

It should also be emphasized it is not the intent of this code change to require occupants in all high-rise buildings to participate in fire and evacuation drills. In certain high-rise buildings where occupants are staying or working less than 30 days, occupants will not be required to participate in an emergency egress and relocation drill. For example, it would not be practical or reasonable to require occupants in high-rise hospitals, hotels, or correctional facilities to participate in an evacuation drill. For these types of circumstances, building employees will still provide the necessary procedures in case of fire to occupants prior to an emergency and facilitate and direct occupants during the emergency regardless of whether the occupants participate in the annual fire and emergency drill.

Cost Impact: The code change proposal will not increase the cost of construction.

F33-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

405.2T #2-F-FRABLE

F34 – 13

408.12 (New)

Proponent: Al Godwin, CBO, CPM, Aon Fire Protection Engineering, representing Aon Fire Protection Engineering Corporation (al.godwin@aon.com)

Add new text as follows:

408.12 Buildings using occupant evacuation elevators. In buildings using occupant evacuation elevators in accordance with Section 3008 of the *International Building Code*, the fire safety and evacuation plan and the training required by Section 404 and Section 406, respectively, shall incorporate specific procedures for the occupants using such elevators.

Reason: This would seem to need clarification.

Cost Impact: The provision might increase operational costs but not construction costs.

F34-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

408.12-Godwin

F35 – 13

408.12 (New)

Proponent: Dwight G. Jones, B.A., Elevaed Medical Inc., representing self (dwight.jones@elevaed.com)

Add new text as follows:

408.12 Public access automated external defibrillators. In high-rise buildings, the main elevator lobby shall be provided with an automated external defibrillator (AED) in an approved and visible location that is accessible to the public.

Reason: Sudden cardiac arrest (SCA), a leading cause of death, takes longer to attend by EMS in high-rise buildings (call volume, urban traffic, security). Please review <http://elevaed.com>

The 'Chain of Survival' is broken, because EMS cannot reliably defibrillate patients within 3-5 minutes, after which progressive organ damage or death occurs. Survival rates are typically single digit, and in this rapidly growing demographic, failed EMS efforts to date have become an intractable and very costly public health problem.

High-rises do, however, offer compact advantages for sharing the cost of an AED, for education in its use, and their elevators enable prompt access by bystanders or volunteers. The most critical factor is having an AED in the building beforehand - one that is publicly visible and accessible 24/7, to bridge the time until the arrival of EMS – which is the sole purpose of an AED. EMS can then arrive within a practical timeframe to consolidate successful defibrillations.

Currently just 2.1% of SCA's have an AED applied by bystanders (Weisfeldt JACC 2010). As a safety agency, the building and fire coding authorities are the appropriate regulators for harmonizing AED deployment. Governments, as legislative agencies, have too many layers and independent AHJ's for uniform and structured adoption, and their statutes largely address 'public' buildings, when most high-rises are privately owned. Local EMS are rescue agencies that act on existing regulations.

This is a *heart safety* issue—a valid parameter for the evolving Green Building initiative—and the coding authorities have a straightforward opportunity to rationalize our (currently chaotic) AED distribution throughout the built environment. AEDs will shortly be connected to the Internet, leading to improved monitoring/assistance by in-building personnel, volunteers and NG9-1-1.

These locations must have a fixed IP address, be documented in databases, and become standardized and trusted. High-rise elevator lobbies will anchor the AED in the public's mind, greatly leveraging its cost, while expanding its use and effectiveness.

This topology also promises to protect adjacent buildings within a two minute radius.

SCA survival in high-rises can possibly improve by an order of difference when supported by cellular communications, volunteer teams, and a location standard. AEDs cannot perform from security guard lunch rooms and desk drawers as they are now expected to do, when they exist at all.

The property management industry will also benefit from unequivocal coding for AEDs. This proposal specifies basic AEDs for high-rise buildings as defined in the code, and their cost or retrofitting is a modest expense in the context of such buildings.

These singular devices will then protect residents and workers around the clock, regardless of their income or health insurance status. The public expects and deserves our attention to this issue, and the world anticipates our leadership in coding for health safety.

Disclosure Statement: Dwight G. Jones and Elevaed are volunteer public advocates only, and have no business relationships or funding from any providers of AEDs, emergency equipment or services.

The following is a letter of support from Dr. Gordon Tomaselli, President, American Heart Association.

August 5, 2011

Dwight G. Jones, CEO
Elevaed Technologies
4550 Birch Bay Lynden Road
Blaine WA 98230-9436

Dear Mr. Jones:

Since 1995 the American Heart Association has recommended the development of lay rescuer AED programs to improve survival rates from out of hospital cardiac arrest. And over the past several years, we have published additional focused scientific statements on lay rescuer AED programs and reducing barriers to bystander CPR – both critical elements in the chain of survival that can greatly improve a cardiac arrest victim's chances of survival.

As recommended in our *2010 AHA Guidelines for CPR & ECC*, and based on peer-reviewed, published research studies, AED programs should be established in public locations where there is a reasonable likelihood of a witnessed cardiac arrest (eg, airports, casinos and sports facilities). We certainly appreciate the innovative approach you've outlined in your proposal to improve out-of-hospital cardiac survival in high rise buildings; it would certainly be beneficial to see the proposal studied in a formal manner and in addition, to see those results published in a peer-reviewed medical journal.

We would be pleased to have you submit a research application to either our Affiliate or National Center Research Program for review. You can learn more about research funding opportunities here: http://my.americanheart.org/professional/Research/Research_UCM_316889_SubHomePage.jsp

I wish you and your company well as you seek to improve sudden cardiac arrest survival.

Sincerely,

Gordon F. Tomaselli, MD, FAHA
President
American Heart Association/American Stroke Association

Cost Impact: The code change proposal will increase the cost of construction.

F35-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

408.12 (NEW)-F-JONES

F36 – 13

501.5 (New)

Proponent: Michael Jacoby, Seven Valleys, PA, representing self

Add new text as follows:

501.5 Geographic location data. A facility or site's geographic location information or data, being a site's set of latitude and longitude coordinate values, are to be centered on a facility's or structure's main front entrance. Such information shall be provided by a Registered Professional Land Surveyor (PLS), licensed by the appropriate governing authority, using the Datum-World Geodetic System (WGS84). The site's coordinate data shall be recorded in decimal degrees in a numeric format with a tolerance of ± 1 m, including the associated hemispheric value where applicable. The information shall include the name of the certifying PLS in the title block area of the facility's construction documents required by Section 105.4.

Reason: By having accurate GPS coordinate data recorded on construction documents for fire service planning / environmental preparedness to protect communities, families or loved ones especially those with special needs, at time of a review as per section should be very easy for officials to understand especially if you've ever been directed to go to a wrong location in times of crisis or need because of having ambiguous locational information in data systems.

In other words when using a set of coordinates for a site/facility by a licensed professional surveyor that are centered on the entrance of a facility at the time of construction, now that everybody is using GPS locational data for their devices, it should start to eliminate the continuing locational data problems being discovered today in mapping databases (GIS shaped layers) that you might have already encountered locally... when using an address/house number method to determine a location or when Out-Of-Area-Assistance is required in times of crisis or need, especially when every second counts..

Again simply put... State Highway Numbers, Road Names and Postal Delivery Addresses may change throughout the years but a site's set of latitude and longitude coordinates will always stay constant.

Cost Impact: The cost of providing the certified lat/long information/data (GPS coordinates) recorded on construction documentation will be absorbed by the developer/builder or others submitting the construction documents for review.

F36-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

501.5 (NEW)-F-JACOBY

F37 – 13

503.1.1

Proponent: Erin Crowley, Code Consultants, Inc, representing self.

Revise as follows:

503.1.1 Buildings and Facilities. Approved fire apparatus access roads shall be provided for every facility, building or portion of a building hereafter constructed or moved into or within the jurisdiction. The fire apparatus access road shall comply with the requirements of this section and shall extend to within 150 feet (45 720 mm) of all portions of the facility and all portions of the exterior walls of the first story of the building as measured by an approved route around the exterior of the building or facility.

~~Exception~~ Exceptions: The fire code official is authorized to increase the dimension of 150 feet (45 720 mm) where any of the following conditions occur:

1. The building is equipped throughout with an approved automatic sprinkler system installed in accordance with Section 903.3.1.1, 903.3.1.2 or 903.3.1.3.
2. Fire apparatus access roads cannot be installed because of location on property, topography, waterways, nonnegotiable grades or other similar conditions, and an approved alternative means of fire protection is provided.
3. There are not more than two Group R-3 or Group U occupancies.

Reason: Revising the Exception fixes and clarifies the language to match the original intent of the section based on the UFC. The intent of the original UFC requirement was that each of the three items above would be applied as an independent exception. As written currently, it could be interpreted to mean that one would have to meet all three items in order to benefit from the increase, which was not the original intent of the requirement.

Cost Impact: The code change proposal will not increase the cost of construction.

F37-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

503.1.1-F-CROWLEY

F38 – 13

503.1.1

Proponent: Adria Smith, Fountain Valley Fire Department, representing the California Fire Chiefs Association (adria.smith@fountainvalley.org); Kevin Reinertson, Division Chief, representing the California State Fire Marshal's Office

Revise as follows:

503.1.1 Buildings and facilities. Approved fire apparatus access roads shall be provided for every facility, building or portion of a building hereafter constructed or moved into or within the jurisdiction. The fire apparatus access road shall comply with the requirements of this section and shall extend to within 150 feet (45 720 mm) of all portions of the facility and all portions of the exterior walls of the first story of the building as measured by an approved route around the exterior of the building or facility.

Exceptions:

1. The fire code official is authorized to increase the dimension of 150 feet (45 720 mm) where:
 - 1.1. The building is equipped throughout with an approved automatic sprinkler system installed in accordance with Section 903.3.1.1, 903.3.1.2 or 903.3.1.3.
 - 1.2. Fire apparatus access roads cannot be installed because of location on property, topography, waterways, nonnegotiable grades or other similar conditions, and an approved alternative means of fire protection is provided.
 - 1.3. There are not more than two Group R-3 or Group U occupancies.
2. Where approved by the fire code official, fire apparatus access roads shall be permitted to be exempted or modified for solar photovoltaic power generation facilities.

Reason: Exception two (other exceptions are existing and renumbered) is provided to address photovoltaic panel system/array power generation facilities. The 2012 IFC does not specifically require or exempt these types of facilities. This proposal intends to provide additional guidance to afford jurisdictions avenues to determine if a fire apparatus road is needed for hazard mitigation or if it can be exempted.

Section 503 is specifically scoped to "buildings and facilities". Power generation sites that utilize a ground mounted photovoltaic system/array would not be considered a building. However, they would be considered a facility as defined in Section 202 and are therefore subject to Section 503.

A ground mounted photovoltaic panel system/array is also considered a structure as defined in IFC Section 202.

Although, where ground mounted photovoltaic panel systems/arrays are mounted on a support structure and the support structure does not create or allow for a use below (e.g. parking, lunch/shade structures, etc.), the structure should be considered equipment.

Therefore, sound rational judgment should be made if IFC, Section 503 is to be applied to a solar generation facility. Not all conditions or facilities of similar type or function necessitate fire apparatus access roads and not all structures are subject to IFC Section 503. The IFC is not clear in its application or scope when applying Section 503 to equipment, specifically ground mounted photovoltaic systems/arrays. However, when other buildings or structures are located on the site, an evaluation and/or classification of the use may require fire apparatus access.

Thus, consideration must be given to the purpose of fire apparatus access roads within these facilities and how the section would be applied.

It is important to note that Section 503 does provide exceptions for length, dimensions, and other specifications based on conditions such as terrain, climate, or other similar concerns.

Several issues arise when applying Section 503 to ground mounted photovoltaic systems/arrays. When considering the issues listed below, one should also consider other available code requirements that provide for appropriate hazard mitigation and risk reduction. Issues for consideration include:

1. Risk/hazard to be mitigated
2. Risk/hazard to firefighters or other emergency responders
3. Interest of public safety and welfare
4. Economics
5. Intended access use
6. Fuel load of the facility and adjacent areas that impact the facility
7. Array configuration (tightly spaced, access aisles, height)
8. Actual hazard to public safety and welfare

Cost Impact: This proposal will not increase the cost of construction.

F38-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

503.1.1-F-REINERTSON-SMITH

F39 – 13

503.2.2

Proponent: Carl D. Wren, P.E., Austin Fire Department, representing self (carl.wren@austintexas.gov)

Revise as follows:

503.2.2 Authority. The fire code official shall have the authority to require or permit an increase or a decrease in the minimum access widths where ~~they are inadequate for fire or rescue operations~~ necessary to meet the public safety objectives of the jurisdiction.

Reason: Fire departments respond to many types of emergency situations and the jurisdictions they serve may have traffic safety criteria that have an impact on the design of access roadways used by emergency response vehicles. It would also seem to be a wise course of action for the fire service and ICC to acknowledge and, when it is possible, to assist in developing methods of improving the safety of the public by helping to prevent injuries and deaths from hazards other than fire.

Cost Impact: This code change will not increase the cost of construction

F39-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

503.2.2 -F-WREN

F40 – 13

503.3

Proponent: Barry Greive, representing Target Corporation (barry.greive@target.com)

Revise as follows:

503.3 Marking. Where required by the fire code official, approved signs every 75 lineal feet or other approved notices or markings that include the words NO PARKING—FIRE LANE shall be provided for fire apparatus access roads to identify such roads or prohibit the obstruction thereof. The means by which fire lanes are designated shall be maintained in a clean and legible condition at all times and be replaced or repaired when necessary to provide adequate visibility.

Reason: There is currently no direction in the code on how far apart these signs need to be. Because there is no clear direction in the current provision enforcement of this regulation is inconsistent. A normal space for parallel parking is 25 feet long and this spacing will allow more than enough signs in any general location to be clearly visible and legible to notify people no parking is allowed, and the distance is within normal viewing distances for signs.

Cost Impact: This will not increase the cost of construction

F40-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

503.3-F-GRIEVE

F41 – 13

503.4

Proponent: Daniel E. Nichols, P.E., New York State Department of State (dan.nichols@dos.ny.gov)

Revise as follows:

503.4 Obstruction of fire apparatus access roads. Fire apparatus access roads shall not be obstructed in any manner, including the parking of vehicles. The minimum widths and clearances established in Sections 503.2.1 and 503.2.2 shall be maintained at all times.

Reason: IFC Section 503.2.2 permits the fire code official to require fire apparatus access roads to be widened when inadequate for fire and rescue operations. This section is most commonly used to require wider fire apparatus access roads for ladder trucks and around fire hydrants (as found in Appendix D), but could be for areas that are susceptible to traffic congestion.

However, there is no way in the current IFC to enforce these wider fire apparatus access road requirements since 503.4 only references Section 503.2.1 which, in turn, only requires the 20 foot width requirement.

This code change will permit the fire code official to enforce required widths of fire apparatus access roads after installation.

This proposal is submitted with the endorsement of the New York State Building Officials Conference, the New York State Fire Marshals and Inspectors Association, and the Association of Fire Districts of New York State.

Cost Impact: This change has no cost impact, but is to enforce requirements in place at the time of construction.

F41-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

503.4-F-NICHOLS

F42 – 13

503.4.1

Proponent: Carl D. Wren, P.E., Austin Fire Department, representing self (carl.wren@austintexas.gov)

Revise as follows:

503.4.1 Traffic calming devices. ~~Traffic calming devices shall be prohibited unless approved by the fire code official.~~ The fire code official and the jurisdiction's traffic engineer shall work collaboratively to plan, design, and install traffic calming devices. Approved traffic calming devices shall be designed to provide for adequate emergency vehicle access in addition to mitigating unsafe traffic conditions identified by the traffic engineer.

Reason: Fire departments respond to many types of emergency situations and the jurisdictions they serve may have traffic safety criteria that have an impact on the design of access roadways used by emergency response vehicles. The design of traffic calming features has been changing over the years as traffic engineers better understand measures that can change how people drive their vehicles. Since data available from the Centers for Disease Control indicate that annual traffic fatalities involving pedestrians likely exceed fire deaths in the United States (see http://www.edc.gov/motorvehiclesafety/pedestrian_safety/factsheet.html), it would also seem to be a wise course of action for the fire service and ICC to encourage collaboration with traffic engineers and, when it is possible, to assist in developing methods of improving the safety of the public by helping to prevent injuries and deaths from hazards other than fire.

Cost Impact: This code change will not increase the cost of construction

F42-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

503.4.1-F-WREN

F43 – 13

IFC 505.1; IBC [F] 501.2; IPMC [F] 304.3; IRC R319.1

THIS IS A 4 PART CODE CHANGE. PARTS I THROUGH III WILL BE HEARD BY THE IFC CODE DEVELOPMENT COMMITTEE. PART IV WILL BE HEARD BY THE IRC B/E CODE DEVELOPMENT COMMITTEE. ALL 4 PARTS WILL BE HEARD AS SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azumiamia@yahoo.com)

PART I – INTERNATIONAL FIRE CODE

Revise as follows:

505.1 Address identification. New and existing buildings shall ~~have~~ be provided with approved address ~~numbers, building numbers or approved building identification.~~ The address identification shall be legible and placed in a position that is plainly legible and visible from the street or road fronting the property. ~~These numbers~~ Address identification characters shall contrast with their background. ~~Where required by the fire code official, address numbers shall be provided in additional approved locations to facilitate emergency response.~~ Address numbers shall be Arabic numbers or alphabetical letters. Numbers shall not be spelled out. Numbers Each character shall be a minimum of 4 inches (101.6 mm) high with a minimum stroke width of 0.5 inch (12.7 mm). Where required by the fire code official, address identification shall be provided in additional approved locations to facilitate emergency response. Where access is by means of a private road and the building cannot be viewed from the public way, a monument, pole or other sign or means shall be used to identify the structure. ~~Address numbers~~ identification shall be maintained.

PART II – INTERNATIONAL BUILDING CODE

Revise as follows:

[F] 501.2 Address identification. New and existing buildings shall be provided with approved address ~~numbers or letters~~ identification. The address identification shall be legible and placed in a position that is visible from the street or road fronting the property. Address identification characters shall contrast with their background. Address numbers shall be Arabic numbers. Numbers shall not be spelled out. Each character shall be not less than 4 inches (102 mm) in height and not less than 0.5 inch (12.7 mm) in width. ~~They shall be installed on a contrasting background and be plainly visible from the street or road fronting the property.~~ When Where required by the fire code official, address numbers identification shall be provided in additional approved locations to facilitate emergency response. Where access is by means of a private road and the building address cannot be viewed from the public way, a monument, pole or other approved sign or means shall be used to identify the structure. ~~Address numbers~~ identification shall be maintained.

PART III – INTERNATIONAL PROPERTY MAINTENANCE CODE

Revise as follows:

[F] 304.3 Premises Address identification. Buildings shall ~~have~~ be provided with approved address ~~numbers~~ identification. The address identification shall be legible and placed in a position to be plainly legible and visible from the street or road fronting the property. ~~These numbers~~ Address identification characters shall contrast with their background. Address numbers shall be Arabic numerals or alphabet letters. Numbers shall not be spelled out. Numbers Each character shall be a minimum of 4 inches (102 mm) in height with a minimum stroke width of 0.5 inch (12.7 mm). Where required by the fire code official, address identification shall be provided in additional approved locations to facilitate emergency response.

Where access is by means of a private road and the building cannot be viewed from the public way, a monument, pole or other sign or means shall be used to identify the structure. Address identification shall be maintained.

PART IV – INTERNATIONAL RESIDENTIAL CODE

Revise as follows:

R319.1 Address numbers identification. Buildings shall ~~have~~ be provided with approved address numbers, building numbers or approved building identification. The address identification shall be legible and placed in a position that is plainly legible and visible from the street or road fronting the property. ~~These numbers~~ Address identification characters shall contrast with their background. Address numbers shall be Arabic numbers or alphabetical letters. Numbers shall not be spelled out. Numbers ~~Each character~~ shall be a minimum of 4 inches (102 mm) high with a minimum stroke width of $\frac{1}{4}$ 0.5 inch (12.7 mm). Where required by the fire code official, address identification shall be provided in additional approved locations to facilitate emergency response. Where access is by means of a private road and the building address cannot be viewed from the public way, a monument, pole or other sign or means shall be used to identify the structure. Address identification shall be maintained.

Reason: When the address numbers are difficult to find, read or identify, the result is a delay in the emergency response, whether it be for fire, medical assistance, or law enforcement. Address numbers which are spelled out in alpha characters, add to this difficulty in quickly responding to emergency situations.

This proposal will require that the address numbers are numeric and clearly identifiable. There are correlating sections in the IBC, IFC, IPMC and IRC with regard to address identification.

Cost Impact: The code change proposal will not increase the cost of construction.

F43-13

PART I - INTERNATIONAL FIRE CODE

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II - INTERNATIONAL BUILDING CODE

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART III - INTERNATIONAL PROPERTY MAINTENANCE CODE

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART IV - INTERNATIONAL RESIDENTIAL CODE

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

505.1-F-ZUBIA-FCAC

F44 – 13

507.2

Proponent: Anthony C. Apfelbeck, City of Altamonte Springs Building/Fire Safety Division, representing self (ACApfelbeck@Altamonte.org)

Revise as follows:

507.2 Types water supply. A water supply shall consist of approved reservoirs, pressure tanks, elevated tanks, water mains, fire department mobile water supply resources or other approved ~~fixed~~ systems capable of providing the required fire flow.

Reason: The current code language in 507.2 does not allow the fire code official to consider fire department rural water supply operations involving tanker shuttles as a means of meeting the required fire flow. For a vast majority of rural areas, the only means of providing a water supply is via a tanker shuttle type operation. This code change will recognize this capability as a reasonable alternative to providing the required water supply. The term “approved” is also added to provide an oversight by the fire code official /Fire Chief in determining if a water supply is appropriate for utilization in providing the needed fire flow.

Cost Impact: This code change proposal will not increase the cost of construction.

F44-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

507.2-F-APFELBECK

F45 – 13

507.4, Chapter 80

Proponent: Bob D. Morgan, P.E., Fort Worth, TX Fire Department representing Fire Advisory Board to North Central Texas Council of Governments

Revise as follows:

507.4 Water supply test date and information. The water supply test used for hydraulic calculation of fire protection systems shall be conducted in accordance with NFPA 291 and within one year of sprinkler plan submittal, or as otherwise approved by the fire code official. The fire code official shall be notified prior to the water supply test. Water supply tests shall be witnessed by the fire code official, as required or approved documentation of the test shall be provided to the fire code official prior to final approval of the water supply system. The exact location of the static/residual hydrant and the flow hydrant shall be indicated on the design drawings. All fire protection plan submittals shall be accompanied by waterflow test report information, or as otherwise approved by the fire code official. At a minimum, the waterflow test report shall indicate the documented fluctuation of the water supply system in question, in accordance with the water supply operator or authority, for an entire year. The fire protection designer shall then design the fire protection system including this fluctuation information, in accordance with the applicable referenced NFPA standard.

Add new standard to Chapter 80 as follows:

NFPA

291-13 Recommended Practice for Fire Flow Testing and Marking of Hydrants

507.4

Reason: Water supply system fluctuation is regularly ignored in fire protection design. Often times, a sprinkler system is designed based on a fire hydrant flow test that only represents one point in time throughout the year when water supply systems may fluctuate up to 50 psi in some areas or more, based on summer vs. winter demands of the systems. This information is critical to ensure that such fire protection systems are designed to account for this potential fluctuation.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, NFPA 291-13, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013.

F45-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

507.4-F-MORGAN

F46 – 13

508.1.3 (IBC [F] 911.1.3)

Proponent: Stephen DiGiovanni, Clark County Fire Department, representing self.

Revise as follows:

508.1.3 (IBC [F] 911.1.3) Size. The fire command center shall be a minimum of 0.015 percent of the total building area of the facility served or 200 square feet (19m²) in area, whichever is greater, with a minimum dimension of 0.7 times the square root of the room area, or 10 feet (3048 mm), whichever is greater.

Reason: The purpose of this amendment is to provide a means to have larger fire command centers for larger facilities. The effect of this change is that buildings that are greater than 1.33 million square feet in total area will require larger fire command centers than the minimum required size of 200 square feet. For reference, this formula would require a fire command center of 750 square feet for a building that is 5 million square feet, and would require a fire command center of 1,500 square feet for a building that is 10 million square feet. These are not seen as unreasonable sizes for a Fire Command Center, in comparison to the associated building sizes.

The amendment also calls for a concurrent calculation for minimum room dimension. The calculation uses a square root of the building area, and applying a 0.7 factor. For the base code required area of 200 square feet, please note that the square root of 200 is approximately 14.14, and the application of the 0.7 factor yields 9.90, which is very close to the base code dimension of 10 feet.

The model codes have set forth varying minimum sizes for Fire Command Centers. For instance, the 2000-2006 editions of the International Building Code set forth a minimum size of 96 square feet, with a minimum dimension of 8 feet. Application of the formula in this amendment would result that a 96 square feet fire command center would be sufficient for a building with area of 640,000 square feet. The square root of 96 is 9.80, and application of the 0.7 factor yields 6.86, which is somewhat close to the base code dimension of 8 feet.

There have been problems with fire command centers that are sized too small for the amount of control equipment and panels that are required for the building. At times, sufficient communication does not occur between the architect and the fire alarm designers, and the fire command center has been sized too small to comfortably accommodate the required equipment. Larger buildings will have more equipment due to the amount of elevators, generators, smoke removal systems, fire alarm nodes, plans, etc., that are present in larger buildings. The list of required items in the fire command centers has been expanded, further stressing the available space of fire command centers. Further, the larger buildings may have unusual fire protection systems, such as deluge systems, video smoke detection, etc., which may require additional control panels and space in the fire command center. It is important to anticipate these issues and develop requirements for larger rooms to accommodate the equipment required in larger facilities.

Please note that this amendment does not increase fire command size until the building exceeds 1.33 million square feet. For smaller buildings, this amendment has no impact.

Cost Impact: Requires additional space for larger buildings over 1.33 million square feet, impact would be lost space to other uses and costs of expanding boundaries of the fire command center.

F46-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

508.1.3-F-DIGIOVANNI

F47 – 13

508.1.5 (New), 315.3.3

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Add new text as follows:

508.1.5 Storage. Storage unrelated to operation of the Fire Command Center shall be prohibited.

(Renumber subsequent section)

Revise as follows:

315.3.3 Equipment rooms. Combustible material shall not be stored in boiler rooms, mechanical rooms, or electrical equipment rooms or in fire command centers as specified in Section 508.1.5.

Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

Fire command centers need to be dedicated to firefighting operations.

Cost Impact: This code change will not increase the cost of construction

F47-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

508.1.6 (NEW)-F-ZUBIA-FCAC

F48 – 13

509.1.1

Proponent: Bob D. Morgan, P.E., Fort Worth, TX Fire Department representing Fire Advisory Board to North Central Texas Council of Governments

Revise as follows:

509.1.1 Utility identification. Where required by the *fire code official*, gas shutoff valves, electric meters, service switches and other utility equipment shall be clearly and legibly marked by signs to identify the unit or space that it serves. Identification shall be made in an approved manner, readily visible and shall be maintained. Lettering for such signs shall have a minimum height of 2 inches (50.8 mm) where located indoors and 4 inches (101.6 mm) where located outdoors, or as approved by the *fire code official*. The letters shall be of a color that contrasts with the background. Signs shall be readily visible and shall be maintained.

Reason: Provides for more consistency with regards to such signage and more guidance to owners/operators and designers to ensure compliance is achieved. Additionally, this addresses an issue of legibility when very small signs are utilized for this purpose.

Cost Impact: The code change proposal will not increase the cost of construction. The signage is already required – this just provides a guide as to the size of such.

F48-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

509.1.1-F-MORGAN

F49 – 13

510.1, 510.6.3

Proponent: Daniel E. Nichols, P.E., New York State Department of State (dan.nichols@dos.ny.gov)

Revise as follows:

510.1 Emergency responder radio coverage in new buildings. Where required by the fire code official, new buildings shall have approved radio coverage for emergency responders within the building. ~~based upon the existing coverage levels of the public safety communication systems of the jurisdiction at the exterior of the building.~~ The requirement shall be based on approved calculations and reports showing the need for such system based upon existing coverage, building location, building properties, and building layout. This section shall not require improvement of the existing public safety communication systems.

Exceptions:

1. Where approved by the building official and the fire code official , a wired communication system in accordance with Section 907.2.13.2 shall be permitted to be installed or maintained in lieu of an approved radio coverage system.
- ~~2. Where it is determined by the fire code official that the radio coverage system is not needed.~~
23. In facilities where emergency responder radio coverage is required and such systems, components or equipment required could have a negative impact on the normal operations of that facility, the fire code official shall have the authority to accept an automatically activated emergency responder radio coverage system.

~~**510.6.3 Field testing.** Agency personnel shall have the right to enter onto the property at any reasonable time to conduct field testing to verify the required level of radio coverage.~~

Reason: This code change proposal is to modify the administrative provisions of the requirements and enforcement of the emergency responder radio coverage. The proposal does not intend to change any technical requirement of the section.

Currently, every building would need to be evaluated for emergency responder radio coverage. The only true way out of this requirement is for the fire code official to state that it isn't needed. The problem with that is 1) there is no standardized test that a fire code official can easily reference to make an appropriate decision and 2) the only baseline is to reference the exterior of a building that hasn't even been built yet.

The proposed code language changes the enforcement to that similar to key boxes, where the fire code official can require it, based on a study or report. This doesn't place the fire code official in a single-point 'yes or no' decision on a system that he/she may have little knowledge in as well as give direct reference to some of the variables that need to be dealt with in evaluating emergency responder radio coverage.

Section 510.6.3 is proposed for deletion since rights of officials on entry to premises is not a condition of technical requirements within the IFC, rather an administrative process requirement.

Cost Impact: This proposal will not affect the cost of construction.

F49-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

510.1-F-NICHOLS

F50 – 13

511 (New); 1103.3 (New)

Proponent: Robert Trotter, MCP, Tennessee Code Development Committee (bobbrotter1023@aol.com)

Add new text as follows:

SECTION 511 **FIRE SERVICE ELECTRICAL DISCONNECT**

511.1 General. All new buildings shall be provided with a fire service electrical disconnect designed to operate a building's shunt trip switch to disconnect electrical power to the building or heavy equipment. Existing buildings shall be provided with a fire service electrical disconnect as required by Section 1103.3.

511.2 Location. The fire service electrical disconnect shall be installed in a location approved by the *fire code official*.

511.2 Alternative locations. The *fire code official* is authorized to require a fire service electrical disconnect at alternative locations for operations including, but not limited to: wind generation stations, solar photovoltaic power system installations, light rail power distribution stations, and amusement parks.

511.3 Enclosure. The shunt trip switch shall be housed in a watertight NEMA container. The switch and NEMA container shall be housed in a secure device operable only by a fire department master key.

511.3.1 Listing. The electrical disconnect enclosure shall be listed in accordance with UL1037.

511.5 Signage. Where the fire service electrical disconnect serves a portion of a building, specific equipment, or alternative locations, an approved sign shall be posted in a readily visible location to indicate the building portion or equipment that the shunt trip serves.

Add new text as follows:

1103.3 Fire Service Electrical Disconnect. Existing buildings shall be provided with a fire service electrical disconnect in accordance with Section 511.

(Renumber subsequent sections)

Reason: Fundamentally, the fire service electrical disconnect is required to provide first responders the ability to safely disconnect electrical power to the building or heavy equipment, and alternative installations so that firefighters are not exposed to shock hazards or injured by equipment in operation during fire suppression and rescue operations.

The principle reason for fire service electrical disconnect is described in Section 101.2 Scope (5) "Conditions affecting the safety of fire fighters and emergency responders during emergency operations". Fire fighters operating in a building with energized electrical service poses extreme risks...risks that can be reduced or eliminated.

The 2008 edition of NFPA 1001, *Standard for Fire Fighter Professional Qualifications* requires Fire Fighter I candidates to requisite knowledge and skills relative to utility control devices.

Chapter 5: Fire Fighter I

5.3 Fireground Operations.

5.3.18 Turn off building utilities, given tools and an assignment, so that the assignment is safely completed.

- (A) Requisite Knowledge.** Properties, principles, and safety concerns for electricity, gas, and water systems; utility disconnect methods and associated dangers; and use of required safety equipment.
- (B) Requisite Skills.** The ability to identify utility control devices, operate control valves or switches, and assess for related hazards.

Cost Impact: The code change proposal will increase the cost of construction. The cost is expected to be less than \$1,250 per installation site.

F50-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

511 (NEW)-F-TROTTER

F51 – 13

601.2 (New)

Proponent: Ian Hardage, San Ramon Valley Fire Protection District (ihardage@srvfire.ca.gov) and Amber Anderson, Cosumnes CSD Fire Department (AmberAnderson@csdfire.com), representing California Fire Chiefs Association

Add new text as follows:

601.2 Construction documents. The fire code official shall have the authority to require construction documents and calculations for the installation, rehabilitation or modification of building services and systems necessary to comply with this chapter. Construction documents for building systems shall be submitted for review and approval prior to installation or modification.

(Renumber subsequent sections)

Reason: We all know that construction documents and related calculations for building services and systems must be reviewed before a system is installed. Factors, such as classification of the hazard, amount of material, type of equipment, devices, and design criteria are just a few examples of what is to be considered when reviewed by the fire code official.

In some instances, shop drawings and supporting documentation such as equipment data sheets, manufacturer's installation instructions and warnings, listing sheets, etcetera for specialized building systems may not be prepared during the initial submittal for building construction, but rather may be a deferred submittal by the specializing contractor. It is not uncommon for a jurisdiction to request additional information or to issue a separate construction or operational permit, based on IFC Section 105 for these types of systems from that of the original building permit. This allows the owner or contractor to begin initial construction without delay. This proposal is not meant to require a separate permit. It is also not meant to say that these systems can not be reviewed during the initial architectural submittal. It is meant to assist the owner, contractor, architect, or engineer as well as the local authority having jurisdiction through the construction process by allowing the fire code official to required construction documents when needed, similar to IFC Sections 501, 901, 907, 909, 1101, 2301, 2311, 3103, 3201, and 6101.

Increases in construction costs would only occur if an authority having jurisdiction chose to implement a separate fee for review. All other costs such as design drawings and construction of the system should already be included in the original design budget. We feel that any cost increase by an AHJ would likely be significantly less than any delays in construction or operation of the system when such system is determined to be non-compliant with codes and standards enforced by the fire code official at a time less than ideal for the customer such as at final inspection.

Cost Impact: The code proposal will increase the cost of construction.

F51-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

601.2 (NEW)-F-ANDERSON-HARDAGE

F52 – 13

604.1 (IBC [F] 2702.1)

Proponent: Robert J Davidson, Davidson Code Concepts, LLC, representing self (BFICOCS)
(rjd@davidsoncodeconcepts.com)

Revise as follows:

604.1 (IBC [F] 2702.1) Installation. Emergency and standby power systems required by this code or the *International Building Code (IBC: International Fire Code)* shall be installed in accordance with this code, the *International Building Code (IBC: International Fire Code)*, NFPA 110 and NFPA 111. Existing installations shall be maintained in accordance with the original approval.

Reason: This proposal is potentially editorial or simply a correlation issue, but if not, it plugs a substantial hole in the installation requirements for these systems.

At first glance Section 604.1 appears thorough, however, though it refers to the IBC for when systems are required, it does not refer to the IBC for the actual installation. The IBC reference is important for addressing structural, flooding and other installation requirements.

To solve the issue the "*International Building Code*" has been added to the installation requirement portion of Section 604.1.

Cost impact: This proposal will not increase the cost of construction.

F52-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

604.1-F-DAVIDSON

F53 – 13

604.1 (IBC [F] 2702.1), 202

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

604.1 (IBC [F] 2702.1) Installation General. Emergency power systems and standby power systems required by this code or the *International Building Code* shall be installed in accordance with this code, NFPA 110 and NFPA 111. Existing installations shall be maintained in accordance with the original approval, shall comply with Sections 604.1.1 through 604.1.7 (IBC [F] 2702.1.1 through [F] 2702.1.6).

604.1.1 (IBC [F] 2702.1.1) Stationary generators. Stationary emergency and standby power generators required by this code shall be *listed* in accordance with UL 2200.

604.1.2 (IBC [F] 2702.1.2) Electrical. Emergency power systems and standby power systems shall be installed in accordance with NFPA 70, NFPA 110 and NFPA 111.

604.1.3 (IBC [F] 2702.1.3) Load transfer. Emergency power systems shall automatically provide secondary power within 10 seconds after primary power is lost, unless specified otherwise in this code. Standby power systems shall automatically provide secondary power within 60 seconds after primary power is lost unless specified otherwise in this code.

604.1.4 (IBC [F] 2702.1.4) Load duration. Emergency power systems and standby power systems shall be designed to provide the required power for a minimum duration of two hours without being refueled or recharged, unless specified otherwise in this code.

604.1.5 (IBC [F] 2702.1.5) Uninterruptable power source. An uninterrupted source of power shall be provided for equipment when required by the manufacturer's instructions, the listing, this code, or applicable referenced standards.

604.1.6 (IBC [F] 2702.1.6) Interchangeability. Emergency power systems shall be an acceptable alternative for installations that require standby power systems.

604.1.7 Maintenance. Existing installations shall be maintained in accordance with the original approval and Section 604.3.

Add new text as follows:

SECTION 202 DEFINITIONS

EMERGENCY POWER SYSTEM. A source of automatic electric power of a required capacity and duration to operate required life safety, fire alarm, detection and ventilation systems in the event of a failure of the primary power. Emergency power systems are required for electrical loads where interruption of the primary power could result in loss of human life or serious injuries.

STANDBY POWER SYSTEM. A source of automatic electric power of a required capacity and duration to operate required building, hazardous materials or ventilation systems in the event of a failure of the primary power. Standby power systems are required for electrical loads where interruption of the primary power could create hazards or hamper rescue or fire-fighting operations.

Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This

includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

The requirements for emergency and standby power system are not treated in a consistent manner in the I-codes. This is one of several proposals designed to add consistency to these requirements. This proposal accomplishes the following:

1. Introduces definitions for emergency power systems and standby power systems that are consistent with definitions in NFPA 110 and NFPA 111.
2. Provides definitive requirements for maximum load transfer times. Emergency power systems must automatically transfer loads within 10 seconds after primary power is lost and standby power systems must automatically transfer loads within 60 seconds after primary power is lost. These times are allowed to vary if so specified in the code
3. To properly design emergency and standby power systems the minimum load duration must be known. This proposal introduces a default minimum two hour duration for systems unless another load duration is specified.
4. Uninterruptible power sources must be provided if required by the manufacturer's instructions, the listing, the code, or applicable referenced standards, such as NFPA 72.
5. A new section clarifies that an emergency power system can be provided to power loads for equipment that requires a standby power source.

Cost Impact: This code change will not increase the cost of construction

F53-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

604.1 (NEW)-F-ZUBIA-FCAC

F54 – 13

604.1.2 (New) (IBC [F] 2702.1.2), Chapter 80

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care
(john.williams@doh.wa.gov)

Add new text as follows:

604.1.1(IBC [F] 2702.1.1) Stationary generators. Stationary emergency and standby power generators required by this code shall be *listed* in accordance with UL 2200

604.1.2 (IBC [F] 2702.1.2) Group I-2 Occupancies. In Group I-2 occupancies, where an essential electrical system is located in flood hazard areas established in Section 1612.3 of the *International Building Code*, the system shall be located and installed in accordance with ASCE 24.

Add new standard to Chapter 80 as follows:

ASCE 24-05 Flood Resistant Design and Construction 604.1.2

Reason: This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering, a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 5 open meetings and over 80 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>.

There is no way to get to the requirements or limitations regarding generator placement for healthcare facilities that are in the standard if the code text for the specific code section does not take you there.

The Adhoc committee on healthcare identified this coordination oversight as it has been identified in healthcare facilities and that generators are being installed in areas subject to flooding, and although they were designed to meet the structural loads for the flooding, they would operationally fail.

There is no cost impact for these requirements because the compliance with ASCE 24 is required for these facilities; specific reference to ASCE for coordination of requirements applicable to healthcare facilities that require emergency or standby power systems per federal, state and licensing agency requirements and references. Also, both this section and this proposal are not intended to be retroactive in application. The AHC has a separate code change that would require facilities to do a risk assessment of existing installations.

It is an installation construction requirement that is not specifically addressed in the code; emergency and standby power by generators is necessary for life safety and preservation for healthcare and for other occupancies and uses as specified in 2702.

Note that G80-12 added requirements for essential electrical systems in I-2 occupancies. This is simply a continuation of that concept. This proposal is furthering the reliability of the essential electrical systems when they will be needed most by specifically referencing to ASCE 24. The additional language referencing Section 1612.3 is similar to that used in Section 3001.2 for elevators.

Cost impact: The code change proposal should not increase the cost of construction because compliance is already required by facility licensure requirements.

Analysis: The standard proposed for inclusion in the code, ASCE 24-05, is currently referenced in the IBC. An update in the year edition of that standard will be accomplished by an administrative standards update code change to be heard by the ADM Code Development Committee.

F54-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

604.1.2 (NEW)-F-WILLIAMS-ADHOC

F55 – 13

604.2.14.1.3 (IBC [F] 403.4.8.2) (New)

Proponent: Robert J Davidson, Davidson Code Concepts, LLC, representing self
(rjd@davidsoncodeconcepts.com)

Add new text as follows:

604.2.14.1 (IBC [F] 403.4.8.1) Standby power. A standby power system shall be provided. Where the standby system is a generator set inside a building, the system shall be located in a separate room enclosed with 2-hour fire barriers constructed in accordance with Section 707 of the International Building Code or horizontal assemblies constructed in accordance with Section 711 of the International Building Code, or both. System supervision with manual start and transfer features shall be provided at the fire command center.

604.2.14.1.1 Fuel supply. (No change to current text.)

604.2.14.1.2 Capacity. (No change to current text.)

604.2.14.1.3 (IBC [F] 403.4.8.2) Fuel line piping protection: Fuel lines supplying a generator set inside a building shall be separated from areas of the building other than the room the generator is located in by fire barriers or by an approved piping protective system that have a fire-resistance rating of not less than 2 hours. Where gypsum wallboard is used, joints on the piping side of the enclosure are not required to be taped. Access openings into the enclosure shall be protected by approved fire protection-rated assemblies.

(Renumber subsequent sections)

Reason: Currently IFC Section 604.2.14.1 and IBC Section [F] 403.4.8.1 require the generator to be protected from a fire within the occupancy by enclosure with 2 hour fire-resistance rated construction.

However, for diesel fueled generators it is common to supply the generators with a day tank and resupply the day tank via remote fuel oil tanks and the fuel line piping from those remote tanks to the generator can be exposed to the fire the generator has been protected against. Loss of the fuel line due to fire exposure has the same impact as loss of the generator itself from fire exposure. The wording only refers to "fuel lines" to also provide protection in those cases where a gaseous fuel supply is approved for use.

This proposal calls for fire-resistance protection of those portions of the fuel line piping that are located outside of the fire-resistance rated room the generator is located in. A portion of the new language was taken from IBC Section [F]415.10.6.4 where protection of HPM supply piping is provided for.

Cost Impact: The code change proposal will increase the cost of construction.

F55-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

604.2.14.1.3 (NEW)-F-DAVIDSON

F56 – 13

604.2.1 through 604.2.18 (IBC [F] 2702.2.1 through [F] 2702.2.20)

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee

Revise as follows:

IFC Sections 604.2.1 through 604.2.18 (IBC Sections [F] 2702.2.1 through [F] 2702.2.20): Arrange these sections in alphabetical order by title.

Reason: There does not appear to be a single method followed for arranging the order of these sections. This proposal will make it easier to locate requirements for specific systems.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

Cost Impact: This code change will not increase the cost of construction

F56-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

604.2.1-F-ZUBIA-FCAC

F57 – 13

604.3 (New) [IBC [F] 2702.3 (New)]; Chapter 80 (IBC Chapter 35)

Proponent: Bob Eugene, representing Underwriters Laboratories (Robert.Eugene@ul.com)

Add new text as follows:

604.3 (IBC [F] 2702.3) Critical circuits. Cables used for survivability of critical circuits shall be listed in accordance with UL 2196. Electrical circuit protective systems shall be installed in accordance with their listing requirements.

(Renumber subsequent sections)

Add new standard to Chapter 80 (IBC Chapter 35) as follows:

UL

2196-2001 Tests for Fire Resistive Cables, with revisions through December 7, 2003...604.3 (2703.2)

Reason: UL 2196 is the ANSI approved standard for tests of fire resistive cables. NFPA 20 (fire pumps) and NFPA 72 (fire alarm) include selective survivability requirements to assure integrity of certain critical circuits. NFPA 70 does not specify the applicable standard within the mandatory provisions of the code, but recognizes electrical circuit protective systems as an alternate to listed cables. An electrical circuit protective system is a field assembly of components that must be installed according to the listing requirements and manufacturer's instructions in order to maintain the listing for the system. There are more than two dozen electrical circuit protective systems listed in the UL Fire Resistance Directory.

Cost Impact: The code change proposal may or may not increase the cost of construction. Such systems are already commonly installed.

F57-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

604.3 (NEW)-F-EUGENE

F58 – 13

IFC 604.1, 604.1.2 (New) (IBC [F] 2702.1.2 (New)), 604.2 (IBC [F] 2702.2), 604.3 (IBC [F] 2702.3), 604.4, 604.5

Proponent: Al Godwin, CBO, CPM, Aon Fire Protection Engineering, representing Aon Fire Protection Engineering Corporation (al.godwin@aon.com)

Revise as follows:

SECTION 604 EMERGENCY AND STANDBY POWER SYSTEMS

604.1 Installation. Emergency and standby power systems required by this code or the *International Building Code* shall be installed in accordance with this code, NFPA 110 and 111. Existing installations shall be maintained in accordance with the original approval, except as specified in Chapter 11.

604.1.2 (IBC [F] 2702.1.2) Critical Operations Power Systems (COPS). Critical Operations Power Systems necessary to maintain continuous power supply to facilities or parts of facilities that require continuous operation for the reasons of public safety, emergency management, national security, or business continuity, shall comply with NFPA 70.

604.2 (IBC [F] 2702.2) Where required. Emergency and standby power systems shall be provided where required by Sections 604.2.1 through ~~604.2.18.4~~ 604.2.24 or other applicable referenced code.

604.2.1 (IBC [F] 2702.2.1) ~~Group A occupancies.~~ Emergency voice/alarm communications systems. Emergency power shall be provided for emergency voice/alarm communications systems in ~~Group A~~ the following occupancies, and as required in other sections of this code, in accordance with Section ~~907.5.2.2.5~~ 907.2.1.4.

Covered and Open Malls in accordance with Section 604.2.13.
Group A occupancies in accordance with Sections 907.2.1.1 and 907.5.2.2.4.
Group E occupancies in accordance with Section 907.2.3
Special Amusement buildings in accordance with Section 907.2.12.3
High rise buildings in accordance with Section 907.2.13
Atriums in accordance with Section 907.2.14
Deep Underground buildings in accordance with Section 907.2.19
Occupant Evacuation Elevators in accordance with Section 3008.10

604.2.2 (IBC [F] 2702.2.2) Smoke control systems. Standby power shall be provided for smoke control systems in the following occupancies, or as required in other sections of this code, in accordance with Section 909.11:

Covered mall building, *International Building Code* in accordance with Section 404.5
Atriums, *International Building Code* in accordance with Section 404.7
Underground buildings, *International Building Code* in accordance with Section 405.5
Group I-3, *International Building Code* in accordance with Section 408.9
Stages, *International Building Code* in accordance with Section 410.3.7.2
Special Amusement buildings (as applicable to Group A's), *International Building Code* in accordance with Section 411.1
Smoke protected seating in accordance with Section 1028.6.2.1

604.2.3 (IBC [F] 2702.2.3) Exit signs. Emergency power shall be provided for *exit* signs in accordance with Section 1011.6.3.

604.2.4 (IBC [F] 2702.2.4) Means of egress illumination. Emergency power shall be provided for *means of egress* illumination in accordance with Section 1006.3.

604.2.9 (IBC [F] 2702.2.9) Membrane structures. Emergency power shall be provided for *exit* signs in temporary tents and membrane structures in accordance with Section 3103.12.6.1. Standby power shall be provided for auxiliary inflation systems in permanent membrane structures in accordance with the *International Building Code*.

604.2.15 (IBC [F] ~~2702.2.16~~ 2702.2.14) Group I-2 Occupancies. Essential electrical systems for Group I-2 occupancies shall be in accordance with Section 407.11 of the *International Building Code*.

~~604.2.15~~ **604.2.16 (IBC [F] ~~2702.2.16~~ 2702.2.15) Underground buildings.** (No change to current text)

~~604.2.16~~ **604.2.17 (IBC [F] ~~2702.2.17~~ 2702.2.16) Group I-3 occupancies.** (No change to current text)

~~604.2.17~~ **604.2.18 (IBC [F] ~~2702.2.18~~ 2702.2.17) Airport traffic control towers.** (No change to current text)

~~604.2.18~~ **604.2.19 (IBC [F] ~~2702.2.19~~ 2702.2.18) Elevators.** (No change to current text)

604.2.20 (IBC [F] ~~2702.2.20~~ 2702.2.19) Smokeproof enclosures and Stair Pressurization Alternative. Standby power shall be provided for smokeproof enclosures. The stair pressurization alternative and associated automatic fire detection systems in accordance with the *International Building Code*, Section 909.20.6.2.

604.2.21 (IBC [F] 2702.2.20) Elevator pressurization. Standby power shall be provided for elevator pressurization system in accordance with the *International Building Code*, Section 909.21.5.

604.2.22 (IBC [F] 2702.2.21) Elimination of Smoke Dampers in Shaft Penetrations. Standby power shall be provided when eliminating the smoke dampers in ducts penetrating shafts in accordance with the *International Building Code*, Section 717.5.3, exception 2.3.

604.2.23 (IBC [F] 2702.2.22) Common exhaust systems for clothes dryers. Standby power shall be provided for common exhaust systems for clothes dryers located in multistory structures in accordance with the *International Mechanical Code* Section 504.8, item 7.

604.2.24 (IBC [F] 2702.2.23) Common exhaust systems for domestic kitchen exhaust. Standby power shall be provided for common exhaust systems for domestic kitchens using common exhaust systems located in multistory structures in accordance with the *International Mechanical Code* Section 505.3.

604.2.25 (IBC [F] 2702.2.24) Hydrogen Cutoff Rooms. Standby power shall be provided for mechanical ventilation and gas detection systems of Hydrogen Cutoff Rooms in accordance with the *International Building Code*, Section 421.8.

604.2.26 Means of Egress Illumination in Existing Buildings. Emergency power shall be provided for *means of egress* illumination in accordance with Section 1104.5 and 1104.5.1 where required by the fire code official.

604.3 (IBC [F] 2702.3) Energy time duration. Unless a time limit is specified by the fire code official, in this chapter or elsewhere in this code, or in any other referenced code or standard, the emergency and standby power system shall be supplied with enough fuel or energy storage capacity for not less than 2-hour full-demand operation of the system.

Exception: Where *approved*, natural gas from a utility provider shall meet the intent of this section.

~~604.3~~ **604.4 Maintenance.** (No change to current text)

604.4 604.5 Operational inspection and testing. (No change to current text)

604.5 604.6 Emergency lighting equipment. (No change to current text)

604.6 604.7 Supervision of maintenance and testing. (No change to current text)

IBC [F] 2702.2.14 Covered and open mall buildings. Standby power shall be provided for voice/alarm communication systems in covered and open mall buildings in accordance with Section 402.7.3.

[F] 2702.2.15 2702.2.13 High-rise buildings. Emergency and standby power shall be provided in high-rise buildings in accordance with Sections 403.4.8 and 403.4.9.

IBC [F] 2702.3 2702.4 Maintenance. Emergency and standby power systems shall be maintained and tested in accordance with the *International Fire Code*.

Reason: These provisions provide a laundry list that seems to have fallen out of date, are incomplete and don't match. This is intended to bring them into better coordination.

The following section is from G80-12, approved last cycle.

604.2.15 Group I-2 Occupancies. Essential electrical systems for Group I-2 occupancies shall be in accordance with the *International Building Code*, Section 407.11.

The following section is based on M73-12, approved last cycle:

604.2.24 Common exhaust systems for domestic kitchen exhaust. Standby power shall be provided for common exhaust systems for domestic kitchens using common exhaust systems located in multistory structures in accordance with the *International Mechanical Code* Section 505.3.

A new reference to COPS in NFPA 70 is provided. While it is unusual to specifically list a use in NFPA 70, this seems justified at least for discussion.

Also, provided is a specified Energy time duration. It seems to add clarity.

Everything else should be a reference to a code provision that already exists.

Possible Modifications:

Depending on any controversy, the following are two options for modifications:

1. Modify out the reference to COPS.

604.1.2 Critical Operations Power Systems (COPS). ~~For Critical Operations Power Systems necessary to maintain continuous power supply to facilities or parts of facilities that require continuous operation for the reasons of public safety, emergency management, national security, or business continuity, see NFPA 70.~~

2. Modify the Energy time duration to accommodate areas in earthquake zones or hurricane zones who might desire more time as follows:

- a. change to a fill in the blank.

604.3 Energy time duration. Unless a time limit is specified by the fire code official, in this chapter or elsewhere in this code, or in any other referenced code or standard, the emergency and standby power system shall be supplied with enough fuel or energy storage capacity for not less than [fill-in]-hour full-demand operation of the system.

- b. or;

604.3 Energy time duration. Unless a time limit is specified by the fire code official, in this chapter or elsewhere in this code, or in any other referenced code or standard, the emergency and standby power system shall be supplied with enough fuel or energy storage capacity for not less than 2-hour full-demand operation of the system, or longer when designated by the code official in accordance with an acceptable normal procedural process.

Reference to COPS can be modified out. However, if NFPA 70 is adopted by the jurisdiction, then it's listing here as a reminder would seem appropriate.

Cost Impact: Most items are already required. As such, this change will not increase the cost of construction.

Analysis: The text shown at Section **604.2.15 (IBC [F] 2702.2.16 2702.2.14) Group I-2 Occupancies**. Is the text of approved code change G80-12 (AMPC) and is shown as current text for clarity.

F58-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

604.1-F-GODWIN

F59 – 13

604 (IBC [F] 2702) among others; 907.5.2.2.5 (IBC [F] 907.5.2.2.5); IMC [F] 513.11, [F]513.11.1 (New); IWUIC 404.10.3; IEBC 805.4.5

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IFC COMMITTEE AND PART II WILL BE HEARD BY THE IEBC COMMITTEE AS TWO SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDER FOR THOSE COMMITTEES.

PART I – INTERNATIONAL FIRE CODE

EMERGENCY VOICE/ALARM COMMUNICATION SYSTEMS

***NOTE:** The normal convention for portraying code changes to duplicated texts is by showing the parallel section numbers (e.g., “907.5.2 (IBC [F] 907.5.2)” or “1011.6.3 (IFC [B] 1011.6.3”). In this code change, however, for improved clarity, duplicate texts are shown for each code in this part.*

Revise the IBC as follows:

[F] 402.7.3 Emergency Standby power. *Covered mall buildings* greater than 50,000 square feet (4645 m²) in area and *open mall buildings* greater than 50,000 square feet (4645 m²) within the established perimeter line shall be provided with ~~standby emergency power systems~~ that ~~is~~ are capable of operating the *emergency voice/alarm communication system* in accordance with Section 2702.

[F] 907.5.2.2.5 Emergency power. Emergency voice/alarm communications systems shall be provided with an ~~approved~~ emergency power source in accordance with Section 2702. The system shall be capable of powering the required load for a duration of not less than 24 hours, as required in NFPA 72.

[F] ~~2702.2.1 Group A occupancies.~~ Emergency power shall be provided for emergency voice/alarm communication systems in Group A occupancies in accordance with ~~Section 907.5.2.2.4.~~

[F] ~~2702.2.14 Covered and open mall buildings.~~ Standby power shall be provided for voice/alarm communication systems in ~~covered and open mall buildings~~ in accordance with ~~Section 402.7.3.~~

[F] 2702.2.1 Emergency voice/alarm communication systems. Emergency power shall be provided for emergency voice/alarm communication systems as required in Section 907.5.2.2.5. The system shall be capable of powering the required load for a duration of not less than 24 hours, as required in NFPA 72.

Revise the IFC as follows:

~~604.2.1 Group A occupancies.~~ Emergency power shall be provided for emergency voice/alarm communication systems in Group A occupancies in accordance with ~~Section 907.2.1.1.~~

~~604.2.13 Covered and open mall buildings.~~ ~~Covered mall buildings exceeding 50,000 square feet (4645 m²) and open mall buildings exceeding 50,000 square feet (4645 m²) within the established perimeter line shall be provided with standby power systems that are capable of operating the emergency voice/alarm communication system.~~

604.2.1 Emergency voice/alarm communication systems. Emergency power shall be provided for emergency voice/alarm communication systems as required in Section 907.5.2.2.5. 5. The system shall be capable of powering the required load for a duration of not less than 24 hours, as required in NFPA 72.

907.5.2.2.5 Emergency power. Emergency voice/alarm communications systems shall be provided with an ~~approved~~ emergency power source in accordance with Section 604. The system shall be capable of powering the required load for a duration of not less than 24 hours, as required in NFPA 72.

SMOKE CONTROL SYSTEMS

NOTE: The normal convention for portraying code changes to duplicated texts is by showing the parallel section numbers (e.g., "907.5.2 (IBC [F] 907.5.2)" or "1011.6.3 (IFC [B] 1011.6.3)"). In this code change, however, for improved clarity, duplicate texts are shown for each code in this part.

Revise the IBC as follows:

[F] 404.7 Standby power. Equipment required to provide smoke control shall be provided with standby power in accordance with ~~connected to a standby power system in accordance with~~ Section 909.11.

[F] 909.11 Standby power ~~Power systems.~~ ~~The s~~Smoke control systems shall be provided with standby power in accordance with Section 2702. ~~shall be supplied with two sources of power. Primary power shall be from the normal building power systems. Secondary power shall be from an approved standby source complying with Chapter 27 of this code.~~

[F] 909.11.1 Equipment room. The standby power source and its transfer switches shall be in a room separate from the normal power transformers and switch gears and ventilated directly to and from the exterior. The room shall be enclosed with not less than 1-hour *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both. ~~The transfer to full standby power shall be automatic and within 60 seconds of failure of the primary power.~~

909.20.6.2 Standby power. Mechanical vestibule and *stair* shaft ventilation systems and automatic fire detection systems shall be provided with ~~powered by an approved~~ standby power in accordance with Section 2702. ~~system conforming to Section 403.4.8 and Chapter 27.~~

909.21.5 Standby power. The pressurization system shall be provided with standby power in accordance with Section 2702. ~~from the same source as other required emergency systems for the building.~~

[F] 2702.2.2 Smoke control systems. Standby power shall be provided for smoke control systems as required in ~~in accordance with~~ Sections 404.7, 909.11, 909.20.6.2, and 909.21.5.

[F] 2702.2.20 Smokeproof enclosures. Standby power shall be provided for smokeproof enclosures ~~as required by in~~ Section 909.20.6.2.

Revise the IFC as follows:

604.2.2 Smoke control systems. Standby power shall be provided for smoke control systems as required in ~~in accordance with~~ Section 909.11.

909.11 Standby power ~~Power systems.~~ ~~The s~~Smoke control systems shall be provided with standby power in accordance with Section 2702. ~~shall be supplied with two sources of power. Primary power shall be from the normal building power systems. Secondary power shall be from an approved standby source complying with Chapter 27 of this code.~~

909.11.1 Equipment room. The standby power source and its transfer switches shall be in a room separate from the normal power transformers and switch gears and ventilated directly to and from the exterior. The room shall be enclosed with not less than 1-hour *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both. ~~The transfer to full standby power shall be automatic and within 60 seconds of failure of the primary power.~~

Revise the IMC as follows:

[F] 513.11 Power systems. ~~The sSmoke control system shall be supplied with standby power in accordance with Section 2702 of the International Building Code. two sources of power. Primary power shall be the normal building power systems. Secondary power shall be from an approved standby source complying with Chapter 27 of the International Building Code.~~

[F] 513.11.1 Equipment room. The standby power source and its transfer switches shall be in a room separate from the normal power transformers and switch gear and ventilated directly to and from the exterior. The room shall be enclosed with not less than 1-hour fire-resistance rated fire barriers constructed in accordance with Section 707 of the *International Building Code* or horizontal assemblies constructed in accordance with Section 711 of the *International Building Code*, or both. Power distribution from the two sources shall be by independent routes. ~~Transfer to full standby power shall be automatic and within 60 seconds of failure of the primary power. The systems shall comply with NFPA 70.~~

EXIT SIGNS

NOTE: The normal convention for portraying code changes to duplicated texts is by showing the parallel section numbers (e.g., "907.5.2 (IBC [F] 907.5.2)" or "1011.6.3 (IFC [B] 1011.6.3)"). In this code change, however, for improved clarity, duplicate texts are shown for each code in this part.

Revise the IBC as follows:

[F] 2702.2.3 Exit signs. Emergency power shall be provided for *exit* signs as required in ~~in accordance with~~ Section 1011.6.3. The system shall be capable of powering the required load for a duration of not less than 90 minutes.

Revise the IFC as follows:

604.2.3 Exit signs. Emergency power shall be provided for *exit* signs as required in ~~in accordance with~~ Section 1011.6.3. The system shall be capable of powering the required load for a duration of not less than 90 minutes.

MEANS OF EGRESS ILLUMINATION

NOTE: The normal convention for portraying code changes to duplicated texts is by showing the parallel section numbers (e.g., "907.5.2 (IBC [F] 907.5.2)" or "1011.6.3 (IFC [B] 1011.6.3)"). In this code change, however, for improved clarity, duplicate texts are shown for each code in this part.

Revise the IBC as follows:

[F] 2702.2.4 Means of egress illumination. Emergency power shall be provided for *means of egress* illumination as required in ~~in accordance with~~ Section 1006.3. The system shall be capable of powering the required load for a duration of not less than 90 minutes.

Revise the IFC as follows:

604.2.4 Means of egress illumination. Emergency power shall be provided for *means of egress* illumination in accordance with Sections 1006.3 and 1104.5.1.

1104.5.1 Emergency power duration and installation. Emergency power for means of egress illumination shall be provided in accordance with Section 604. In other than Group I-2, ~~the emergency power system shall provide power~~ shall be provided for not less than 60 minutes. ~~and consist of storage batteries, unit equipment or an on-site generator.~~ In Group I-2, ~~the emergency power system shall provide power~~ shall be provided for not less than 90 minutes. ~~and consist of storage batteries, unit equipment or an on-site generator.~~ ~~The installation of the emergency power system shall be in accordance with Section 604.~~

ELEVATORS AND PLATFORM LIFTS

NOTE: The normal convention for portraying code changes to duplicated texts is by showing the parallel section numbers (e.g., “907.5.2 (IBC [F] 907.5.2)” or “1011.6.3 (IFC [B] 1011.6.3)”). In this code change, however, for improved clarity, duplicate texts are shown for each code in this part.

Revise the IBC as follows:

[F] 2702.2.5 Elevators and platform lifts. Standby power shall be provided for elevators and platform lifts as required in Sections 1007.4, 1007.5, 3003.1, 3007.9 and 3008.9.

[F] 2702.2.5 Accessible means of egress elevators. Standby power shall be provided for elevators that are part of an accessible means of egress in accordance with Section 1007.4.

[F] 2702.2.6 Accessible means of egress platform lifts. Standby power in accordance with this section or ASME A 18.1 shall be provided for platform lifts that are part of an accessible means of egress in accordance with Section 1007.5.

[F] 2702.2.19 Elevators. Standby power for elevators shall be provided as set forth in Sections 3003.1, 3007.9 and 3008.9.

Revise the IFC as follows:

604.2.5 Accessible means of egress elevators. Standby power shall be provided for elevators that are part of an accessible means of egress in accordance with Section 1007.4.

604.2.6 Accessible means of egress platform lifts. Standby power in accordance with this section or ASME A18.1 shall be provided for platform lifts that are part of an accessible means of egress in accordance with Section 1007.5.

604.2.18 Elevators and platform lifts. Standby power shall be provided for elevators and platform lifts as required in Sections 607.2, 1007.4, and 1007.5.

Relocate IFC sections and renumber the remaining sections.

607.2 Standby power. 604.2.18 Elevators. In buildings and structures where standby power is required or furnished to operate an elevator, standby power shall be provided in accordance with Section 604. the eOperation of the system shall be in accordance with Sections 604.2.18.1 through 604.2.18.4 607.2.1 through 607.2.4.

607.2.1 604.2.18.1 Manual transfer. (No change to current text.)

607.2.2 604.2.18.2 One elevator. (No change to current text.)

607.2.3 604.2.18.3 Two or more elevators. (No change to current text.)

607.2.4 604.2.18.4 Machine room ventilation. (No change to current text.)

HORIZONTAL SLIDING DOORS

NOTE: The normal convention for portraying code changes to duplicated texts is by showing the parallel section numbers (e.g., “907.5.2 (IBC [F] 907.5.2)” or “1011.6.3 (IFC [B] 1011.6.3)”). In this code change, however, for improved clarity, duplicate texts are shown for each code in this part.

Revise the IBC as follows:

[F] 2702.2.7 Horizontal sliding doors. Standby power shall be provided for horizontal sliding doors as required in in accordance with Section 1008.1.4.3. The standby power supply shall have a capacity to operate a minimum of 50 closing cycles of the door.

Revise the IFC as follows:

604.2.7 Horizontal sliding doors. Standby power shall be provided for horizontal sliding doors as required in in accordance with Section 1008.1.4.3. The standby power supply shall have a capacity to operate a minimum of 50 closing cycles of the door.

MEMBRANE STRUCTURES

NOTE: The normal convention for portraying code changes to duplicated texts is by showing the parallel section numbers (e.g., "907.5.2 (IBC [F] 907.5.2)" or "1011.6.3 (IFC [B] 1011.6.3)"). In this code change, however, for improved clarity, duplicate texts are shown for each code in this part.

Revise the IBC as follows:

[F] 2702.2.9 Membrane structures. Standby power shall be provided for auxiliary inflation systems in permanent membrane structures as required in in accordance with Section 3102.8.2. Standby power shall be provided for a duration of not less than four hours. Auxiliary inflation systems in temporary air-supported and air-inflated membrane structures shall be provided in accordance with Section 3103.10.4 of Emergency power shall be provided for exit signs in temporary tents and membrane structures in accordance with the International Fire Code.

Revise the IFC as follows:

604.2.9 Membrane structures. Emergency power shall be provided for exit signs in temporary tents and membrane structures in accordance with Section 3103.12.6.1.

Standby power shall be provided for auxiliary inflation systems in permanent membrane structures in accordance with Section 2702 of the International Building Code. Auxiliary inflation systems shall be provided in temporary air-supported and air-inflated membrane structures in accordance with Section 3103.10.4.

3103.10.4 Auxiliary inflation systems power. Places of public assembly for more than 200 persons shall be furnished with an auxiliary inflation system capable of powering a blower with the capacity to maintain full inflation pressure with normal leakage in accordance with Section 3103.10.3 for a minimum duration of four hours. The auxiliary inflation system can be either a fully automatic auxiliary engine-generator set capable of powering one blower continuously for 4 hours, or a supplementary blower powered by an internal combustion engine which shall be automatic in operation. The system shall be capable of automatically operating the required blowers at full power within 60 seconds of a commercial power failure.

SEMICONDUCTOR FABRICATION FACILITIES

NOTE: The normal convention for portraying code changes to duplicated texts is by showing the parallel section numbers (e.g., "907.5.2 (IBC [F] 907.5.2)" or "1011.6.3 (IFC [B] 1011.6.3)"). In this code change, however, for improved clarity, duplicate texts are shown for each code in this part.

Revise the IBC as follows:

[F] 415.10.10 Emergency power system. An emergency power system shall be provided in Group H-5 occupancies in accordance with Section 2702. where required in Section 415.10.10.1. The emergency power system shall be designed to supply power automatically to required the electrical systems specified in Section 415.10.10.1 when the normal electrical supply system is interrupted.

[F] 415.10.10.1 Required electrical systems. Emergency power shall be provided for electrically operated equipment and connected control circuits for the following systems:

1. through 6. (No change to current text.)
7. Manual and automatic fire alarm systems.
8. through 11. (No change to current text.)

[F] 2702.2.8 Semiconductor fabrication facilities. Emergency power shall be provided for semiconductor fabrication facilities as required in ~~in accordance with~~ Section 415.10.10.

Revise the IFC as follows:

604.2.8 Semiconductor fabrication facilities. Emergency power shall be provided for semiconductor fabrication facilities as required in ~~in accordance with~~ Section 2703.15.

2703.15 Emergency power system. An emergency power system shall be provided in Group H-5 occupancies in accordance with ~~where required by~~ Section 604. The emergency power system shall ~~be designed to~~ supply power automatically to ~~required the~~ electrical systems specified in Section 2703.15.1 when the normal supply system is interrupted.

HAZARDOUS MATERIALS

NOTE: The normal convention for portraying code changes to duplicated texts is by showing the parallel section numbers (e.g., "907.5.2 (IBC [F] 907.5.2)" or "1011.6.3 (IFC [B] 1011.6.3)"). In this code change, however, for improved clarity, duplicate texts are shown for each code in this part.

Revise the IBC as follows:

[F] 414.5.3 Emergency or standby power. Where mechanical *ventilation*, treatment systems, temperature control, alarm, detection or other electrically operated systems are required by the *International Fire Code* or this code, such systems shall be provided with an emergency or standby power system in accordance with Section 2702 Chapter 27. ~~Exceptions: 1.~~

[F] 414.5.3.1 Exempt applications. Emergency or standby power are not required for ~~the following storage areas:~~ 1.1. Mechanical ventilation systems provided for:

1. Storage of Class IB and Class IC flammable and combustible liquids in closed containers not exceeding 6.5 gallons (25 L) capacity.
- ~~4.21.1. Storage areas for of Class 1 and 2 oxidizers.~~
- ~~4.31.2. Storage areas for of Class II, III, IV and V organic peroxides.~~
- ~~4.41.3. Storage, use and handling areas for of asphyxiant, irritant and radioactive gases.~~
- ~~4.5. For storage, use and handling areas for highly toxic or toxic materials, see Sections 6004.2.2.8 and 6004.3.4.2 of the International Fire Code.~~

[F] 414.5.3.2 Fail-safe engineered systems. Standby power for mechanical *ventilation*, treatment systems and temperature control systems shall not be required where an approved fail-safe engineered system is installed.

[F] 421.8 Standby power. Mechanical *ventilation* and gas detection systems shall be ~~connected to a provided with~~ standby power system in accordance with Section 2702 Chapter 27.

[F] 2702.2.10 Hazardous materials. Emergency or standby power shall be provided in occupancies with hazardous materials as required in ~~in accordance with~~ Sections 414.5.3 and 421.8 and the *International Fire Code*.

Revise the IFC as follows:

604.2.10 Hazardous materials. Emergency or standby power shall be provided in occupancies with hazardous materials as required in the following in accordance with sections 5004.7 and 5005.1.5:

Hazardous materials – 5001.3.3.10

Highly toxic and toxic gases - 6004.2.2.8, 6004.3.4.2

Organic peroxides - 6204.1.11

5004.7 Standby or emergency power. Where mechanical ventilation, treatment systems, temperature control, alarm, detection or other electrically operated systems are required, such systems shall be provided with an emergency or standby power system in accordance with ~~NFPA 70 and~~ Section 604.

Exceptions:

5004.7.1 Exempt applications. Standby or emergency power is not required for ~~M~~mechanical ventilation systems provided for:

1. Storage of Class IB and Class IC flammable and *combustible liquids* in closed containers not exceeding 61/2 gallons (25 L) capacity.
2. Storage ~~areas for~~ of Class 1 and 2 oxidizers.
3. Storage ~~areas for~~ of Class II, III, IV and V organic peroxides.
4. Storage ~~areas for~~ of asphyxiant, irritant and radioactive gases.
5. ~~For storage areas for highly toxic or toxic materials, see Sections 6004.2.2.8 and 6004.3.4.2.~~

5004.7.2 Fail-safe engineered systems. ~~6-~~ Standby power for mechanical ventilation, treatment systems and temperature control systems shall not be required where an *approved* fail-safe engineered system is installed.

5005.1.5 Standby or emergency power. Where mechanical ventilation, treatment systems, temperature control, manual alarm, detection or other electrically operated systems are required in this code, such systems shall be provided with an emergency or standby power system in accordance with ~~NFPA 70 and~~ Section 604.

Exceptions: ~~1-~~

5005.1.5.1 Exempt applications. Standby power for mechanical ventilation, treatment systems and temperature control systems shall not be required where an *approved* fail-safe engineered system is installed.

2. ~~Systems for highly toxic or toxic gases shall be provided with emergency power in accordance with Sections 6004.2.2.8 and 6004.3.4.2.~~

6004.2.2.8 Emergency power. Emergency power shall be provided for the following systems in accordance with the Section 604. ~~and NFPA 70 shall be provided in lieu of standby power where any of the following systems are required:~~

1. through 7. (No change to current text.)

6004.2.2.8.1 Fail-safe engineered systems. ~~Exception:~~ Emergency power is shall not be required for mechanical exhaust ventilation, treatment systems and temperature control systems where *approved* fail-safe engineered systems are installed.

6204.1.11 Standby power. Standby power ~~in accordance with Section 604 shall be provided for storage areas of Class I and unclassified detonable organic peroxide. shall be provided in accordance with~~

Section 604 for the following systems used to protect Class I and unclassified detonable organic peroxide:

1. through 7. (No change to current text.)

6204.1.11.1 Fail-safe engineered systems. Exception: Standby power shall not be required for mechanical exhaust ventilation, treatment systems and temperature control systems where *approved* fail-safe engineered systems are installed.

HIGH RISE BUILDINGS

NOTE: The normal convention for portraying code changes to duplicated texts is by showing the parallel section numbers (e.g., "907.5.2 (IBC [F] 907.5.2)" or "1011.6.3 (IFC [B] 1011.6.3)"). In this code change, however, for improved clarity, duplicate texts are shown for each code in this part.

Revise the IBC as follows:

[F] 403.4.8 Standby and emergency power. A standby power system complying with Section 2702 Chapter 27 and Section 3003 shall be provided for the standby power loads specified in 403.4.8.2. An emergency power system complying with Section 2702 shall be provided for the emergency power loads specified in Section 403.4.8.3. ~~Where elevators are provided in a high-rise building for accessible means of egress, fire service access or occupant self-evacuation, the standby power system shall also comply with Sections 1007.4, 3007 or 3008, as applicable.~~

[F] 403.4.8.1 Equipment room. Special requirements for standby power systems. If the standby or emergency power system includes is a generator set inside a building, the system shall be located in a separate room enclosed with 2-hour *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both. System supervision with manual start and transfer features shall be provided at the *fire command center*.

[F] 403.4.8.2 Standby power loads. The following are classified as standby power loads:

1. Power and lighting for the *fire command center* required by Section 403.4.6;
2. *Ventilation* and automatic fire detection equipment for *smokeproof enclosures*; and
3. Elevators.
4. Where elevators are provided in a high-rise building for accessible means of egress, fire service access or occupant self-evacuation, the standby power system shall also comply with Sections 1007.4, 3007 or 3008, as applicable.

[F] 403.4.9 Emergency power systems. An emergency power system complying with Chapter 27 shall be provided for emergency power loads specified in Section 403.4.9.1.

[F] 403.4.9.1 403.4.8.3 Emergency power loads. The following are classified as emergency power loads:

1. Exit signs and *means of egress* illumination required by Chapter 10;
2. Elevator car lighting;
3. *Emergency voice/alarm communications systems*;
4. Automatic fire detection systems;
5. *Fire alarm* systems; and
6. Electrically powered fire pumps.

[F] 2702.2.15 High-rise buildings. Emergency and standby power systems shall be provided in high-rise buildings as required in ~~in accordance with~~ Sections 403.4.8 and 403.4.9.

Revise the IFC as follows:

604.2.14 High-rise buildings. Standby power and emergency power, light and emergency systems in high-rise buildings shall be provided as required in Section 403 of the International Building Code, and shall be in accordance with Section 604. ~~comply with the requirements of Sections 604.2.14.1 through 604.2.14.3.~~

604.2.14.1 Standby power. A standby power system shall be provided. Where the standby system is a generator set inside a building, the system shall be located in a separate room enclosed with 2-hour *fire barriers* constructed in accordance with Section 707 of the *International Building Code* or *horizontal assemblies* constructed in accordance with Section 711 of the *International Building Code*, or both. ~~System supervision with manual start and transfer features shall be provided at the fire command center.~~

604.2.14.1.1 Fuel supply. An on-premises fuel supply, sufficient for not less than 2-hour full-demand operation of the system, shall be provided.

Exception: ~~When approved, the system shall be allowed to be supplied by natural gas pipelines.~~

604.2.14.1.2 Capacity. The standby system shall have a capacity and rating that supplies all equipment required to be operational at the same time. The generating capacity is not required to be sized to operate all of the connected electrical equipment simultaneously.

604.2.14.1.3 Connected facilities. Power and lighting facilities for the *fire command center* and elevators specified in Sections 403.4.8.2 and 403.6 of the *International Building Code*, as applicable, shall be transferable to the standby source. Standby power shall be provided for at least one elevator to serve all floors and be transferable to any elevator.

604.2.14.2 Separate circuits and luminaires. Separate lighting circuits and luminaires shall be required to provide sufficient light with an intensity of not less than 1 footcandle (11 lux) measured at floor level in all *means of egress corridors, stairways, smokeproof enclosures, elevator cars and lobbies, and other areas that are clearly a part of the escape route.*

604.2.14.2.1 Other circuits. Circuits supplying lighting for the *fire command center* and mechanical equipment rooms shall be transferable to the standby source.

604.2.14.3 Emergency systems. ~~Exit signs, exit illumination as required by Chapter 10, electrically powered fire pumps required to maintain pressure, and elevator car lighting are classified as emergency systems and shall operate within 10 seconds of failure of the normal power supply and shall be capable of being transferred to the standby source.~~

Exception: ~~Exit sign, exit and means of egress illumination are permitted to be powered by a standby source in buildings of Group F and S occupancies.~~

UNDERGROUND BUILDINGS

NOTE: The normal convention for portraying code changes to duplicated texts is by showing the parallel section numbers (e.g., "907.5.2 (IBC [F] 907.5.2)" or "1011.6.3 (IFC [B] 1011.6.3)"). In this code change, however, for improved clarity, duplicate texts are shown for each code in this part.

Revise the IBC as follows:

[F] 405.8 Standby and emergency power. A standby power system complying with Section 2702 Chapter 27 shall be provided for the standby power loads specified in Section 405.8.1. An emergency power system complying with Section 2702 shall be provided for the emergency power loads specified in Section 405.8.2.

[F] 405.8.1 Standby power loads. The following loads are classified as standby power loads:

1. Smoke control system.
2. Ventilation and automatic fire detection equipment for *smokeproof enclosures*.
3. Fire pumps.
4. ~~Standby power shall be provided for e~~Elevators, ~~as required in~~ in accordance with Section 3003.

[F] 405.8.2 Pick-up time. ~~The standby power system shall pick up its connected loads within 60 seconds of failure of the normal power supply.~~

[F] 405.9 Emergency power. ~~An emergency power system complying with Chapter 27 shall be provided for emergency power loads specified in Section 405.9.1.~~

[F] 405.9.1 405.8.2 Emergency power loads. The following loads are classified as emergency power loads:

1. through 5. *(No change to current text.)*

[F] 2702.2.16 Underground buildings. Emergency and standby power shall be provided in underground buildings as required in ~~in accordance with~~ Sections 405.8 and 405.9.

Revise the IFC as follows:

604.2.15 Underground buildings. Emergency and standby power ~~systems shall be provided in~~ underground buildings covered as required in Chapter 4 Section 405 of the *International Building Code* shall comply with Sections 604.2.15.1 and 604.2.15.2. and shall be in accordance with Section 604.

604.2.15.1 Standby power. A standby power system complying with this section and NFPA 70 shall be provided for standby power loads as specified in Section 604.2.15.1.1.

604.2.15.1.1 Standby power loads. The following loads are classified as standby power loads:

1. ~~Smoke control system.~~
2. ~~Ventilation and automatic fire detection equipment for smokeproof enclosures.~~
3. ~~Fire pumps.~~
4. ~~Standby power shall be provided for elevators in accordance with Section 3003 of the *International Building Code*.~~

604.2.15.1.2 Pickup time. ~~The standby power system shall pick up its connected loads within 60 seconds of failure of the normal power supply.~~

604.2.15.2 Emergency power. ~~An emergency power system complying with this code and NFPA 70 shall be provided for emergency power loads as specified in Section 604.2.15.2.1.~~

604.2.15.2.1 Emergency power loads. The following loads are classified as emergency power loads:

1. ~~Emergency voice/alarm communication systems.~~
2. ~~Fire alarm systems.~~
3. ~~Automatic fire detection systems.~~
4. ~~Elevator car lighting.~~
5. ~~Means of egress lighting and exit sign illumination as required by Chapter 10.~~

GROUP I-3 OCCUPANCY DOOR LOCKS

NOTE: The normal convention for portraying code changes to duplicated texts is by showing the parallel section numbers (e.g., "907.5.2 (IBC [F] 907.5.2)" or "1011.6.3 (IFC [B] 1011.6.3)"). In this code change, however, for improved clarity, duplicate texts are shown for each code in this part. See Part XX for this subject in the IEBC.

Revise the IBC as follows:

[F] 408.4.2 Power-operated doors and locks. Power-operated sliding doors or power-operated locks for swinging doors shall be operable by a manual release mechanism at the door. Emergency power shall be provided for the doors and locks in accordance with Section 2702. ~~and either emergency power or a remote mechanical operating release shall be provided.~~

Exceptions:

1. Emergency power is not required in facilities with 10 or fewer locks complying with the exception to Section 408.4.1.
2. Emergency power is not required when remote mechanical operating releases are provided.

[F] 2702.2.17 Group I-3 occupancies. Emergency power shall be provided for power operated doors and locks in Group I-3 occupancies as required in ~~in accordance with~~ Section 408.4.2.

Revise the IFC as follows:

604.2.16 Group I-3 occupancies. Power-operated sliding doors or power-operated locks for swinging doors shall be operable by a manual release mechanism at the door. Emergency power shall be provided for the doors and locks in accordance with Section 604. ~~and either emergency power or a remote mechanical operating release shall be provided.~~

Exceptions:

1. Emergency power is not required in facilities with 10 or fewer locks complying with the exception to Section 408.4.1.
2. Emergency power is not required when remote mechanical operating releases are provided.

AIRPORT TRAFFIC CONTROL TOWERS

NOTE: The normal convention for portraying code changes to duplicated texts is by showing the parallel section numbers (e.g., "907.5.2 (IBC [F] 907.5.2)" or "1011.6.3 (IFC [B] 1011.6.3)"). In this code change, however, for improved clarity, duplicate texts are shown for each code in this part.

Revise the IBC as follows:

~~**[F] 2702.2.18 Airport traffic control towers.** Standby power shall be provided in airport traffic control towers in accordance with Section 412.3.4.~~

[F] 412.3.4 Standby power. A standby power system that conforms to Chapter 27 shall be provided in airport traffic control towers more than 65 feet (19 812 mm) in height. Power shall be provided to the following equipment:

1. ~~Pressurization equipment, mechanical equipment and lighting.~~
2. ~~Elevator operating equipment.~~
3. ~~Fire alarm and smoke detection systems.~~

Revise the IFC as follows:

604.2.17 Airport traffic control towers. A standby power system shall be provided in airport traffic control towers more than 65 feet (19 812 mm) in height. Power shall be provided to the following equipment:

1. ~~Pressurization equipment, mechanical equipment and lighting.~~
2. ~~Elevator operating equipment.~~
3. ~~Fire alarm and smoke detection systems.~~

SMOKE ALARMS

NOTE: The normal convention for portraying code changes to duplicated texts is by showing the parallel section numbers (e.g., "907.5.2 (IBC [F] 907.5.2)" or "1011.6.3 (IFC [B] 1011.6.3)"). In this code change, however, for improved clarity, duplicate texts are shown for each code in this part.

Revise the IBC as follows:

[F] 907.2.11.4 Power source. In new construction, required smoke alarms shall receive their primary power from the building wiring where such wiring is served from a commercial source and shall be equipped with a battery backup. Smoke alarms with integral strobes that are not equipped with battery backup shall be connected to an emergency electrical system in accordance with Section 2702. Smoke alarms shall emit a signal when the batteries are low. Wiring shall be permanent and without a disconnecting switch other than as required for overcurrent protection.

Exception: Smoke alarms are not required to be equipped with battery backup where they are connected to an emergency electrical system that complies with Section 2702.

Revise the IFC as follows:

907.2.11.4 Power source. In new construction, required smoke alarms shall receive their primary power from the building wiring where such wiring is served from a commercial source and shall be equipped with a battery backup. Smoke alarms with integral strobes that are not equipped with battery back-up shall be connected to an emergency electrical system in accordance with Section 604. Smoke alarms shall emit a signal when the batteries are low. Wiring shall be permanent and without a disconnecting switch other than as required for overcurrent protection.

Exception: Smoke alarms are not required to be equipped with battery backup where they are connected to an emergency electrical system that complies with Section 604.

EMERGENCY ALARM SYSTEMS

NOTE: The normal convention for portraying code changes to duplicated texts is by showing the parallel section numbers (e.g., "907.5.2 (IBC [F] 907.5.2)" or "1011.6.3 (IFC [B] 1011.6.3)"). In this code change, however, for improved clarity, duplicate texts are shown for each code in this part.

Revise the IBC as follows:

[F] 414.7.4 Emergency alarm systems. Emergency alarm systems shall be provided with emergency power in accordance with Section 2702.

[F] 2702.2.21 Emergency alarm systems. Emergency power shall be provided for emergency alarm systems as required by Section 414.7.4.

Revise the IFC as follows:

604.2.19 Emergency alarm systems. Emergency power shall be provided for emergency alarm systems as required by Section 414 of the International Building Code.

EMERGENCY RESPONDER RADIO COVERAGE SYSTEMS

NOTE: The normal convention for portraying code changes to duplicated texts is by showing the parallel section numbers (e.g., "907.5.2 (IBC [F] 907.5.2)" or "1011.6.3 (IFC [B] 1011.6.3)"). In this code change, however, for improved clarity, duplicate texts are shown for each code in this part.

Add a new Section 2702.2.21 to the IBC as follows:

[F] 2702.2.21 Emergency responder radio coverage systems. Standby power shall be provided for emergency responder radio coverage systems required in Section 915 and the *International Fire Code*. The standby power supply shall be capable of operating the emergency responder radio coverage system for a duration of not less than 24 hours.

Revise the IFC as follows:

510.4.2.3 Standby power. ~~Secondary power.~~ Emergency responder radio coverage systems shall be provided with an ~~approved secondary source of~~ standby power in accordance with Section 604. The ~~secondary standby~~ power supply shall be capable of operating the emergency responder radio coverage system for a period of at least duration of not less than 24 hours. ~~When primary power is lost, the power supply to the emergency responder radio coverage system shall automatically transfer to the secondary power supply.~~

604.2.19 Emergency responder radio coverage systems. Standby power shall be provided for emergency responder radio coverage systems as required in Section 510.4.2.3. The standby power supply shall be capable of operating the emergency responder radio coverage system for a duration of not less than 24 hours.

FLARING SYSTEMS FOR MECHANICAL REFRIGERATION

Revise the IFC as follows:

606.12.5 Flaring systems. Flaring systems for incineration of flammable refrigerants shall be designed to incinerate the entire discharge. The products of refrigerant incineration shall not pose health or environmental hazards. Incineration shall be automatic upon initiation of discharge, shall be designed to prevent blowback and shall not expose structures or materials to threat of fire. Standby fuel, such as LP gas, and standby power shall have the capacity to operate for one and one-half the required time for complete incineration of refrigerant in the system. Standby electrical power, where required to complete the incineration process, shall be in accordance with Section 604.

WATER SUPPLY POWER

Revise the IWUIC as follows:

404.10.3 Standby power. Standby power shall be provided to pumps, controllers and related electrical equipment so that Stationary water supply facilities within the wildland-urban interface area that are dependent on electrical power can provide the required to meet adequate water supply. The standby power system shall be demands shall provide standby power systems in accordance with Section 2702 Chapter 27 of the International Building Code, and Section 604 of the International Fire Code. and NFPA 70 to ensure that an uninterrupted water supply is maintained. The standby power source shall be capable of providing power for a minimum of two hours.

Exceptions: *(No change to current text.)*

PART II - INTERNATIONAL EXISTING BUILDING CODE

GROUP I-3 OCCUPANCY DOOR LOCKS

Revise the IEBC as follows:

IEBC 805.4.5 Emergency power source in Group I-3. Power-operated sliding doors or power-operated locks for swinging doors shall be operable by a manual release mechanism at the door. Emergency power shall be provided for the doors and locks in accordance with Section 2702 of the International Building Code.

Exceptions:

1. Emergency power is not required in facilities with 10 or fewer locks complying with the exception to Section 408.4.1.
2. Emergency power is not required where remote mechanical operating releases are provided.

~~Work areas in buildings of Group I-3 occupancy having remote power unlocking capability for more than 10 locks shall be provided with an emergency power source for such locks. Power shall be arranged to operate automatically upon failure of normal power within 10 seconds and for a duration of not less than 1 hour.~~

Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

This proposal is part of a comprehensive rewrite of the I-Codes emergency and standby power requirements. Some edits are made to provide consistency in how standby power is referenced in the codes.

Part I - INTERNATIONAL FIRE CODE

Emergency voice/alarm communication systems: Emergency voice/alarm communication systems are required to include an emergency power source in IBC/IFC Section 907.5.2.2.5. A reference to these systems has been added to IBC 2702.2 and IFC 604.2. With the addition of this requirement it is no longer necessary to indicate that these systems are required in covered malls and Group A occupancies, which are just two of the many occupancies and building types that require emergency voice/alarm communication systems.

All reference in the IFC and IBC to emergency voice/alarm communication systems requires them to be provided with a source of emergency power, except for IBC Section 402.7.3. This oversight was corrected.

Smoke control systems: Smoke control systems are required to include a standby power source in IBC/IFC Section 909.11. In addition the IBC requires standby power to be provided for smoke control systems or components of the systems in Sections 404.7, 909.20.6.2, and 909.21.5. A reference to these section have been added to IBC 2702.2. By referencing section 909.20.6.2 in Section 2702.2.2, it is no longer necessary to include Section 2702.2.20 smokeproof enclosure reference.

IBC/IFC 909.11 and IMC 513.11 were rather lengthy and included requirements for standby power equipment rooms. These were broken off and put in Section 909.11.1 and 513.11.1. The reference to automatically transferring to standby power within 60 seconds is included in a separate code proposal for Sections 2702.1 and 604.1, and does not need to be repeated here.

Exit signs: The proposal updates references to emergency power requirements by including the appropriate IFC and IBC code sections that specify requirements for emergency power supply and operation of Exit Signs.

Means of egress illumination: Details on system components in 1006.3.1 have been eliminated because these are covered in the revised IFC Section 604.1 and IBC Section 2702.1 requirements. The last part of IFC Section 1006.3 was renumbered 1006.3.1 to match the format used in the equivalent IBC requirements.

Elevators and platform lifts: In IBC Section 2702.2 and IFC Section 604.2, references to three types of elevators or platform lifts were consolidated into a single reference to elevators and platform lifts.

Requirements for the specific rating of the standby systems required in 3007.9 and 3008.9 were removed since they are covered under another comprehensive rewrite of IBC Section 2702.1 and IFC Section 604.1. Elevator requirements in IFC Section 604.2.18 were relocated to IFC Section 607, which covers similar elevator requirements.

Horizontal sliding doors: The requirement for the standby power supply to have a capacity to operate a minimum of 50 opening and closing cycles of the door is based on requirements in NFPA 80, Section 9.4.2.2.2.

Membrane structures: The IBC and IFC require auxiliary inflation systems to be provided for air-supported and air-inflated membrane structures. (The IBC covers permanent membrane structures and the IFC covers temporary membrane structures). The differences are that permanent air-inflated membrane structures include standby power as covered by Section 2702 of the IBC. Temporary air-inflated membrane structures are required to include an automatic engine-generator set or a blower powered by an internal combustion engine to serve as an auxiliary inflation system in the event of a commercial power failure. These are not required to be permanently installed.

Semiconductor fabrication facilities: Automatic fire alarm systems are required to be provided with emergency power, which is consistent with NFPA 72.

Hazardous materials: Reference in Section 2702 of the IBC for emergency power for pyrophoric materials to be provided in accordance with the IFC was removed since backup power is not required in IFC Chapter 64. IBC Section 414.5.3 and IFC Section 5004.7 were reformatted with no substantive changes to the systems that do not require emergency or standby power and fail-safe engineered systems. In IBC Section 414.5.3 the requirements to provide emergency power for ventilation systems required by the IBC (or this code) were removed. This eliminates the need to provide emergency power for normal building ventilation systems as required by Section 1203. In looking at the hazardous material related systems that require a secondary power source, they all fall under the definition of emergency power system as included in NFPA 110. Therefore reference to standby power was removed from this section. References for emergency power were added to Sections 53, 54, 55, 57, 61 and 63 since these sections include requirements for system that require emergency power per Section 5001.3.3.10.

High rise buildings: The scope of IFC Section 604 covers emergency and standby power system, and yet sections 604.2.14.1 through 604.2.14.3 either duplicated requirements in revised Section 604.1, (covered under a separate proposal), or covered electrical system components that are not part of the standby or emergency power system. These requirements were eliminated. If the desire is to include these systems in the IFC they should be placed in a more appropriate location.

Underground buildings: Sections 604.2.15.1 through 604.2.15.2.1 duplicate some, but not all of the IBC requirements for underground buildings, and were therefore eliminated. If the desire is to include these details in the IFC they should be added in their entirety.

Group I-3 occupancy door locks: The proposal updates references to emergency power requirements by including the appropriate IFC and IBC code sections that specify requirements for emergency power supply and operation of power-operated door locks.

Airport traffic control towers: There is no reason to call out emergency and standby power requirements for aircraft traffic control towers. These requirements are specified for the types of electrical systems that will be provided, such as exit signs, egress illumination, elevators, smoke control, etc. In addition there is an error in some of the criteria since emergency power is required for fire alarm and smoke detection equipment and lighting of the means of egress. If the desire is to include a list of all possible emergency and standby power loads that can be included in these towers that can be done.

Smoke alarms: The proposal updates references to emergency power requirements by including the appropriate IFC and IBC code sections that specify requirements for emergency power supply and operation of Smoke Alarms.

Emergency alarms systems: Emergency power for emergency alarm systems is not currently required in either the IBC or the IFC, but it should be, based on the proposed definition of emergency power system.

Emergency responder radio coverage systems: Reference to standby power for emergency responder radio coverage systems was inadvertently left out of IBC Section 2702 and IFC Section 604.

Flaring systems for mechanical refrigeration: The proposal updates references to emergency power requirements by including the appropriate IFC code sections that specify requirements for emergency power supply and operation of flaring systems for mechanical refrigeration.

Clothes dryer exhaust systems: The proposal updates IMC references to stand-by power requirements by including the appropriate IBC code sections that specify requirements for stand-by power supply and operation of clothes dryer exhaust systems.

Water supply power: The proposal updates IWUI references to stand-by power requirements for pumps, controllers and related electrical equipment so that stationary water supply facilities within the *wildland-urban interface* by including the appropriate IFC and IBC code sections that specify requirements for stand-by power supply and operation of specified water supply equipment.

Part II - INTERNATIONAL EXISTING BUILDING CODE

Group I-3 occupancy door locks in the IEBC: The IEBC format was revised to more closely correlate with the IBC and IFC.

Cost Impact: This code change will increase the cost of construction

F59-13

PART I – INTERNATIONAL FIRE CODE

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – INTERNATIONAL EXISTING BUILDING CODE

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

604.2.1(NEW)-F-ZUBIA-FCAC

F60 – 13

604.19 (New) [IBC [F] 2702.2.21 (New)]

Proponent: Robert J Davidson, Davidson Code Concepts, LLC, representing National Renewable Energy Laboratory (NREL) (rjd@davidsoncodeconcepts.com)

Revise as follows:

604.19 (IBC [F] 2702.2.21) Hydrogen gas rooms. Standby power shall be provided for mechanical ventilation and gas detection systems in accordance with Section 5808.8.

Reason: .This proposal is primarily an editorial cleanup, the standby power is already required, it just never got added to the list of where required in IBC Section [F]2702.2 and IFC Section 604.2.

Note: There is a separate proposal to create IFC Section 5808 by copying the language from IBC Section 421. If that proposal fails the reference in proposed Section 604.19 would be IBC Section [F]421.8.

Cost Impact: The code change proposal will not increase the cost of construction.

F60-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

604.19-F-DAVIDSON

F61 – 13

605.11

Proponent: John Smirnow and Joseph H. Cain P.E. representing Solar Energy Industries Association (SEIA) (JSmirnow@seia.org)

Revise as follows:

605.11 Solar photovoltaic power systems. Solar photovoltaic power systems shall be installed in accordance with Sections 605.11.1 through 605.11.4, the International Building Code and NFPA 70.

Exception: Detached, nonhabitable Group U structures including, but not limited to, parking shade structures, carports, solar trellises and similar structures shall not be subject to the requirements of ~~this~~ Sections 605.11.2 through 605.11.3.3.

Reason: This code change proposal is the result of a consensus process established by the Solar Energy Industries Association's (SEIA) Codes and Standards Working Group. Established in 1974, SEIA is the national trade association of the U.S. solar energy industry. As the voice of the industry, SEIA works with its member companies to make solar a mainstream and significant energy source by expanding markets, removing market barriers, strengthening the industry, and educating the public on the benefits of solar energy.

Relocation of exception to a more appropriate section. The exception should not be applicable to all the requirements of Section 605.11. Markings should still be required on Group U Occupancies.

Cost Impact: No Impact on Construction Costs

F61-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

605.11-F-CAIN-SMIRNOW

F62 – 13

605.11, 605.11.3, 605.11.3.2, 605.11.3.3

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

605.11 Solar photovoltaic power systems. Solar photovoltaic power systems shall be installed in accordance with Sections 605.11.1 through 605.11.4, the *International Building Code* and NFPA 70.

Exception: ~~Detached, nonhabitable Group U structures including, but not limited to, parking shade structures, carports, solar trellises and similar structures shall not be subject to the requirements of this section.~~

605.11.3 Access and pathways. Roof access, pathways, and spacing requirements shall be provided in accordance with Sections 605.11.3.1 through 605.11.3.3.

Exceptions:

- ~~1. Residential structures shall be designed so that each photovoltaic array is no greater than 150 feet (45 720 mm) by 150 feet (45 720 mm) in either axis.~~
- ~~2. Panels/modules shall be permitted to be located up to the roof ridge where an alternative ventilation method approved by the fire chief has been provided or where the fire chief has determined vertical ventilation techniques will not be employed.~~

Exception: Detached, nonhabitable Group U structures including, but not limited to, parking shade structures, carports, solar trellises and similar structures.

605.11.3.2 Residential Solar photovoltaic systems for one- and two-family dwellings. ~~Access to residential Solar photovoltaic systems for one- and two-family dwellings shall be provided in accordance with Sections 605.11.3.2.1 through 605.11.3.2.45.~~

605.11.3.2.1 Size of solar photovoltaic array. Each photovoltaic array shall be limited to 150 feet (45 720 mm) by 150 feet (45 720 mm). Multiple arrays shall be separated by a 3-foot-wide (914 mm) clear access pathway.

605.11.3.2.12 Residential buildings with hip Hip roof layouts. ~~Panels/ and modules installed on residential buildings one- and two-family dwellings~~ with hip roof layouts shall be located in a manner that provides a 3-foot-wide (914 mm) clear access pathway from the eave to the ridge on each roof slope where panels/ and modules are located. The access pathway shall be located at a structurally strong location on the building capable of supporting the live load of fire fighters accessing the roof.

Exception: These requirements shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) or less.

605.11.3.2.23 Residential buildings with a Single ridge roofs. ~~Panels/ and modules installed on residential buildings one- and two-family dwellings~~ with a single ridge shall be located in a manner that provides two, 3-foot-wide (914 mm) access pathways from the eave to the ridge on each roof slope where panels/ and modules are located.

Exception: This requirement shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) or less.

605.11.3.2.34 Residential buildings with roofs with hips and valleys. Panels/ and modules installed on ~~residential buildings one- and two-family dwellings~~ with roof hips and valleys shall be located no closer than 18 inches (457 mm) to a hip or a valley where panels/modules are to be placed on both sides of a hip or valley. Where panels are to be located on only one side of a hip or valley that is of equal length, the panels shall be permitted to be placed directly adjacent to the hip or valley.

Exception: These requirements shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) or less.

605.11.3.2.45 Residential building Allowance for smoke ventilation operations. Panels/ and modules installed on ~~residential buildings one- and two-family dwellings~~ shall be located no higher-less than 3 feet (914 mm) ~~below from~~ the ridge in order to allow for fire department smoke ventilation operations.

Exception: Panels and modules shall be permitted to be located up to the roof ridge where an alternative ventilation method approved by the fire chief has been provided or where the fire chief has determined vertical ventilation techniques will not be employed.

605.11.3.3 Other than residential buildings one- and two-family dwellings. Access to systems for occupancies other than one- and two-family dwellings shall be provided in accordance with Sections 605.11.3.3.1 through 605.11.3.3.3.

Exception: Where it is determined by the fire code official that the roof configuration is similar to that of a one- or two-family dwelling, the residential access and ventilation requirements in Sections 605.11.3.2.1 through 605.11.3.2.4 shall be permitted to be used.

605.11.3.3.1 Access. There shall be a minimum 6-foot-wide (1829 mm) clear perimeter around the edges of the roof.

Exception: Where either axis of the building is 250 feet (76 200 mm) or less, ~~there the clear perimeter around the edges of the roof shall be permitted to be reduced to a minimum 4-foot-wide (1290 mm) clear perimeter around the edges of the roof.~~

Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

This proposal is primarily an editorial clarification to Section 605.11.3. There is only one section which contains new text, it is Section 605.11.3.2.1. The sections and their revisions are noted below:

- | | |
|-----------------|---|
| 605.11 Exc: | This exception eliminates all requirements for solar PV systems located on Group U structures. This exception inadvertently eliminates the requirements for listing of components, marking and location of disconnects. This exception is relocated to Section 605.11.3 so that it only eliminates the requirements for access and pathways which will then retain the listing and marking requirements. |
| 605.11.3 Exc 1: | This exception is actually a requirement; it is not an exception. Therefore, the exception is deleted and the text has been relocated to Section 605.11.3.2.1. |
| 605.11.3 Exc 2: | This is an exception based on the need for the ability to vertically ventilate smoke through the roof. Section 605.11.3.2.5 (renumbered from 605.11.3.2.4) deals with smoke ventilation. The exception is intended to apply to a specific set of requirements regarding smoke ventilation. If the exception is left in this section, it exempts these systems from all of the requirements in this entire section. Therefore this exception has been relocated to Section 605.11.3.2.5. |
| 605.11.3.2: | The title of this section is revised to correlate with the text of the section. The text only applies to one- and two-family dwellings so the term "residential" is removed from the title. |

Also, the section is revised by deleting the reference to 'access' since the subsections deal with more than access, and additional access requirements are found in 605.11.3.1.

605.11.3.2.1: This section originates from 605.11.3 Exception 1. It is relocated to the section which applies to dwellings and is inserted as a requirement.

Additionally, the 2nd sentence is added as a new requirement. The current requirements limit the size of each PV array but provide no guidance as to the required separation between multiple PV arrays. This requirement fills that void by requiring a 3

foot separation between PV arrays. The 3 foot distance is the same spacing requirement found around PV arrays to the edge of roof or to the ridge of the roof, and provides for access around the arrays.

- 605.11.3.2.2: Renumbered from 605.11.3.2.1. The text is revised to correlate with the previous sections regarding one- and two-family dwellings.
- 605.11.3.2.3: Renumbered from 605.11.3.2.2. The text is revised to correlate with the previous sections regarding one- and two-family dwellings.
- 605.11.3.2.4: Renumbered from 605.11.3.2.3. The text is revised to correlate with the previous sections regarding one- and two-family dwellings.
- 605.11.3.2.5: Renumbered from 605.11.3.2.4. The text is revised to correlate with the previous sections regarding one- and two-family dwellings.

Additionally, the exception is added which was previously located in Section 605.11.3. This exception is based on the need for the ability to vertically ventilate smoke through the roof, and Section 605.11.3.2.5 deals with smoke ventilation.

- 605.11.3.3: The text is revised to correlate with the previous revisions regarding one- and two-family dwellings.
- 605.11.3.3.1: This exception is reworded into an actual exception which states that the required clearance is allowed to be reduced to 4', rather than requiring a clearance of 4'.

Cost Impact: This code change will not increase the cost of construction

F62-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

605.11 #2-F-ZUBIA-FCAC

F63 – 13

605.11, 605.11.5 (New)

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

605.11 Solar photovoltaic power systems. Solar photovoltaic power systems shall be installed in accordance with Sections 605.11.1 through ~~604.11.4~~ 605.11.5, the International Building Code and NFPA 70.

Exception: ~~Detached, nonhabitable Group U structures including, but not limited to, parking shade structures, carports, solar trellises and similar structures shall not be subject to the requirements of this Section.~~

605.11.5 Group U structures. Solar photovoltaic arrays on detached, nonhabitable Group U structures including, but not limited to, parking shade structures, carports, solar trellises and similar structures shall comply with Sections 605.11 through 605.11.2 and this section. Photovoltaic power systems on ground mounted structures shall also comply with 605.11.4.

Reason: As written the code exempts photovoltaic arrays located on detached canopies and similar structures from complying with the IBC, NFPA 70 and the important emergency responder marking requirements in Sections 605.11.1 and 605.11.2. This proposal requires these arrays to comply with these basic safety requirements, but not the access and pathway requirements in Section 605.11.3. If the group U structure is ground based it is required to also comply with the section 605.11.4 ten foot clear space requirements.

For consistency, the language chosen for this new section is similar to the wording in section 605.11.4.

Cost Impact: A cost increase will be associated with compliance with these requirements when solar PV arrays are installed on Group U occupancies

F63-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

605.11 #1-F-ZUBIA-FCAC

F64 – 13

605.11.1, 605.11.2

Proponent: Steve Thomas, Colorado Code Consulting, LLC representing self
(sthomas@coloradocode.net)

Revise as follows:

605.11.1 Marking. ~~Marking is required on interior and exterior direct current (DC) conduit, enclosures, raceways, cable assemblies, junction boxes, combiner boxes and disconnects.~~

605.11.1.1 Materials. ~~The materials used for marking shall be reflective, weather resistant and suitable for the environment. Marking as required in Sections 605.11.1.2 through 605.11.1.4 shall have all letters capitalized with a minimum height of 3/8 inch (9.5 mm) white on red background.~~

605.11.1.2 Marking content. ~~The marking shall contain the words "WARNING: PHOTOVOLTAIC POWER SOURCE."~~

605.11.1.3 Main service disconnect. ~~The marking shall be placed adjacent to the main service disconnect in a location clearly visible from the location where the disconnect is operated.~~

605.11.1.4 Location of marking. ~~Marking shall be placed on interior and exterior DC conduit, raceways, enclosures and cable assemblies every 10 feet (3048 mm), within 1 foot (305 mm) of turns or bends and within 1 foot (305 mm) above and below penetrations of roof/ceiling assemblies, walls or barriers.~~

605.11.2 Locations of DC conductors. ~~Conduit, wiring systems, and raceways for photovoltaic circuits shall be located as close as possible to the ridge or hip or valley and from the hip or valley as directly as possible to an outside wall to reduce trip hazards and maximize ventilation opportunities. Conduit runs between sub arrays and to DC combiner boxes shall be installed in a manner that minimizes the total amount of conduit on the roof by taking the shortest path from the array to the DC combiner box. The DC combiner boxes shall be located such that conduit runs are minimized in the pathways between arrays. DC wiring shall be installed in metallic conduit or raceways when located within enclosed spaces in a building. Conduit shall run along the bottom of load bearing members.~~

Reason: The language in these sections relate to the installation of the electrical system for photovoltaic systems. They do not belong in the fire code. The language in this section is similar to that of the NEC. They are already included in the National Electrical Code (NEC), NFPA 70 Article 690.31. The NEC is already referenced in Chapter 27 of the IBC. It states "Electrical components, equipment and systems shall be designed and constructed in accordance with the provisions of NFPA 70". Section 102.4 of the IFC states that the design and construction of buildings shall comply with the IBC. Therefore, the requirements are duplicative and are not needed in the IFC. By having similar requirements in two different codes, there is a great potential for conflicts.

It is my understanding that the original proponent of this section intended to remove the requirements after the NEC adopted requirements for PV electrical installations. They have made those additions and therefore they should be removed from the IFC.

In addition, the ICC decided many years ago to not include electrical installation requirements in any of its codes. We should maintain this position in the fire code as well.

Cost Impact: This change will not affect the cost of construction.

F64-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

605.11.1-F-THOMAS

F65 – 13

605.11.1.2

Proponent: John Smirnow and Joseph H. Cain P.E. representing Solar Energy Industries Association (SEIA) (JSmirnow@seia.org)

Revise as follows:

605.11.1.2 Marking content. The marking shall contain the words "~~WARNING:~~ PHOTOVOLTAIC POWER SOURCE."

Reason: This code change proposal is the result of a consensus process established by the Solar Energy Industries Association's (SEIA) Codes and Standards Working Group. Established in 1974, SEIA is the national trade association of the U.S. solar energy industry. As the voice of the industry, SEIA works with its member companies to make solar a mainstream and significant energy source by expanding markets, removing market barriers, strengthening the industry, and educating the public on the benefits of solar energy.

This proposal will create consistency with NEC. Consistent prescribed language for labels will eliminate a conflict where multiple labels must be printed for the same purpose.

Cost Impact: This proposal will reduce construction costs by not having to have two different labels on equipment.

F65-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

605.11.1.2-F-CAIN-SMIRNOW

F66 – 13

605.11.2

Proponent: Dennis Grubb, Orange County Fire Authority, Representing the California Fire Chiefs Association; Kevin Reinertson, Division Chief, Representing the California State Fire Marshal's Office (adria.paesani@fountainvalley.org)

Revise as follows:

605.11.2 Locations of DC conductors. Conduit, wiring systems, and raceways for photovoltaic circuits shall be located as close as possible to the ridge or hip or valley and from the hip or valley as directly as possible to an outside wall to reduce trip hazards and maximize ventilation opportunities. Conduit runs between sub arrays and to DC combiner boxes shall be installed in a manner that minimizes the total amount of conduit on the roof by taking the shortest path from the array to the DC combiner box. The DC combiner boxes shall be located such that conduit runs are minimized in the pathways between arrays. DC wiring shall be installed in metallic conduit or raceways when located within enclosed spaces in a building. Conduit shall run along the bottom of and parallel with load bearing members.

Exception: Where it is not practical to run conduit along the bottom of or parallel with load bearing members, the conduit shall be installed a minimum of 10 inches below the roof as measured from the interior side of the roof sheathing.

Reason: The intent of 2012 International Fire Code, Section 605.11.3 for DC runs in a building is to allow firefighters to ventilate a structure without the inadvertently cutting through a live DC line and being electrocuted. Firefighters are trained not to cut through structural members so running the conduit below these members would preclude the DC line being cut. The current language does not specify the direction the DC line must follow. Running the DC line perpendicular to, but runs along the bottom of the load bearing members can easily be interpreted as code compliant. Adding "and parallel with" clearly defines what the intent of the code section is.

There are many PV system configurations when in is not practical to run the DC line directly below load bearing members. Although firefighting ventilation techniques vary slightly across the country, keeping the DC line 10 inches below the roof creates a safety zone for the chain saw to operate without compromising firefighter safety while providing flexibility in the installation.

Cost Impact: This proposal will not increase the cost of construction.

F66-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

605.11.2-F-GRUBB

F67 – 13

605.11.2

Proponent: John Smirnow and Joseph H. Cain P.E. representing Solar Energy Industries Association (SEIA) (JSmirnow@seia.org)

Revise as follows:

605.11.2 Locations of DC conductors. Conduit, wiring systems, and raceways for photovoltaic circuits shall be located as close as possible to the ridge or hip or valley and from the hip or valley as directly as possible to an outside wall to reduce trip hazards and maximize ventilation opportunities. Conduit runs between sub arrays and to DC combiner boxes shall be installed in a manner that minimizes the total amount of conduit on the roof by taking the shortest path from the array to the DC combiner box. The DC combiner boxes shall be located such that conduit runs are minimized in the pathways between arrays. DC wiring shall be installed in metallic conduit or raceways when located within enclosed spaces in a building. ~~Conduit shall run along the bottom of load bearing members.~~ Placement of conduit shall be in accordance with NFPA 70.

Reason: This code change proposal is the result of a consensus process established by the Solar Energy Industries Association's (SEIA) Codes and Standards Working Group. Established in 1974, SEIA is the national trade association of the U.S. solar energy industry. As the voice of the industry, SEIA works with its member companies to make solar a mainstream and significant energy source by expanding markets, removing market barriers, strengthening the industry, and educating the public on the benefits of solar energy.

NFPA 70 provides requirements for placement of conduit beneath roof surfaces, for protection of fire fighters. The requirements of NFPA 70 are more specific, and should govern the installation by reference. The NEC recognized roof ventilation techniques will not be used in the portions of roof covered by PV panels.

2011 NEC 690.31(E)(1) Beneath Roofs. Wiring methods shall not be installed within 25 cm (10 in.) of the roof decking or sheathing except where directly below the roof surface covered by PV modules and associated equipment. Circuits shall be run perpendicular to the roof penetration point to supports a minimum of 25 cm (10 in.) below the roof decking.

Cost Impact: There is no cost impact with this proposal.

F67-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

605.11.2-F-CAIN-SMIRNOW

F68 – 13

605.11.3, 605.11.3.2.5 (New)

Proponent: John Smirnow and Joseph H. Cain P.E. representing Solar Energy Industries Association (SEIA) (JSmirnow@seia.org)

Revise as follows:

605.11.3 Access and pathways. Roof access, pathways, and spacing requirements shall be provided in accordance with Sections 605.11.3.1 through 605.11.3.3.3.

Exceptions:

1. ~~Residential structures shall be designed so that each photovoltaic array is no greater than 150 feet (45 720 mm) by 150 feet (45 720 mm) in either axis.~~
2. Panels/modules shall be permitted to be located up to the roof ridge where an alternative ventilation method approved by the fire chief has been provided or where the fire chief has determined vertical ventilation techniques will not be employed.

605.11.3.2.5 Pathways. Residential structures shall be designed so that each photovoltaic array is not greater than 150 feet (45 720 mm) by 150 feet (45 720 mm) in either axis.

Reason: This code change proposal is the result of a consensus process established by the Solar Energy Industries Association's (SEIA) Codes and Standards Working Group. Established in 1974, SEIA is the national trade association of the U.S. solar energy industry. As the voice of the industry, SEIA works with its member companies to make solar a mainstream and significant energy source by expanding markets, removing market barriers, strengthening the industry, and educating the public on the benefits of solar energy.

The exception is not written correctly. It is written as a code requirement. We have relocated it to a more appropriate section by adding it to the residential occupancy section.

Cost Impact: No cost impact

F68-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

605.11.3 #1-F-CAIN-SMIRNOW

F69 – 13

605.11.3

Proponent: John Smirnow and Joseph H. Cain P.E. representing Solar Energy Industries Association (SEIA) (JSmirnow@seia.org)

Revise as follows:

605.11.3 Access and pathways. Roof access, pathways, and spacing requirements shall be provided in accordance with Sections 605.11.3.1 through 605.11.3.3.3.

Exceptions:

1. Residential structures shall be designed so that each photovoltaic array is no greater than 150 feet (45 720 mm) by 150 feet (45 720 mm) in either axis.
2. ~~Panels/modules shall be permitted to be located up to the roof ridge~~ Roof access, pathways, and spacing requirements need not be provided where an alternative ventilation method approved by the fire chief has been provided or where the fire chief has determined vertical ventilation techniques will not be employed.

Reason: This code change proposal is the result of a consensus process established by the Solar Energy Industries Association's (SEIA) Codes and Standards Working Group. Established in 1974, SEIA is the national trade association of the U.S. solar energy industry. As the voice of the industry, SEIA works with its member companies to make solar a mainstream and significant energy source by expanding markets, removing market barriers, strengthening the industry, and educating the public on the benefits of solar energy.

This proposal provides better language to address roof access for firefighters. The language is consistent with the charging statement. Different fire agencies have different ways to ventilate roof systems. If a fire department has a policy of not accessing roofs, the requirements for roof access are not necessary. This only applies in those cases. Where departments have a policy of accessing roofs, they will still be able to require the access pathways and spacing requirements.

Cost Impact: No cost impact

F69-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

605.11.3 #2-F-CAIN-SMIRNOW

F70 – 13

605.11.3, 605.11.3.2.4

Proponent: John Smirnow and Joseph H. Cain P.E. representing Solar Energy Industries Association (SEIA) (JSmirnow@seia.org)

Revise as follows:

605.11.3 Access and pathways. Roof access, pathways, and spacing requirements shall be provided in accordance with Sections 605.11.3.1 through 605.11.3.3.3.

Exceptions:

- 4- Residential structures shall be designed so that each photovoltaic array is no greater than 150 feet (45 720 mm) by 150 feet (45 720 mm) in either axis.
- 2- ~~Panels/modules shall be permitted to be located up to the roof ridge where an alternative ventilation method approved by the fire chief has been provided or where the fire chief has determined vertical ventilation techniques will not be employed.~~

605.11.3.2.4 Residential building smoke ventilation. Panels/modules installed on residential buildings shall be located no higher than 3 feet (914 mm) below the ridge in order to allow for fire department smoke ventilation operations.

Exception: Panels/modules shall be permitted to be located up to the roof ridge where an alternative ventilation method approved by the fire chief has been provided or where the fire chief has determined that vertical ventilation techniques will not be employed.

Reason: This code change proposal is the result of a consensus process established by the Solar Energy Industries Association's (SEIA) Codes and Standards Working Group. Established in 1974, SEIA is the national trade association of the U.S. solar energy industry. As the voice of the industry, SEIA works with its member companies to make solar a mainstream and significant energy source by expanding markets, removing market barriers, strengthening the industry, and educating the public on the benefits of solar energy.

This proposal relocates the exception for alternative ventilation methods to a more appropriate section. Section 605.11.3.2.4 is the section that requires the panels to be located 3 feet below the ridge. Therefore, it is a better location for the exception. It is a more specific exception to the placement of panels to the ridge.

Cost Impact: No cost impact

F70-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

605.11.3 #3-F-CAIN-SMIRNOW

F71 – 13

605.11.3.2

Proponent: Jennifer G. Gallegos, Development Services Department, City of San Antonio, TX, representing Self

Revise as follows:

605.11.3.2 Residential Systems for ~~one- and two-family~~ family dwellings Group R buildings.

Access to residential systems for ~~one- and two-family dwellings~~ Group R buildings shall be provided in accordance with Sections 605.11.3.2.1 through 605.11.3.2.4.

Reason: After discussions with ICC Staff, the referenced code change corrects the intent of the application of pathways to Group R buildings regulated by the International Building Code (IBC). The code proponent did not mention Group R buildings regulated by the International Residential Code (IRC) in his code change proposal or rationale. The current language has caused confusion for jurisdictions and customers as they believe that the code change applies to Group R buildings regulated by the IRC. This has place an undue hardship on Group R buildings regulated by the IRC and homeowners who now are required to comply with these provisions. The Significant Changes to the IFC 2012 Edition also states:

The provisions of Section 605.11.3 address the placement of PV arrays on building roofs. These requirements apply to buildings regulated by the IBC, including Group R-3 uses; they do not apply to buildings regulated by the International Residential Code for One- and Two-Family Dwellings (IRC).

Cost Impact: This will increase not increase the cost of construction as this code change is for clarification purposes only.

F71-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

605.11.3.2-F-GALLEGOS

F72 – 13

605.11.3.2, 605.11.3.3

Proponent: Tim Pate, City and County of Broomfield, CO, representing Colorado Chapter Code Change Committee

Revise as follows:

605.11.3.2 Residential systems for one- and two-family dwellings. Access to residential systems for ~~one- and two-family dwellings~~ shall be provided in accordance with Sections 605.11.3.2.1 through 605.11.3.2.4.

605.11.3.3 Other than residential buildings. Access to systems for occupancies other than ~~one- and two-family dwellings~~ residential shall be provided in accordance with Sections 605.11.3.3.1 through 605.11.3.3.3.

Exception: Where it is determined by the *fire code official* that the roof configuration is similar to that of a residential occupancy one- or two-family dwelling, the residential access and ventilation requirements in Sections 605.11.3.2.1 through 605.11.3.2.4 shall be permitted to be used.

Reason: This code change proposal will add specific language that will clarify that these new provisions for access to PV systems only apply to structures built under the IBC and not under the IRC. The new language will differentiate between residential and non residential occupancies. Residential occupancies could include an R-3 single family if being built under the IBC but would typically include multifamily residential. The proponent of this code change did not intend to make these provisions apply to IRC structures and even the book published by ICC for significant changes to the IFC says this is not to apply to IRC structures. I have already seen some confusion by Fire Departments and Fire Districts with the language “one and two family dwellings” and if it should apply to IRC structures. This added language will help clear up this confusion.

Cost Impact: Will not increase cost of construction

F72-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

605.11.3.2-F-PATE

F73 – 13

605.11.3.2.1, 605.11.3.3.2

Proponent: Steve Orlowski, representing National Association of Home Builders (NAHB)
(sorlowski@nahb.org)

Revise as follows:

605.11.3.2.1 Residential buildings with hip roof layouts. Panels/modules installed on residential buildings with hip roof layouts shall be located in a manner that provides a 3-foot-wide (914 mm) clear access pathway from the eave to the ridge on each roof slope where panels/modules are located. The access pathway shall be located at a ~~structurally strong~~ location on the building capable of supporting the live load of fire fighters accessing the roof.

Exception: These requirements shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) or less.

605.11.3.3.2 Pathways. The solar installation shall be designed to provide designated pathways. The pathways shall meet the following requirements:

1. The pathway shall be over areas capable of supporting ~~the live load of~~ fire fighters accessing the roof.
2. The centerline axis pathways shall be provided in both axes of the roof. Centerline axis pathways shall run where the roof structure is capable of supporting ~~the live load of~~ fire fighters accessing the roof.
3. Shall be a straight line not less than 4 feet (1290 mm) clear to skylights or ventilation hatches.
4. Shall be a straight line not less than 4 feet (1290 mm) clear to roof standpipes.
5. Shall provide not less than 4 feet (1290 mm) clear around roof access hatch with at least one not less than 4 feet (1290 mm) clear pathway to parapet or roof edge.

Reason: Changes proposed in this code proposal are two minor editorial fixes to remove language that is currently in the IFC. The first change is to remove the ambiguous term structurally strong, which is not only redundant it does nothing to provide the user with any new information. Roofs by default must be structurally sound and meet the required engineering design loads. None of the residential or commercial structural design manuals, nor the IRC or the IBC give a calculation value for the live load of a fire fighter, which is why we are proposing to remove this term from the IFC.

Cost Impact: The code change proposal will not increase the cost of construction.

F73-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

605.11.3.2.1-F-ORLOWSKI

F74 – 13

605.11.3.3.2, 605.11.3.3.3

Proponent: John Smirnow and Joseph H. Cain P.E. representing Solar Energy Industries Association (SEIA) (JSmirnow@seia.org)

Revise as follows:

605.11.3.3.2 Pathways. The solar installation shall be designed to provide designated pathways. The pathways shall meet the following requirements:

1. The pathway shall be over areas capable of supporting the live load of firefighters accessing the roof.
2. The centerline axis pathways shall be provided in both axes of the roof. Centerline axis pathways shall run where the roof structure is capable of supporting the live load of fire fighters accessing the roof.
3. Shall be a straight line not less than 4 feet (1290 mm) clear to ~~skylights~~ roof standpipes or ventilation hatches.
- ~~4. Shall be a straight line not less than 4 feet (1290 mm) clear to roof standpipes.~~
- 5 4. Shall provide not less than 4 feet (1290 mm) clear around roof access hatch with at least one not less than 4 feet (1290 mm) clear pathway to parapet or roof edge.

605.11.3.3.3 Smoke ventilation. The solar installation shall be designed to meet the following requirements:

1. Arrays shall be no greater than 150 feet (45 720 mm) by 150 feet (45 720 mm) in distance in either axis in order to create opportunities for fire department smoke ventilation operations.
2. Smoke ventilation options between array sections shall be one of the following:
 - 2.1. A pathway 8 feet (2438 mm) or greater in width.
 - 2.2. A 4-foot (1290 mm) or greater in width pathway and bordering roof skylights or smoke and heat vents on at least one side.
 - 2.3. A 4-foot (1290 mm) or greater in width pathway and bordering 4-foot by 8-foot (1290 mm by 2438 mm) “venting cutouts” every 20 feet (6096 mm) on alternating sides of the pathway.

Reason: This code change proposal is the result of a consensus process established by the Solar Energy Industries Association's (SEIA) Codes and Standards Working Group. Established in 1974, SEIA is the national trade association of the U.S. solar energy industry. As the voice of the industry, SEIA works with its member companies to make solar a mainstream and significant energy source by expanding markets, removing market barriers, strengthening the industry, and educating the public on the benefits of solar energy.

The purpose of pathways in 605.11.3.3.2 is for access for firefighters. Access is necessary for roof standpipes and ventilation hatches. Access to skylights should not have the same level of priority as equipment specifically installed for firefighting operations. Some roofs have skylights every 20 feet whereas ventilation hatches are normally required far less frequently. Buildings with numerous skylights have them primarily for interior lighting, not ventilation opportunities. Section 605.11.3.3.3 allows for the use of skylights for smoke ventilation at the areas between array sections. Removing the reference to skylights in 605.11.3.3.2 clarifies that pathways are not required to every skylight.

Arrays on buildings with few skylights will normally plan for array sections to coincide with the skylights since the skylight areas are already lost mounting space.

Cost Impact: No cost impact

F74-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

605.11.3.3.2-F-CAIN-SMIRNOW

F75 – 13

605.12 (New), 202 (New)

Proponent: Marcelo M Hirschler, GBH International (gbhint@aol.com)

Add new text as follows:

605.12 Abandoned wiring in plenums. Accessible portions of abandoned cables in air handling plenums in Group I occupancies shall be removed. Cables that are unused and have not been tagged for future use shall be considered abandoned.

SECTION 202 GENERAL DEFINITIONS

[M] PLENUM. An enclosed portion of the building structure, other than an occupiable space being conditioned, that is designed to allow air movement, and thereby serve as part of an air distribution system.

Reason: This new section is intended to introduce a concept that has been in the National Electrical Code (as well as in NFPA 90A) for a long time: plenums are intended for a specific use (see definition below), namely to be a part of the air distribution system so as to allow air movement. Plenums are also used (legitimately) for stringing communications and data cables as well as pipes and sprinkler pipes and other similar products. However, in actual fact, it is a common practice not to make the effort to remove products when they become obsolete. Examples include when an updated data system is being installed in the facility (and that typically occurs every 18-24 months). Normally, as the building is being rewired the old wires are cut off the grid but they are left in place and a new wiring system is added on top of them.

The tiles that often support plenums are not intended to support any significant weight and they can, therefore easily be overwhelmed by the added weight of storage or abandoned materials (such as abandoned cables). Recently, Bob Davidson and Sean DeCrane (Plenum Space Fuel Load, NFPA Annual Meeting 2009, M33) did an analysis that showed how the safety of firefighters is compromised by the weight of these abandoned cables. They point out that: "Plenum space fuel loads and wiring issues are a serious concern for fire fighters during interior firefighting operations." Their key recommendation was: "Take out the abandoned wiring!!"

Although the primary reason to recommend the removal of abandoned materials in plenums is weight, fire safety should also be taken into account.

The introduction of a requirement such as the one being proposed here has long been believed not to be enforceable. This is probably true if it were to apply to all occupancies, primarily because fire code inspectors would rarely spend their time looking into plenums in existing buildings. However, the inspection of I occupancies occurs with enough regularity that there should be no significant difficulty in having inspectors identify the existence of abandoned products, especially abandoned cables, classify them as storage and demand their removal.

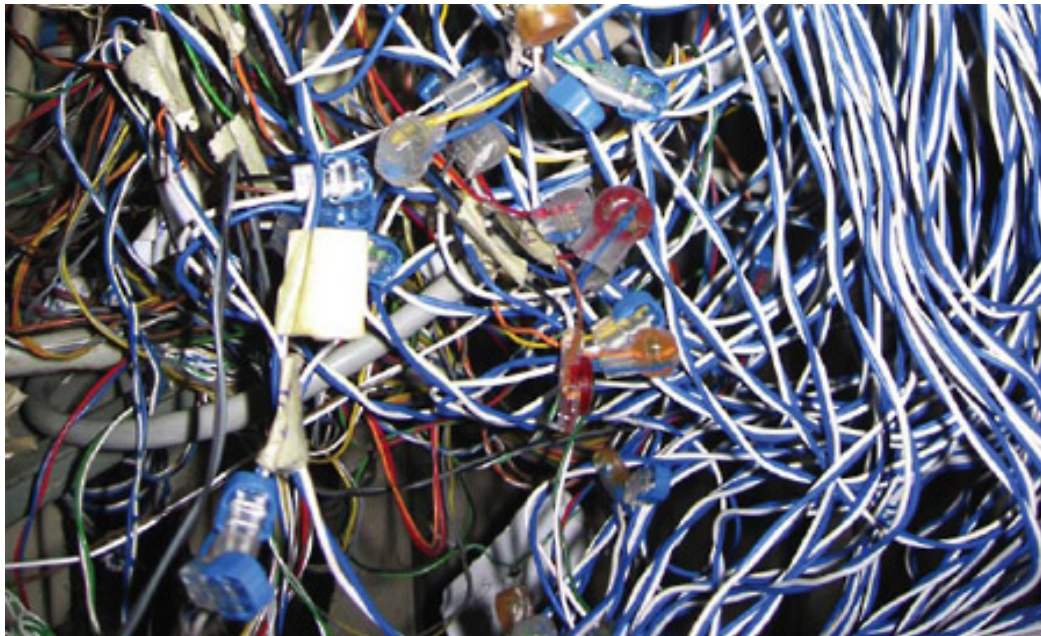
The proposal recommends that only the "accessible portions" of abandoned cables be removed, because there is no intent to cause potential damage to the building or facility by attempting to remove cables or circuits that are strung through walls, floors or other building elements.

A similar, but broader, proposal was made in 2009 and disapproved (F38-09/10) with the following language: "The committee felt that the subject matter is adequately addressed in NFPA 70 where it belongs. The committee was also concerned that the proposal would put the fire code official in the role of being an electrical inspector and that these issues are manageable under the building permit process."

Unfortunately the requirement to remove abandoned cables is not being enforced. This proposal has a much more limited scope than F38-09/10 and would not require the fire code official to act as an electrical inspector because he/she would simply have to ascertain that the cables are not connected to any active circuits and not tagged before requiring their removal.

This issue is particularly suitable for Chapter 6 (and section 605) of the IFC since it addresses electrical equipment, wiring and hazards, which are not necessarily electrical hazards but address other safety issues, such as illumination, temporary wiring and unapproved conditions, compliance with all of which is being inspected by the fire code official.

Photographs of typical wiring in plenums, as found by Davidson and DeCrane, follow:



Cost Impact: Minimal

F75-12

Public Hearing: Committee:
Assembly:

AS
ASF

AM
AMF

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DF

605.12 (NEW)-F-HIRSCHLER

F76 – 13

606.5 (New)

Proponent: Mona Casey, United Parents to Restrict Open Access to Refrigerant, representing the United Parents to Restrict Open Access to Refrigerant

Add new text as follows:

606.5 Access port protection. Refrigerant circuit access ports located outdoors shall be fitted with locking-type, tamper-resistant caps or shall be otherwise secured to prevent unauthorized access.

Exception: Refrigerant circuit access ports on equipment installed in controlled areas such as on roof tops with locked and alarmed access hatches or doors.

(Renumber subsequent sections.)

Reason: The purpose of this code change proposal is to add language to the code for securing refrigerant access ports, which will help reduce injuries and fatalities resulting from unauthorized access to refrigerant. Refrigerants are controlled substances that must be properly protected. The IMC currently has requirements for protection of refrigerant ports. This will add the requirements to the IFC to be consistent with the IMC. It will also provide the fire official with proper code language to enforce the requirement.

Cost Impact: The code change proposal will increase the cost of construction.

Analysis: Proposed Section 606.5 (without the exception) is identical to IMC Section 1101.10.

F76-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

606.5 (NEW)-F-CASEY.doc

F77 – 13

606.9.2 (IMC [F] 1106.5.2)

Proponent: Jeffrey M. Shapiro, International Institute of Ammonia Refrigeration
(jeff.shapiro@intlcodeconsultants.com)

Revise as follows:

606.9.2 (IMC [F] 1106.5.2) Ventilation system. A clearly identified switch of the break-glass type or with an approved tamper resistant cover shall provide on-only control of the *machinery room* ventilation fans.

Reason: Correlation with Section 606.9.1 (IMC [F]1106.5.1), which also permits a tamper resistant covered switch in lieu of a break glass type.

Cost Impact: The code change proposal will not increase the cost of construction.

F77-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

606.9.2-F-SHAPIRO

F78 – 13

606.10

Proponent: Jeffrey M. Shapiro, International Institute of Ammonia Refrigeration
(jeff.shapiro@intlcodeconsultants.com)

Revise as follows:

606.10 Emergency pressure control system. Permanently installed rRefrigeration systems containing more than 6.6 pounds (3 kg) of flammable, toxic or highly toxic refrigerant or ammonia shall be provided with an emergency pressure control system in accordance with Sections 606.10.1 and 606.10.2.

Reason: When the provisions for emergency pressure control systems were added to the code, they were provided as an alternative to manual emergency control boxes, which were previously required by some legacy codes. The emergency control box provisions didn't apply to portable refrigeration equipment, such as agricultural cooling trailers used in fields and at processing facilities, and it was never intended that emergency pressure control systems be applied to portable equipment either. Nevertheless, the current code text doesn't provide an exclusion for portable equipment, and lacking that exclusion, the intent of the code is currently unclear. The proposed revision fixes the oversight.

Cost Impact: The code change proposal will not increase the cost of construction.

F78-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

606.10-F-SHAPIO

F79 – 13

606.12

Proponent: Jeffrey M. Shapiro, International Institute of Ammonia Refrigeration

Revise as follows:

606.12 Discharge and termination of pressure relief devices and purge systems. Pressure relief devices, fusible plugs and purge systems discharging to the atmosphere from ~~for~~ refrigeration systems containing ~~more than 6.6 pounds (3 kg) of~~ flammable, toxic or highly toxic refrigerants or ammonia shall be provided with an approved discharge system as required by comply with Sections ~~606.12.1 606.12.2, 606.12.2 606.12.3 and 606.12.3 606.12.4.~~

606.12.1 Fusible plugs and rupture members. Discharge piping and devices connected to the discharge side of a fusible plug or rupture member shall have provisions to prevent plugging the pipe in the event of the fusible plug or rupture member functions.

~~606.12.1 606.12.2~~ **Flammable refrigerants.** Systems containing more than 6.6 pounds (3 kg) of flammable refrigerants having a density equal to or greater than the density of air shall discharge vapor to the atmosphere only through an *approved* treatment system in accordance with Section 606.12.54 or a flaring system in accordance with Section ~~606.12.5 606.12.6.~~ Systems containing more than 6.6 pounds (3 kg) of flammable refrigerants having a density less than the density of air shall be permitted to discharge vapor to the atmosphere provided that the point of discharge is located outside of the structure at not less than 15 feet (4572 mm) above the adjoining grade level and not less than 20 feet (6096 mm) from any window, ventilation opening or *exit*.

~~606.12.2 606.12.3~~ **Toxic and highly toxic refrigerants.** Systems containing more than 6.6 pounds (3 kg) of toxic or highly toxic refrigerants shall discharge vapor to the atmosphere only through an *approved* treatment system in accordance with Section ~~606.12.4 606.12.5~~ or a flaring system in accordance with Section ~~606.12.5 606.12.6.~~

~~606.12.3 606.12.4~~ **Ammonia refrigerant.** Systems containing more than 6.6 pounds (3 kg) of ammonia refrigerant shall discharge vapor to the atmosphere through an *approved* treatment system in accordance with Section ~~606.12.4 606.12.5~~, a flaring system in accordance with Section ~~606.12.5 606.12.6~~, or through an *approved* ammonia diffusion system in accordance with Section ~~606.12.6 606.12.7~~, or by other *approved* means.

Exceptions:

1. Ammonia/water absorption systems containing less than 22 pounds (10 kg) of ammonia and for which the ammonia circuit is located entirely outdoors.
2. When the *fire code official* determines, on review of an engineering analysis prepared in accordance with Section 104.7.2, that a fire, health or environmental hazard would not result from discharging ammonia directly to the atmosphere.

(Renumber subsequent sections)

Reason: The revisions accomplish an editorial cleanup of Section 606.12 and subordinate sections. No technical changes are intended. Section 606.12 has been revised to simply be a charging paragraph for the entire section. The requirements for individual refrigerant classes are now fully contained in the subordinate sections for each class, including the 6.6 pound threshold. The title of 606.12 has been expanded to make it clear that the content of existing section is not limited to termination of vents. This is because the existing section also covers purging, and the second sentence of 606.12 is not related to vent termination. That sentence has been separated into its own subsection, which is not restricted by refrigerant classification, because it applies to fusible plugs and rupture members for ALL refrigeration systems (this is consistent with ASHRAE 15, Section 9.7.8). The addition of "discharging to atmosphere" in Section 606.12 is consistent with the existing text in the sections governing flammable and toxic/highly toxic refrigerants and ammonia. Each of these sections contains a similar phrase, and this has been duplicated into Section 606.12 to make it clear that restrictions on vent termination do not and never have applied to relief arrangements that are internal to a system (i.e. not routed to atmosphere).

Cost Impact: The code change proposal will not increase the cost of construction.

F79-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

606.12-F-SHAPIO

F80 – 13

606.12.1 (New), Chapter 80

Proponent: Jeffrey M. Shapiro, International Institute of Ammonia Refrigeration
(jeff.shapiro@intlcodeconsultants.com)

Revise as follows:

606.12.1 Standards. Refrigeration systems and the buildings in which such systems are installed shall be in accordance with ASHRAE 15.

606.12.1.1 Ammonia Refrigeration. Refrigeration systems using ammonia refrigerant and the buildings in which such systems are installed shall comply with the following standards:

1. IIAR-2 for system design and installation
2. IIAR-6 for maintenance and inspection
3. IIAR-7 for operating procedures
4. IIAR-8 for decommissioning.

Add standards to Chapter 80 as follows:

IIAR

International Institute of Ammonia Refrigeration
1001 N. Fairfax Street, Suite 503
Alexandria, VA 22314

IIAR-2-2014 *Equipment, Design, and Installation of Closed-Circuit Ammonia Mechanical Refrigerating Systems*

IIAR-6-2014 *Maintenance and Inspection of Closed-Circuit Ammonia Mechanical Refrigerating Systems*

IIAR-7-2013 *Developing Operating Procedures for Closed-Circuit Ammonia Mechanical Refrigerating*

IIAR-8-2014 *Decommissioning of Closed- Circuit Ammonia Mechanical Refrigerating Systems*

Reason: The International Institute of Ammonia Refrigeration is completing a suite of standards to prescribe regulations for the safe design, installation, operation, maintenance, inspection and decommissioning of ammonia refrigeration systems. All of these documents will be ANSI standards. As the leading organization representing the interests of the ammonia refrigeration industry, IIAR believes that it is essential for facilities with ammonia refrigeration systems to follow the requirements in these standards, which are being written as enforceable documents, as a basis of providing for the safety of the these facilities as well as surrounding communities.

With the exception of IIAR-2, the remaining standards are at various stages of completion with respect to the ANSI process, and it is anticipated that all will be completed prior to conclusion of the 2013 ICC code cycle.

Note that IIAR-2 is already adopted by the IMC, and it is being proposed for adoption by the IFC as well because the standard includes requirements governing refrigerant leak detection alarms and other topics scoped to the IFC.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standards proposed for inclusion in the code, IIAR-6, -7 and -8, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013. IIAR-2-99 with 2005 addendum is currently referenced in the IMC. An update in the year edition of that standard will be accomplished by an administrative standards update code change to be heard by the ADM Code Development Committee.

F80-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

606.12.1 (NEW)-F-SHAPIRO

F81 – 13

606.12.3

Proponent: Jeffrey M. Shapiro, International Institute of Ammonia Refrigeration
(jeff.shapiro@intlcodeconsultants.com)

Revise as follows:

606.12.3 Ammonia refrigerant. Systems containing more than 6.6 pounds (3 kg) of ammonia refrigerant shall discharge vapor to the atmosphere in accordance with one of the following methods: ~~through an approved treatment system in accordance with Section 606.12.4, a flaring system in accordance with Section 606.12.5, or through an approved ammonia diffusion system in accordance with Section 606.12.6, or by other approved means.~~

Exceptions: 4- Ammonia/water absorption systems containing less than 22 pounds (10 kg) of ammonia and for which the ammonia circuit is located entirely outdoors.

- ~~1.2-Directly to atmosphere~~ When the fire code official determines, on review of an engineering analysis prepared in accordance with Section 104.7.2, that a fire, health or environmental hazard would not result from atmospheric dischargeing of ammonia directly to the atmosphere
2. Through an approved treatment system in accordance with Section 606.12.4
3. Through a flaring system in accordance with Section 606.12.5
4. Through an approved ammonia diffusion system in accordance with Section 606.12.6
5. By other approved means.

Reason: Exception 2 in the current text isn't really an exception. It's just another discharge option in addition to the four that are listed in the current base paragraph. The proposed revision restructures the existing text to make this clear, and it duplicates the 6.6 pound threshold currently provided in the parent paragraph (606.12) for clarity. No technical change is intended.

Cost Impact: The code change proposal will not increase the cost of construction.

F81-13

Public Hearing: Committee:	AS	AM	D
Assembly:	ASF	AMF	DF

606.12.3-F-SHAPIRO

F82 – 13

607.4 (New)

Proponent: Brian Black, BDBlack Codes, Inc., representing National Elevator Industry Inc.
(bdbblack@neii.org)

Add new text as follows:

607.4 Occupant evacuation elevator lobbies. Where occupant evacuation elevators are provided in accordance with Section 3008 of the *International Building Code*, occupant evacuation elevator lobbies shall be maintained free of storage and furniture.

[Renumber subsequent sections]

Reason: The proposed text replicates an identical requirement in Section 607.3 for fire service access elevators. It is just as important for occupant evacuation elevator lobbies to be maintained free of storage and furniture if the elevators are to be available and safe for building occupants to use this system to evacuate the building in case of fire.

Cost Impact: The code change proposal will not increase the cost of construction.

F82-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

607.4 (NEW) #1-F-BLACK

F83 – 13

607.4 (New)

Proponent: Brian Black, BDBlack Codes, Inc., representing National Elevator Industry Inc.
(bdbblack@neii.org)

Add new text as follows:

607.4 Water protection of hoistway enclosures. Methods to prevent water from infiltrating into a hoistway enclosure required by Section 3007.4 and Section 3008.4 of the *International Building Code* shall be maintained.

[Renumber subsequent sections]

Reason: The referenced sections of the International Building Code provide performance criteria to ensure that water from the operation of an automatic sprinkler system outside of an enclosed fire service access or occupant evacuation elevator lobby does not enter the hoistway and compromise the function of the elevator. Drains in the lobbies or drainage trenches at the hoistway door openings are two of many ways these requirements can be met. As drain openings are subject to clogging by dirt and debris, it is important that the integrity of these systems be maintained if the elevators are to remain function in case of a fire.

Cost Impact: The code change proposal will not increase the cost of construction.

F83-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

607.4 (NEW) #2-F-BLACK

F84 – 13

607.5, 607.5.1, 607.5.2, 607.5.3

Proponent: Brian Black, BDBlack Codes, Inc., representing National Elevator Industry Inc. (bdbblack@neii.org)

Revise as follows:

607.5 Standardized fire service elevator keys. Buildings with elevators equipped with Phase I emergency recall, Phase II emergency in-car operation, or a fire service access elevator shall be equipped to operate with a standardized fire service elevator key ~~approved by the fire code official complying with ASME A17.1/CSA B44.~~

Exception: ~~The owner shall be permitted to place the building's nonstandardized fire service elevator keys in a key box installed in accordance with Section 506.1.2.~~

607.5.1 Requirements for standardized fire service elevator keys. ~~Standardized fire service elevator keys shall comply with all of the following:~~

- ~~1. All fire service elevator keys within the jurisdiction shall be uniform and specific for the jurisdiction. Keys shall be cut to a uniform key code.~~
- ~~2. Fire service elevator keys shall be of a patent-protected design to prevent unauthorized duplication.~~
- ~~3. Fire service elevator keys shall be factory restricted by the manufacturer to prevent the unauthorized distribution of key blanks. No uncut key blanks shall be permitted to leave the factory.~~
- ~~4. Fire service elevator keys subject to these rules shall be engraved with the words "DO NOT DUPLICATE."~~

607.5.2 Access to standardized fire service keys. ~~Access to standardized fire service elevator keys shall be restricted to the following:~~

- ~~1. Elevator owners or their authorized agents.~~
- ~~2. Elevator contractors.~~
- ~~3. Elevator inspectors of the jurisdiction.~~
- ~~4. Fire code officials of the jurisdiction.~~
- ~~5. The fire department and other emergency response agencies designated by the fire code official.~~

607.5.3 Duplication or distribution of keys. ~~No person shall duplicate a standardized fire service elevator key or issue, give, or sell a duplicated key unless in accordance with this code.~~

607.5.4 Responsibility to provide keys. The building owner shall provide up to three standardized fire service elevator keys where required by the fire code official, upon installation of a standardized fire service key switch or switches in the building.

Reason: The National Elevator Industry Inc. (NEII) agrees with the reason this section was added to the 2012 International Fire Code, that firefighters need a standardized fire service elevator key that is secure and that will work throughout a jurisdiction. However, this is already a requirement in the ASME A17.1/CSA B44 Safety Code for Elevators and Escalators referenced by the International Fire Code:

ASME A17.1-2010/CSA B44-10
SECTION 2.27
EMERGENCY OPERATION AND SIGNALING DEVICES

2.27.8 Switch Keys

The key switches required by 2.27.2 through 2.27.5 for all elevators in a building shall be operable by the FEO-K1 key. The keys shall be Group 3 Security (see 8.1). A separate key shall be provided for each switch. These keys shall be kept on the premises in a location readily accessible to firefighters and emergency personnel, but not where they are available to the public. This key shall be of a tubular, 7 pin, style 137 construction and shall have a biting code of 6143521 starting at the tab sequenced clockwise as viewed from the barrel end of the key. The key shall be coded "FEO-K1." The possession of the "FEO-K1" key shall be limited to elevator personnel, emergency personnel, elevator equipment manufacturers, and authorized personnel during checking of Firefighters' Emergency Operation (see 8.1 and 8.6.11.1).

Where provided, a lock box, including its lock and other components, shall conform to the requirements of UL 1037 (see Part 9).

NOTE (2.27.8): Local authorities may specify additional requirements for a uniform keyed lock box and its location to contain the necessary keys.

Group 3 Security is specified in Section 8.1:

8.1.4 Group 3: Emergency Operation

Group 3 covers access or operation of equipment by emergency, authorized, and elevator personnel.

Simply, this requirement is unnecessary because the need it purports to address is already covered by the code's referenced standard. However, there is a greater problem with having a requirement in the International Fire Code that conflicts with the firefighter key requirements of ASME A17.1/CSA B44.

The proponents of this code provision proposed in the 2012 cycle dismissed the conflict between the IFC and ASME code by claiming that Section 102.7 of the IFC resolves this by stating, "Where differences occur between the provisions of this code and the referenced standards, the provisions of this code apply." This argument may be true for most codes and standards referenced in the I-Codes, but is incorrect in this case.

In many jurisdictions in the United States (e.g., Wisconsin) the building code, fire code and elevator code are enacted by different pieces of legislation and regulated by entirely different state or municipal rules and agencies. Because of this, one department enforces the fire code, another the elevator code, and neither official is obligated or legally able to recognize the requirements of the other. In other words, Section 102.7 of the IFC does not "trump" the laws and rules that adopt and regulate these jurisdictions' elevator codes.

The result is that the State Fire Marshall will require one firefighters' elevator key (the IFC key), the Chief Elevator Inspector will require another (The ASME A17.1 FEO-K1 key), neither will have priority over the other, and the building owner will be continuously in violation of one law or the other.

The other major problem with this new section of the code is that, unlike the demands placed on proponents for most I-Code changes, no evidence was offered to support the need for this change. There was (and is) no evidence that firefighters have been hampered in fighting a building fire because some unauthorized person was using an ASME A17.1 FEO-K1 key at the time. No loss of life or property because some pizza delivery person was able to acquire a firefighter elevator key on the internet (as alleged in the testimony on this code change) and deny elevator use for firefighters or emergency personnel.

Ironically, we found that in Massachusetts the only reported misuses of firefighter keys were by EMTs. EMTs are authorized to be given the special IFC fire key by the existing code text!

A Captain in the Toronto Fire Department who has fought countless high-rise fires in his career dismissed the need for some special fire service elevator key that exceeds the requirements of ASME A17.1/CSA B44 by asking, "What can you do with it? Ride an elevator up and down, up and down until you're bored or sick?" As dismissive as the Captain's statement may be, it demonstrates how unnecessary it is for the IFC to create special requirements for keys that conflict with the ASME requirements that have been in place (and referenced by the IFC and IBC) for years. This code section "solves" a problem that does not exist while creating many more for the Fire Marshall, Elevator Inspector, and building owner.

Cost Impact: The code change proposal will not increase the cost of construction.

F84-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

607.5-F-BLACK

F85 – 13

608.1.1 (New)

Proponent: Ronald Marts, Telcordia, representing AT&T, Verizon, CenturyLink (rmarts@telcordia.com)

Add new text as follows:

608.1.1 Applicability. The requirements in Section 608 shall supersede all the hazardous material designations, permits, and requirements in Chapter 50.

Reason: Chapter 50 does a good job of identifying 14 exceptions to Hazardous Materials. Number 7 is battery systems as regulated in Section 608. Section 608 needs to identify itself as one of those exceptions, thus cross-referencing to Chapter 50.

Many fire and local code officials have insisted that battery systems are hazardous, forcing owners to identify these spaces as Hazardous Uses and imposing restrictions and further requirements on their operations of the space. This in turn increases the expense to the user and incorrectly identifies the space hazards to occupants and emergency responders. The requirements by code officials to obtain a Hazardous Materials Operating Permit and submit Hazardous Materials Inventory Statement, or Hazardous Materials Management Plan are removed by the development and use of this Chapter.

The requirement for the user to report site gross quantities of sulfuric acid in compliance with SARA Title III does not constitute the installation as a hazardous material installation per Section 608 of the code.

Section 608 discusses batteries that are in use, not those batteries that are in storage, such as a warehouse, waiting for shipment to be used.

Section 608 was taken from Article 64 of the UFC, and has been modified over the last few cycles to include new technologies of batteries. Article 64 was written to properly represent the use of Stationary Battery Systems and address specific installation and operational concerns. This early development and adoption was worked out among the Uniform Fire Code (UFC) staff, several regional fire chiefs associations throughout the country, Telcordia and Hughes Associates. Article 64 was accepted during the code hearings in Spokane Washington in August of 1994.

Cost Impact: None.

F85-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

608.1.1 (NEW)-F-MARTS

F86 – 13

608.6.1 (IMC [F] 502.4.1), Chapter 80 (IMC Chapter 15)

Proponent: Ronald Marts, Telcordia, representing AT&T, Verizon, CenturyLink (rmarts@telcordia.com)

Revise as follows:

608.6.1 Room ventilation. Ventilation shall be provided in accordance with the *International Mechanical Code* and the following:

1. (IMC [F] 502.4.1) For flooded lead-acid, flooded Ni-Cad and VRLA batteries, the ventilation system shall be designed to limit the maximum concentration of hydrogen to 1.0 percent of the total volume of the room in accordance with IEEE 1635 / ASHRAE 21; or
2. (IMC [F] 502.4.2) Continuous ventilation shall be provided at a rate of not less than 1 cubic foot per minute per square foot (1 ft³/min/ft²) [0.0051 m³/s × m²] of floor area of the room.

Exception: Lithium-ion and lithium metal polymer batteries shall not require ventilation

Add new standard to Chapter 80 (IMC Chapter 15) as follows:

IEEE

IEEE Operations Center
445 Hoes Lane
Piscataway, NJ 08854-4141 USA
Phone: +1 732 981 0060

IEEE-1635/ASHRAE 21-12 Guide for the Ventilation and Thermal Management of Batteries for Stationary Applications

Reason: The option to ventilate the space based on the designed hydrogen concentration in option 1 is very beneficial to battery users. This typically provides for a lower ventilation rate than option 2, which saves energy, reduces equipment contamination from outdoor sources, and improves equipment reliability and longevity. As noted in the previous submittal, the IEEE 1635 / ASHRAE 21 Guide to Battery Room Ventilation and Thermal Management provides several useful formulae in determining minimum recommended rates of ventilation so not to exceed the 1.0 percent maximum concentration of hydrogen for the room. For spaces containing batteries, the use of this document provides definitive and accurate calculations to meet the criteria of Section 608.6.1.

As noted above, the new Guide was developed by leaders in both the battery community and the ventilation (ASHRAE) community. IEEE Stationary Battery Committee has published over a dozen standards for battery installation, maintenance, and spill concerns for most existing battery technologies. Including a direct reference to the guide in the standard would facilitate safe and efficient ventilation of the battery spaces.

Cost Impact: None.

Analysis: A review of the standard proposed for inclusion in the code, IEEE-1635/ASHRAE 21-12, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013.

F86-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

608.6.1-F-MARTS

F87 – 13

608.6.3 (IMC [F] 502.5.3)

Proponent: Ronald Marts, Telcordia, representing AT&T, Verizon, CenturyLink (rmarts@telcordia.com)

Delete without substitution:

~~**608.6.3 (IMC [F] 502.5.3) Supervision.** Mechanical ventilation systems where required by Sections 608.6.1 and 608.6.2 shall be supervised by an approved central, proprietary or remote station service or shall initiate an audible and visual signal at a constantly attended on-site location.~~

Reason: This requirement was added to the code to assure that ventilation systems operate so as to prevent the buildup of hydrogen gas in the battery room. Experience has shown that the risk of hydrogen buildup in an indoor battery plant installation is extremely low. In normal use, batteries generate little hydrogen gas, and present a very low hydrogen gas hazard. This is noted in manufacturer documentation, proven via testing, and supported by many years of user experience in thousands of locations.

To further detail expected levels of hydrogen and recommended ventilation rates for battery rooms, ASHRAE and IEEE working groups jointly created a new document: IEEE 1635 / ASHRAE 21 Guide to Battery Room Ventilation and Thermal Management. This document focuses primarily on personnel safety hazards from stationary battery plants that can be mitigated through minimal ventilation and thermal management.

IEEE is the world's largest professional association dedicated to advancing technological innovation and excellence for the benefit of humanity. IEEE provides electrical engineering information worldwide via publications, conferences, technology standards, and professional and educational activities.

IEEE has broad industry representation and expertise on stationary battery technologies. IEEE Stationary Battery Committee has published over a dozen standards for battery installation, maintenance, , and spill concerns for most existing battery technologies.

ASHRAE is a building technology society with more than 50,000 members worldwide. The Society and its members focus on building systems, energy efficiency, indoor air quality and sustainability within the industry. Activities include research, standards writing, publishing and continuing education. The mission of ASHRAE is to advance the arts and sciences of heating, ventilating, air conditioning and refrigerating to serve humanity and promote a sustainable world.

Using the formulae in the new guide, it can be shown that it would take months in most normal-sized sealed battery rooms with zero ventilation to reach the lower flammability limit (4% for Hydrogen).

Long before that ever happens, the lack of ventilation would produce a room temperature alarm; thus making the need to independently alarm and monitor the ventilation system unnecessary.

In worst case scenarios, the recommended ventilation levels are very low. The ventilation system does not need to run constantly to achieve the recommended ventilation rate. Excessive ventilation is not desirable as it wastes energy, potentially contributing to global warming and climate change. Alarming an intermittent ventilation system is results in false alarms and c is counterproductive.

Per IEEE 1635 / ASHRAE 21 Guide to Battery Room Ventilation and Thermal Management, remote alarms of mechanical ventilation failure are not required. Furthermore, there is no requirement in the guide for supervision of alarms via a central station. This current Supervision requirement was added to code during the code change hearings in Orlando in the fall of 2006. After lengthy testimony, the committee voted in favor of rejecting the proposed change. The proponent asked for a floor vote, which overturned the committee's rejection by a very small margin. This change was made in response to a widely publicized event that occurred in an unoccupied, non-ventilated installation, where batteries were left on charge for several months after a building was abandoned? The explosion resulted from batteries that were essentially abused and not maintained in accordance with industry practices, and is not reflective of battery safety overall.

Supervision of mechanical ventilation systems for compliance with this requirement is very expensive, complicates installations, and is totally unnecessary given the fire history of stationary battery installations

Cost Impact: This change, if adopted, will save money.

F87-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

608.6.3-F-MARTS

F88 – 13

608.7.1

Proponent: Ronald Marts, Telcordia, representing AT&T, Verizon, CenturyLink (rmarts@telcordia.com)

Revise as follows:

608.7.1 Equipment room and building signage. Doors into electrical equipment rooms or buildings containing stationary battery systems shall be provided with *approved* signs. The signs shall state that:

1. The room contains energized battery systems.
2. The room contains energized electrical circuits.
3. The battery electrolyte solutions, where present, are *corrosive* liquids.

Reason: The existing wording is confusing, as it indicates that if signage is on the outside of the building, that the entire building contains energized batteries and electrical systems, and electrolyte.

The signage is meant to identify that room or space within the building where these systems exist.

Cost Impact: None

F88-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

608.7.1-F-MARTS

F89 – 13

608.7.2 (New)

Proponent: Ronald Marts, Telcordia, representing AT&T, Verizon, CenturyLink (rmarts@telcordia.com)

Add new text as follows:

608.7.2 Specifications. The sign shall be minimum 1/2" block letters in black on a white background.

(Renumber subsequent sections)

Reason: Need to clarify signage requirements. For the sake of first responders, it is prudent to have consistency in the design of the sign.

Cost Impact: None

F89-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

608.7.2 (NEW)-F-MARTS

F90 – 13

609.2

Proponent: Barry Greive, representing Target Corporation (barry.greive@target.com)

Revise as follows:

609.2 Where required. A Type I hood shall be installed at or above all commercial cooking appliances and domestic cooking appliances used for commercial purposes that produce grease vapors.

Exception: A Type I hood shall not be required for an electric cooking appliance where an approved testing agency provides documentation that the appliance effluent contains 5 mg/m³ or less of grease when tested at an exhaust flow rate of 500 cfm (0.236 m³/s) in accordance with Section 17 of UL 710B

Reason: This proposal is intended to bring consistency between the Fire Code and Mechanical Code provisions.

Section 609.1 of the Fire Code states that "Commercial kitchen exhaust hoods shall comply with the requirements of the International Mechanical Code." This statement lends itself to imply that they should be consistent. There are many situations where the amount of grease is very low to almost non-existent and a type 1 hood is not needed. This exception will bring greater consistency between the codes, better clarity to when a type 1 hood is needed, and a test method that must be followed to show compliance.

Cost Impact: This will not increase the cost of construction.

F90-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

609.2-F-GRIEVE

F91 – 13

609.3.3.2, Chapter 80

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

609.3.3.2 Grease accumulation. If during the inspection it is found that hoods, grease-removal devices, fans, ducts or other appurtenances have an accumulation of grease, such components shall be cleaned in accordance with ANSI/IKECA C-10.

Add new standard to Chapter 80 as follows:

IKECA

International Kitchen Exhaust Cleaning Association
100 North 20th, Street, Suite 400
Philadelphia, PA 19103

C10-2011 *Standard for Cleaning of Commercial Kitchen Exhaust Systems...* 609.3.3.2

Reason: Commercial kitchen exhaust systems remove smoke, soot and grease-laden vapor resulting from cooking operations. These systems become contaminated with grease and cooking by-products over time. Accumulations of these combustible contaminants create a fire safety hazard to workers, patrons, other building occupants and property. Mitigation of this hazard requires periodic cleaning of commercial kitchen exhaust systems.

The first edition of ANSI/IKECA C10-2011, *Standard for Cleaning of Commercial Kitchen Exhaust Systems*, was developed by the IKECA Standards Development Committee Consensus Body. It approved the standard on September 1, 2011. It was approved as an American National Standard by the American National Standards Institute (ANSI) on December 9, 2011.

For many years, the commercial kitchen exhaust cleaning industry has relied on certain codes and standards. ANSI/IKECA C10 addresses many of the areas that these other standards and codes do not cover. The other codes include the *International Fire Code*® (Section 609 Commercial Kitchen Hoods; 904 Alternative Automatic Fire-Extinguishing Systems, including: 904.2.1 Hood suppression systems; 904.3.2 Actuation; 904.3.3 System interlocking; 904.3.5 Monitoring; 904.11 Commercial cooking systems; 904.11 thru 904.11.6.5), the *International Mechanical Code*® (Section 202 General Definitions; 506 Commercial Kitchen Grease Ducts and Exhaust Equipment; 507 Commercial Kitchen Hoods; 508 Commercial Kitchen Make Up Air; 509 Fire Suppression Systems; 917 (Solid Fuel) Cooking Appliances), the *ASHRAE® Handbook HVAC Applications* (Chapter 31, Ventilation of the Industrial Environment), and the *NFPA 96®*, *Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations*.

ANSI/IKECA C-10 is intended to determine the frequency and necessity for commercial kitchen exhaust system cleaning through inspection procedures, to define acceptable methods for cleaning exhaust systems and components, and to set standards for acceptable post-cleaning cleanliness.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

This standard applies to, but is not limited to, Type I exhaust systems. This standard does not apply to residential kitchen exhaust systems, replacement air systems, fire extinguishing systems, heating and air-conditioning systems, dryer exhaust systems, and toilet exhaust systems.

The purpose of this standard is to enhance public safety by reducing the potential fire safety hazards associated with commercial kitchen exhaust systems through the performance of professional cleaning services, irrespective of the type of cooking equipment used and whether used in public or private facilities.

About IKECA: The International Kitchen Exhaust Cleaning Association (IKECA) formed in 1989 and became an ANSI accredited standards developer in 2008. IKECA was founded by a small group of exhaust kitchen exhaust cleaning specialists who were attending the same meeting. They had similar beliefs in the importance of proper and complete exhaust cleaning to the fire protection world. Within two years, these founders had created the first non-profit trade association for the kitchen exhaust cleaning industry.

Today, IKECA members represent some of the best in the industry from around the world. They are proud to have made significant contributions to the decrease in commercial kitchen fires in the U.S. The current membership is approximately 250. Headquartered in Philadelphia, IKECA is a member of the International Code Council. For more information, visit www.ikeca.org.

Additionally this Standard covers the required documentation associated with the cleaning and inspections of kitchen exhaust hoods. Currently there is no Standard recognized by the IFC for this purpose, and adoption of this Standard will enhance code compliance and enforcement.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

Cost Impact: This code change will not increase the cost of construction

Analysis: A review of the standard proposed for inclusion in the code, IKECA C10-2011, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013.

F91-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

609.3.3.2-F-ZUBIA-FCAC

F92 – 13

609.3.3.2, 609.3.3.3.1 (New), Chapter 80

Proponent: Robert Marshall, Contra Costa County Fire Protection District representing self
(rmars@cccfd.org)

Revise as follows:

609.3.3.2 Grease accumulation. If during the inspection it is found that hoods, grease-removal devices, fans, ducts or other appurtenances have an accumulation of grease, such components shall be cleaned in accordance with ANSI/IKECA C-10.

609.3.3.3.1 Labels. Where a commercial kitchen hood or ducting system is inspected, a certificate, label or tag containing the service provider name, address, telephone number and date of service shall be affixed to the hood in a conspicuous location. Prior certificates, labels or tags shall be covered or removed.

Add new standard to Chapter 80 as follows:

IKECA

International Kitchen Exhaust Cleaning Association
100 North 20th Street, Suite 400
Philadelphia, PA 19103

C10-2011 Standard for Cleaning of Commercial Kitchen Exhaust Systems, 2011 609.3.3.2

Reason: The proposed text clarifies necessary marking requirements to visually confirm serviceability of commercial kitchen hood and ducting systems. The text is consistent with the requirements set forth in ANSI/IKECA C-10, which is proposed for adoption by code change (Insert Code Change Number for Proposal that inserts new section 609.3.3.2).

ANSI/IKECA C-10 is an ANSI accredited nationally recognized standard prescribing pre-cleaning inspections, protection of the equipment, control of the waste and the cleaning process. Additionally this Standard covers the required documentation associated with the cleaning and inspections of kitchen exhaust hoods. Currently there is no Standard recognized by the IFC for this purpose, and adoption of this Standard will enhance code compliance and enforcement.

Cost Impact: This proposal will not increase the cost of construction

Analysis: A review of the standard proposed for inclusion in the code, IKECA C10-2011, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013.

F92-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

609.3.3.2-F-MARSHALL

F93 – 13

609.3.3.3.1 (New)

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Add new text as follows:

609.3.3.3 Records. Records for inspections shall state the individual and company performing the inspection, a description of the inspection and when the inspection took place. Records for cleanings shall state the individual and company performing the cleaning and when the cleaning took place. Such records shall be completed after each inspection or cleaning, maintained on the premises for a minimum of three years and be copied to the *fire code official* upon request.

609.3.3.3.1 Tags. Where a commercial kitchen hood or duct system is inspected, a tag containing the service provider name, address, telephone number and date of service shall be provided in a conspicuous location. Prior tags shall be covered or removed.

Reason: The proposed text clarifies necessary marking requirements to visually confirm serviceability of commercial kitchen hood and ducting systems. The text is consistent with the requirements set forth in ANSI/IKECA C-10, which is proposed for adoption by a separate code change proposal submitted by the F-CAC.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

Cost Impact: This code change will not increase the cost of construction

F93-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

609.3.3.3.1 (NEW)-F-ZUBIA-FCAC

F94 – 13

609.4 (New), Chapter 80

Proponent: James Carver, City of El Segundo Fire Department, representing City of El Segundo
(jcarver@elsegundo.org)

Add new text as follows:

609.4 Appliance connection to building piping. Gas-fired commercial cooking appliances installed on casters and appliances that are moved for cleaning and sanitation purposes shall be connected to the piping system with an appliance connector listed as complying with ANSI Z21.69. The commercial cooking appliance connector installation shall be configured in accordance with the manufacturer's installation instructions. Movement of appliances with casters shall be limited by a restraining device installed in accordance with the connector and appliance manufacturer's instructions.

Add new standard to Chapter 80:

ANSI

American National Standards Institute
25 West 43rd Street
Fourth Floor
New York, NY 10036

Z21.69/CSA 616-09 Connectors for Movable Gas Appliances

Reason: The end users of commercial cooking appliances are replacing listed flexible piping with residential flexible piping, causing mechanical damage to the residential flexible piping when the cooking equipment is moved for cleaning, and causing a fire/life safety problem with gas leaks and fires. A similar section exists in the California Plumbing Code, and while it would be followed during initial installation by the plumbing inspector, maintenance of the code section requirements could not be verified by the fire inspector unless it was put into the Fire Code.

Cost Impact: None, the user is complying with existing code requirements.

Analysis: The proposed text is similar to IFGC Section 411.1.1 as revised by code change FG24-12 (AMPC). The standard proposed for inclusion in the code, ANSI Z21.69/CSA 616-09, is currently referenced in the IFGC.

F94-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

609.4 (NEW)-F-CARVER

F95 – 13

610.1, 610.2, 610.3 (New), 610.4, 610.5, 610.6 (New), 610.7, 5701.2, Chapter 80

Proponent: Andy Burke, Restaurant Technologies, Inc, representing self (aburke@rti-inc.com)

Revise as follows:

610.1 General Commercial Kitchen Cooking Oil Storage Tank Systems. Storage of cooking oil (grease) in commercial cooking operations utilizing aboveground tanks with a capacity greater than 60 gal (227 L) installed within a building shall comply with Chapter 57 Sections 610.2 through 610.7. ~~Systems used to store cooking oils in larger than 60-gallon (227 L) above-ground tanks shall also comply with Sections 610.2 through 610.5.~~ For purposes of this section, cooking oil shall be classified as a Class IIIB liquid unless otherwise determined by testing.

610.2 Metallic Storage Tanks. Metallic cooking oil storage tanks shall be listed in accordance with UL 142 or UL 80, and shall be installed in accordance with ~~Section 5704~~ and the tank manufacturer's instructions.

610.3 Nonmetallic Storage Tanks. Nonmetallic cooking oil storage tanks shall be installed in accordance with the tank manufacturer's instructions and shall also comply with all of the following:

1. Tanks shall be designed in accordance with ASTM D1998 unless otherwise approved.
2. Tank capacity shall not exceed 200 gallons per tank.
3. Tanks shall be suitable for use with cooking oil and the maximum temperature to which the tank will be exposed during use.

~~610.3~~ **610.4 Other Storage Components Cooking Oil Storage System Components.** Cooking oil storage system components ~~including~~ shall include but are not limited to piping, connections, fittings, valves, tubing, hose, pumps, vents, and other related components used for the transfer of cooking oil from the cooking appliance to the storage tank, and from the storage tank to the discharge point, shall be installed in accordance with ~~Section 5703.6~~ and are permitted to be of either metallic or non-metallic construction.

610.4.1 Design Standards. The design, fabrication, and assembly of system components shall be suitable for the working pressures and structural stresses to be encountered by the components.

610.4.2 Components in Contact with Heated Oil. Any system component that comes in contact with heated cooking oil shall be rated for the maximum intermittent and continuous operating temperatures expected in the system.

610.4.3 Plenums. Installation of non-metallic cooking oil system components shall be prohibited in concealed interstitial spaces used as return air plenums unless the components are fully enclosed within continuous noncombustible raceways or enclosures, approved gypsum board assemblies, or within materials listed and labeled for installation within a plenum.

~~610.4~~ **610.5 Tank Venting.** Normal and emergency venting shall be provided for cooking oil storage tanks shall terminate outside the building as specified in ~~Sections 5704.2.7.3 and 5704.2.7.4.~~

610.5.1 Normal Vents. Normal venting shall be located above the maximum normal liquid line, and shall have a minimum effective area at least as large as the largest filling or withdrawal connection.

610.5.2 Emergency Vents. Emergency relief venting shall be located above the maximum normal liquid line, and shall be in the form of a device or devices that will relieve excessive internal pressure caused by

an exposure fire. For non-metallic tanks, the emergency relief vent shall be allowed to be in the form of construction.

610.6 Heating of Cooking Oil. Electrical equipment used for heating cooking oil in cooking oil storage systems shall be listed to UL 499 and shall comply with NFPA 70. Use of electrical immersion heaters shall be prohibited in non-metallic tanks.

~~610.5~~ **610.7 Electrical Equipment.** Electrical equipment used for the operation and heating of the cooking oil storage systems shall be listed and comply with NFPA 70.

Revise as follows:

5701.2 Nonapplicability. This chapter shall not apply to liquids as otherwise provided in other laws or regulations or chapters of this code, including:

1 through 10 *(No change to current text)*

11. Commercial cooking oil storage tank systems located within a building and designed and installed in accordance with Section 610.

Add new standards to Chapter 80 as follows:

ASTM

D 1998-06 Standard Specification for Polyethylene Upright Storage Tanks

UL

499-05 Standard for Electrical Heating Appliances

Reason: The section as written presents practical challenges to innovative restaurant technologies, which entirely eliminate manual handling of cooking oil. These systems provide personnel safety and environmental improvements to existing manual or semi-manual oil handling operations. The proposal seeks to address the following issues:

The requirements as currently written (added in 2012 version of the code) are based on used, spent, or inedible cooking oil. For systems which include fresh cooking oil supply, a foodstuff, tanks and components must be food grade. The metallic tank standards currently referenced are based on fuel oil storage tanks and do not meet food grade requirements. The proposal addresses this limitation by adding requirements for non-metallic tanks, with an associated recognized engineering tank standard adapted for use with cooking oil.

Current references to Chapter 57 are more relevant to industrial flammable and combustible liquid tank requirements. High flash point cooking oil in a restaurant back-of-house setting represents a different, and generally lower, hazard than commonly anticipated by Chapter 57. The proposed exemption to Section 5701.2 unifies all pertinent fire safety requirements into Section 610 and the standards referenced therein. This establishes the level of safety applicable to this hazard. This approach is consistent with other exceptions in Chapter 57, in particular the exception for fuel oil tanks connected with oil burning equipment. The proposal takes into consideration comments received from code officials and fire safety professionals.

Note: This proposal applies only to the storage of cooking oil, a Class IIIB liquid with a high flash point (typically above 500°F), which represents a low fire hazard when stored and used per the requirements of the proposal. All other flammable and combustible liquids must comply with Chapter 57.

As written, Section 610.4 requires tank venting to terminate outside of the building, as specified in Sections 5704.2.7.3 and 5704.2.7.4. These referenced sections allow tanks storing Class IIIB liquids to vent inside the building, based on the relatively low fire hazard associated with Class IIIB liquids. The proposal modifies the current requirements for venting to accurately reflect the level of protection for this hazard as established in Chapter 57.

The intent of the requirements as written, as described in the 2012 substantiation, was to add a level of protection to address the use of immersion heaters in storage tanks containing used cooking oil. The proposal addresses these concerns by requiring compliance to UL 499 and NFPA 70, and by restricting the use of immersion heaters to metallic tanks only. Furthermore, the proposal requires all other electrical equipment used with cooking oil storage tank systems to comply with NFPA 70 as well.

The limitations for installing non-metallic tubing or piping are consistent with the International Mechanical Code requirements.

Cost Impact: The code change proposal will not increase the cost of construction. The introduction of Section 610 to the 2012 IFC increased cost of construction by limiting cooking oil storage tanks to metallic construction. The proposal will allow for non-metallic tank construction, allowing costs to remain reasonable for this type of technology and usage. The proposal also provides cost efficiencies for support/compliance of environmental initiatives to limit/prevent the introduction of used cooking oil and used portable containers into liquid and solid waste streams.

Analysis: A review of the standard proposed for inclusion in the code, ASTM D1998-06, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013. UL 499-05 is currently referenced in the IMC.

F95-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

610.1-F-BURKE

F96 – 13

611 (New)

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care
(john.williams@doh.wa.gov)

Add new text as follows:

SECTION 611

HYPERBARIC FACILITIES

611.1 General. Hyperbaric facilities shall be inspected, tested and maintained, in accordance with NFPA 99.

611.2 Records. Records shall be maintained of all testing and repair conducted on the hyperbaric chamber and associated devices and equipment. Records shall be available to the fire code official.

Reason: This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering, a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April 2011, the AHC has held 5 open meetings and over 80 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>

Currently there is no specific requirement for maintaining hyperbaric chambers in the IFC. Adding this section into Chapter 6 will require that all hyperbaric chambers are maintained to the same NFPA standard they were required to meet when they were installed.

Cost impact: The code change proposal should not increase the cost of construction because compliance is already required by facility licensure requirements.

F96-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

611 (NEW)-F-WILLIAMS-ADHOC

F97 – 13

Chapter 7, 701.1

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

CHAPTER 7

FIRE-RESISTANCE-RATED CONSTRUCTION FIRE AND SMOKE PROTECTION FEATURES

701.1 Scope. ~~The provisions of this chapter shall specify the requirements for and the maintenance of fire resistance-rated construction.~~ The provisions of this chapter govern maintenance of the materials, systems and assemblies used for structural fire resistance and fire-resistance-rated construction separation of adjacent spaces to safeguard against the spread of fire and smoke within a building and the spread of fire to or from buildings. New buildings shall comply with the *International Building Code*.

Reason: This proposal will provide correlation of IBC Chapter 7 which addresses construction of assemblies to limit the spread of fire and smoke with IFC Chapter 7 which addresses maintenance of the constructed assemblies designed to limit the spread of fire and smoke.

Chapter 7 in the IBC is titled "Fire and Smoke Protection Features". Since IFC Chapter 7 is intended to maintain the components which are constructed under IBC Chapter 7, a revision in the title of the IFC Chapter to mirror the IBC is appropriate. The scope of IBC Chapter 7 reads as follows:

701.1 Scope. The provisions of this chapter shall govern the materials, systems and assemblies used for structural *fire resistance* and fire-resistance-rated construction separation of adjacent spaces to safeguard against the spread of fire and smoke within a building and the spread of fire to or from buildings.

The proposed scope of IFC Chapter 7 is written to address maintenance of the items covered in the scope of IBC Chapter 7. Therefore, the similarity in the language is appropriate.

Cost Impact: The code change proposal will not increase the cost of construction.

F97-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

CHAPTER 7-F-ZUBIA-FCAC

F98 – 13

703

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azumiamia@yahoo.com)

Revise as follows:

SECTION 703

FIRE-RESISTANCE-RATED CONSTRUCTION INSPECTION AND MAINTENANCE OF CONSTRUCTION FEATURES

703.1 Maintenance General. ~~The required fire-resistance rating of fire-resistance-rated construction (including walls, firestops, shaft enclosures, partitions, smoke barriers, floors, fire-resistive coatings and sprayed fire-resistant materials applied to structural members and fire-resistant joint systems)~~ Construction features intended to limit the spread of fire or smoke shall be maintained.

703.2 Inspection and Maintenance. Construction features intended to limit the spread of fire or smoke ~~Such elements~~ shall be visually inspected by the owner annually and properly repaired, restored or replaced when damaged, altered, breached or penetrated.

Exception: Where construction features are concealed, ~~such elements shall not be required to be visually inspected~~ visual inspection by the owner is not required unless the concealed space is accessible by the removal or movement of a panel, access door, ceiling tile or similar movable entry to the space.

703.2.1 Openings. ~~Openings made therein in smoke-resistant or fire-resistance-rated assemblies for the passage of pipes, electrical conduit, wires, ducts, air transfer openings and holes made for any reason shall be protected with approved methods or self- or automatic-closing opening protectives capable of resisting the passage of smoke and or fire, as required to maintain the rating of the assembly. Openings through fire-resistance-rated assemblies shall be protected by self- or automatic-closing doors of approved construction meeting the fire protection requirements for the assembly.~~

~~**703.1.1 Fireblocking and draftstopping.** Required fireblocking and draftstopping in combustible concealed spaces shall be maintained to provide continuity and integrity of the construction.~~

~~**703.1.2 703.2.1.1 Smoke Openings in smoke barriers and smoke partitions.** Required smoke barriers and smoke partitions shall be maintained to prevent the passage of smoke. All openings~~ Openings ~~protected with approved smoke barrier doors or smoke dampers shall be maintained in accordance with NFPA 105.~~

~~**703.1.3 Fire walls, fire barriers and fire partitions.** Required fire walls, fire barriers and fire partitions shall be maintained to prevent the passage of fire. All openings protected with approved doors or fire dampers shall be maintained in accordance with NFPA 80.~~

~~**703.2**~~ **703.2.1.2 Opening protectives in fire-resistance rated assemblies.** *(No change to current text)*

~~**703.2.4**~~ **703.2.1.2.1 Signs.** *(No change to current text)*

~~**703.2.2**~~ **703.2.1.2.2 Hold-open devices and closers.** *(No change to current text)*

~~**703.2.3**~~ **703.2.1.2.3 Door operation.** *(No change to current text)*

703.3 Ceilings. *(No change to current text)*

703.4 Testing. *(No change to current text)*

Reason: Chapter 7 and Section 703.1 have been expanded to clearly require that construction features intended to limit the spread of smoke must also be maintained.

Predominantly an editorial code change proposal to clarify the intent of the provisions.

Section 703.1 has been revised to provide a broadly-inclusive requirement to maintain any construction feature that was provided to limit the spread of smoke and/or fire. The parenthetical list in this section has been deleted since it was not all-inclusive. These changes improve the usability of the code and address topics that were previously overlooked, such as maintenance of draft stopping in attics.

The existing text in Section 703.1.1 and the first sentence of Sections 703.1.2 and 703.1.3 have been deleted because they are no longer necessary with the revised text of Section 703.1, which will now encompass fire blocking, draftstopping, smoke barriers, smoke partitions, firewalls, fire barriers and fire partitions.

The second sentence of Section 703.1.3 has been deleted because it is redundant. Section 703.2.1 covers maintenance of opening protectives.

NOTE: To assist in following the revisions proposed in this code change, below is a clean version of section 703 without underline and strikeout.

Cost Impact: The code change proposal will not increase the cost of construction.

F98-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

703-F-ZUBIA-FCAC

F99 – 13

803.5.1

Proponent: Marcelo M Hirschler, GBH International (gbhint@aol.com)

Revise as follows:

803.5.1 Textile wall or ceiling coverings. Textile wall or ceiling coverings shall comply with one of the following:

1. The wall or ceiling covering shall have a Class A flame spread index in accordance with ASTM E 84 or UL 723, and be protected by automatic sprinklers installed in accordance with Section 903.3.1.1 or 903.3.1.2;
2. The wall covering shall meet the criteria of Section ~~803.5.1.1~~ or 803.5.1.2 when tested in the manner intended for use in accordance with NFPA 265 using the product-mounting system, including adhesive, of actual use; or
3. The wall or ceiling covering shall meet the criteria of Section 803.1.2.1 when tested in accordance with NFPA 286 using the product-mounting system, including adhesive, of actual use.

~~803.5.1.1 Method A test protocol.~~ ~~During the Method A protocol, flame shall not spread to the ceiling during the 40-kW exposure. During the 150-kW exposure, the textile wall covering shall comply with all of the following:~~

- ~~1. Flame shall not spread to the outer extremity of the sample on the 8 foot by 12 foot (203 by 305 mm) wall.~~
- ~~2. The specimen shall not burn to the outer extremity of the 2-foot wide (610 mm) samples mounted in the corner of the room.~~
- ~~3. Burning droplets deemed capable of igniting textile wall coverings or that burn for 30 seconds or more shall not form.~~
- ~~4. Flashover, as defined in NFPA 265, shall not occur.~~
- ~~5. The maximum not instantaneous peak heat release rate, determined by subtracting the burner output from the maximum heat release rate, does not exceed 300 kW.~~

Reason: The Method A protocol of NFPA 265 has been deleted from the mandatory portion of the NFPA 265 test. Method A was eliminated from NFPA 265 because it was always considered simply a screening test. Note that NFPA 265 states, in the annex: "Method A test protocol is a screening test method that is useful for testing small amounts of material." Note that NFPA 265 Method A uses small 2 foot samples as opposed to the full 8 foot samples used by the Method B.

Method A of NFPA 265 was retained in the IFC for two more code cycles to accommodate older existing systems but can now be eliminated as no longer needed. The IBC already eliminated Method A 2 cycles ago.

Cost Impact: None

F99-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

803.5.1-F-HIRSCHLER

F100 – 13

803.7 (New), Chapter 80

Proponent: Marcelo M Hirschler, GBH International (gbhint@aol.com)

Add new text as follows:

803.7 Laminated products factory-produced with a wood substrate. Laminated products factory-produced with a wood substrate shall comply with one of the following:

1. The laminated product shall have a Class A, B, or C flame spread index and smoke developed index, based on the requirements of Table 803, in accordance with ASTM E84 or UL 723. Test specimen preparation and mounting shall be in accordance with ASTM E2579.
2. The laminated product shall meet the criteria of Section 803.1.2.1 when tested in accordance with NFPA 286 using the product-mounting system (including adhesive) of actual use.

(Renumber subsequent sections)

Add new standard to Chapter 80 as follows:

ASTM

ASTM E2579-12	Standard Practice for Specimen Preparation and Mounting of Wood Products to Assess Surface Burning Characteristics	803.7
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Reason: Clarification has recently been issued, in the mounting method for wood products in ASTM E84 (namely ASTM E2579), to detail the proper way to test laminated products factory-produced with a wood substrate. They are to be treated the same way as any product but differently from facings or veneers applied "on site" over a wood substrate. A separate proposal addresses veneers applied on site.

The new section in ASTM E2579 reads as follows:

- 8.6 Laminated products factory-produced with a wood substrate:
- 8.6.1 If the factory-produced laminated product includes a facing or wood veneer applied over a wood substrate, the specimens shall comply with 8.6.1.1 as well as with 8.6.1.2.
- 8.6.1.1 The specimens shall consist of the finished product, namely the combination of the facing, panel product or wood veneer, the adhesive used and the specific wood substrate that will be used. Mount the specimens on the ledges of the Test Method E84 furnace without using additional means of support.
- 8.6.1.2 The adhesive used to attach the facing, panel product, or wood veneer, ~~or panel product~~ to the wood substrate shall be that specified by the manufacturer and applied in accordance with manufacturer's application instructions.
- 8.7 Wood veneers or facings intended to be applied on site over a wood substrate. If the laminated product is not factory-produced but the wood veneer or facing is to be applied on-site over a wood substrate, the specimens shall comply with the requirements of Practice E2404.

Cost Impact: None

F100-12

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

803.7 (NEW) #1-F-HIRSCHLER

F101 – 13

803.7 (New)

Proponent: Marcelo M Hirschler, GBH International (gbhint@aol.com)

Add new text as follows:

803.7 Facings or wood veneers intended to be applied on-site over a wood substrate. Facings or wood veneers intended to be applied on-site over a wood substrate shall comply with one of the following:

1. The facing or wood veneer shall have a Class A, B, or C flame spread index and smoke developed index, based on the requirements of Table 803, in accordance with ASTM E 84 or UL 723. Test specimen preparation and mounting shall be in accordance with ASTM E 2404.
2. The facing or wood veneer shall meet the criteria of Section 803.1.2.1 when tested in accordance with NFPA 286 using the product-mounting system, including adhesive, described in section 5.8.9 of NFPA 286.

(Renumber subsequent sections)

Reason: Clarification has recently been issued, in the mounting method for wall coverings in ASTM E84 (namely ASTM E2404), to detail the proper way to test facings or wood veneers intended to be applied over a wood substrate. They are to be treated the same way as any other wall or ceiling covering applied "on-site" to a wood substrate but differently from panels where the facing or veneer is applied in the factory over the wood substrate and the entire panel is installed. A separate proposal addresses factory-produced panels.

The new section in ASTM E2404 reads as follows:

8.7 Facings or Wood Veneers Intended to be Applied On-site Over a Wood Substrate:

- 8.7.1 *If the facing or wood veneer is intended to be applied on-site over a wood substrate, the specimens shall comply with as well as with 8.1.*
- 8.7.1.1 *The specimens shall consist of the facing or wood veneer mounted on the "A" face of nominal 15/32 in. untreated plywood with a face veneer of Douglas fir. The plywood shall comply with NIST Voluntary Product Standard PS 1-07. The plywood shall carry the grade stamp of either APA-The Engineered Wood Association or TECO, indicating that the plywood has been graded PS 1-07 A-C and is for exterior exposure. Alternatively, the plywood shall be permitted to be stamped as conforming to CSA O121 (Standard for Douglas fir plywood). Mount the specimens on the ledges of the Test Method E84 furnace without using additional means of support.*
- 8.8 *Laminated Products Factory-produced with a Wood Substrate — If the laminated product is factory-produced the specimens shall comply with the requirements of Practice E2579.*
- 8.1 *Whenever a wall or ceiling covering system uses an adhesive to attach a wall or ceiling covering material, the adhesive specified by the manufacturer shall be used for construction of the test specimen in accordance with the wall or ceiling covering manufacturer application instructions.*

Section 5.8.9 of NFPA 286 reads as follows:

- 5.8.9 Wall or Ceiling Coverings Intended to Be Applied over a Wood Substrate.** *If the wall or ceiling coverings are intended to be applied over a wood substrate, the specimens shall consist of the wall or ceiling covering mounted on untreated plywood, with a face veneer of Douglas fir. The plywood shall have the same thickness as the wood substrate used in actual installations, and shall comply with NIST Voluntary Product Standard PS 1-07, Structural Plywood. The plywood shall be marked with a grade stamp indicating that the plywood has been graded PS 1-07 A-B and is for exterior exposure. The grade stamp shall be issued by a quality control agency. Alternatively, the plywood shall be permitted to be stamped as conforming to CSA Standard O121, Douglas Fir Plywood.*

Cost Impact: None

Analysis: ASTM E2404 -08 is currently referenced in the IFC. An update in the year edition of that standard will be accomplished by an administrative standards update code change to be heard by the ADM Code Development Committee.

F101-12

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

803.7 (NEW) #2-F-HIRSCHLER

F102 – 13

805.1

Proponent: Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee
(cbaldassarra@RJAGroup.com)

Revise as follows:

805.1 Group I-1, ~~board and care facilities~~ Condition 2. The requirements in Sections 805.1.1 through 805.1.2 shall apply to ~~board and care facilities classified~~ in Group I-1 Condition 2.

Reason: The term 'board and care facilities' was deleted from the IBC during the last cycle. These provisions are appropriate for Group I-1 Condition 2, assisted living facilities.

This proposal is submitted by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty-five meetings - all open to the public. In 2012, three of the 25 face-to face meetings were held. In addition to the CTC meetings, the CTC established Study Groups (SG) of interested parties for each of the areas of study. These SG's are responsible for reviewing the available information and making recommendations to the CTC. All totaled, the SG's held over 70 conference calls in 2012.

Cost Impact: None

F102-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

805.1-F-BALDASSARRA-CTC

F103 – 13

805.3.2.2, 805.3.2.2.1 (New), 803.5.3.2.2.2 (New), Chapter 80

Proponent: Marcelo M Hirschler, GBH International (gbhint@aol.com)

Add new text as follows:

805.3.2 Mattresses. Newly introduced mattresses shall meet the requirements of Sections 805.3.2.1 through 805.3.2.3.

805.3.2.1 Ignition by cigarettes. Newly introduced mattresses shall be shown to resist ignition by cigarettes as determined by tests conducted in accordance with DOC 16 CFR Part 1632 and shall have a char length not exceeding 2 inches (51 mm).

805.3.2.2 Fire performance tests. Newly introduced mattresses shall be tested in accordance with Section 805.3.2.2.1 or 805.3.2.2.2.

805.3.2.2.1 Heat release rate. Newly introduced mattresses shall have limited rates of heat release when tested in accordance with ASTM E 1590 or California Technical Bulletin 129, as follows:

1. The peak rate of heat release for the single mattress shall not exceed 100 kW.
2. The total energy released by the single mattress during the first 10 minutes of the test shall not exceed 25 MJ.

805.3.2.2.2 Mass Loss Test. Newly introduced mattresses shall have a mass loss not exceeding 15% of the initial mass of the mattress when tested in accordance with the test in Annex A3 of ASTM F1085.

805.3.2.3 Identification.

Mattresses shall bear the label of an *approved* agency, confirming compliance with the requirements of Sections 805.3.2.1 and 805.3.2.2.

Add new standard to Chapter 80 as follows:

ASTM

F1085-10 Standard Specification for Mattress and Box Springs for Use in Berths in Marine Vessels.....
805.3.2.2.2

Reason: The test method in Annex A3 of ASTM F1085 was developed originally for use in detention and correctional occupancies and it is a very severe test that is a reasonable (and less expensive) alternative to ASTM E1590. This test is very simple and can be conducted at any facility and does not require the use of an instrumented fire test lab. The test can be described in a few words: it involves rolling up a mattress, placing it at an angle (for example by holding it with a brick), introducing newspaper into the volume surrounding the rolled up mattress and igniting the newspaper with a match.

One of the advantages of using the ASTM F1085 Annex A3 test is that if the mattress materials melt away from the flame with flaming drips they may "pass" the ASTM E1590 test but melting will not allow a mattress to pass this test. In this test the material that flames on the floor will keep burning the mattress itself.

The following table shows the results using the ASTM F1085 Annex A3 test for a number of mattresses in two studies (one in 1980 and one in 2003) and it also shows whether the mattresses meet the ASTM E1590 requirements in the IFC code. It is clear from the table that mattresses usually burn up almost completely or lose very little mass and that the ASTM F1085 test will not pass mattresses that fail the IFC code requirements.

Mattress	ASTM F1085 Mass Loss %	IFC Code Pass: Yes or No
1 (2003)	1.22	Yes
2 (2003)	9.47	Yes
3 (2003)	3.30	Yes
4 (2003)	100	No
5 (2003)	100	No
1 (1980)	100	No
2 (1980)	100	No

3 (1980)	98.5	No
4 (1980)	91.1	No
5 (1980)	91	No
6 (1980)	83.1	No
7 (1980)	44.7	No
8 (1980)	3.0	Yes

As another example of the usefulness of this test, two mattresses, both of which pass the ASTM E1590 test requirements, were recently tested to the ASTM F1085 Annex A3 test. One of the mattresses gave a mass loss of 1% while the other one melted and burnt virtually completely.

Test/Results	Polychloroprene Mattress	FR Polyester Mattress
ASTM F1085 Annex A3	1% weight loss (pass)	>90% weight loss (fail)
ASTM E1590	Pass (Peak HRR: 25 kW)	Pass

The test method from Annex A3 of ASTM F1085 is also described (albeit without enough details to conduct the test in a standard fashion) in section 10.2 of ASTM F1870 (Standard Guide for Selection of Fire Test Methods for the Assessment of Upholstered Furnishings in Detention and Correctional Facilities) as a test method "Designed for Detention and Correction Facilities".

Relevant parts of the text of Annex A3 of ASTM F1085 follows:

A3.1 Background

- A3.1.1 *This optional test method provides a means for evaluating mattresses, and mattress inserts, for the weight loss, and fire behavior they exhibit under specified exposure conditions.*
- A3.1.2 *Results of this test method are likely to be reasonably predictive of the results of the test method in Annex A1, in terms of being able to differentiate between mattresses (or mattress inserts) of various degrees of fire performance.*
- A3.1.3 *This test method is capable of subdividing mattresses (or mattress inserts) into several categories depending on their response to the ignition source applied: some mattresses (or mattress inserts) will burn up completely, while some others will lose small fractions of the initial weight, with a series of intermediate fire-test responses also likely.*

A3.2 Test Specimen

- A3.2.1 *Use as the test specimen an actual manufactured mattress, mattress insert, or prototype thereof, in the configuration of its intended use.*
- A3.2.2 *If an actual manufactured mattress, or mattress insert, is not supplied, the size of the default mattress to be tested has the following dimensions: 0.76 by 1.90 m by at least 76 mm thick (30.0 by 75 in. by at least 3 in. thick). Whenever possible an actual mattress shall be used.*
- A3.2.3 *The test specimen used shall be the size representative of the intended use of the product to be tested. Report the actual dimensions of the test specimen used.*
- A3.2.4 *The test specimen, shall, in all respects, reflect the construction of the actual mattress, or mattress insert, that it is intended to represent.*

A3.5 Procedure

- A3.5.1 *Conduct the tests in a room equipped with appropriate exhausts to ensure that the resulting smoke can be vented. The so-called "ASTM room" (2.4 by 3.7 by 2.4 m high; 8 by 12 by 8 ft high) described in Test Method E1590 is an example of a room deemed satisfactory for this test. Rooms of other dimensions are also suitable.*
- A3.5.2 *Weigh 8 double sheets of black print newspaper (not tabloid size) and record the weight, to an accuracy of no less than 1.0 g.*
- A3.5.3 *Weigh the conditioned mattress, or mattress insert, and record the weight, to an accuracy of no less than 50 g. This shall be considered the initial mattress or mattress insert weight. Test within 30 min of weighing the mattress.*
- A3.5.4 *Use a pipe approximately 0.6-1.0 m (24-39 in.) long and 230-250 mm (9-10 in.) in internal diameter for rolling the mattress, or mattress insert.*
- A3.5.5 *Roll the long dimension of the test specimen (mattress, mattress prototype, mattress insert or mattress cushioning material), completely around the pipe. Retain the test specimen in place by using steel poultry netting or a minimum of three steel wire ties. This configuration creates a "chimney effect." Remove the pipe after the roll containing the test specimen has been secured and has formed a test specimen roll.*
- A3.5.5.1 *If the mattress, or mattress insert, is asymmetrical, inasmuch as the top and bottom surfaces are different, tests shall be conducted on both sides. If results differ depending on the side exposed to the ignition source, the appropriate results are those from the test that is shown to be more severe.*
- A3.5.6 *Position the test specimen roll such that it is both: (1) secure from falling and (2) tilted to one side at an angle of 75-80 degrees to the floor. This is achievable: (a) by propping up the test specimen roll on one side, with two 70-80 mm (3 in.) steel angle irons or two bricks, with 70-100 mm separation between them, and securing the test specimen roll from tipping over during testing by attaching 3 wires to the steel netting, with the wires suspended from up high (for example from the ceiling) or (b) by leaning the mattress against a non combustible support at the required angle. The angled configuration is needed to allow air to enter at the bottom of the chimney formed by the test specimen roll.*
- A3.5.7 *Crumple up the sheets of newspaper, loosely, into individual balls approximately 150 mm (6 in.) in diameter and place them in the inside of the chimney.*
- A3.5.8 *Ignite the crumpled newspaper, from the top, with a single match, ensuring that the newspaper is well lit.*
- Note: *A rather intense fire lasting 90-100 s is likely to result.*
- A3.5.9 *Allow free burning of the test specimen roll until the first of the following conditions is reached: (a) All burning has ceased. (b) Flashover in the test room appears inevitable. In this case, extinguish the test specimen fire manually and report the result as a flashover. Weighing of the test specimen remains is not necessary in this case.*

- A3.5.10 *Conclude the test after visible flames have ceased, unless the mattress, or mattress insert, is still smoldering. At the test conclusion, let the mattress, or mattress insert, cool to room temperature and check to ensure that there is no visible smoke and that the mattress, or mattress insert, is not smoldering.*
- A3.5.11 *If the mattress, or mattress insert, is smoldering when visible flames have ceased, do not conclude the test but continue the test until 60 minutes have elapsed and then terminate the test. Report the time at which visible flames have ceased and the time at which smoldering has ceased, unless smoldering has continued until the test has been externally terminated. Report the method of test termination and check to ensure that there is no more smoldering, no visible smoke and that the mattress is dry (if water was used).*
- A3.5.12 *Upon completion of the test, the mattress, or mattress insert, remains, if any, shall be weighed, after placing them in a pre-weighed non combustible container. The mattress, or mattress insert, remains shall include any portion of the test specimen that has fallen off, during or after the test.*
- A3.5.14 *Conduct the test in duplicate. Conduct each burn on an untested specimen.*

Cost Impact: None

Analysis: A review of the standard proposed for inclusion in the code, ASTM F1085-10, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

F103-12

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

805.3.2-F-HIRSCHLER

F104 – 13

806.1.1

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care
(john.williams@doh.wa.gov)

Add new text as follows:

806.1.1 Restricted occupancies. Natural cut trees shall be prohibited within ambulatory care facilities and Group A, E, I-1, I-2, I-3, I-4, M, R-1, R-2 and R-4 occupancies.

Exceptions:

1. Trees located in areas protected by an *approved automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2 shall not be prohibited in Groups A, E, M, R-1 and R-2.
2. Trees shall be allowed within *dwelling units* in Group R-2 occupancies.

Reason: Ambulatory Care Facilities are being added to the list of prohibited occupancies for natural cut trees at Section 806.1.1. Patients in these facilities are rendered incapable of self-preservation in this occupancy in activities that present the same evacuation challenges presented by Group I-2 occupancies which are already in the list. This section is recommended for modification because of the rapid manner in which a natural cut tree is consumed by fire with the associated release of heat and smoke would present a distinct hazard to occupants. A burning tree could not be approached or passed by thus effectively blocking that portion of an egress path while spreading heat and smoke to additional portions of the means of egress.

Ambulatory Care Facilities are located within Business (Group B) occupancies where natural cut trees are permitted. This added prohibition eliminates a hazard that otherwise would not occur for similar activities conducted in a Group I-2 occupancy and provides an improved level of protection for other occupancies in the mixed use situation.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>

Cost impact: This proposal will not increase the cost of construction.

F104-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

806.1.1-F-WILLIAMS-ADHOC

F105 – 13

806.2

Proponent: Amy Carpenter, AIA, Pioneer Network Long Term Care Code Task Force

Revise as follows:

806.2 Artificial vegetation. Artificial decorative vegetation shall ~~meet the flame propagation performance criteria of NFPA 701. Meeting the flame propagation performance criteria of NFPA 701 shall be documented and certified by the manufacturer in an approved manner. Alternatively, the artificial decorative vegetation item shall~~ be tested in accordance with NFPA 289, using the 20 kW ignition source, and shall have a maximum heat release rate of 100 kW.

Exception: In Groups R-2, I-1 and I-2, artificial vegetation shall be permitted in limited quantities such that a hazard of fire development or spread is not present.

Reason: The text stricken from section 806.2 is proposed because it is not a correct reference and should not be included. NFPA 701 is the standard for "flame propagation of Textiles and Films". The scope description, in the standard, is clear that it is for materials that will be used as curtains, drapes and window treatments, therefore it is not the correct reference standard, nor the correct test method, for artificial decorative vegetation that may be used in buildings.

In Groups R-2, I-1 and I-2 Condition 1, residents often seek to create a home-like environment and display decorative items, like a seasonal wreath at their unit entries. It is not always possible, or practical to determine compliance with NFPA 289, especially for items procured by individual residents. The language of this exception is similar to the permissions for decorative materials, in these use groups, under Section 807. Further, as all of these Occupancies are required to have sprinkler coverage, there is a reduced risk for detrimental effects of limited quantities of artificial vegetation.

Cost Impact: No cost impact

F105-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

806.2-F-CARPENTER

F106 – 13

806.2, 807.1(IBC [F] 806.1), 807.1.2 (IBC [F] 806.1.2), 807.2 (IBC [F] 806.2), 807.4.2.2, 2603.5, 3104.2, 3105.4

Proponent: Timothy T. Earl, GBH International (tearl@gbhinternational.com)

Revise as follows:

806.2 Artificial vegetation. Artificial decorative vegetation shall meet the flame propagation performance criteria of Test Method 1 or Test Method 2, as appropriate, of NFPA 701. Meeting the flame propagation performance criteria of Test Method 1 or Test Method 2, as appropriate, of NFPA 701 shall be documented and certified by the manufacturer in an *approved* manner. Alternatively, the artificial decorative vegetation item shall be tested in accordance with NFPA 289, using the 20 kW ignition source, and shall have a maximum heat release rate of 100 kW.

807.1 (IBC [F] 806.1) General requirements. In occupancies in Groups A, E, I and R-1, and dormitories in Group R-2, curtains, draperies, hangings and other decorative materials suspended from walls or ceilings shall meet the flame propagation performance criteria of Test Method 1 or Test Method 2, as appropriate, of NFPA 701 in accordance with Section 807.2 or be noncombustible.

Exceptions:

1. Curtains, draperies, hangings and other decorative materials suspended from walls of *sleeping units* and *dwelling units* in dormitories in Group R-2 protected by an *approved automatic sprinkler system* installed in accordance with Section 903.3.1 and such materials are limited to not more than 50 percent of the aggregate area of walls.
2. Decorative materials, including, but not limited to, photographs and paintings in dormitories in Group R-2 where such materials are of limited quantities such that a hazard of fire development or spread is not present.

In Groups I-1 and I-2, combustible decorative materials shall meet the flame propagation criteria of Test Method 1 or Test Method 2, as appropriate, of NFPA 701 unless the decorative materials, including, but not limited to, photographs and paintings, are of such limited quantities that a hazard of fire development or spread is not present. In Group I-3, combustible decorative materials are prohibited.

Fixed or movable walls and partitions, paneling, wall pads and crash pads, applied structurally or for decoration, acoustical correction, surface insulation or other purposes, shall be considered interior finish if they cover 10 percent or more of the wall or of the ceiling area, and shall not be considered decorative materials or furnishings.

In Group B and M occupancies, fabric partitions suspended from the ceiling and not supported by the floor shall meet the flame propagation performance criteria in accordance with Section 807.2 and Test Method 1 or Test Method 2, as appropriate, of NFPA 701 or shall be noncombustible.

807.1.2 (IBC [F] 806.1.2) Combustible decorative materials. The permissible amount of decorative materials meeting the flame propagation performance criteria of Test Method 1 or Test Method 2, as appropriate, of NFPA 701 shall not exceed 10 percent of the specific wall or ceiling area to which it is attached.

Exceptions:

1. In auditoriums in Group A, the permissible amount of decorative material meeting the flame propagation performance criteria of Test Method 1 or Test Method 2, as appropriate, of NFPA 701 shall not exceed 75 percent of the aggregate wall area where the building is equipped

throughout with an *approved automatic sprinkler system* in accordance with Section 903.3.1.1, and where the material is installed in accordance with Section 803.11 of the *International Building Code*.

2. The amount of fabric partitions suspended from the ceiling and not supported by the floor in Group B and M occupancies shall not be limited.

807.2 (IBC [F] 806.2) Acceptance criteria and reports. Where required to be flame resistant, decorative materials shall be tested by an *approved agency* and meet the flame propagation performance criteria of Test Method 1 or Test Method 2, as appropriate, of NFPA 701, or such materials shall be noncombustible.

Reports of test results shall be prepared in accordance with Test Method 1 or Test Method 2, as appropriate, of NFPA 701 and furnished to the *fire code official* upon request.

807.4.2.2 Motion picture screens. The screens upon which motion pictures are projected in new and existing buildings of Group A shall either meet the flame propagation performance criteria of Test Method 1 or Test Method 2, as appropriate, of NFPA 701 or shall comply with the requirements for a Class B interior finish in accordance with Section 803 of the *International Building Code*.

Revise as follows:

2603.5 Sealing of buildings, structures and spaces. Paper and other similar materials that do not meet the flame propagation performance criteria of Test Method 1 or Test Method 2, as appropriate, of NFPA 701 shall not be used to wrap or cover a building, structure or space in excess of that required for the sealing of cracks, casements and similar openings.

Revise as follows:

3104.2 Flame propagation performance treatment. Before a permit is granted, the *owner* or agent shall file with the *fire code official* a certificate executed by an *approved testing laboratory* certifying that the tents and membrane structures and their appurtenances; sidewalls, drops and tarpaulins; floor coverings, bunting and combustible decorative materials and effects, including sawdust when used on floors or passageways, are composed of material meeting the flame propagation performance criteria of Test Method 1 or Test Method 2, as appropriate, of NFPA 701 or shall be treated with a flame retardant in an *approved manner* and meet the flame propagation performance criteria of Test Method 1 or Test Method 2, as appropriate, of NFPA 701, and that such flame propagation performance criteria are effective for the period specified by the permit.

IBC [F] 801.4 Decorative materials and trim. *Decorative materials* and *trim* shall be restricted by combustibility, fire performance, or ~~and the flame propagation performance criteria of NFPA 701,~~ in accordance with Section 806.

Reason: In 1989 the NFPA Technical Committee on Fire Tests eliminated the so-called "small-scale test" from NFPA 701 because the results had been shown not to represent a fire performance that corresponded to what happened in real scale. Instead of the "small-scale test" NFPA 701 now (and for over 20 years) contains two tests (Test 1 and Test 2), which apply to materials as indicated by the text of NFPA 701 (2010) that is shown at the bottom of this proposal.

However, a large number of manufacturers continue stating that the materials or products that they sell have been tested to NFPA 701, when they really mean the pre-1989 small-scale test in NFPA 701. That test no longer exists and materials or products meeting that test do not exhibit acceptable fire performance.

The change above was already done in the IBC.

Text of NFPA 701 (2010):

- 1.1.1.1 Test Method 1 shall apply to fabrics or other materials used in curtains, draperies, or other window treatments. Vinyl-coated fabric blackout linings shall be tested according to Test Method 2.
- 1.1.1.2 Test Method 1 shall apply to single-layer fabrics and to multilayer curtain and drapery assemblies in which the layers are fastened together by sewing or other means. Vinyl-coated fabric blackout linings shall be tested according to Test Method 2.

- 1.1.1.3 Test Method 1 shall apply to specimens having an areal density less than or equal to 700 g/m² (21 oz/yd²), except where Test Method 2 is required to be used by 1.1.2.
- 1.1.2.1 Test Method 2 (flat specimen configuration) shall be used for fabrics, including multilayered fabrics, films, and plastic blinds, with or without reinforcement or backing, with areal densities greater than 700 g/m² (21 oz/yd²).
- 1.1.2.2 Test Method 2 shall be used for testing vinyl-coated fabric blackout linings and lined draperies using a vinyl-coated fabric blackout lining.
- 1.1.2.3 Test Method 2 shall be used for testing plastic films, with or without reinforcement or backing, when used for decorative or other purposes inside a building or as temporary or permanent enclosures for buildings under construction.
- 1.1.2.4 Test Method 2 shall apply to fabrics used in the assembly of awnings, tents, tarps, and similar architectural fabric structures and banners.

Note also the following from the text of NFPA 701 (2010):

- 1.2* Purpose.
- 1.2.1 The purpose of Test Methods 1 and 2 shall be to assess the propagation of flame beyond the area exposed to the ignition source.
- A.1.1 A small-scale test method appeared in NFPA 701 until the 1989 edition. It was eliminated from the test method because it has been shown that materials that "pass" the test do not necessarily exhibit a fire performance that is acceptable. The test was not reproducible for many types of fabrics and could not predict actual full-scale performance. It should not, therefore, be used.
- A.1.1.1 For the purposes of Test Method 1, the terms curtains, draperies, or other types of window treatments, where used, should include, but not be limited to, the following items:
 - (1) Window curtains
 - (2) Stage or theater curtains
 - (3) Vertical folding shades
 - (4) Roll-type window shades
 - (5) Hospital privacy curtains
 - (6) Window draperies
 - (7) Fabric shades or blinds
 - (8) Polyvinyl chloride blinds
 - (9) Horizontal folding shades
 - (10) Swags

Examples of textile items other than window treatments to which Test Method 1 applies include:

- (1) Table skirts
- (2) Table linens
- (3) Display booth separators
- (4) Textile wall hangings
- (5) Decorative event tent linings not used in the assembly of a tent

Cost Impact: Minimal

F106-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

806.2-F-EARL

F107 – 13

806.3

Proponent: Amy Carpenter, AIA, Pioneer Network Long Term Care Code Task Force

Revise as follows:

806.3 Obstruction of means of egress. ~~The required width of any portion of a means of egress shall not be obstructed by decorative vegetation.~~ Decorative vegetation shall not protrude more than 6 inches into the means of egress pathway and shall not obstruct any life safety equipment or controls.

Reason: Section 806.3 seeks to clarify a common enforcement mis-conception that decorative vegetation cannot protrude at all into the corridor. Often, calculated egress loads will set a required width of a corridor much lower than the actual provided corridor width. The current language would actually allow items to protrude into the corridor to any distance, as long as the vegetation doesn't encroach more than the required calculated width. This new language restricts the total projection to 6 inches, which is consistent with items such as hand sanitizers.

Cost Impact: No cost impact

F107-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

806.3-F-CARPENTER

F108 – 13

806.3

Proponent: Robert J Davidson, Davidson Code Concepts, LLC, representing self
(rjd@davidsoncodeconcepts.com)

Revise as follows:

806.3 Obstruction of means of egress. The required width of any portion of a *means of egress* shall not be obstructed by decorative vegetation. Natural cut trees shall not be located within an exit, corridor, or a lobby or vestibule.

Reason: Section 806.3 “Obstruction of the means of egress” is recommended for modification because the rapid manner in which a natural cut tree is consumed by fire with the associated release of heat and smoke would present a distinct hazard to egress regardless of whether it impinged on the required width of the means of egress. A burning tree could not be approached or passed by thus effectively blocking that portion of an egress path while spreading heat and smoke to additional portions of the means of egress. A significant impact would be a natural cut tree located within a lobby that has the allowed 50% of all egress capacity passing through the same lobby.

Cost impact: This proposal will not increase the cost of construction.

F108-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

806.3-F-DAVIDSON

F109 – 13

807 (IBC [F] 806)

Proponent: Amy Carpenter, representing Pioneer Network Long Term Care Code Task Force (acarpenter@lenhardtrodders.net) and Wayne Jewell Township of Green Oak, MI representing self

Revise as follows:

SECTION 807

DECORATIVE MATERIALS OTHER THAN DECORATIVE VEGETATION IN NEW AND EXISTING BUILDINGS

807.1 (IBC [F]806.1) General. Combustible decorative materials, other than decorative vegetation, shall comply with Section 807.2 through 807.5.

807.1 (IBC [F]806.1) General requirements. In occupancies in Groups A, E, I and R-1 and dormitories in Group R-2, curtains draperies, hangings and other *decorative materials* suspended from walls or ceilings shall meet the flame propagation performance criteria of NFPA 701 in accordance with section 807.2 or be noncombustible.

Exceptions:

1. ~~Curtains, draperies, hangings and other decorative materials suspended from walls of sleeping units and dwelling units in dormitories in Group R-2 protected by an approved automatic sprinkler system installed in accordance with Section 903.3.1 and such materials are limited to not more than 50 percent of the aggregate area of walls. (relocated to Section 807.3 exception 2)~~
2. ~~Decorative materials, including, but not limited to, photographs and paintings in dormitories in Group R-2 where such materials are of limited quantities such that a hazard of fire development or spread is not present. (relocated to Section 807.5.5)~~

~~In Groups I-1 and I-2, combustible decorative materials shall meet the flame propagation criteria of NFPA 701 unless the decorative materials, including, but not limited to, photographs and paintings, are of such limited quantities that a hazard of fire development or spread is not present. In Group I-3, combustible decorative materials are prohibited. (relocated to Section 807.5.6 and 807.5.7)~~

~~Fixed or movable walls and partitions, paneling, wall pads and crash pads, applied structurally or for decoration, acoustical correction, surface insulation or other purposes, shall be considered interior finish if they cover 10 percent or more of the wall or of the ceiling area, and shall not be considered decorative materials or furnishings. (relocated to Section 807.3)~~

~~In Group B and M occupancies, fabric partitions suspended from the ceiling and not supported by the floor shall meet Sections 807.2 and 807.3 the flame propagation performance criteria in accordance with Section 807.2 and NFPA 701 or shall be noncombustible.~~

807.1.1 (IBC [F]806.1.1), 807.2 (IBC [F] 806.2) Noncombustible materials. The permissible amount of noncombustible decorative material shall not be limited.

807.1.2 (IBC [F]806.1.1), 807.3 (IBC [F] 806.3) Combustible decorative materials. In other than Group I-3, The permissible amount of curtains, draperies, fabric hangings and other similar combustible decorative materials suspended from walls or ceilings shall be flame resistant meeting the flame propagation performance criteria of NFPA 701 in accordance with Section 807.4 and shall not exceed 10 percent of the specific wall or ceiling area to which it is attached.

Fixed or movable walls and partitions, paneling, wall pads and crash pads applied structurally or for decoration, acoustical correction, surface insulation or other purposes shall be considered *interior finish* if they cover 10 percent or more of the wall or of the ceiling area, and shall not be considered *decorative materials* or furnishings. (relocated from Section 807.1)

Exceptions:

1. In auditoriums in Group A, the permissible amount of curtains, draperies, fabric hangings and other similar combustible decorative materials suspended from walls or ceilings meeting the flame propagation performance criteria of NFPA 701 shall not exceed 75 percent of the aggregate wall area where the building is equipped throughout with an *approved automatic sprinkler system* in accordance with Section 903.3.1.1, and where the material is installed in accordance with Section 803.11 of the *International Building Code*.
2. In Group R-2 dormitories, within sleeping units and dwelling units, the permissible amount of curtains, draperies, fabric hangings and other similar decorative materials suspended from walls or ceiling shall not exceed 50 percent of the aggregate wall areas where the building is equipped throughout with an *approved automatic sprinkler system* installed in accordance with Section 903.3.1. (relocated and revised from Section 807.1, exception 1)
- ~~3.2.~~ In Group B and M occupancies, the amount of fabric partitions suspended from the ceiling and not supported by the floor in ~~Group B and M occupancies~~ shall not be limited.

~~807.2(IBC [F] 806.2)~~ 807.4 (IBC [F] 806.4) Acceptance criteria and reports. Where required to be flame resistant, curtains, draperies, fabric hangings and other similar combustible decorative materials suspended from walls or ceilings shall be tested by an *approved agency* and meet the flame propagation performance criteria of NFPA 701, ~~or such materials shall be noncombustible~~. Reports of test results shall be prepared in accordance with NFPA 701 and furnished to the *fire code official* upon request.

~~807.4~~ 807.5 Occupancy-based requirements. In occupancies specified in Group A, E and I-4 day care facilities, combustible decorative materials not complying with Section 807.3 other than decorative vegetation shall comply with Sections 807.5.1 807.4.4 through 807.4.4.2 807.5.7.

~~IFC 807.5.1 807.4.4~~ General. All of The following requirements shall apply to all occupancies: ~~to all Group A and E occupancies and Group I-4 day care facilities regulated by Sections 807.4.2 through 807.4.4:~~

1. ~~Explosive or highly flammable materials:~~ Furnishings or decorative materials of an explosive or highly flammable character shall not be used.
2. ~~Fire-retardant coatings:~~ Fire-retardant coatings in existing buildings shall be maintained so as to retain the effectiveness of the treatment under service conditions encountered in actual use.
3. ~~Obstructions:~~ Furnishings or other objects shall not be placed to obstruct *exits*, access thereto, egress there from or visibility thereof.

~~807.5.2 807.4.2~~ Group A. In Group A occupancies, the requirements in Sections 807.4.2.4 807.5.2.1 through 807.4.2.3 807.5.2.4 shall apply ~~to occupancies in Group A~~.

~~807.5.2.1 807.4.2.1~~ Foam plastics. Exposed foam plastic materials and unprotected materials containing foam plastic used for decorative purposes or stage scenery or exhibit booths shall have a maximum heat release rate of 100 kW when tested in accordance with UL 1975, or when tested in accordance with NFPA 289 using the 20 kW ignition source.

Exceptions:

1. Individual foam plastic items or items containing foam plastic where the foam plastic does not exceed 1 pound (0.45 kg) in weight.
2. Cellular or foam plastic shall be allowed for trim in accordance with Section 804.2.

807.5.2.2 ~~807.4.2.2~~ Motion Picture Screens. The screens upon which motion pictures are projected in new and existing buildings shall either ~~meet the flame propagation performance criteria of NFPA 701-~~ comply with Section 807.4 or shall comply with the requirements for a Class B interior finish in accordance with Section 803 of the *International Building Code*.

807.5.2.3 ~~807.4.2.3~~ Wood use in ~~Group A-3~~ places of religious worship. In places of religious worship, wood used for ornamental purposes, trusses, paneling or chancel furnishing shall ~~be allowed~~ not be limited.

807.5.2.4 ~~807.3 (IBC [F] 806.4)~~ Pyroxylin plastic. Imitation leather or other material consisting of or coated with a pyroxylin or similarly hazardous base shall not be used ~~in Group A occupancies~~.

807.5.3 ~~807.4.3~~ Group E. Group E occupancies, shall comply with Sections ~~the requirements in Sections 807.4.3.1 807.5.3.1 through and 807.4.3.2 807.5.3.3 shall apply to occupancies in Group E.~~

807.5.3.1 ~~807.4.3.1~~ Storage in corridors and lobbies. Clothing and personal effects shall not be stored in *corridors* and lobbies.

Exceptions:

1. *Corridors* protected by an *approved automatic sprinkler system* installed in accordance with Section 903.3.1.1.
2. *Corridors* protected by an *approved smoke detection fire alarm system* installed in accordance with Section 907.
3. Storage in metal lockers, provided the minimum required egress width is maintained.

807.5.3.2 ~~807.4.3.2~~ Artwork in corridors. Artwork and teaching materials shall be limited on the walls of *corridors* to not more than 20 percent of the wall area.

807.5.3.3 Artwork in classrooms. Artwork and teaching materials shall be limited on walls of classrooms to not more than 50 percent of the specific wall area to which they are attached.

807.5.4 ~~807.4.4~~ Group I-4, day care facilities. Group I-4 occupancies shall comply with, the requirements in Sections ~~807.4.4.1 807.5.4.1 through and 807.4.4.2 807.5.4.2 shall apply to day care facilities classified in Group I-4.~~

807.5.4.1 ~~807.4.4.1~~ Storage in corridors and lobbies. Clothing and personal effects shall not be stored in *corridors* and lobbies.

Exceptions:

1. *Corridors* protected by an *approved automatic sprinkler system* installed in accordance with Section 903.3.1.1.
2. *Corridors* protected by an *approved smoke detection fire alarm system* installed in accordance with Section 907.
3. Storage in metal lockers, provided the minimum required egress width is maintained.

807.5.4.2 ~~807.4.4.2~~ Artwork in corridors. Artwork and teaching materials shall be limited on the walls of *corridors* to not more than 20 percent of the wall area.

807.5.4.3 Artwork in classrooms. Artwork and teaching materials shall be limited on walls of classrooms to not more than 50 percent of the specific wall area to which they are attached.

807.5.5 Dormitories in Group R-2. In Group R-2 dormitories, within sleeping units and dwelling units, the combustible decorative materials, shall be of limited quantities such that a hazard of fire development or spread is not present. *(relocated and revised from Section 807.1, exception 2)*

807.5.6 Groups I-1 and I-2. In Groups I-1 and I-2 occupancies, combustible *decorative materials* shall be of such limited quantities that a hazard of fire development or spread is not present. *(relocated from Section 807.1)*

IFC 807.5.7 Group I-3. In Group I-3, combustible *decorative materials* are prohibited. *(relocated from Section 807.1)*

Reason: The proposed revision is intended to be a clarification of the combustible materials permitted within a space. Specifically, to understand the different requirements for fabric-type decorative materials and paper-type decorative materials and what quantities of each are permitted in various use groups.

Currently, photographs and paintings, in some use groups, are required to be tested and certified to NFPA 701. The scope of this standard does not address paper items such as artwork and photographs and therefore was impossible to comply with.

The scope of NFPA 701 is as follows:

“1.1.1* Test Method 1

1.1.1.1 Test Method 1 shall apply to fabrics or other materials used in curtains, draperies, or other window treatments. Vinyl-coated fabric blackout linings shall be tested according to Test Method 2.

1.1.1.2 Test Method 1 shall apply to single-layer fabrics and to multi-layer curtain drapery assemblies in which the layers are fastened together by sewing or other means. Vinyl-coated fabric blackout linings shall be tested according to Test Method 2.

1.1.1.3 Test Method 1 shall apply to specimens having an areal density less than or equal to 700 g/m² (21 oz/yd²), except where Test Method 2 is required to be used by 1.1.2.”

Most revisions are editorial and serve to provide better clarity and to group requirements by use group.

807.1 – A general statement was needed so that the requirements match the Section title

The former text in 807.1 was re-organized and is now in Section 807.3 and 807.5 for better clarity.

807.2 – re-number only

807.3 - Since Group I-3 are limited to only non-combustible, the limitation is added to the front of the combustible materials.

The remainder of the sentence is revised for coordination with the next section on acceptance criteria and eliminating redundant reference to NFPA 701. That section starts out with “where required to be flame resistant”. The limitation to “curtains, draperies, hangings and other decorative materials suspended from walls or ceilings” is in the first paragraph in Section 807.1. The addition of the words “fabric” hangings and other “similar” combustible decorative materials is to differentiate between fabrics and films that are covered under NFPA Standard 701 and other materials used for decorative effect, that are discussed in 807.5 for each use group.

Exception 1 is specific to Group A for percentage of materials complying with 701.

Exception 2, curtains for dormitories is relocated from 807.1. It was reformatted to be consistent with the exception for auditoriums. Revised language shown below:

2. In Group R-2 dormitories, within sleeping units and dwelling units, the permissible amount of curtains, draperies, fabric hangings and other similar decorative materials suspended from walls or ceiling of sleeping units and dwelling units in dormitories in Group R-2 shall not exceed 50 percent of the aggregate wall areas where the building is equipped throughout with protected by an approved automatic sprinkler system installed in accordance with Section 903.3.1 and such materials are limited to not more than 50 percent of the aggregate area of walls.

Exception 3, reformatted to put groups first.

807.4 – Deleted text is not needed as this is addressed in 807.2. Added text is intended to specifically reference decorative items that are covered under the NFPA Standard.

807.5 – This proposed revision places requirements for multiple use groups in this section so the listing of groups was deleted. In addition, new section 807.1 already states this section is not applicable to decorative vegetation, so this language was deleted.

807.5.1 – these requirements should apply to all occupancies in this section.
Titles at the beginning of each sentence were redundant and not proper code language.

807.5.2 – text re-organized for consistency. The intent is to clarify the following conditions are applicable to Group A

807.5.2.1 – Re-number only

807.5.2.2 - Re-number. This is a subsection of Group A criteria, so group not needed. Consistency between subsections.

807.5.2.3 – Re-number. This is a subsection of Group A criteria, so group not needed. Plus, only in the title, not the text.
Consistency between subsections.

807.5.2.4 - Relocated to group with Group A requirements. This is a subsection of Group A criteria, so group not needed.
Consistency between subsections.

807.5.3 - text re-organized for consistency. The intent is to clarify the following conditions are applicable to Group E

807.5.3.1 – Re-number. Change in Exception 2 is for consistency in language with Section 907.

807.5.3.2 – Re title and re-number only.

807.5.3.3 - This provide guidance within the classroom as to how much art work is permitted.

807.5.4 - The intent of the first sentence is to clarify that the general provisions are applicable for Group I-4. The phrase “day care facilities” is redundant.

807.5.4.1 – Re-number. Change in Exception 2 is for consistency in language with Section 907.

807.5.4.2 – Re-title and re-number only.

807.5.4.3 – This provide guidance within the classroom as to how much art work is permitted.

807.5.5 - Relocate existing exception 2 in 807.1 related to Group R-2 dormitories. Language is similar to paper in school corridors. NFPA 701 does not apply to Photos or paintings. All Group R are now required to be sprinklered, so the threat of flame spread is reduced. Revised language shown below:

807.5.5 (IBC [F] 806.5.5) Dormitories in Group R-2. In Group R-2 dormitories, within sleeping units and dwelling units, the combustible decorative materials, including, but not limited to, photographs and paintings in dormitories in Group R-2 where such materials are shall be of limited quantities such that a hazard of fire development or spread is not present.

807.5.6 - Relocate existing Group I-1 and I-2 from 2nd paragraph of 807.1. New 807.3 would apply to curtains in all occupancies, including Group I-1 and I-2. This allowance is just for the paper permitted in the facilities. Revised language shown below:

IFC 807.5.6 Groups I-1 and I-2. In Groups I-1 and I-2, combustible *decorative materials* shall meet the flame propagation criteria of NFPA 701 unless the decorative materials, including, but not limited to, photographs and paintings, are be of such limited quantities that a hazard of fire development or spread is not present.

807.5.7 – Re-located from 2nd paragraph of 807.1. Also scoped in 807.3

Cost Impact: None

F109-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

807.1-F-CARPENTER.doc

F110 – 13

807.1 (IBC [F] 806.1), 807.2 (IBC [F] 806.2), 807.3 (IBC [F] 806.4), 807.4

Proponent: Marcelo M Hirschler, GBH International (gbhint@aol.com)

Revise as follows:

807.1 (IBC [F] 806.1) General requirements. ~~In occupancies in Groups A, E, I-4 and R-1 occupancies, and dormitories in Group R-2, curtains, draperies, hangings and other decorative materials suspended from walls or ceilings shall comply with 807.1.1, 807.1.2 or 807.1.3 meet the flame propagation performance criteria of NFPA 701 in accordance with Section 807.2 or be noncombustible.~~

807.1.1 (IBC [F] 806.1.1) The decorative materials shall meet the flame propagation performance criteria of Test Method 1 or Test Method 2, as appropriate, of NFPA 701 in accordance with Section 807.2.

807.1.2 (IBC [F] 806.1.2) The decorative materials shall exhibit a maximum rate of heat release of 100 kW when tested in accordance with NFPA 289, using the 20 kW ignition source.

807.1.3 (IBC [F] 806.1.3) The decorative materials shall be noncombustible.

Exceptions:

1. ~~Curtains, draperies, hangings and other decorative~~ Decorative materials suspended from walls of *sleeping units* and *dwelling units* in dormitories in Group R-2 protected by an *approved automatic sprinkler system* installed in accordance with Section 903.3.1 do not need to comply with the requirements of 807.1.1 through 807.1.3 provided and such materials are limited to not more than 50 percent of the area of the specific wall or ceiling to which they are attached ~~aggregate area of walls.~~
2. ~~Decorative materials, including, but not limited to, photographs and paintings in dormitories in Group R-2 do not need to comply with the requirements of 807.1.1 through 807.1.3 where such materials are of limited quantities such that a hazard of fire development or spread is not present.~~

~~In Groups I-1 and I-2, combustible decorative materials shall meet the flame propagation criteria of NFPA 701 unless the decorative materials, including, but not limited to, photographs and paintings, are of such limited quantities that a hazard of fire development or spread is not present. In Group I-3, combustible decorative materials are prohibited.~~

~~Fixed or movable walls and partitions, paneling, wall pads and crash pads, applied structurally or for decoration, acoustical correction, surface insulation or other purposes, shall be considered interior finish if they cover 10 percent or more of the wall or of the ceiling area, and shall not be considered decorative materials or furnishings.~~

~~In Group B and M occupancies, fabric partitions suspended from the ceiling and not supported by the floor shall meet the flame propagation performance criteria in accordance with Section 807.2 and NFPA 701 or shall be noncombustible.~~

807.1.4 (IBC 806.1.4) Wall and ceiling coverings. Fixed or movable walls and partitions, paneling, wall pads and crash pads applied structurally or for decoration, acoustical correction, surface insulation or other purposes shall be considered interior wall or ceiling finish and shall comply with the requirements for interior finish in Section 803 or shall be noncombustible.

Exception: Existing fixed or movable walls and partitions, paneling, wall pads and crash pads applied structurally or for decoration, acoustical correction, surface insulation or other purposes that cover

less than 10 percent of the wall or ceiling area to which they are attached do not need to comply with the requirements of 807.1.4.

807.1.5 (IBC 806.1.5) Fabric partitions. Fabric partitions that are suspended from the ceiling in Group B and M occupancies and not supported by the floor shall comply with the requirements of 807.1.1, 807.1.2 or 807.1.3. The amount of such fabric partitions shall not be limited.

~~807.1.4~~ **807.1.6 (IBC 806.1.6) Noncombustible materials.** The permissible amount of noncombustible decorative material shall not be limited.

~~807.1.2~~ **807.1.7 (IBC 806.1.7) Combustible decorative materials.** The permissible amount of decorative materials meeting the flame propagation performance criteria of Test Method 1 or Test Method 2, as appropriate, of NFPA 701 shall not exceed 10 percent of the specific wall or ceiling area to which they are it is attached.

Exceptions:

4. In auditoriums in Group A, the permissible amount of decorative material meeting the flame propagation performance criteria of Test Method 1 or Test Method 2, as appropriate, of NFPA 701 shall not exceed 75 percent of the aggregate wall area where the building is equipped throughout with an *approved automatic sprinkler system* in accordance with Section 903.3.1.1, and where the material is installed in accordance with Section 803.11 of the *International Building Code*.
- ~~2. The amount of fabric partitions suspended from the ceiling and not supported by the floor in group B and M occupancies shall not be limited.~~

807.2 (IBC [F] 806.2) Acceptance criteria and reports. Where required to be flame resistant, decorative materials shall be tested by an *approved* agency and meet the flame propagation performance criteria of Test Method 1 or Test Method 2, as appropriate, of NFPA 701, or such materials shall be noncombustible. Reports of test results shall be prepared in accordance with NFPA 701 and furnished to the *fire code official* upon request.

807.3 (IBC [F] 806.4) Pyroxylin plastic. Imitation leather or other material consisting of or coated with a pyroxylin or similarly hazardous base shall not be used in Group A occupancies.

807.4 Occupancy-based requirements. In occupancies in Group A, E and ~~I~~ I-4 day care facilities, decorative materials other than decorative vegetation shall comply with Sections 807.4.1 through ~~807.4.6.2~~ 807.4.4.2.

807.4.1 General. All of the following requirements shall apply to all Groups A, and E and I occupancies and ~~Group I-4 day care facilities~~ regulated by Sections 807.4.2 through 807.4.4:

1. Explosive or highly flammable materials. Furnishings or decorative materials of an explosive or highly flammable character shall not be used.
2. Fire-retardant coatings. Fire-retardant coatings in existing buildings shall be maintained so as to retain the effectiveness of the treatment under service conditions encountered in actual use.
3. Obstructions. Furnishings or other objects shall not be placed to obstruct *exits*, access thereto, egress therefrom or visibility thereof.

807.4.2 Group A. The requirements in Sections 807.4.2.1 through 807.4.2.3 shall apply to occupancies in Group A.

807.4.2.1 Foam plastics. Exposed foam plastic materials and unprotected materials containing foam plastic used for decorative purposes or stage scenery or exhibit booths shall have a maximum heat release rate of 100 kW when tested in accordance with UL 1975, or when tested in accordance with NFPA 289 using the 20 kW ignition source.

Exceptions:

1. Individual foam plastic items or items containing foam plastic where the foam plastic does not exceed 1 pound (0.45 kg) in weight do not need to comply with the requirements of 807.4.2.1.
2. Cellular or foam plastic shall be allowed for trim in accordance with Section 804.2.

807.4.2.2 Motion picture screens. The screens upon which motion pictures are projected in new and existing buildings of Group A shall either meet the flame propagation performance criteria of Test Method 1 or Test Method 2, as appropriate, of NFPA 701 or shall comply with the requirements for a Class B interior finish in accordance with Section 803 of the *International Building Code*.

807.4.2.3 Wood use in Group A-3 places of religious worship. In places of religious worship, wood used for ornamental purposes, trusses, paneling or chancel furnishing shall be allowed.

807.4.3 Group E. The requirements in Sections 807.4.3.1 and 807.4.3.2 shall apply to occupancies in Group E.

807.4.3.1 Storage in corridors and lobbies. Clothing and personal effects shall not be stored in *corridors* and lobbies.

Exceptions:

1. *Corridors* protected by an *approved automatic sprinkler system* installed in accordance with Section 903.3.1.1.
2. *Corridors* protected by an *approved smoke detection system* installed in accordance with Section 907.
3. Storage in metal lockers, provided the minimum required egress width is maintained.

807.4.3.2 Artwork in corridors. Artwork and teaching materials shall be limited on the walls of *corridors* to not more than 20 percent of the specific wall area to which they are attached.

807.4.3.3 Artwork in classrooms. Artwork and teaching materials shall be limited on walls of classrooms to not more than 50 percent of the specific wall area to which they are attached.

807.4.4 Groups I-1 and I-2. In Groups I-1 and I-2 occupancies, combustible decorative materials shall comply with the requirements of 807.1.1, 807.1.2 or 807.1.3.

Exceptions:

1. Combustible decorative materials including bulletin boards, artwork, photographs, paintings and similar personal items do not need to comply with the requirements of 807.1.1 through 807.1.3 provided such materials do not exceed 20 percent of the specific wall area to which they are attached.
2. In Group I-2 Condition 1 occupancies and Group I-1 occupancies, combustible decorative materials, including bulletin boards, artwork, photographs, paintings and similar personal items do not need to comply with the requirements of 807.1.1 through 807.1.3 provided such materials do not exceed 50 percent of the specific wall area to which they are attached where located within sleeping units and dwelling units
3.

807.4.5 Group I-3. Combustible decorative materials are prohibited in Group I-3 occupancies.

807.4.4 807.4.6 Group I-4, day care facilities. The requirements in Sections 807.4.6.1 and 807.4.6.2 807.4.4.1 and 807.4.4.2 shall apply to day care facilities classified in Group I-4.

807.4.4.1 807.4.6.1 Storage in corridors and lobbies. Clothing and personal effects shall not be stored in *corridors* and lobbies.

Exceptions:

1. Corridors protected by an *approved automatic sprinkler system* installed in accordance with Section 903.3.1.1.
2. Corridors protected by an *approved smoke detection system* installed in accordance with Section 907.
3. Storage in metal lockers, provided the minimum required egress width is maintained.

807.4.4.2 807.4.6.2 Artwork in corridors. Artwork and teaching materials shall be limited on walls of corridors and classrooms to not more than 20 percent of the specific wall area to which they are attached.

807.4.6.3 Artwork in classrooms. Artwork and teaching materials shall be limited on walls of classrooms to not more than 50 percent of the specific wall area to which they are attached.

Reason: This is primarily a reorganization of section 807 without changes, done for clarification. However, some changes were made as shown below.

1. Areas in healthcare occupancies used for long term patients often exhibit patient-prepared art and seasonal decorations, which help to define a friendlier environment. The 2012 IFC limits the decorative materials present to those materials meeting NFPA 701. These requirements are included independently of automatic sprinkler protection but automatic sprinklers are required in Group I-1 & I-2 facilities. Automatic suppression will limit the fire propagation to the area of origin. Small amounts of decorative finishes will not adversely affect the automatic sprinkler performance for typical materials of paper, cloth, textiles, and plastic films in quantities limited to less than 20% of the wall area. Proposed Section 807.4.4, exception 1, will allow up to 20% of the wall area to be decorative material without NFPA 701 documentation. This allowable area is in response to the users' needs to display artwork for the comfort of the patient/client.
2. The original requirements for Group I-1 & I-2 occupancies allow photos and paintings but only in such limited quantities that a hazard of fire development or spread is not present. Materials meeting NFPA 701 flame propagation requirements are in the 2012 IFC for other decorative materials. Burning characteristics vary widely based on the material used. Quick response sprinklers are required by NFPA 13 for hospital room and sleeping room areas. Group I-1 & I-2 corridor and circulation spaces are considered light hazard area for automatic sprinkler protection. These quick response sprinklers will respond 3 to 5 times faster than standard response sprinklers. This faster response will start suppression when the fire is smaller with less heat and products of combustion generation. Proposed Section 807.4.4, exception 2, will allow in Group I-2 nursing homes and in Group I-1 up to 50% of the wall area of sleeping units or dwelling units to be decorative material without NFPA 701 documentation. Again, this allowable area is in response to the users' needs to display artwork for the comfort of the patient/client.
3. The 2012 IFC Section 807.4.3.2 and 807.4.4.2 for Group E and I-4 occupancies allows art work and teaching materials on the corridor walls not to exceed 20% of the wall area. There is trained staff in the facility at all times it is occupied by students, children or clients. Group I-1 and I-2 occupancies have trained staff present 24 hours a day. Similar safe guards are present in these 3 types of occupancies. I-1 and I-2 also have smoke zoning and special protection of hazard requirements to control exposure to the products of combustion.
4. Flame spread on the decorative wall covering will be primarily in the vertical direction. Horizontal propagation will occur at a considerably slower rate than the vertical in typical corridor configurations. This slower horizontal propagation can be retarded or controlled by the quick response sprinklers. 20% of the wall area was selected as a reasonable limit, allowing the facility flexibility in using decorative wall materials.
5. Other issues covered in the re-write follow.
6. Wall coverings and ceiling coverings cannot be tested to NFPA 701. Thus, surface coverings should be deleted from the definition of decorative materials and wall coverings and ceiling coverings added. This was done in a separate proposal, because it is not dependent on this change.
7. If a partition is attached to the wall it is a wall covering system. Such partitions usually are fabric covering foam plastic and they should not be exempt from testing because they can result in having very high heat release.
8. Chapter 8 of the IBC treats wall coverings and ceiling coverings differently because textile ceiling coverings and expanded ceiling coverings cannot be tested to NFPA 265 and therefore the section (now 807.1.4) should address wall and ceiling coverings.
9. If a "partition" is attached to a wall it is not a partition but either a wall covering or a curtain/drape and it is covered by the general requirements for wall coverings in 807.1.4.
10. Once a partition is supported from the floor it becomes more structural and it cannot be tested to NFPA 701.
11. Fabric partitions are covered by 807.1.5, which addresses how they should be tested and there is no need for an exception to 807.1.7.
12. The IFC now includes NFPA 289 as a test and it offers a better option for testing than NFPA 701 so it should be added as an option. It would be an intermediate option between NFPA 701 and noncombustible.
13. NFPA 701 has two tests: test 1 and test 2 (with the weight per unit area of the decoration being what determines which one is used). Many manufacturers advertise fabrics that "meet NFPA 701" and sometime they add that the fabric meets the "small scale test in NFPA 701". The problem is that the "small scale test" was eliminated from NFPA 701 in 1989

(because it does not provide adequate safety) and is now no longer an acceptable test anywhere. This is covered by a separate proposal submitted by Tim Earl, because it is independent of the action here. That has already been done in the IBC.

14. The IFC 2012 code is silent about fixed or movable walls, etc. that cover less than 10% of a wall or ceiling area. To avoid problems the proposal recommends that we grandfather in existing systems.

Cost Impact: Minimal

F110-12

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

807.1-F-HIRSCHLER

F111 – 13

(IBC [F] 202); 807.1 (IBC [F] 806.1), 807.4, 807.4.1, 807.4.3.1, 807.4.4, 807.4.4.1, 807.4.5(New)

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care (john.williams@doh.wa.gov) and Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee (cbaldassarra@RJAGroup.com)

Revise as follows:

SECTION 202 (IBC [F] 202) GENERAL DEFINITIONS

DECORATIVE MATERIALS. All materials applied over the building *interior finish* for decorative, acoustical or other effect (~~such as including but not limited to~~ curtains, draperies, fabrics, streamers and surface coverings), and all other materials utilized for decorative effect (~~such as including but not limited to, photographs, paintings, bulletin boards, artwork, posters, batting, cloth, cotton, hay, stalks, straw, vines, leaves, trees, moss and similar items~~), including foam plastics and materials containing foam plastics. Decorative materials do not include floor coverings, ordinary window shades, *interior finish* and materials 0.025 inch (0.64 mm) or less in thickness applied directly to and adhering tightly to a substrate.

SECTION 807 DECORATIVE MATERIALS OTHER THAN DECORATIVE VEGETATION IN NEW AND EXISTING BUILDINGS

IFC 807.1 (IBC [F] 806.1) General requirements. In occupancies in Groups A, E, I-1 and R-1 and dormitories in Group R-2, curtains draperies, hangings and other combustible decorative materials suspended from walls or ceilings shall meet the flame propagation performance criteria of NFPA 701 in accordance with section 807.2 or be noncombustible.

Exceptions:

1. Curtains, draperies, hangings and other combustible decorative materials suspended from walls of *sleeping units* and *dwelling units* in dormitories in Group R-2 ~~protected~~ equipped by an approved automatic sprinkler system installed in accordance with Section 903.3.1 and such materials are limited to not more than 50 percent of the aggregate area of walls.
2. Decorative materials, including, but not limited to, photographs and paintings in dormitories in Group R-2 where such materials are of limited quantities such that a hazard of fire development or spread is not present.

In Groups I-1 and I-2, curtains, draperies, hangings and other combustible decorative materials suspended from walls or ceilings shall meet the flame propagation performance criteria of NFPA 701 or be noncombustible unless the decorative materials, including, but not limited to, photographs and paintings, are of such limited quantities that a hazard of fire development or spread is not present.

In Group I-3, combustible decorative materials are prohibited.

Fixed or movable walls and partitions, paneling, wall pads and crash pads applied structurally or for decoration, acoustical correction, surface insulation or other purposes shall be considered *interior finish* if they cover 10 percent or more of the wall or of the ceiling area, and shall not be considered *decorative materials* or furnishings.

In Group B and M occupancies, fabric partitions suspended from the ceiling and not supported by the floor shall meet the flame propagation performance criteria in accordance with Section 806.2 and NFPA 701 or shall be noncombustible.

IFC 807.4 Occupancy-based requirements. In occupancies specified in Group A, E and I-4 day care facilities, combustible decorative materials other than decorative vegetation shall comply with Sections 807.4.1 through 807.4.4.2 807.4.5.4.

IFC 807.4.1 General. All of the following requirements shall apply to all Group A, and E occupancies and Group I-4 day care facilities occupancies regulated by Sections 807.4.2 through 807.4.4:

1. ~~Explosive or highly flammable materials:~~ Furnishings or decorative materials of an explosive or highly flammable character shall not be used.
2. ~~Fire-retardant coatings:~~ Fire-retardant coatings in existing buildings shall be maintained so as to retain the effectiveness of the treatment under service conditions encountered in actual use.
3. ~~Obstructions:~~ Furnishings or other objects shall not be placed to obstruct *exits*, access thereto, egress there from or visibility thereof.

807.4.2 Group A. *(No change)*

807.4.2.1 Foam plastics. *(No change)*

807.4.2.2 Motion picture screens. *(No change)*

807.4.2.3 Wood use in Group A-3 places of religious worship. *(No change)*

807.4.3 Group E. *(No change)*

807.4.3.1 Storage in corridors and lobbies. Clothing and personal effects shall not be stored in *corridors* and lobbies.

Exceptions:

1. *Corridors* protected by an *approved automatic sprinkler system* installed in accordance with Section 903.3.1.1.
2. *Corridors* protected by an *approved* smoke detection system installed in accordance with Section 907.
3. Storage in metal lockers, provided the minimum required egress width is maintained.

807.4.3.2 Artwork. *(No change to current text)*

807.4.4 Group I-4, day care facilities. ~~Group I-4 occupancies shall comply with~~ the requirements in Sections 807.4.4.1 and 807.4.4.2 ~~shall apply to day care facilities classified in Group I-4.~~

807.4.4.1 Storage in corridors and lobbies. Clothing and personal effects shall not be stored in *corridors* and lobbies.

Exceptions:

1. *Corridors* protected by an *approved automatic sprinkler system* installed in accordance with Section 903.3.1.1.
2. *Corridors* protected by an *approved* smoke detection system installed in accordance with Section 907.
3. Storage in metal lockers, provided the minimum required egress width is maintained.

807.4.4.2 Artwork. Artwork and teaching materials shall be limited on the walls of *corridors* to not more than 20 percent of the wall area.

IFC 807.4.5 Groups I-1 and I-2. In Groups I-1 and I-2 occupancies, combustible decorative materials shall comply with Sections 807.4.5.1 through 807.4.5.4

IFC 807.4.5.1 Group I-1 and Group I-2 Condition 1 within units. In Group I-1 and Group I-2 Condition 1 occupancies, equipped throughout by an *approved automatic sprinkler system* installed in accordance with Section 903.3.1, within sleeping units and dwelling units, combustible decorative materials are limited to not more than 50 percent of the aggregate wall area.

IFC 807.4.5.2 In Group I-1 and Group I-2 Condition 1 for areas other than within units. In Group I-1 and Group I-2 Condition 1 occupancies, equipped throughout by an *approved automatic sprinkler system* installed in accordance with Section 903.3.1, combustible decorative materials in areas other than within dwelling and sleeping units are limited to not more than 30 percent of the aggregate wall area.

IFC 807.4.5.3 In Group I-2 Condition 2. In Group I-2 Condition 2 occupancies, equipped throughout by an *approved automatic sprinkler system* installed in accordance with Section 903.3.1, the combustible decorative materials are limited to not more than 30 percent of the aggregate wall area.

IFC 807.4.5.4 Other areas in Groups I-1 and I-2. In Group I-1 and I-2 occupancies, in areas not equipped throughout by an *approved automatic sprinkler system*, the combustible decorative materials, shall be of such limited quantities that a hazard of fire development or spread is not present.

Reason: The intent of this proposal is to create consistent language for the Group I-1, I-2, and I-4 language for flame resistant curtains complying with NFPA 701 and the appropriate amount of paper permitted in these environments. The format for Group I-2 is consistent with how education and day care are currently addressed.

807.1 –The change from Group I-1 to I-4 in the first line is because I-1, I-2 and I-3 are addressed later in the section. For Group I-1 and I-2, the language is revised so it is clear what materials must comply with NFPA 701. Allowances for other decorative materials in Group I-1 and I-2 will be addressed in a new Section 807.4.5.

In the remainder of revised sections, the changes are editorial clean ups for consistent use of language and current terminology.

- 807.4 is revised to include the provisions added for Group I-1 and I-2.
- 807.4.1 is revised to remove redundant language.
- 807.4.3.1 is revised for consistent language with the referenced Section 907
- 807.4.4 is revised to remove redundant language.
- 807.4.4.1 is revised for consistent language with the referenced Section 907

807.4.5 is new text to address Group I-1 and I-2 facilities.-

Residents/patients in health care facilities increasingly seek to make their stay be comfortable and maintain connections with family and community. Part of this process may include decorating their bedrooms with personal décor from their homes, pictures drawn by their grandchildren, get well cards and other such items. The code currently calls for any combustible decorations to meet the flame spread requirements of NFPA 701, and a report must be provided to the code official. However, it is not practical nor routinely possible for every construction paper drawing or greeting card to be tested to NFPA 701 or to be treated with a flame retardant coating.

However, Section 407.2.1 of the code allows waiting or similar areas to be open to corridors. These types of spaces typically have magazines, bulletin boards with paper notices tacked to them, and other combustible items, not treated with flame retardants nor tested to NFPA 701. We submit that by allowing a specified percentage of un-treated, combustible decorative materials, in fully sprinkled Group I-1 and I-2 buildings, we do not exceed the “ordinary occupancy” classification outlined in NFPA 13, nor to do we increase the fire loading above what is currently permitted. What this proposal does do, though, is provide consistent language to aid enforcement, and provides a guide to providers to determine compliance within their facilities. This should eliminate the haphazard and inconsistent application of these provisions in facilities nationwide. A brief outline of the new provisions are as follows:

Section 807.4.5.1 - Group I-1 and I-2 Condition 1 buildings, that are protected throughout with an automatic sprinkler system, would be allowed to have combustible decorative materials that cover up to 50% of the aggregate area of walls inside of resident rooms. This is consistent with the requirements within sprinklered dwelling units in Group R-2 dormitories.

Section 807.4.5.2 - In I-1 and I-2 Condition 1 buildings, that are protected throughout with an automatic sprinkler system, spaces other than resident rooms would be limited to 30% coverage of walls by combustible decorative materials. This would include common spaces and corridors.

Section 807.4.5.3 - For Group I-2 Condition 2 buildings, protected throughout with an automatic sprinkler system, all spaces would be limited to 30% coverage of walls. The need for this allowance is for such items as pictures, bulletin boards, safety bulletins, educational materials, patient bills or rights, allowing longer term patients to put up cards, and limited holiday decorations.

Section 807.4.5.4 - For existing Group I-1 and I-2 non-sprinkled buildings, and for Group I-2 buildings that have not yet retroactively provide complete automatic sprinkler protection, Section 807.4.5.4 shall apply. This text is current language relocated from Section 807.1.

Please note, that this proposed language change would also include combustible decorations that are tested to NFPA 701 or have been treated with an approved fire retardant coating within these limits. This change would also allow decorations to be placed on doorways, as long as they are either less than 50% coverage inside a Group I-1 or I-2 Condition 1 resident or 30% in other areas, and do not obstruct the use of the door, nor block vision panels.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering, a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>.

This proposal is being co-sponsored by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

Cost Impact: None

F111-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

807.1-F-BALDASSARRA.DOC

F112 – 13

808.1, 808.2, 5003.8.7.1, 5003.9.10, 5005.1.10, 5704.3.2.1.1, 5705.2.4, Chapter 80

Proponent: Glen Carter, Justrite Manufacturing Company LLC

Revise as follows:

808.1 Wastebaskets and linen containers in Group I-1, I-2 and I-3 occupancies. Wastebaskets, linen containers and other waste containers, including their lids, located in Group I-1, I-2 and I-3 occupancies shall be constructed of noncombustible materials or of materials that meet a peak rate of heat release not exceeding 300 kW/m² when tested in accordance with ASTM E 1354 at an incident heat flux of 50 kW/m² in the horizontal orientation. Metal wastebaskets and other metal waste containers with a capacity of 20 gallons (75.7 L) or more shall be listed in accordance with UL 1315 or approved in accordance with FM 6921 and shall be provided with a noncombustible lid. Portable containers exceeding 32 gallons (121 L) shall be stored in an area classified as a waste and linen collection room and constructed in accordance with Table 509 of the International Building Code.

808.2 Waste containers with a capacity of 20 gallons or more in Group R-2 college and university dormitories. Waste containers, including their lids, located in Group R-2 college and university dormitories, and with a capacity of 20 gallons (75.7 L) or more, shall be constructed of noncombustible materials or of materials that meet a peak rate of heat release not exceeding 300 kW/m² when tested in accordance with ASTM E 1354 at an incident heat flux of 50 kW/m² in the horizontal orientation. Metal wastebaskets and other metal waste containers with a capacity of 20 gallons (75.7 L) or more shall be listed in accordance with UL 1315 or approved in accordance with FM 6921 and shall be provided with a noncombustible lid. Portable containers exceeding 32 gallons (121 L) shall be stored in an area classified as a waste and linen collection room constructed in accordance

5003.8.7.1 Construction. The interior of cabinets shall be treated, coated or constructed of materials that are nonreactive with the hazardous material stored. Such treatment, coating or construction shall include the entire interior of the cabinet. Cabinets shall either be listed in accordance with UL 1275 or approved in accordance to FM 6050 as suitable for the intended storage or constructed in accordance with the following: with Table 509 of the International Building Code.

5003.9.10 Safety cans. Safety cans shall be listed in accordance with UL 30, UL 1313, or approved in accordance with FM 6051 and FM 6052 when used to increase the maximum allowable quantities per control area of flammable or combustible liquids in accordance with Table 5003.1.1(1). ~~Safety cans listed in accordance with UL 1313 are allowed for flammable and combustible liquids when not used to increase the maximum allowable quantities per control area and for other hazardous material liquids in accordance with the listing.~~

5005.1.10 Liquid transfer. Liquids having a hazard ranking of 3 or 4 in accordance with NFPA 704 shall be transferred by one of the following methods:

1. From safety cans complying with UL 30, UL 1313 or with FM 6051 and FM 6052.
- 2 through 5 *(No change to current text)*

5704.3.2.1.1 Materials. Cabinets shall be listed in accordance with UL 1275, or approved in accordance to FM 6050, or constructed of approved wood or metal in accordance with the following:

5705.2.4 Class I, II and III liquids. Class I liquids or when heated to or above their flash points, Class II and Class III liquids shall be transferred by one of the following methods:

1. From safety cans complying with UL 30, UL 1313 or with FM 6051 and FM 6052
- 2 through 5 *(No change to current text)*

Add standards to Chapter 80 as follows:

FM

6050-96	Approval Standard for Storage Cabinets (Flammable and Combustible Liquids
6051 and 6052-76	Approval Standard for Safety Containers and Filling, Supply and Disposal Containers
6921-04	Approval Standard for Cabinets for Combustible Waste

Reason:

- 1) For those proposals adding the appropriate FM Approval standard: FM Approvals is a nationally and globally recognized laboratory who just like UL has construction specifications these safety products have to be built to, performance specification these safety products are tested to before an approval is issued.

FM Approvals publish an approval guide that lists all the products they have approved. And FM Approvals conducts periodic quality assurance audits to assure the approved products are manufactured to the same standards as those products and designs that were submitted for evaluation. All design changes are submitted to FM Approvals for their approval prior to those changes being allowed. The fire tests conducted by both organizations (UL & FM) on these products are to the same time temperature curve.

It is in this spirit that FM Approvals should be included in the IFC as a nationally & globally recognized approval laboratory.

- 2) For those proposals 5003.9.10, 5005.1.10, and 5705.2.4 I am proposing adding UL 1313 for Non-metallic Safety Cans. Non-metallic safety cans are tested the same way as metallic safety cans and are as safe or safer than the metallic safety cans. If you had ever seen a non-metallic safety can in a fire test you would no longer be a skeptical.
 - a) Intuitively, it is hard to imagine a safety can made of polyethylene surviving a fire test. I was curious about this concept until I witnessed our non-metallic safety can in a fire test conducted at UL. In the fire test, the safety can performed very admirably in the way the design met its goals, in not contributing to the spread of fire. Our non-metallic safety can vented on cue. As the vented vapors were being consumed by fire, the level of the liquid fuel lowered in the can. In turn the polyethylene started to melt but, only in the void above the fluid level. The liquid fuel level was protecting the can from melting further by absorbing the heat. As the fluid level went down the safety can's walls melted inward and further down the height of the can above the fuel level. This continued until all the fuel inside the safety can had been consumed while contained within the safety can's walls. There was no spew of fuel; no rupture of the safety can spreading fuel all over the area. That is exactly the intended result of a well-designed safety can. I believe once anyone has witnessed this test and understood the consequences they would be compelled to agree too.
 - b) There are numerous flammable and combustible liquids that are incompatible with metallic safety cans. As an example, isopropyl alcohol will begin to pit a metallic safety can until micro leaks begin to occur. The only safe and compatible solution for storage of this liquid and others is a non-metallic safety can.
 - c) A non-metallic safety can is definitely more robust during a drop test; our non-metallic safety can designs will rebound undamaged because of its superior thick wall strength. The metallic safety can in a drop test will result in a dented and crumpled shell. Both meet the criteria of a safety can but you cannot top the strength and resilience of the poly can.
 - d) Metallic and non-metallic safety cans both benefit work place safety and each are recognized by many local, state, and federal laws. Non-metallic safety cans would be a loss to the safety community if it is not recognized. It is hard to picture what legal & safe alternative will be available to those whose processes that currently requiring non-metallic safety cans. Non-metallic safety cans have long provided a safe solution over makeshift consumer gasoline cans or glass/plastic carboys etc...

Note: The FM 6051 and 6052 are a combined specification covering metallic and non-metallic safety cans.

- 3) I am proposing the deletion illustrated in section 5003.9.10 to allow non-metallic safety cans to be used to allow the increase of MAQs in a control area for those reasons described in 2 a), b), c), & d) above.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standards proposed for inclusion in the code, FM 6050-96, FM 6051 and 6052-76 and FM 6921-04, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013. The standard UL 1313 is currently referenced within the IFC.

F112-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

XXX

F113 – 13

901.4.1

Proponent: Edwin M. Berkel, CFI, Fire Marshal, Mehlville Fire Protection District, St, Louis, MO
(EBerkel@mehlvillefire.com)

Revise as follows:

901.4.1 Required fire protection systems. Fire protection systems required by this code or the *International Building Code* shall be installed, repaired, operated, tested and maintained in accordance with this code. Any fire protection system for which a design option, exception or reduction to the provisions of this code or the *International Building Code* has been granted shall be considered to be a required system.

Reason: The new text proposed for this section parallels the second paragraph of Section 901.2 of the IBC and will improve the correlation between the IBC and the IFC. While the code may not require a fire protection system for a specific building or portion thereof due to its occupancy, the fire protection system would still be considered a required system if some other code trade-off, exception, reduction or design option was taken based on the installation of the fire protection system. As a typical example, a small office building would not require an automatic sprinkler system solely due to its Group B occupancy classification; however, if an exit access corridor fire-resistance-rating reduction is taken in accordance with Table 1018.1 for buildings equipped throughout with an NFPA 13 sprinkler system, that sprinkler system would then be considered a required system. Code trade-offs, exceptions, reductions or other design options are not unique to the IBC but also occur frequently in the IFC. The following 62 IFC sections, among others, illustrate this fact and validate the need for the added text:

Chapter 3: 5 Sections: 304.3.3, 304.3.4, 308.1.4, 313.1, 318.1)
Chapter 4: Section 403.3
Chapter 5: 2 Sections (503.1.1, 507.5.1)
Chapter 6: Section 603.3.2.1
Chapter 8: 1 3 sections (Table 803.3, 803.5.1, 804.3.3.2, 805.1.1.2, 805.1.2.2, 805.2.1.2, 805.2.2.2, 805.4.1.2, 805.4.2.2, 806.1.1, 807.1, 807.4.3.1, 807.4.4.1)
Chapter 10: 16 sections (1005.3.1, 1005.3.2, 1007.2.1, 1007.3, 1007.4, 1008.1.9.4, 1009.3, Table 1014.3, 1015.1, 1015.2, Table 1016.2, Table 1018.1, 1018.4, Table 1021.2(1), Table 1021.2(2), 1022.1, 1026.6)
Chapter 11: 11 sections (1103.4.2, 1103.4.4, 1103.4.5, 1103.4.6, 1103.7.5.1, 1103.7.6, 1104.16.2, 1104.17, 1104.17.1, Table 1104.17.2, 1104.21)
Chapter 28: Section 2804.2.1
Chapter 32: Section 3204.2
Chapter 50: 3 Tables: 5003.1.1(1), 5003.1.1(2) and 5003.11.1
Chapter 57: 3 Sections: 5704.29.2.3., 5704.3.6.2, Tables 5704.3.6.3(1), (2) and (3)
Chapter 60: Section 6002.3.5
Appendix Sections: B105.1, B105.2; D106.1, D107.1

Cost impact: This proposal will not increase the cost of construction.

F113-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

901.4.1-F-BERKEL

F114 – 13

901.4.3.1 (New)

Proponent: Al Godwin, CBO, CPM, Aon Fire Protection Engineering, representing Aon Fire Protection Engineering Corporation (al.godwin@aon.com)

Add new text as follows:

901.4.3.1 Speculative buildings. In new buildings or existing buildings undergoing interior demolition, that create vacant *fire areas* in size that exceed the established limits but have a future intent to divide *fire areas* so as not to exceed the limits established for requiring a *fire protection system*, such areas shall install preliminary *fire area* separations as described in Section 901.4.3 until such tenant insertions occur and such separations can be relocated to meeting tenant locations.

Reason: There are some developments that intend on sprinklering but desire to wait until the first tenant is installed, postponing the costs until rent can be collected. And there are some that desire to do such sprinklering with each tenant installation; thus, not achieving a fully sprinklered building until fully occupied. Such buildings are not addressed in this provision but are left to local discretion.

This provision is for buildings that are identified as being non-sprinklered such as retail strip centers. As with sprinklers, an intent is sometimes expressed to install the separations as tenant finish out occurs, avoiding the cost until a renter is installed. In this case, at a bare minimum, the floor/ceiling of a two-story building should have a 1-hour rating installed up front. Of course, an upgrade to 2-hour might be required sporadically in the future.

Having to install such horizontal assembly at a later date, from structural to structural, including the columns to foundation may prove difficult. And, it is possible that such horizontal assemblies are not installed at all due to the difficulty of crossing existing tenants.

Also, it is not uncommon for developers to flip such projects, leaving the new owner and future architects clueless of the requirement. It also requires that the jurisdiction keep up with such buildings so as to tag them with each finish out permit.

Installation up front will comply with code and provide a reminder that such separations are continually required.

Opposition to this code change might express the idea:

1. that a hazard does not exist until occupancy occurs;
2. that this requires double costs for such separation construction; or,
3. such vacant spaces are often not closed in across the front subjecting such protection to the elements.

As such, it should encourage more sprinklering to avoid this issue.

Costs: in jurisdiction where this is not enforced now, this will increase the cost of construction.

F114-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

901.4.3.1 (NEW)-F-GODWIN

F115 – 13

901.4.6 (IBC [F] 901.8)

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

901.4.6 Pump and riser room size. Where provided fire pump rooms and automatic sprinkler system riser rooms shall be designed with adequate space for all equipment necessary for the installation, as defined by the manufacturer, with sufficient working room around the stationary equipment. Clearances around equipment to elements of permanent construction, including other installed equipment and appliances, shall be sufficient to allow inspection, service, repair or replacement without removing such elements of permanent construction or disabling the function of a required fire-resistance-rated assembly. Fire pump and automatic sprinkler system riser rooms shall be provided with a door(s) and unobstructed passageway large enough to allow removal of the largest piece of equipment.

Reason: A fire pump room, an automatic sprinkler riser room, or the combination is not required by this section. This section can be interpreted to require rooms around fire sprinkler risers. The Fire Code committee and proponent verbally clarified this intent during 09/10 cycle. The proponent's intent is to clarify these rooms are not required. When one is provided, it is required to meet Section 901.8.

Cost Impact: This code change will increase the cost of construction

F115-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

901.4.6-F-ZUBIA-FCAC

F116 – 13

901.7, 311.2.2

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

901.7 Systems out of service. In other than one- and two-family dwellings and Group R-3 occupancies, where a required fire protection system is out of service, the fire department and the fire code official shall be notified immediately. In other than one- and two-family dwellings and Group R-3 occupancies, where a required fire protection system is out of service and, where required by the fire code official, the building shall either be evacuated or an approved fire watch shall be provided for all occupants left unprotected by the shutdown until the fire protection system has been returned to service. Vacant premises shall comply with Section 311.2.2.

Where utilized, fire watches shall be provided with at least one approved means for notification of the fire department and their only duty shall be to perform constant patrols of the protected premises and keep watch for fires.

Revise as follows:

311.2.2 Fire protection. Fire alarm, sprinkler and stand-pipe systems shall be maintained in an operable condition at all times. Before a vacant premises is permitted to be reoccupied, the fire code official shall have the authority to require inspection and testing of any fire protection system that has been out of service for 30 days or greater.

Exceptions:

1. When the premises have been cleared of all combustible materials and debris and, in the opinion of the fire code official, the type of construction, fire separation distance and security of the premises do not create a fire hazard.
2. Where approved by the fire chief, buildings that will not be heated and where fire protection systems will be exposed to freezing temperatures, fire alarm and sprinkler systems are permitted to be placed out of service and standpipes are permitted to be maintained as dry systems (without an automatic water supply), provided the building has no contents or storage, and windows, doors and other openings are secured to prohibit entry by unauthorized persons.

Reason: Section 901.7 is revised because it is imperative that the fire department and the fire code official must be notified when **any** fire protection system is taken out of service, not just required systems. Dwellings are eliminated from this requirement since the dwelling fire sprinkler system is designed to provide life safety and only operate for 10 minutes. Arriving firefighters expect the systems they encounter to be operational in commercial facilities, and many times will make decisions based on the operating fire sprinkler system. The second sentence and the remainder of the section are appropriate to apply only to required systems, so the reference to required fire sprinkler systems is added back in at this point.

Additionally, there should also be a reference directing the code user to Section 311.2.2 for the requirements for fire protection systems in vacant buildings.

Section 311.2.2 is revised because when a fire protection system that has been out of service for 30 days or more in a vacant building could have been subject to corrosion or vandalism and needs to be inspected and tested to ensure that it working properly before allowing the building to be reoccupied.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

Cost Impact: The code change proposal will not increase the cost of construction.

F116-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

901.7-F-ZUBIA-FCAC

F117 – 13

903.2.1 (IBC [F] 903.2.1)

Proponent: Barry Gupton, PE, NC Department of Insurance, Office of State Fire Marshal, Engineering Division (barry.gupton@ncdoi.gov)

Revise as follows:

903.2.1 (IBC [F] 903.2.1) Group A. An *automatic sprinkler system* shall be provided throughout buildings and portions thereof used as Group A occupancies as provided in this section. For Group A-1, A-2, A-3 and A-4 occupancies, the *automatic sprinkler system* shall be provided throughout the floor ~~area where~~ the containing a Group A-1, A-2, A-3 or A-4 occupancy ~~is located~~, and in all floors from the Group A occupancy to, and including, the nearest *level of exit discharge* serving the Group A occupancy. For Group A-5 occupancies, the *automatic sprinkler system* shall be provided in spaces indicated in Section 903.2.1.5.

Reason The term "floor area" is confusing. "Floor area" infers that only the actual space where the Group A-1, A-2, A-3 or A-4 occupancies are located require sprinklers on that floor. The intent of the code is to provide sprinklers for the entire story where the Group A occupancy is located as well as the stories between that story and the level of exit discharge. The changed wording is to help clarify the intent of the code.

Cost Impact: The code change proposal will not increase the cost of construction.

F117-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

903.2.1 #1-FS-GUPTON

F118 – 13

903.2.1 (IBC [F] 903.2.1)

Proponent: Barry Gupton, PE, NC Department of Insurance, Office of State Fire Marshal, Engineering Division (barry.gupton@ncdoi.gov)

Revise as follows:

903.2.1 (IBC [F] 903.2.1) Group A. An *automatic sprinkler system* shall be provided throughout buildings and portions thereof used as Group A occupancies as provided in this section. For Group A-1, A-2, A-3 and A-4 occupancies, the *automatic sprinkler system* shall be provided throughout the floor area where the Group A-1, A-2, A-3 or A-4 occupancy is located, and in all floors from the Group A occupancy to, and including, the ~~nearest level~~ levels of exit discharge serving the Group A occupancy. For Group A-5 occupancies, the *automatic sprinkler system* shall be provided in spaces indicated in Section 903.2.1.5.

Reason This change insures that floors adjacent to all exit discharges serving the assembly occupancy are protected with sprinklers to provide the additional time required to egress the higher occupant load. The previous language of "nearest level of exit discharge" may only protect one exit when exit discharge is on more than one level.

Cost Impact: The code change proposal will increase the cost of construction for buildings with more than one level of exit discharge that would not otherwise require sprinklers.

F118-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

903.2.1 #2-FS-GUPTON

F119 – 13

903.2.1

Proponent: Daniel E. Nichols, P.E., New York State Department of State (dan.nichols@dos.ny.gov)

Revise as follows:

903.2.1 Group A. An *automatic sprinkler system* shall be provided throughout buildings and portions thereof used as Group A occupancies as provided in this section. For Group A-1, A-2, A-3 and A-4 occupancies, the *automatic sprinkler system* shall be provided throughout the floor area where the Group A-1, A-2, A-3 or A-4 occupancy is located, and in all floors from the Group A occupancy to, and including, the nearest *level of exit discharge* serving the Group A occupancy. For Group A-5 occupancies, the *automatic sprinkler system* shall be provided in the spaces indicated in Section 903.2.1.5.

903.2.1.1 Group A-1. An *automatic sprinkler system* shall be provided for Group A-1 occupancies where one of the following conditions exists:

1. The *fire area* exceeds 12,000 square feet (1115 m²).
2. The *fire area* has an *occupant load* of 300 or more.
3. The *fire area* is located on a floor other than a *level of exit discharge* serving such occupancies.
4. ~~The *fire area* contains a multitheater complex.~~ When separate fire areas share exit or exit access components that have a cumulative occupant load of 300 or more.

903.2.1.2 Group A-2. An *automatic sprinkler system* shall be provided for Group A-2 occupancies where one of the following conditions exists:

1. The *fire area* exceeds 5,000 square feet (464 m²).
2. The *fire area* has an *occupant load* of 100 or more.
3. The *fire area* is located on a floor other than a *level of exit discharge* serving such occupancies.
4. When separate fire areas share exit or exit access components that have a cumulative occupant load of 300 or more.

903.2.1.3 Group A-3. An *automatic sprinkler system* shall be provided for Group A-3 occupancies where one of the following conditions exists:

1. The *fire area* exceeds 12,000 square feet (1115 m²).
2. The *fire area* has an *occupant load* of 300 or more.
3. The *fire area* is located on a floor other than a *level of exit discharge* serving such occupancies.
4. When separate fire areas share exit or exit access components that have a cumulative occupant load of 300 or more.

903.2.1.4 Group A-4. An *automatic sprinkler system* shall be provided for Group A-4 occupancies where one of the following conditions exists:

1. The *fire area* exceeds 12,000 square feet (1115 m²).
2. The *fire area* has an *occupant load* of 300 or more.
3. The *fire area* is located on a floor other than a *level of exit discharge* serving such occupancies.
4. When separate fire areas share exit or exit access components that have a cumulative occupant load of 300 or more.

Reason: Under the current provisions for sprinkler protection in assembly occupancies, the option of a fire area allows for compartmentation to be utilized in place of installing a sprinkler system. The issue with this arrangement is that multiple small assembly occupancies can be placed in a single story building and not trigger a sprinkler system because of the installation of a rated corridor and separation wall.

This proposal adds the requirement that sprinkler systems shall be added when the convergence of more than 300 persons shares an exit. This is consistent with the intent of automatic sprinkler systems being required for life safety and to maintain tenable

exiting in a fire event. A fire event that is near an exit is the same whether there are 300 occupants in one room or three rooms with 100 occupants each sharing an exit. This is also consistent with the requirement in the current IFC for A-1 occupancies in "multitheater complex", which is a requirement for anytime two or more theaters are in the same tenancy and does not consider occupant load as a trigger.

This proposal still provides options for those single story buildings with multiple tenancies that have separate exits and utilize the fire area separation concept; such as buildings with multiple restaurants with separate entrances and strip-style mall buildings.

The State of New York has had experience in both fire losses and new building construction with this topic. First, the Stouffer's Inn and conference center in 1981 killed 23 top-level executives when a fire in a common hallway trapped occupants in several small (50-100 person) conference rooms. Second, the fire area method of separating A-3 occupancies has provided a way to not sprinkler college and university lecture room buildings by separating the spaces but having room occupant loads approaching 1,000 people in the common hallway.

This proposal is submitted with the endorsement of the New York State Building Officials Conference, the New York State Fire Marshals and Inspectors Association, and the Association of Fire Districts of New York State.

Cost Impact: For buildings that have previously utilized the passive method of separating assembly occupancies when exiting is shared, this will increase the cost of construction due to the additional sprinkler requirement.

F119-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

903.2.1-F-NICHOLS

F120 – 13

903.2.1

Proponent: Carl D. Wren, P.E., Austin Fire Department, representing self (carl.wren@austintexas.gov)

Revise as follows:

903.2.1 Group A. An automatic sprinkler system shall be provided throughout buildings and portions thereof used as Group A occupancies as provided in this section. For Group A-1, A-2, A-3 and A-4 occupancies, the automatic sprinkler system shall be provided throughout the floor ~~area~~ where the fire area containing the Group A-1, A-2, A-3 or A-4 occupancy is located, and ~~in~~ throughout all floors of the building ~~from above or below~~ the Group A occupancy to, and including, the nearest level of exit discharge serving the Group A occupancy. For Group A-5 occupancies, the automatic sprinkler system shall be provided in the spaces indicated in Section 903.2.1.5.

903.2.1.1 Group A-1. An automatic sprinkler system shall be provided for fire areas containing Group A-1 occupancies and intervening floors of the building that impact the egress pathways where one of the following conditions exists:

1. The fire area exceeds 12,000 square feet (1115 m2).
2. The fire area has an occupant load of 300 or more.
3. The fire area is located on a floor other than a level of exit discharge serving such occupancies.
4. The fire area contains a multitheater complex.

903.2.1.2 Group A-2. An automatic sprinkler system shall be provided for fire areas containing Group A-2 occupancies and intervening floors of the building that impact the egress pathways where one of the following conditions exists:

1. The fire area exceeds 5,000 square feet (464 m2).
2. The fire area has an occupant load of 100 or more.
3. The fire area is located on a floor other than a level of exit discharge serving such occupancies.

903.2.1.3 Group A-3. An automatic sprinkler system shall be provided for fire areas containing Group A-3 occupancies and intervening floors of the building that impact the egress pathways where one of the following conditions exists:

1. The fire area exceeds 12,000 square feet (1115 m2).
2. The fire area has an occupant load of 300 or more.
3. The fire area is located on a floor other than a level of exit discharge serving such occupancies.

903.2.1.4 Group A-4. An automatic sprinkler system shall be provided for fire areas containing Group A-4 occupancies and intervening floors of the building that impact the egress pathways where one of the following conditions exists:

1. The fire area exceeds 12,000 square feet (1115 m2).
2. The fire area has an occupant load of 300 or more.
3. The fire area is located on a floor other than a level of exit discharge serving such occupancies.

903.2.1.5 Group A-5. An automatic sprinkler system shall be provided for Group A-5 occupancies in the following areas: concession stands, retail areas, press boxes and other accessory use areas in excess of 1,000 square feet (93 m2).

Reason: The current code language can be somewhat confusing since the charging language in 903.2.1 deals with the occupancy and certain building areas outside the occupancy but the language in subsections 903.2.1.1, 903.2.1.2, 903.2.1.3 and 903.2.1.4 require the "occupancy" to be protected by fire sprinklers while it addresses the thresholds in terms of the size of the "fire area". It is not the intent of this proposal to change the requirements of this section, only to clarify them.

Cost Impact: This code change is being proposed as an effort to clarify potentially confusing language and will not increase the cost of construction.

F120-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

903.2.1F-WREN

F121 – 13

903.2, 102.3, 1106 (New)

Proponent: Al Godwin, CBO, CPM, Aon Fire Protection Engineering, representing Aon Fire Protection Engineering Corporation (al.godwin@aon.com)

Revise as follows:

903.2.1 Group A. An *automatic sprinkler system* in accordance with Section 903.3.1.1 shall be provided throughout buildings and portions thereof used as Group A occupancies ~~when any one of the following conditions exists as provided in this section.~~ For Group A-1, A-2, A-3 and A-4 occupancies, ~~the automatic sprinkler system shall be provided throughout the floor area where the Group A-1, A-2, A-3 or A-4 occupancy is located, and in all floors from the Group A occupancy to, and including, the nearest level of exit discharge serving the Group A occupancy.~~ For Group A-5 occupancies, ~~the automatic sprinkler system shall be provided in the spaces indicated in Section 903.2.1.5.~~

903.2.1.6 Location. When required by Sections 903.2.1.1 through 903.2.1.5, sprinkler installation shall be as follows:

1. For Group A-1, A-2, A-3 and A-4 occupancies, the automatic sprinkler system shall be provided throughout the floor area where the Group A-1, A-2, A-3 or A-4 occupancy is located, and in all floors from the Group A occupancy to, and including, the nearest level of exit discharge serving the Group A occupancy.
2. For Group A-5 occupancies, the automatic sprinkler system shall be provided in the spaces indicated in Section 903.2.1.5.
3. For a Change of Occupancy, Partial Change of Occupancy or Change of Character, compliance shall be as specified in Section 1106.

903.2.2 Ambulatory care facilities. An *automatic sprinkler system* shall be installed ~~throughout the entire floor containing in~~ an ambulatory care facility where either of the following conditions exist at any time:

1. Four or more care recipients are incapable of self-preservation, whether rendered incapable by staff or staff has accepted responsibility for care recipients already incapable.
2. One or more care recipients that are incapable of self-preservation are located at other than the level of exit discharge serving such a facility.

903.2.2.1 Location. Where required by Section 903.2.2, sprinkler installation shall be as follows:

1. Throughout the entire floor containing an ambulatory care facility.
2. In buildings where ambulatory care is provided on levels other than the level of exit discharge, an automatic sprinkler system shall be installed throughout the entire floor where such care is provided as well as all floors below, and all floors between the level of ambulatory care and the nearest level of exit discharge, including the level of exit discharge.
3. For a change of occupancy, partial change of occupancy or change of character, compliance shall be as specified in Section 1106.

903.2.3 Group E. An *automatic sprinkler system* in accordance with Section 903.3.1.1 shall be provided for Group E occupancies where either of the following conditions exist ~~as follows:~~

1. ~~Throughout all~~ The Group E fire areas exceeds greater than 12,000 square feet (1115 m²) in area.
2. ~~Throughout every~~ Where portions of educational buildings are below the lowest level of exit discharge serving that portion of the building.

903.2.3.1 Location. Where required by Section 903.2.3, sprinkler installation shall be as follows:

1. Throughout the applicable *fire areas* as specified above.
2. Throughout the portion of educational buildings that are below the *lowest level of exit discharge* serving that portion of the building.

Exception: An *automatic sprinkler system* is not required in any area below the *lowest level of exit discharge* serving that area where every classroom throughout the building has at least one exterior *exit door* at ground level.

3. For a change of occupancy, partial change of occupancy or change of character, compliance shall be as specified in section 1106.

903.2.4 Group F-1. An *automatic sprinkler system* in accordance with Section 903.1.1 shall be provided throughout all buildings containing a Group F-1 occupancy where one of the following conditions exists:

1. A Group F-1 *fire area* exceeds 12,000 square feet (1115 m²).
2. A Group F-1 *fire area* is located more than three stories above grade plane.
3. The combined area of all Group F-1 *fire areas* on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m²).
4. A Group F-1 occupancy used for the manufacture of upholstered furniture or mattresses exceeds 2,500 square feet (232 m²).

903.2.4.1 Woodworking operations. An *automatic sprinkler system* in accordance with Section 903.1.1 shall be provided throughout all Group F-1 occupancy *fire areas* that contain woodworking operations in excess of 2,500 square feet in area (232 m²) which generate finely divided combustible waste or which use finely divided combustible materials.

903.2.4.2 Location. Where required by Sections 903.2.4 or 903.2.4.1, sprinkler installation shall be as follows:

1. Throughout the applicable *fire areas* as specified above.
2. Throughout Group F-1 occupancies used for the manufacture of upholstered furniture or mattresses in excess of 2,500 square feet (232 m²).
3. For a Change of Occupancy, Partial Change of Occupancy or Change of Character, compliance shall be as specified in Section 1106.

903.2.5 Group H. *Automatic sprinkler systems* in accordance with Section 903.3.1.1 shall be provided in high-hazard occupancies as required in Sections 903.2.5.1 through 903.2.5.3 ~~4~~.

903.2.5.1 General. An *automatic sprinkler system* in accordance with Section 903.3.1.1 shall be installed in Group H occupancies.

903.2.5.2 Group H-5 occupancies. An *automatic sprinkler system* in accordance with Section 903.3.1.1 shall be installed (*remainder unchanged*).

903.2.5.3 Pyroxylin plastics. An *automatic sprinkler system* in accordance with Section 903.3.1.1 shall be provided (*remainder unchanged*).

903.2.5.4 Location. Where required by Sections 903.2.5, 903.2.5.1, 903.2.5.2 or 903.2.5.3, sprinkler installation shall be as follows:

1. Throughout the area containing a Group H occupancy.
2. Throughout the floor area where cellulose nitrate film or pyroxylin plastics are manufactured,

stored or handled in quantities exceeding 100 pounds (45 kg).

3. For a change of occupancy, partial change of occupancy or change of character, compliance shall be as specified in section 1106.

903.2.6 Group I. An *automatic sprinkler system* in accordance with Section 903.3.1.1 shall be provided throughout all buildings with a Group I *fire area*.

Exceptions:

1. An *automatic sprinkler system* installed in accordance with Section 903.3.1.2 shall be permitted in Group I-1 facilities.
2. An *automatic sprinkler system* installed in accordance with Section 903.3.1.3 shall be allowed in Group I-1 facilities when in compliance with all of the following:
 - 2.1 A hydraulic design information sign is located on the system riser;
 - 2.2 Exception 1 of Section 903.4 is not applied; and
 - 2.3 Systems shall be maintained in accordance with the requirements of Section 903.3.1.2.
3. ~~An *automatic sprinkler system* is not required where day care facilities are at the *level of exit discharge* and where every room where care is provided has at least one exterior *exit door*.~~
4. ~~In buildings where Group I-4 day care is provided on levels other than the *level of exit discharge*, an *automatic sprinkler system* in accordance with Section 903.3.1.1 shall be installed on the entire floor where care is provided and all floors between the level of care and the *level of exit discharge*, all floors below the *level of exit discharge*, other than areas classified as an open parking garage.~~

903.2.6.1 Location. Where required by Section 903.2.6, sprinkler installation shall be throughout the entire building when containing a Group I occupancy.

Exceptions:

1. An *automatic sprinkler system* is not required where day care facilities are at the *level of exit discharge* and where every room where care is provided has at least one exterior *exit door*.
2. In buildings where Group I-4 day care is provided on levels other than the *level of exit discharge*, an *automatic sprinkler system* in accordance with Section 903.3.1.1 shall be installed on the entire floor where care is provided and all floors between the level of care and the *level of exit discharge*, all floors below the *level of exit discharge*, other than areas classified as an open parking garage.
3. For a change of occupancy, partial change of occupancy or change of character, compliance shall be as specified in section 1106.

903.2.7 Group M. An *automatic sprinkler system* in accordance with Section 903.3.1.1 shall be provided throughout buildings containing a Group M occupancy where one of the following conditions exists:

1. A Group M *fire area* exceeds 12,000 square feet (1115 m²).
2. A Group M *fire area* is located more than three stories above grade plane.
3. The combined area of all Group M *fire areas* on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m²).
4. A Group M occupancy used for the display and sale of upholstered furniture or mattresses exceeds 5,000 square feet (464 m²).

903.2.7.1 High-piled storage. An *automatic sprinkler system* in accordance with Section 903.3.1.1 shall be provided as required in Chapter 32 in all buildings of Group M where storage of merchandise is in high-piled or rack storage arrays.

903.2.7.2 Location. Where required by Sections 903.2.7 or 903.2.7.1, sprinkler installation shall be as follows:

1. Throughout the applicable *fire areas* as specified above.
2. Throughout Group M occupancies used for the display and sale of upholstered furniture or mattresses in excess of 5,000 square feet (464 m²).
3. As applicable in Chapter 32 for high-piled storage.
4. For a change of occupancy, partial change of occupancy or change of character, compliance shall be as specified in section 1106.

903.2.8 Group R. An *automatic sprinkler system* installed in accordance with Section 903.3 shall be provided throughout all buildings with a Group R *fire area*.

903.2.8.1 Group R-3 or R-4 congregate residences. An *automatic sprinkler system* installed in accordance with Section 903.3.1.3 shall be permitted in Group R-3 or R-4 congregate living facilities with 16 or fewer residents.

903.2.8.2 Care facilities. An *automatic sprinkler system* installed in accordance with Section 903.3.1.3 shall be permitted in care facilities with 5 or fewer individuals in a single-family dwelling.

903.2.8.3 Location. Where required by Section 903.2.8, sprinkler installation shall be throughout the entire building when containing a Group R occupancy.

Exception: For a change of occupancy, partial change of occupancy or change of character, compliance shall be as specified in section 1106.

903.2.9 Group S-1. An *automatic sprinkler system* shall be provided throughout all buildings containing a Group S-1 occupancy where one of the following conditions exists:

1. A Group S-1 *fire area* exceeds 12,000 square feet (1115 m²).
2. A Group S-1 *fire area* is located more than three stories above grade plane.
3. The combined area of all Group S-1 *fire areas* on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m²).
4. A Group S-1 occupancy used for the storage of upholstered furniture or mattresses exceeds 2,500 square feet (232 m²).

903.2.9.1 Repair garages. An *automatic sprinkler system* shall be provided throughout all buildings used as repair garages in accordance with Section 406.8 of the *International Building Code*, where one of the following conditions exists as shown:

1. Buildings having two or more stories above grade plane, including *basements*, with a *fire area* containing a repair garage exceeding 10,000 square feet (929 m²)
2. Buildings no more than one story above grade plane, with a *fire area* containing a repair garage exceeding 12,000 square feet (1115 m²).
3. Buildings with repair garages servicing vehicles parked in *basements*.
4. A Group S-1 *fire area* used for the repair of commercial trucks or buses where the *fire area* exceeds 5,000 square feet (464 m²).

903.2.9.2 Bulk storage of tires. Throughout all buildings and structures where the area for the storage of tires exceeds 20,000 cubic feet (566 m³) shall be equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.

903.2.9.3 Location. Where required by Sections 903.2.9, 903.2.9.1 or 903.2.9.2, sprinkler installation shall be as follows:

1. Throughout the applicable *fire areas* as specified above.
2. Throughout Group S-1 occupancies used for the storage of upholstered furniture or mattresses in excess of 2,500 square feet (232 m²).
3. Throughout the entire building when any of the conditions of Sections 903.2.9.1 and 903.2.9.2

- exists.
4. For a change of occupancy, partial change of occupancy or change of character, compliance shall be as specified in section 1106.

903.2.10 Group S-2 enclosed parking garages. An *automatic sprinkler system* shall be provided throughout buildings classified as enclosed parking garages in accordance with Section 406.6 of the *International Building Code* where one of the following conditions exists as follows:

1. Where the *fire area* of the enclosed parking garage exceeds 12,000 square feet (1115 m²); ~~or,~~
2. Where the enclosed parking garage is located beneath other groups.

~~**Exception:** Enclosed parking garages located beneath Group R-3 occupancies.~~

903.2.10.1 Commercial parking garages. An *automatic sprinkler system* shall be provided throughout buildings used storage of commercial trucks or buses where the *fire area* exceeds 5,000 square feet (464 m²).

903.2.10.2 Location. Where required by Sections 903.2.10 or 903.2.10.1, sprinkler installation shall be as follows:

1. Throughout the applicable *fire areas* as specified above.
2. Throughout the area of all floors below other groups used as an enclosed parking garage.

~~**Exception:** Enclosed parking garages located beneath Group R-3 occupancies.~~

3. For a change of occupancy, partial change of occupancy or change of character, compliance shall be as specified in section 1106.

Delete and substitute as follows:

~~**[A] 102.3 Change of use or occupancy.** No change shall be made in the use or occupancy of any structure that would place the structure in a different division of the same group or occupancy or in a different group of occupancies, unless such structure is made to comply with the requirements of this code and the *International Building Code*. Subject to the approval of the *fire code official*, the use or occupancy of an existing structure shall be allowed to be changed and the structure is allowed to be occupied for purposes in other groups without conforming to all of the requirements of this code and the *International Building Code* for those groups, provided the new or proposed use is less hazardous, based on life and fire risk, than the existing use.~~

[A] 102.3 Change of use or occupancy, partial change of occupancy and change of character. No change in use or occupancy, partial change of occupancy or change of character shall be made to any structure without compliance with Section 1106.

Add new text as follows:

SECTION 1106

CHANGE OF OCCUPANCY, PARTIAL CHANGE OF OCCUPANCY, CHANGE OF CHARACTER

1106.1 General. Buildings or portions thereof undergoing a change of occupancy, partial change of occupancy or change of character, shall comply with the provisions of Sections 1106.1.1 through 1106.4

1106.1.1 Special use. Any change of Occupancy, Partial Change of Occupancy or Change of Character that results in the creation of one of the following special use or occupancy shall comply with all of the applicable requirements of this code and the *International Building Code*.

1. Covered and open mall buildings.
2. Atriums.
3. Motor vehicle-related occupancies.
4. Aircraft-related occupancies.
5. Motion picture projection rooms.
6. Stages and platforms.
7. Special amusement buildings.
8. Incidental use areas.
9. Hazardous materials.
10. Ambulatory care facilities.

1106.1.2. Underground buildings. An underground building in which there is a change of occupancy, partial change of occupancy or change of character shall comply with the requirements of this code and the *International Building Code* applicable to underground buildings.

1106.2 Change of use or occupancy. No change shall be made in the use or occupancy of any structure that would place the structure in a different division of the same group or occupancy or in a different group of occupancies, unless such structure is made to comply with the requirements of this code and the *International Building Code*. Subject to the approval of the *fire code official*, the use or occupancy of an existing structure shall be allowed to be changed and the structure is allowed to be changed and is allowed to be occupied for purposes in other groups without conforming to all of the requirements of this code and the *International Building Code* for those groups, provided the new or proposed use is less hazardous, based on life and fire risk, than the existing use.

1106.3 Partial change of occupancy classification. In other than special uses as specified in Section 1106.1.1, where a portion of an existing building is changed to a new occupancy classification, Sections 1106.3.1 and 1106.3.2 shall apply.

1106.3.1 Fire sprinkler system. Automatic sprinkler system provisions of Section 903.2.1 through 903.2.10.1 shall only be applicable to the *fire area* of concern where separated from other *fire areas* as required by Section 707.3.10 of the *International Building Code* except as specifically required by Sections 1106.3.1.1 through 1106.1.8.

1106.3.1.1 Ambulatory care facilities. For ambulatory care facilities, the automatic sprinkler system provisions of Section 903.2.2 shall only be applicable to the floor where the ambulatory care facility is located where the *fire area* of the floor is separated from other floors in accordance with Section 707.3.10 of the *International Building Code*.

1106.3.1.2 Group E occupancies. Group E occupancies created over portions of educational buildings that are below the *lowest level of exit discharge*, an *automatic sprinkler system* is not required in any area below the *lowest level of exit discharge* serving that area where:

- 1 The new Group E *fire area* has at least one exterior *exit door* at ground level; or,
- 2 All existing and new Group E *fire areas* above are separated from the level below in accordance with Section 707.3.10 of the *International Building Code*.

1106.3.1.3 Group F-1 occupancies. For Group F-1 occupancies as provided for in Sections 903.2.4 and 902.4.1, automatic sprinkler system installation shall be as required ~~specified~~ in Section 903.2.4.2.

1106.3.1.4 Group H occupancies. For Group H occupancies as provided for in Sections 903.2.5, 903.2.5.1, 903.2.5.2 and 903.2.5.3, automatic sprinkler system installation shall be as specified in Section 903.2.5.4.

1106.3.1.5 Group I occupancies. For Group I occupancies as provided for in Sections 903.2.6, automatic sprinkler system installation shall be in accordance with one of the following:

- 1 Throughout the building containing a Group I occupancy.
- 2 An *automatic sprinkler system* is not required where Group I-4 day care facilities are at the *level*

of exit discharge and where every room where care is provided has at least one exterior exit door;
or,

- 3 In buildings where a Group I-4 day care is provided on levels other than the level of exit discharge, an automatic sprinkler system in accordance with Section 903.3.1.1 shall only be required to be installed on the floor where the Group I-4 day care is located and where the floor is separated from other floors in accordance with Section 707.3.10 of the International Building Code.

1106.3.1.6 Group M occupancies. For Group M as provided for in Sections 903.2.7 and 903.2.7.1, automatic sprinkler system installation shall be as specified in Section 903.2.7.2.

1106.3.1.7 Group S-1 occupancies. For Group S-1 as provided for in Sections 903.2.9, 903.2.9.1 and 903.2.9.2, automatic sprinkler system installation shall be as specified in Section 903.2.9.3.

1106.3.1.8 Group S-2 occupancies. For Group S-2 enclosed parking garages as provided for in Sections 903.2.10 and 903.2.10.1, automatic sprinkler system installation shall be as specified in Section 903.2.10.2.

106.3.2 Fire alarm and detection system. Fire alarm and detection systems of Section 907.2 shall be provided throughout the area where the partial change of occupancy occurs. Existing alarm notification appliances shall be automatically activated throughout the building. Where the building is not equipped with a fire alarm system, alarm notification appliances shall be provided throughout the area where the partial change of occupancy occurs and shall be automatically activated.

1106.4 Change of character. A change in occupancy with no change of occupancy classification shall not be made to any structure that will subject the structure to any special provisions of the applicable International Codes, without approval of the fire code official. Compliance shall be only as necessary to meet the specified provisions and is not intended to require the entire building be brought into compliance.

Reason: This bold code change is an attempt to accomplish the following:

1. Attempt to explain what areas must be sprinklered under Section 903.2. Some provisions make reference to "throughout buildings", "throughout all buildings" or "in the occupancy." Group R occupancies, Repair garages and bulk storage of tires makes it clear that it is throughout all buildings. The Commentary implies that Group I is the entire building, but it is not clear about other occupancies. Is it the building or just the fire area.
And, the provisions for upholstered furniture and Group H do not use the term fire area. Therefore, the changes to 903.2 is to start discussions about clarification.
Code change E116-12, which was approved As Modified, identifies that Group H occupancies might be sprinklered but in a non-sprinklered building as follows:

E116– 12

Table 1016.2 (IFC [B] Table 1016.2)

Proponent: Patrick A. McLaughlin, McLaughlin & Associates, representing Compressed Gas Association (pmclaugma@aol.com)

Revise as follows:

TABLE 1016.2 (IFC [B] TABLE 1016.2)
EXIT ACCESS TRAVEL DISTANCE^a

OCCUPANCY	WITHOUT SPRINKLER SYSTEM (feet)	WITH SPRINKLER SYSTEM (feet)
A, E, F-1, M, R, S-1	200	250 ^b
I-1	Not Permitted	250 ^b
B	200	300 ^c
F-2, S-2, U	300	400 ^c
H-1	Not Permitted	75 ^d
H-2	Not Permitted	100 ^d
H-3	Not Permitted	150 ^d
H-4	Not Permitted	175 ^d
H-5	Not Permitted	200 ^d

For SI: 1 foot = 304.8 mm.

a. (no change)

b. Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2. See Section 903 for occupancies where automatic sprinkler systems are permitted in accordance with Section 903.3.1.2.

c. Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

d. Occupancies equipped throughout with an automatic sprinkler system in accordance with Section 903.2.5.1.

Reason: H-1 thru H-4 occupancies are required to be sprinklered, however, if the H occupancy is located within another occupancy, that occupancy may or may not be sprinklered because the sprinkler system is not required throughout. As written, the travel distance allowance would not apply and there is no guidance on what the travel distance should be. Furthermore, the current footnote has led to erroneous interpretation of the code requiring the building to be sprinklered throughout. In our opinion this was never the intent of this table. H occupancies cannot exit through a more hazardous occupancy, therefore the travel distances allowed within the H occupancy seem reasonable when exiting through another occupancy of lesser hazard.

Cost Impact: The code change proposal will not increase the cost of construction.

E116-12

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

T1016.2-E-MCLAUGHLIN

2. Attempt to bring the IFC in line with IEBC Section 1012.2 Fire Protection systems. I don't agree with the blanket provisions provided there and believe that more detail info is needed. 2012 IEBC Section 1012.2 is as follows:

1012.2 Fire protection systems. Fire protection systems shall be provided in accordance with Sections 1012.2.1 and 1012.2.2.

1012.2.1 Fire sprinkler system. Where a change in occupancy classification occurs that requires an automatic fire sprinkler system to be provided based on the new occupancy in accordance with Chapter 9 of the International Building Code, such system shall be provided throughout the area where the change of occupancy occurs.

1012.2.2 Fire alarm and detection system. Where a change in occupancy classification occurs that requires a fire alarm and detection system to be provided based on the new occupancy in accordance with Chapter 9 of the *International Building Code*, such system shall be provided throughout the area where the partial *change of occupancy* occurs. Existing alarm notification appliances shall be automatically activated throughout the building. Where the building is not equipped with a fire alarm system, alarm notification appliances shall be provided throughout the area where the partial *change of occupancy* occurs and shall be automatically activated.

3. Match the IFC with the IEBC Sections 1001, 1002 and 1012 provided below.

SECTION 1001 GENERAL

1001.1 Scope. The provisions of this chapter shall apply where a *change of occupancy* occurs, as defined in Section 202, including:

1. Where the occupancy classification is not changed; or
2. Where there is a change in occupancy classification or the occupancy group designation changes.

1001.2 Change in occupancy with no change of occupancy classification. A change in occupancy, as defined in Section 202, with no *change of occupancy* classification shall not be made to any structure that will subject the structure to any special provisions of the applicable *International Codes*, including the provisions of Sections 1002 through 1011, without the approval of the *code official*. A certificate of occupancy shall be issued where it has been determined that the requirements for the change in occupancy have been met.

1001.2.1 Repair and alteration with no change of occupancy classification. Any *repair* or *alteration* work undertaken in connection with a *change of occupancy* that does not involve a *change of occupancy* classification shall conform to the applicable requirements for the work as classified in Chapter 4 and to the requirements of Sections 1002 through 1011.

Exception: As modified in Section 1205 for *historic buildings*.

1001.3 Change of occupancy classification. Where the occupancy classification of a building changes, the provisions of Sections 1002 through 1012 shall apply. This includes a *change of occupancy* classification within a group as well as a *change of occupancy* classification from one group to a different group.

1001.3.1 Partial change of occupancy classification.

Where a portion of an *existing building* is changed to a new occupancy classification, Section 1012 shall apply.

1001.4 Certificate of occupancy required. A certificate of occupancy shall be issued where a *change of occupancy* occurs that results in a different occupancy classification as determined by the *International Building Code*.

SECTION 1002 SPECIAL USE AND OCCUPANCY

1002.1 Compliance with the building code. Where the character or use of an *existing building* or part of an *existing building* is changed to one of the following special use or occupancy categories as defined in the *International Building Code*, the building shall comply with all of the applicable requirements of the *International Building Code*:

1. Covered and open mall buildings.
2. Atriums.
3. Motor vehicle-related occupancies.
4. Aircraft-related occupancies.
5. Motion picture projection rooms.
6. Stages and platforms.
7. Special amusement buildings.
8. Incidental use areas.
9. Hazardous materials.
10. Ambulatory care facilities.

1002.2 Underground buildings. An underground building in which there is a change of use shall comply with the requirements of the *International Building Code* applicable to underground structures.

SECTION 1012 CHANGE OF OCCUPANCY CLASSIFICATION

1012.1 General. The provisions of this section shall apply to buildings or portions thereof undergoing a change of occupancy classification. This includes a change of occupancy classification within a group as well as a change of occu-

pancy classification from one group to a different group. Such buildings shall also comply with Sections 1002 through 1011. The application of requirements for the change of occupancy shall be as set forth in Sections 1012.1.1 through 1012.1.4. A *change of occupancy*, as defined in Section 202, without a corresponding change of occupancy classification shall comply with Section 1001.2.

1012.1.1 Compliance with Chapter 9. The requirements of Chapter 9 shall be applicable throughout the building for the new occupancy classification based on the separation conditions set forth in Sections 1012.1.1.1 and 1012.1.1.2.

1012.1.1.1 Change of occupancy classification without separation. Where a portion of an *existing building* is changed to a new occupancy classification and that portion is not separated from the remainder of the building with fire barriers having a fire-resistance rating as required in the *International Building Code* for the separate occupancy, the entire building shall comply with all of the requirements of Chapter 9 applied throughout the building for the most restrictive occupancy classification in the building and with the requirements of this chapter.

1012.1.1.2 Change of occupancy classification with separation. Where a portion of an *existing building* that is changed to a new occupancy classification and that portion is separated from the remainder of the building with fire barriers having a fire-resistance rating as required in the *International Building Code* for the separate occupancy, that portion shall comply with all of the requirements of Chapter 9 for the new occupancy classification and with the requirements of this chapter.

1012.1.2 Fire protection and interior finish. The provisions of Sections 1012.2 and 1012.3 for fire protection and interior finish, respectively, shall apply to all buildings undergoing a change of occupancy classification.

1012.1.3 Change of occupancy classification based on hazard category. The relative degree of hazard between different occupancy classifications shall be determined in accordance with the categories specified in Tables 1012.4, 1012.5 and 1012.6. Such a determination shall be the basis for the application of Sections 1012.4 through 1012.7.

1012.1.4 Accessibility. All buildings undergoing a change of occupancy classification shall comply with Section 1012.8.

1012.2 Fire protection systems. Fire protection systems shall be provided in accordance with Sections 1012.2.1 and 1012.2.2.

1012.2.1 Fire sprinkler system. Where a change in occupancy classification occurs that requires an automatic fire sprinkler system to be provided based on the new occupancy in accordance with Chapter 9 of the *International Building Code*, such system shall be provided throughout the area where the *change of occupancy* occurs.

1012.2.2 Fire alarm and detection system. Where a change in occupancy classification occurs that requires a

fire alarm and detection system to be provided based on the new occupancy in accordance with Chapter 9 of the *International Building Code*, such system shall be provided throughout the area where the *change of occupancy* occurs. Existing alarm notification appliances shall be automatically activated throughout the building. Where the building is not equipped with a fire alarm system, alarm notification appliances shall be provided throughout the area where the *change of occupancy* occurs and shall be automatically activated.

4. This is also intended to coordinate with code change G231-12 which was approved as Submitted at the Final Action hearing.

G231-12

202, 3408.1.1 (New) [IEBC [B] 202, 407.1.1 (New)]

Proposed Change as Submitted

Proponent: Al Godwin, CBO, CPM, Aon Fire Protection Engineering (al.godwin@aon.com)

Add new text as follow:

3408.1.1 (IEBC [B] 407.1.1) Change of Character. A change in occupancy with no change of occupancy classification shall not be made to any structure that will subject the structure to any special provisions of the applicable *International Codes*, without approval of the building official. Compliance shall be only as necessary to meet the specific provisions and is not intended to require the entire building be brought into compliance.

Add new definition as follows:

CHANGE OF OCCUPANCY. A change in the purpose or level of activity within a building that involves a change in application of the requirements of this code.

Reason: In the last code cycle, Code Change EB27-09/10 added "10. Ambulatory health care facilities" to IEBC Section 902.1 (now 1002.1) under the classification of "change of character. This section in the IEBC, along with The IEBC definition of Change of Use, in general verbiage, recognizes that there are changes of use that do not involve changing occupancy groups.

IEBC Section 1001.2 states:

"1001.2 Change in occupancy with no change in occupancy classification. A change in occupancy, as defined in Section 202, with no change of occupancy classification shall not be made to any structure that will subject the structure to any special provisions of the applicable *International Codes*, including the provisions of Section 1002 through 1011, without the approval of the code official."

This proposal is to bring those provisions from IEBC Section 1001.2 over into Chapter 34 of the IBC.

As noted in the IEBC, it is possible to change a use without changing the occupancy classification. Some examples are as follows:

1. Group A-2 bar with an occupant load of 275 to a Group A-2 bar with an occupant load of 350. Increasing occupant loads is permitted under Section 1004.2.
2. Group B office to Group B Ambulatory Health Care
3. Group B office to Group B café
4. Group F-1 factory to a Group F-1 woodworking shop.
5. Group H-3 Oxidizing gases to Group H-3 Flammable solids
6. Group M retail to Group M retail of upholstered furniture
7. Group S-1 warehouse to Group S-1 tire warehouse over 20,000 cubic feet
8. Group S-1 warehouse to Group S-1 motor vehicle repair garage
9. Group R-2 apartment to Group R-2 Live/Work unit.

Each of these classifications has particular code provisions that would apply if the occupancy had been originally identified. Some items might be fire protection, alarms, fresh air, restroom facilities, accessibility, smoke barriers, etc. The IBC currently does not specifically address these changes since they do not change Groups or change Divisions within Groups.

When making a change of character, it is not necessary to totally re-evaluate the building. Only the new applicable provisions should be addressed.

For example:

Group A-2 bar with an occupant load of 275 to a Group A-2 bar with an occupant load of 350.

Items that might require review:

Means of egress – 1004.2, to the public way
Sprinklers – 903.2.1.2, only in this space
Alarms – 907.2.1, only in this space
Restrooms – Chapter 29
Fresh air – IMC

Accessibility – see Section 3411
If food – upgrade of interceptor provisions of the IPC

Items that might not require a new review:

Height and area
Exterior walls and openings

As this is a confusing issue, the code official will need to define what items of correction are appropriate. While the wording may be new, code officials have performed this service for years. This proposal just puts it in the code.

Cost Impact: This code change proposal will not increase the cost of construction.

3408.1.1 (NEW)-G-GODWIN

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The proposed language needs to be revised with terminology such as "change in the character of use." There was some discussion that the definition proposed could be beneficial in the IBC. Some committee members felt that this language was unnecessary.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Al Godwin, CBO, CPM, Aon Fire Protection Engineering Corporation, requests Approval as Submitted.

Commenter Reason: The Committee made the comment that the wording should be changed to "change in the character of use." Therefore the title of Section 3408.1.1 has been amended to reflect the new provision. This provision already exists in IEBC Section 1001.2. However, according to IEBC Section 301.1 compliance can be achieved by one of the three methods. The provision for Change of Character only exists in the Work Area Method of Section 301.1.2. Change of Character should also occur under the Prescriptive Compliance Method of Chapter 4 which is IBC Section 3408.1.1.

Therefore, this provision is a good change. It merely duplicates an existing IEBC provision and copies it in IEBC 407.1.1, which is also IBC 3408.1.1.

G231-12

Final Action: AS AM AMPC_____ D

5. The design of this code change proposal would allow the adoption of Part I and disapproval of the remainder. As such, all references to "For a Change of Occupancy, Partial Change of Occupancy or Change of Character, compliance shall be as specified in Section 1106" would editorially drop out since that section would not exist.

Cost Impact: This should be considered as a clarification and coordination. While some provisions of Section 1106 are more intensive than currently written in the IEBC, they may be less intensive than what is currently enforced under the IFC. As such, it should be a merge of the potential costs under the IFC and the IEBC.

F121-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

903.2.1-F-GODWIN

F122 – 13

903.2.1.2 (IBC [F] 903.2.1.2), 903.2.1.6 (New) [IBC [F] 903.2.1.6 (New)]

Proponent: Robert Trotter, MCP., Tennessee Code Development Committee (bobbrotter1023@aol.com)

Revise as follows:

903.2.1.2 (IBC [F] 903.2.1.2) Group A-2. An automatic sprinkler system shall be provided for Group A-2 occupancies where one of the following conditions exists:

1. The fire area exceeds 5,000 square feet (465 m²);
2. The fire area has an occupant load of 100 or more;
- or
3. The ~~fire area~~ Group A-2 occupancy is located on a floor other than the level of exit discharge.

903.2.1.6 (IBC [F] 903.2.1.6) Group A-2 on Roof. Where a Group A-2 occupancy is located on the roof, the building shall be equipped throughout with an automatic sprinkler system.

Reason: Activities involving A-2 occupancies located above or below the level of exit discharge and on the roof of buildings could be unaware of life threatening fire conditions above or below their location. The means of egress can become impassable and untenable conditions can be present regardless of the size of the area or occupant load.

Cost Impact: The code change proposal will increase the cost of construction. However, this proposal only clarifies the requirement and is not expected to increase the cost of construction beyond previously applied provisions.

F122-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

903.2.1.2-F-TROTTER

F123 – 13

903.2.1.3 (IBC [F] 903.2.1.3), 903.2.1.4 (IBC [F] 903.2.1.4)

Proponent: Joseph E. Moore, representing The City of Maryland Heights

Revise as follows:

903.2.1.3 (IBC [F] 903.2.1.3) Group A-3. An automatic sprinkler system shall be provided for Group A-3 occupancies where one of the following conditions exists:

1. The fire area exceeds 12,000 square feet (1115 m2);
2. The fire area has an occupant load of 300 or more; or
3. The fire area is located on a floor other than a level of exit discharge serving such occupancies.

Exception: Areas used exclusively as participant sports areas.

903.2.1.4 (IBC [F] 903.2.1.4) Group A-4. An automatic sprinkler system shall be provided for Group A-4 occupancies where one of the following conditions exists:

1. The fire area exceeds 12,000 square feet (1115 m2);
2. The fire area has an occupant load of 300 or more; or
3. The fire area is located on a floor other than a level of exit discharge serving such occupancies.

Exception: Areas used exclusively as participant sports areas.

Reason: These sections of the code were un-necessarily modified by code change F132-07/08. The supporting statement for the change in 07/08 was that the spaces were becoming multi-use facilities that presented higher occupant loads and fuel loading concerns. The previous code language and the revised exception proposed herein, already addresses this concern...Areas used exclusively as participant sports areas. If a gymnasium is to be used for parties, assemblies, meetings, etc. the gym floor would not comply with the exclusive use requirement in the exception. It is the code official's responsibility to make a determination of use prior to issuing the permit for construction.

In 2011 a new aquatic center addition for a public high school was submitted for plan review. The owner was required to install an automatic sprinkler system above the surface of the water in an indoor swimming pool building. There was seating for observing events in the pool area located in a mezzanine which was also suppressed. There is no retractable floor to cover the water surface. The pool itself cannot be used for any purpose except indoor water sports, but due to the lack of the exception it was required that an automatic fire suppression system be installed above a body of water. There are clearly circumstances where the omission of automatic sprinklers above participant sports areas should be permitted.

The persuasive testimony given in the previous hearing stated that during the refinishing of hardwood floors or painting of a pool large quantities of Volatile Organic Compounds could be released creating a highly combustible/explosive environment. It is important to remember that during these operations the building will only be occupied by a few individuals performing these tasks. These individuals are fully trained and familiar with the hazardous nature of the work involved. Furthermore, an automatic fire suppression system in this type of building would not be designed to suppress an explosion or flash fire.

Cost Impact: This represents a significant cost reduction in an indoor swimming pool for example. Simply accessing the area above the water to install the sprinkler system requires a large knuckle boom or bridge scaffold. Maintaining the system in a high humidity environment with corrosive chemicals in the water vapor also requires specialized equipment that must now fit through the doors and corridors in the building.

F123-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

903.2.1.3-F-MOORE

F124 – 13

903.2.1.6 (New)

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

903.2.1.6 (IBC [F] 903.2.1.6) Assembly use on roofs. Where an occupied roof has an assembly use with an occupant load exceeding 100, all floors between the occupied roof and the level of exit discharge shall be equipped with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2.

Reason: Currently the code states that if you have a fire area containing an A-2 Assembly on a floor other than the floor of exit discharge, that floor level and all floors to the level of exit discharge must be sprinklered. Frequently, roof tops are being used and occupied as assemblies. Building owners will provide an open air roof-top bar or lounge, or other use similar to a Group A-2 occupancy on the roof of a building.

The roof of the building does not meet the definition of a fire area. So protection of the occupants can be less than what would otherwise be required if the occupancy was on a floor rather than on the roof.

The current fire sprinkler threshold for Group A-2 is an occupant load of 100. It is appropriate to apply this same threshold to the occupant load on the roof.

This proposal will require that when a roof top is occupied for an assembly use AND the occupant load exceeds 100, then the building must be protected with sprinklers. This proposal does not require that the roof top itself is sprinklered, but provides sprinkler protection on all floors to the level of exit discharge.

The reference to Section 903.3.1.2 is added, since this use can occur on the roof of multi-family housing facilities.

Cost Impact: The code change will increase the cost of construction.

F124-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

903.2.1.6 (NEW)-F-ZUBIA-FCAC

F125 – 13

903.2.2 (New)

Proponent: Daniel E. Nichols, P.E., New York State Department of State (dan.nichols@dos.ny.gov)

Add new text as follows:

903.2.2 Group B. *An automatic sprinkler system shall be provided throughout all buildings containing a Group B occupancy where a Group B fire area is located more than three stories above grade plane.*

903.2.2 903.2.2.1 Ambulatory Care Facilities. (No Changes)

Reason: This proposal is to set a requirement for automatic sprinkler systems to be installed in mid-rise business occupancies. Currently, the only requirement for automatic sprinkler protection in Group B occupancies is when the building meets one of the specific hazard requirements in IFC 903.2.11, generally the occupied floor (30 people) over 55 feet in height requirement.

The State of New York has required the installation of automatic sprinkler systems in all buildings over 30 feet in height for the past 10 years. A majority of that reasoning is to require business and educational occupancies to have an automatic sprinkler system for buildings over 3 stories. The reasoning for this lower height for sprinkler protection is due to the following:

1. Firefighting operations on higher levels is increasing challenging. The IFC already implicitly recognizes the extra challenges by requiring standpipe systems at the 30 feet or more height measurement as well as aerial apparatus access roads (in Appendix D). With the excellent performance of automatic sprinkler systems, the hazards to firefighters is greatly reduced.
2. Group B occupancies create a fire control problem by a majority of floor spaces being open. With the change of the materials used to construct furnishings, smoke produces a greater obscuration of the environment and makes finding the source of the fire more difficult. Other open space floor plan occupancies, such as Group M and F-1 occupancies, already have sprinkler thresholds for buildings above three stories.
3. Group B occupancies are not required to have any automatic fire alarm or detection requirements. The requirement for automatic sprinkler systems to be monitored provides a system to give accelerated warning of a fire within the building , evacuates the area and starts first responders to the scene.
4. In 2011, a Fire Captain in Asheville, North Carolina died while operating on an upper floor of a mid-rise office building that was not sprinkler protected. Several crew members, including the deceased, ran out of breathing air which was attributed to the need for utilizing air during the stair ascent. An automatic sprinkler systems would have allowed firefighters, at a minimum, to not encounter such heavy smoke conditions on lower floors during entry and allow for their air supply to be more adequate for fire attack operations. Information on this fire and recommendations for the installation of fire suppression systems in these occupancies is found in the NIOSH firefighter fatality report # F2011-18.

Over the past 10 years, the State of New York has not been petitioned to omit the sprinkler system on the new construction of mid-rise office buildings (3-7 stories). Many find that the sprinkler system allows for the use of a Class 1 standpipe system. NFPA 14, the referenced standard for standpipe system installation, permits Class 1 standpipes to be of manual wet design. This allows a building with a marginal water supply to use either street pressure or a smaller fire pump to run the sprinkler system and allow the FD to pump the pressures required to the standpipe. Without the sprinkler system, the building is responsible for providing at least 100 psi for at least 750 GPM of flow (2 stairways minimum).

This proposal is submitted with the endorsement of the New York State Building Officials Conference, the New York State Fire Marshals and Inspectors Association, and the Association of Fire Districts of New York State.

Cost Impact: This proposal will add costs to the construction of 4 to 6 story buildings that are not already using sprinklers for a 'tradeoff' of other code requirements. Cost savings may be achieved by not requiring an automatic Class III standpipe, but a manual Class I standpipe.

F125-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

903.2.2 (NEW)-F-NICHOLS

F126 – 13

903.2.4, 903.2.7, 903.2.9

Proponent: Steve Thomas, Colorado Code Consulting, LLC representing self
(sthomas@coloradocode.net)

Revise as follows:

903.2.4 Group F-1. An automatic sprinkler system shall be provided throughout all buildings containing a Group F-1 occupancy where one of the following conditions exists:

1. A Group F-1 fire area exceeds 12,000 square feet (1115 m²).
2. A Group F-1 fire area is located more than three stories above grade plane.
3. The combined area of all Group F-1 fire areas on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m²).
4. ~~A Group F-1 occupancy used for the manufacture of upholstered furniture or mattresses exceeds 2,500 square feet (232 m²).~~

903.2.7 Group M. An automatic sprinkler system shall be provided throughout buildings containing a Group M occupancy where one of the following conditions exists:

1. A Group M fire area exceeds 12,000 square feet (1115 m²).
2. A Group M fire area is located more than three stories above grade plane.
3. The combined area of all Group M fire areas on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m²).
4. ~~A Group M occupancy used for the display and sale of upholstered furniture or mattresses exceeds 5,000 square feet (464 m²).~~

903.2.9 Group S-1. An automatic sprinkler system shall be provided throughout all buildings containing a Group S-1 occupancy where one of the following conditions exists:

1. A Group S-1 fire area exceeds 12,000 square feet (1115 m²).
2. A Group S-1 fire area is located more than three stories above grade plane.
3. The combined area of all Group S-1 fire areas on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m²).
4. A Group S-1 fire area used for the storage of commercial trucks or buses where the fire area exceeds 5,000 square feet (464 m²).
5. ~~A Group S-1 occupancy used for the storage of upholstered furniture or mattresses exceeds 2,500 square feet (232 m²).~~

Reason: The original proponent offered no technical justification in the original proposal. The fire event that was used to support the original emotional proposal was located in a building that was 59,000 square feet in area. It was not provided with fire sprinklers. The code currently requires that this size building be provided with fire sprinklers. Previous legacy codes have also required fire sprinklers in this size building. This requirement is over-restrictive and should be removed from the code.

When the provisions were revised in the 2012 IFC, the revision was not tied to FIRE AREA, but instead was based on some area of the upholstered furniture and mattresses. It is not clear how the areas are measured. Is it the area of the space, display or building that requires the fire sprinklers? This vague language makes enforcement more difficult.

The second issue is that the provisions in these sections conflicts with provision in Section 3206.2 for high piled combustible storage (HPCS). It creates a loophole because the IFC high piled combustible storage provisions set an area threshold of 500 square feet when the height of mattress storage is > 6 feet in a public-accessible area. The provision for Group M occupancies for upholstered mattresses and furniture sets an occupancy area threshold of 5,000 square feet. The committee wasn't thinking about HPCS when they considered the proposal and it was further amended on the floor.

Finally, loss history has never been presented substantiating why upholstered furniture and mattresses warrant a different threshold for sprinkler protection.

Cost Impact: This will reduce the cost of construction.

F126-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

903.2.4-F-THOMAS

F127 – 13

903.2.5.2 (New) [IBC [F] 903.2.5.2] (New) 903.2.5.2.1 (New) [IBC [F] 903.2.5.2.1 (New)] 903.2.5.2.2 (New) [IBC [F] 903.2.5.2.2 (New)]

Proponent: Brad Emerick, Denver Fire Department representing the Fire Marshal's Association of Colorado (FMAC) and the Colorado Chapter of the ICC (CCICC) (brad.emerick@denvergov.org)

Add new text as follows:

903.2.5.2 (IBC [F] 903.2.5.2) Group H-3 Bulk storage of distilled spirits. Automatic Sprinkler system requirements for bulk storage of distilled spirits in wooden barrels and casks shall be in accordance with Sections 903.2.5.2.1 and 903.2.5.2.2.

903.2.5.2.1 (IBC [F] 903.2.5.2.1) Ceiling sprinklers. Distilled spirits stored in wooden barrels and casks in H-3 fire areas shall be protected with ceiling sprinklers in accordance with the requirements for relieving-style metal containers in NFPA 30 for the following storage configurations

1. Double-row racks with a load depth of no more than 3 barrels per row on each rack and 10 feet or less in height, or
2. Single-row racks with no more than 4 barrels per row, and 10 feet or less in height

903.2.5.2.2 (IBC [F] 903.2.5.2.2) Engineered systems. An approved engineered automatic sprinkler system design is required for bulk storage of distilled spirits stored in wooden barrels and casks in Group H-3 fire areas for any of the following storage configurations.

1. Storage in multi-row racks with three or more rows of racks
2. The number of barrels or casks per row exceeds that specified in Section 903.2.5.2.1.
3. Storage height Greater than 10 feet.

(Renumber subsequent sections)

Reason: There is confusion about the applicability of flammable liquid (Chapter 57) and hazardous materials (Chapter 50) provisions to distilled spirits because of the exceptions for distilled spirits and wines stored in wooden barrels and casks in IFC Chapters 50 and 57 (and NFPA 30). The issue arises because of the growing popularity of "boutique" or "craft" distillers locating their operations in urban areas. The proposed language clarifies bulk storage provisions for distilled spirits but does not alter the intent. The proposed language does not affect provisions applicable to use, nor those applicable to liquor storage in retail or wholesale establishments.

First, note distilled spirits are Class 1C and Class 1B flammable liquids. They are primarily comprised of ethyl alcohol (ethanol) and water with concentrations ranging from approximately 19% to 99%. The boiling point of pure ethanol is approximately 178°F so an ethanol mixture with water will boil between 178°F and 212°F. The closed cup flash point for a 19% concentration of ethanol in water is 100°F and for a 58% concentration is 73°F making the mixtures in this range Class 1C flammable liquids (these values are not adjusted for altitude). Ethanol concentrations in water between 58% and 99% are Class 1B flammable liquids.

Second, the Building Code establishes occupancy. If a quantity of a Class 1B or Class 1C flammable liquid exceeding the maximum allowable quantity (MAQ), the room in which it is located is an H3 Occupancy. Please remember this applies to bulk storage (casks, barrels, metal containers, etc. exceeding 1.3 gallon capacities) and not liquor stores and wholesale distributors for which there are several exceptions.

Third, H occupancies have to be sprinklered. The sprinklering requirements for flammable and combustible liquids are outside the scope of NFPA 13. NFPA 13 points to NFPA 30 (Flammable and Combustible Liquids Code) for detailed requirements. Ethanol stored in any container larger than those excepted for retail – other than wood – is addressed there.

This is not because wood is inherently safer than metal, plastic or glass – it is not. It was probably inserted in the legacy code(s) back when casks were stored in liquid storage warehouses separated by hundreds of feet from one another and urban distilleries weren't contemplated. It was probably held over today because there is not yet an established sprinkler criteria for the storage of Class 1C flammable liquids in wooden barrels and casks. THIS HOWEVER DOES NOT MEAN THESE ROOMS SHOULD BE EXEMPT FROM SPRINKLERING REQUIREMENTS!

Fourth, there is no established sprinkler criteria for flammable and combustible liquids stored in wood casks. The modification proposed to Section 903.2.5.2 provides a baseline sprinkler criteria for distilled spirit storage quantities over the Class 1C flammable liquid MAQ, up to 10 feet in height, 2 racks (flu space) with 3 barrels per row in each rack, or single rack with 4 barrels per row. An engineered sprinkler design is required for quantities over the MAQ stored in a manner that exceeds any of these parameters. The language allows the fire code official the latitude to accept published recommended industry practices in lieu of an engineered design or test.

Relieving-style containers are identified because the wooden barrels and casks will release their contents when exposed to fire as the metal bands expand and the staves separate. Metal is identified because plastic and glass are much more vulnerable than wood. Ten foot height is identified as this envelopes the maximum storage heights of wooden barrels and casks typically seen in craft distilleries and is well below the 25 foot storage height permitted in NFPA 30 for relieving-style metal containers.

Last, please note that except for establishing a baseline sprinkler design criteria, the applicable code requirements have not been changed.

Cost Impact: This change will not affect the cost of construction.

F127-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

903.2.5.2-F-EMERICK

F128 – 13

903.2.9 (IBC [F] 903.2.9), 903.2.9.1 (IBC [F] 903.2.9.1), 903.2.10.1 (IBC [F] 903.2.10.1), 202

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Add new text as follows:

903.2.9 (IBC [F] 903.2.9) Group S-1. An automatic sprinkler system shall be provided throughout all buildings containing a Group S-1 occupancy where one of the following conditions exists:

1. A Group S-1 fire area exceeds 12,000 square feet (1115 m²).
2. A Group S-1 fire area is located more than three stories above grade plane.
3. The combined area of all Group S-1 fire areas on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m²).
4. A Group S-1 fire area used for the storage of ~~commercial trucks or buses~~ commercial motor vehicles where the fire area exceeds 5,000 square feet (464 m²).
5. A Group S-1 occupancy used for the storage of upholstered furniture or mattresses exceeds 2,500 square feet (232 m²).

903.2.9.1 (IBC [F] 903.2.9.1) Repair garages. An automatic sprinkler system shall be provided throughout all buildings used as repair garages in accordance with Section 406.8 of the International Building Code, as shown:

1. Buildings having two or more stories above grade plane, including basements, with a fire area containing a repair garage exceeding 10,000 square feet (929 m²).
2. Buildings no more than one story above grade plane, with a fire area containing a repair garage exceeding 12,000 square feet (1115 m²).
3. Buildings with repair garages servicing vehicles parked in basements.
4. A Group S-1 fire area used for the repair of ~~commercial trucks or buses~~ commercial motor vehicles where the fire area exceeds 5,000 square feet (464 m²).

903.2.10.1 (IBC [F] 903.2.10.1) Commercial parking garages. An automatic sprinkler system shall be provided throughout buildings used for storage of ~~commercial trucks or buses~~ commercial motor vehicles where the fire area exceeds 5,000 square feet (464 m²).

Add new definition as follows:

SECTION 202 GENERAL DEFINITIONS

COMMERCIAL MOTOR VEHICLE. A motor vehicle used to transport passengers or property where the motor vehicle:

1. Has a gross vehicle weight rating of 10,000 pounds or more; or
2. Is designed to transport 16 or more passengers, including the driver.

Reason: The current text is not clear on what constitutes a "commercial" truck or bus. The intent of this proposal is that sprinklers should be installed based on the size of the vehicle. A definition of a commercial motor vehicle is needed. These criteria are from the DOT regulations 49CFR390.5, and correlate with IBC Section 1607.7. (See S70-09/10, AMPC1.)

The fuel load is significantly increased with these larger vehicles. Large commercial vehicles typically have an increased quantity of fuel in the vehicle fuel tanks. The vehicles may have larger amounts of upholstered interior furnishings. Large commercial vehicles may be storing or transporting additional combustibles on-board which also increases the fuel load and fire duration.

Cost Impact: The code change will not increase the cost of construction.

F128-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

903.2.9-F-ZUBIA-FCAC

F129 – 13

903.2.11.1 (IBC [F] 903.2.11.1)

Proponent: Paul Armstrong, P.E., CBO, City of El Monte representing the ICC Orange Empire Chapter Code Committee (paul@jaspacific.com)

Revise as follows:

903.2.11.1 (IBC [F] 903.2.11.1) Stories without openings. An automatic sprinkler system shall be installed throughout all stories, including basements, of all buildings where the floor area exceeds 1,500 square feet (139.4 m2) and where there is not provided at least one of the following types of exterior wall openings:

1. Openings below grade that lead directly to ground level by an exterior stairway complying with Section 1009 or an outside ramp complying with Section 1010. ~~Openings~~ Each opening shall be at least 20 square feet in area and shall be located in each 50 linear feet (15 240 mm), or fraction thereof, of exterior wall in the story on at least one side. The required openings shall be distributed such that the lineal distance between adjacent openings does not exceed 50 feet (15 240 mm).
2. Openings entirely above the adjoining ground level totaling at least 20 square feet (1.86 m2) in each 50 linear feet (15 240 mm), or fraction thereof, of exterior wall in the story on at least one side. The required openings shall be distributed such that the lineal distance between adjacent openings does not exceed 50 feet (15 240 mm). The height of the bottom of the clear opening shall not exceed 44 inches (1118 mm) measured from the floor.

Reason: Item 1 does not have a minimum area requirement for openings in exterior walls to allow for an exemption from the installation of a sprinkler system. These openings are intended to be used by Fire Department personnel during emergency response operations. This revision uses the area requirement found in Item 2 and is consistent with the IBC commentary on this topic.

Cost Impact: The code change proposal will not increase the cost of construction.

F129-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

903.2.11.1-F-ARMSTRONG

F130 – 13

903.2.11.1.3 (IBC [F] 903.2.11.1.3)

Proponent: Joanne T. McCaughan, Code Specialist, Washington State Building Code Council, representing Washington State (joanne.mccaughan@des.wa.gov)

Revise as follows:

903.2.11.1.3 (IBC [F] 903.2.11.1.3) Basements. Where any portion of a basement is located more than 75 feet (22 860 mm) from openings required by Section 903.2.11.1, or where new walls, partitions or other similar obstructions are installed that ~~restrict the application of water from hose streams~~ increase the exit access travel distance to more than 75 feet, the basement shall be equipped throughout with an approved automatic sprinkler system.

Reason: The enforcement of determining obstructions that can restrict the application of water from hose streams leaves too much room for judgment and will result in inconsistent application of this provision; this concern was echoed in the ICC manual, Significant Changes to the IFC/2012 Edition (p.65).

This proposal provides code language and distances that are consistent with this provision of the code by utilizing the exit access travel distance to establish the threshold that would trigger the requirement for fire sprinklers in a basement. This provision works for both new construction and tenant improvements to an existing basement.

The life safety concern is that a basement could be initially constructed with no walls or partitions, which would make the exit distance easy to obtain. As new walls or partitions are constructed, the exit distance is reviewed again to ensure that it does not trigger fire sprinklers.

This approach removes the judgment of the current wording and provides a more reasonable and enforceable provision. Washington State is adopting this language as a statewide amendment to the 2012 IFC.

Cost Impact: The code change proposal will not increase the cost of construction. For initial construction, the cost of construction will not be affected. However, if revisions to floor plans result in exit access travel distances that exceed 75 feet in an existing basement, costs could potentially increase.

F130-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

903.2.11.1.3-F-MCCAUGHAN

F131 – 13

903.2.11.3 (IBC [F] 903.2.11.3)

Proponent: Brad Emerick, Denver Fire Department representing the Fire Marshal's Association of Colorado (FMAC) and the Colorado Chapter of the ICC (CCICC) (brad.emerick@denvergov.org)

Revise as follows:

903.2.11.3 (IBC [F] 903.2.11.3) Buildings 55 feet or more in height. An automatic sprinkler system in accordance with Section 903.3.1.1 shall be installed throughout buildings with a floor level having an occupant load of 30 or more that is located 55 feet (16 764 mm) or more above the lowest level of fire department vehicle access.

Exceptions:

1. Airport control towers.
2. Open parking structures.
3. Occupancies in Group F-2.

Reason: This proposal revises the language to specify a NFPA 13 sprinkler system is required in buildings meeting the height criteria. The proposed change only affects residential buildings on sloping sites where the lowest level of fire department vehicle access is significantly below grade plane. It has no other effect on sprinkler requirements related to the height of a building, namely IBC Section 540.2 which permits NFPA 13R sprinkler systems in residential buildings up to 60 feet in height – measured to the roof from grade plane (vs. lowest level of FD vehicle access).

If the lowest level of fire department vehicle access is at grade plane or on the high-elevation side of a sloping site, and the building height with respect to grade plane is 60 feet, then the highest occupied floor will be 10+ feet below this at a height of 50 feet or less – but below “55 feet to the highest occupied floor” in either case. Per IBC Section 540.2, a 13R sprinkler system is still permitted.

On a sloping site, where the lowest level of fire department vehicle access is on the low-elevation side of the site, firefighters are presented a building face taller in stories and feet than the nominal height of the building. If this face is tall enough that the highest occupied floor is 55 feet above them, the additional protection afforded by an NFPA 13 sprinkler system- especially with combustible construction – is warranted.

Cost Impact: This change will not affect the cost of construction.

F131-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

903.2.11.3-F-EMERICK

F132 – 13

903.2.11.3 (IBC [F] 903.2.11.3)

Proponent: Eric R. Rosenbaum, Hughes Associates, Inc. representing the Air Traffic Control Tower Fire Life Safety Task Group (erosenbaum@haifire.com)

Revise as follows:

903.2.11.3 (IBC [F] 903.2.11.3) Buildings 55 feet or more in height. An *automatic sprinkler system* shall be installed throughout buildings with a floor level having an *occupant load* of 30 or more that is located 55 feet (16 764 mm) or more above the lowest level of fire department vehicle access.

Exceptions:

1. ~~Airport control towers.~~
2. ~~1.~~ Open parking structures.
3. ~~2.~~ Occupancies in Group F-2.

Reason: The proposed change reflects changes accepted in Section 412.3 of the IBC regarding air traffic control towers. The accepted change in the IBC requires an automatic sprinkler system in all air traffic control towers with an occupiable floor 35 ft or more above the lowest level of fire department vehicle access. This accepted change is more restrictive than current IFC requirements and could cause confusion if left in the IFC. A copy of the accepted change is as follows:

412.3 Airport traffic control towers. The provisions of Sections 412.3.1 through 412.3.11 shall apply to airport traffic control towers occupied only for the following uses:

1. Airport traffic control cab.
2. Electrical and mechanical equipment rooms.
3. Airport terminal radar and electronics rooms.
4. Office spaces incidental to the tower operation.
5. Lounges for employees, including sanitary facilities.

412.3.1 Type of construction. Airport traffic control towers shall be constructed to comply with the height limitations of Table 412.3.2.

TABLE 412.3.2 HEIGHT LIMITATIONS FOR AIRPORT TRAFFIC CONTROL TOWERS	
TYPE OF CONSTRUCTION	HEIGHT ^a (feet)
IA	Unlimited
IB	240
IIA	100
IIB	85
IIIA	65

a. Height to be measured from grade plane to cab floor

412.3.2 Stairway Stairways in Airport traffic control towers shall conform to the requirements of Section 1009. Such *stairways* shall be a smokeproof enclosure in accordance with Section 909.20. The stair pressurization alternative in accordance with Section 909.20.5 shall be permitted to be used. *Stairways* shall not be required to extend to the roof as specified in Section 1009.11.

412.3.3 Exit access. From observation levels, airport traffic control towers shall be permitted to have a single means of exit access for a distance of travel not exceeding 100 ft (30 m). This means of egress shall be permitted to include exit access utilizing an unenclosed stair at the observation level.

412.3.4 Single means of egress. Not less than one *exit stairway* shall be permitted for airport traffic controls towers of any height provided that the *occupant load* per floor is not greater than 15 and the area per floor does not exceed 1,500 square feet (140 m²).

412.3.4.1 Arrangement of single means of egress. Airport traffic control towers permitted a single exit and located above another building shall be provided with one of the following:

1. Exit enclosure separated from the other building with no door openings to or from the other building
2. Exit enclosure leading directly to an exit enclosure serving the other building, with walls and door separating the exit enclosures from each other, and another door allowing access to the top floor of the building that provides access to a second exit serving that floor.

412.3.4.2 Interior Finish. Airport traffic control towers permitted a single exit in accordance with Section 412.3.4 shall be restricted to interior wall and ceiling finishes of Class A or Class B.

412.3.5 Automatic fire detection systems. Airport traffic control towers shall be provided with an automatic fire detection system installed in accordance with Section 907.2.

412.3.6 Automatic sprinkler system. Airport traffic control towers shall be equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.

412.3.7 Standby power. A standby power system that conforms to Chapter 27 shall be provided in airport traffic control towers more than 65 feet (19 812 mm) in height. Power shall be provided to the following equipment:

1. Pressurization equipment, mechanical equipment and lighting.
2. Elevator operating equipment.
3. Fire alarm and smoke detection systems.

412.3.8 Elevator Protection. Wires or cables that provide normal and standby power, control signals, communication with the car, lighting, heating, air conditioning, ventilation and fire-detecting systems to elevators shall be protected by construction having a minimum 1-hour *fire resistance rating* or shall be circuit integrity cable having a minimum 1-hour *fire-resistance rating*.

412.3.9 Accessibility. Airport traffic control towers need not be *accessible* as specified in the provisions of Chapter 11.

Cost Impact: This code change will increase the cost of construction from the current code requirements in some instances; however, reflects current building practices of the FAA.

F132-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

903.2.11.3-F-ROSENBAUM

F133 – 13

903.3.1.1 (IBC [F] 903.3.1.1), 903.3.1.1.2 (New) [IBC [F] 903.3.1.1.2]

Proponent: Marshall Klein, International Code Consultants, representing Multi Housing Council

Revise as follows:

903.3.1.1 (IBC [F] 903.3.1.1) NFPA 13 sprinkler systems. Where the provisions of this code require that a building or portion thereof be equipped throughout with an automatic sprinkler system in accordance with this section, sprinklers shall be installed throughout in accordance with NFPA 13 except as provided in Sections 903.3.1.1.1 and 903.3.1.1.2.

903.3.1.1.2 (IBC [F] 903.3.1.1.2) Bathrooms. In Group R occupancies, other than Group R residential care facilities, sprinklers shall not be required in bathrooms that do not exceed 55 square feet in area and are located within individual dwelling units or sleeping units, provided that walls and ceilings, including the walls and ceilings behind any shower enclosure or tub, are of noncombustible or limited-combustible materials with a 15-minute thermal barrier rating.

Reason: This change is necessary to reinstate an exception that has been in existence since 1976 but was nevertheless deleted from the 2013 edition of NFPA 13 with no technical justification. Because the 2015 I-codes will reference the 2013 edition of NFPA 13, it is necessary and appropriate for the IBC and IFC to reverse NFPA's unsupported action on this issue.

Although reinstating the small bathroom exception will have a limited impact on new construction because many bathrooms exceed the 55 sq. ft. area limit in the exception to accommodate wheelchair access, the more important consequence will be removing an unnecessary cost increase for building owners who choose to retrofit existing properties with small bathrooms that were built before it was common to provide wheelchair access. Codes and standards should not erect any unnecessary barriers to retrofitting sprinklers into existing properties, such as existing high-rise buildings.

Background: In the 1976 edition of the Life Safety Code, to encourage cost effective fire protection systems for apartment buildings, NFPA 101 Section 11-3.8.3.4.1 provided an exception to permit bathrooms that did not exceed 55 sq. ft within individual dwelling units to omit sprinklers when the apartment building was sprinklered in accordance with NFPA 13. The basis of the 55 sq. ft. area is that this area accommodates a "typical" small bathroom that contains a standard tub, a toilet and a sink...nothing more. This exception was later duplicated from NFPA 101 into the 1991 edition of NFPA 13 with the understanding that the next edition of NFPA 101 (1994) could delete the exception since NFPA 13 would have it covered. NFPA 101-1994 then, as planned, deleted the exception.

The situation remained "status quo" until the cycle that produced the 2010 edition of NFPA 13. A proposal to delete the bathroom exception for apartments was initially rejected by the NFPA 13 Committee during the ROP process (Code Proposal 13-202 Log #79) with the Committee Statement for rejection as "No technical data was provided supporting this change". During the ROC process, a public comment (Comment 13-141 Log #235) was submitted by the National Fire Sprinkler Association (NFSA), and the NFPA 13 Committee reversed itself by accepting the Comment, even though no new technical information had been provided. Nevertheless, the NFPA membership rejected this revision at NFPA's annual conference, and the 2010 edition of NFPA 13 retained the exception.

During the 2013 edition cycle for NFPA 13, the issue was raised again, and this time, still with no technical justification, NFPA accepted the change. As a result, NFPA 13-2013 (Section 8.15.8.1.1) only allows omission of sprinklers from in bathrooms in hotels and motels, not apartments.

The history of apartment unit bathroom fires is statistically minimal. According to the recent NFPA Home Structure Fire Report, January 2009, Table 9B, "Reported Apartment Structure Fires by Area of Origin 2003-2006 Annual Averages", out of 113,000 fires/year, only 1600 (1%) are in bathrooms. Given that we have more than 35 years of experience with the bathroom sprinkler exception being in place (since it was put into NFPA 101 in 1976), one would certainly expect anecdotal or statistical experience to indicate the existence of a problem, if there were one. On the contrary, apartments have consistently rank at the top of the list with respect to sprinkler reliability and performance statistics, and no statistical (or other) evidence was presented to or by the NFPA 13 committee to justify deletion of the bathroom sprinkler exception for apartments.

Cost Impact: The code change proposal will not increase the cost of construction.

F133-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

903.3.1.1-F-KLEIN

F134 – 13

903.3.1.2 (IBC [F] 903.3.1.2)

Proponent: Brad Emerick, Denver Fire Department representing the Fire Marshal's Association of Colorado (FMAC) and the Colorado Chapter of the ICC (CCICC) (brad.emerick@denvergov.org)

Add new text as follows:

903.3.1.2 (IBC [F] 903.3.1.2) NFPA 13R sprinkler systems. *Automatic sprinkler systems* in Group R occupancies up to and including four stories and 60 feet in height above grade plane shall be permitted to be installed throughout in accordance with NFPA 13R.

Reason: There has been confusion as to where you measure the four story limitation for NFPA 13R sprinkler systems. This proposal clarifies the intent of NFPA 13R limitations by using the correct language for building height and correlating with the NFPA 13R committee.

There is a breakpoint in the codes for building heights between 30 feet above the lowest level of fire department access and four stories. This is the point where stair enclosures have to be 2-hour rated, where at least one stair is required to extend to the roof, when standpipes are required, where emergency escape and rescue windows are no longer required, etc. This height correlates with the upper limit at which fire departments can conduct operations using ground ladders. Hand-carried ladders can typically only reach 30 to 40 feet above the grade from where they're set. A higher degree of safety has historically been required in buildings taller than this because an offensive attack will include – maybe exclusively – internal operations.

In residential buildings, this is also the threshold where sprinkler systems are required to be more robust; i.e., where NFPA 13 systems are required.

With the relaxation in requirements for residential pedestal buildings leading to the consolidation of combustible framing (and the contents) in the highest stories, it makes no sense to also relax the sprinklering requirements for that portion of the building. More stories means more time required for search and rescue. Combustible construction – especially if the attics and interstitial floor/ceiling spaces are not protected, means less time is provided.

Cost Impact: This change will not affect the cost of construction.

F134-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

903.3.1.2-F-EMERICK

F135 – 13

903.3.1.2 (IBC [F] 903.3.1.2)

Proponent: Tim Pate, City and County of Broomfield, CO, representing Colorado Chapter Code Change Committee

Revise as follows:

903.3.1.2 (IBC [F] 903.3.1.2) NFPA 13R sprinkler systems. Automatic sprinkler systems in Group R occupancies up to and including four stories in height above grade plane shall be permitted to be installed throughout in accordance with NFPA 13R.

Exception: The number of stories of Group R occupancies constructed in accordance with Section 510.2 and 510.4 of the International Building Code shall be measured from the horizontal assembly creating separate buildings.

Reason: There has been confusion as to where you measure the four story limitation for NFPA 13R sprinkler systems. This proposal clarifies the intent of NFPA 13R limitations by using the correct language for building height and addressing the use of these systems in podium buildings.

Cost Impact: This change will not affect the cost of construction.

F135-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

903.3.1.2-F-PATE

F136 – 13

903.3.1.2.1 (IBC [F] 903.3.1.2.1)

Proponent: Jeffrey M. Hugo, CBO, representing the National Fire Sprinkler Association
(hugo@nfsa.org)

Revise as follows:

903.3.1.2.1 (IBC [F] 903.3.1.2.1) Balconies and decks. Sprinkler protection shall be provided for exterior balconies, decks and ground floor patios of *dwelling units* and *sleeping units* where the building is of Type V construction, provided there is a roof or deck above. Sidewall sprinklers that are used to protect such areas shall be permitted to be located such that their deflectors are within 1 inch (25 mm) to 6 inches (152 mm) below the structural members and a maximum distance of 14 inches (356 mm) below the deck of the exterior balconies and decks that are constructed of open wood joist construction.

Reason: According to the current text, a balcony or deck from a sleeping unit would be exempt from fire sprinklers. Sleeping units are common for dormitories, hotel rooms, assisted living, etc. and we do not believe this is the intent of the code to forego protection of these balconies and decks because they lack sanitation or cooking facilities.

DWELLING UNIT. A single unit providing complete, independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking and sanitation.

SLEEPING UNIT. A room or space in which people sleep, which can also include permanent provisions for living, eating, and either sanitation or kitchen facilities but not both. Such rooms and spaces that are also part of a *dwelling unit* are not sleeping units.

Cost Impact: Will not increase the cost of construction

F136-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

903.3.1.2.1-FS-HUGO

F137 – 13

202, 903.3.1.2.2 (New) [IBC [F] 903.3.1.2.2 (New)], 1104.21

Proponent: Al Godwin, CBO, CPM, Aon Fire Protection Engineering, representing Aon Fire Protection Engineering Corporation (al.godwin@aon.com)

Add new text as follows:

SECTION 202 GENERAL DEFINITIONS

OPEN-ENDED CORRIDOR. An interior corridor that is open on each end, and connects to an exterior stairway or ramp at each end with no intervening doors or separation from the corridor.

Revise as follows:

903.3.1.2.2 (IBC [F] 903.3.1.2.2) Open-ended Corridors. Sprinkler protection shall be provided in open-ended corridors and associated exterior stairways and ramps as specified in Section 1026.6, exception 4.

1104.21 Exterior stairway protection. Exterior exit stairs shall be separated from the interior of the building as required in Section 1026. Openings shall be limited to those necessary for egress from normally occupied spaces.

Exceptions:

1 through 3 (No change to current text)

4. Separation from the interior open-ended corridor of the building is not required for exterior stairways ~~connected to open-ended corridors~~, provided that:
 - 4.1 ~~— The building, including corridors, and stairs, is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2.~~
 - 4.2 4.1 The open-ended corridors comply with Section 1018.
 - 4.3 4.2 The open-ended corridors are connected on each end to an exterior exit stairway complying with Section 1026.
 - 4.4 4.3 At any location in an open-ended corridor where a change of direction exceeding 45 degrees (0.79 rad) occurs, a clear opening of not less than 35 square feet (3.3 m²) or an exterior stairway or ramp shall be provided. Where clear openings are provided, they shall be located so as to minimize the accumulation of smoke or toxic gases.

Reason: This is a correlation with code change E153-12 which was approved last cycle. New Section 903.3.1.2.2 is to clarify that when using a 13R system for this provision, extra heads are required in the breezeway.

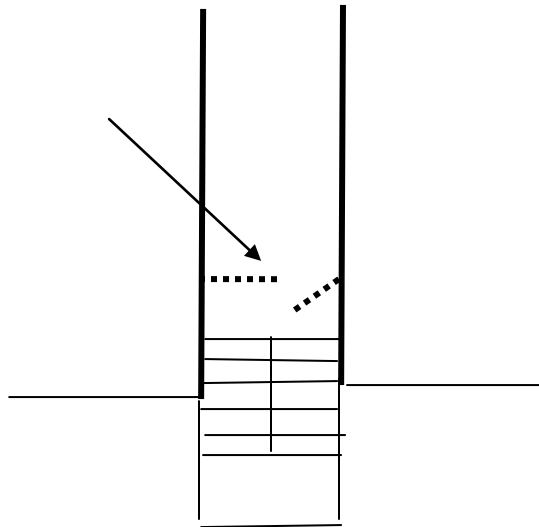
The Reason statement for E153-12 is as follows:

Reason: Breezeway stairs is what this section is talking about. Whether straight through the building with a stair on each side, or taking a turn somewhere during its path through the building with a stair on either end, it is still a breezeway with exterior stairs. This point is not clear in the current language.

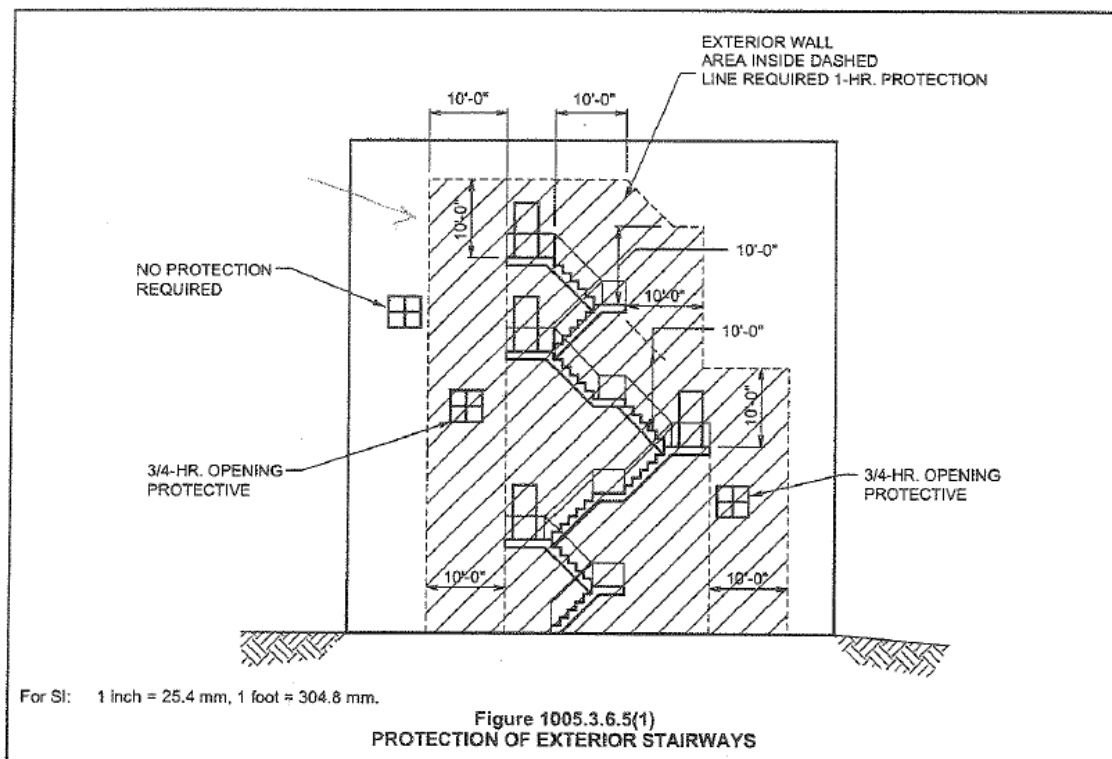
There is this opinion that an open breezeway stairs are allowed by basic code. They are not. 2012 IBC Section 1026.6 states that exterior stairs must be separated from the interior of the building. The breezeway (interior corridor) is part of the interior of the building. I have conferred with the original proponent of this code change many times and confirmed that the intent was to allow the removal of the wall and door that separates the stair from the corridor, creating a breezeway.

Many designers and jurisdictions assume that breezeway stairs are allowed by right. However, in order to not have to build the wall and fire door separating the exterior stair from the interior corridor, exception 4 must be complied with, which includes sprinklers in this breezeway.

The following is a representation of the intent of Exception 4, allowing the removal of the separation wall and door:

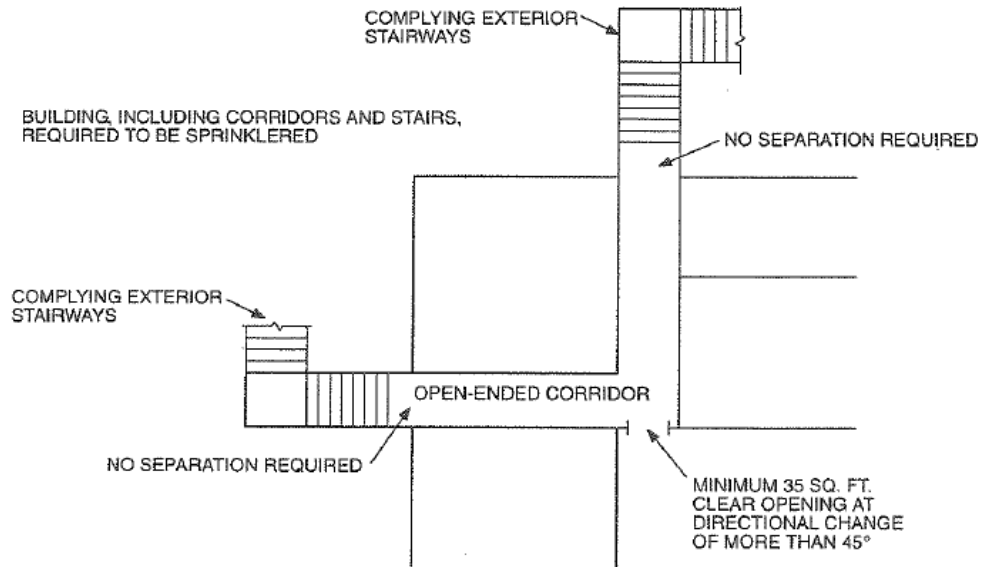


We are all familiar with the required protection on each side of the exterior stair as represented in this clip from the 2000 International Building Code Commentary.



So, if the walls on each side of the stair have to be protected, how can a large opening where the door occurs be removed and have an unprotected connection to the interior corridor.

The 2000 IBC Handbook, provided an accurate depiction of what this code change applied to as follows:



OPEN-ENDED CORRIDOR

FIGURE 1005-10

Here is the original code change that inserted the provision. Notice the statement "The purpose of this analysis was to determine if an equivalent level of life safety could be achieved by the design of an open breezeway in comparison to an enclosed corridor or balcony for these multifamily buildings."

technical change.

Public Hearing: Committee: AS AM D
Assembly: ASF DF

1008.7-2

Proponent: Ron Nickson, National Multi Housing Council/National Apartment Association

1. Revise as follows:

1008.7 Exterior exit stairways. Exterior exit stairways that conform to the requirements for interior exit stairways except for the enclosure requirements, are permitted as an element of a required means of egress for buildings not exceeding six stories or 75 feet (22.9 m) in height for occupancies other than Group I-2.

An exterior exit stairway that serves as an exit component shall be open to the outside on at least one side except for required structural columns beams, and open-type handrails and guards. A minimum of 35 square feet (3.22 m²) of aggregate open area shall be provided within the horizontal projection of each floor to ceiling level at each exterior stair or within the horizontal projection of the floor to ceiling level of the stairway landing that is located no more than 1/2 level above the corridor floor.

The adjoining open areas shall be either yards, courts or public ways; the remaining sides are permitted to be enclosed by the exterior walls of the building. Any stairway not meeting the definition of an exterior stairway shall comply with the requirements for interior stairways.

Exterior stairways shall be located in accordance with Section 1009.1.

2. Revise the definition of Stairway, Exterior as follows:

SECTION 1002 DEFINITIONS

STAIRWAY, EXTERIOR A stairway that is open on at least one side, except for required structural columns, beams, and open-type handrails, and guards. The adjoining open areas shall be either yards, courts or public ways; the other sides of the exterior stairway need not be open.

Reason: To establish minimum requirements for open area on exterior exit stairways and permit the use of enclosed guards and handrail systems.

The 35 sq. ft. of open area is based on computer fire studies of six multifamily projects in Virginia containing more than 2000 individual dwelling units. The analysis was completed by the Sullivan Code Group using HAZARD I, a fire hazard assessment method developed by the

United States National Institute of Standards and Technology. The procedures used by the Sullivan Code Group were reviewed by Professor Jonathan Barnett, Ph.D., Associate Professor, Center for Firesafety Studies, Worcester Polytechnic Institute who checked for conformity with the fire modeling expectations and limitations.

The findings, which are based on the provisions in the 1996 BOCA National Building Code, apply equally to the provisions in the IBC. The results, summarized by the Sullivan Code Group in the following Executive Summary, for the six buildings included in the studies were very similar. The buildings studied were multifamily apartments with various configurations of corridors connected to exterior open stairs.

EXECUTIVE SUMMARY

The purpose of this analysis was to determine if an equivalent level of life safety could be achieved by the design of an open breezeway in comparison to an enclosed corridor or a balcony for these multifamily buildings.

The multifamily buildings were analyzed using engineering judgement, referenced literature, the suite of computer programs called FASTlite, and CFAST and, computer-based fire models developed by the United States National Institute of Standards and Technology, Building and Fire Research Laboratory.

The reasonable worst case fire scenario modeled was an arson fire on the breezeway. By assuming that the design fire is a fast growing arson fire, this analysis goes beyond the requirements of the Building Code which does not consider arson fire situations in determining building fire safety regulations. Therefore, this analysis is evaluating the building under more adverse conditions than are addressed in the Building Code. The results of the analysis are:

1. For the life safety of the building occupants on the floor of fire origin, the open breezeway configuration is superior to the enclosed corridor configuration.
2. For the life safety of the building occupants on floors other than the floor of fire origin, the open breezeway configuration meets the intent of the egress provisions in the BOCA Code. With the open breezeway configuration, at least one stairwell should maintain tenable egress conditions depending on the wind direction. In all cases analyzed, one stairwell was capable of handling the occupant load. Therefore, the intent of the code is met.
3. Smoke conditions on floors other than the floor of fire origin will remain safe for a suitable period of time to allow occupant egress with the open breezeway configuration, even without sprinklers. If there is a wind, the tenability in the open breezeways is improved.
4. With the enclosed corridor configuration, sprinkler activation is predicted to occur after the time at which the upper smoke layer reaches a level that could impede egress. With the open breezeway configuration, sprinkler activation is predicted to occur prior to the time at which the upper smoke layer reaches a level that could impede egress.
5. The results of this analysis have demonstrated that an open breezeway protected by quick response automatic sprinklers provides occupant egress conditions which are better than code-complying balcony designs. Therefore an open breezeway protected by quick response sprinklers, as designed for this project, should be regulated by the same requirements as the open balcony which does not require a fire resistance rated floor when standard response automatic sprinklers are present. The design of the open breezeway provides a level of life safety equivalent or superior to that required by the BOCA Code Sections 106.2 and 106.4.

Copies of the Fire Studies are submitted for reference (see NMHC/NAA proposal for Section 1004.7). Additional copies are available from the proponent.

Public Hearing: Committee: AS' AM D
Assembly: ASF DF

In the 09/10 cycle, code change E134-09/10 made it clear that this exception only applied to the wall and door that would normally separate an exterior stair from the interior corridor. This exception does not apply to other separation requirements on the sides of the stairs.

The specific section reasoning for this code change is as follows:

Section 202, provide a definition of an open-corridor. Hopefully this will expand on code change E134-09/10 to clarify that this provision is only to eliminate the separation required between the stair and the interior corridor. Not the units on either side.

Section 1026.6, expanding the same concept, adding clarity.

Section 903.3.1.2.2, providing an explicit requirement that sprinkler protection must be provided in this open-ended corridor when using a residential system. As with Section 903.3.1.2.1, this protection is above the requirements of a standard 13R system. If not checked in the design, these heads will not be installed. As such, the open-ended corridor will not be in compliance with code.

Section 1104.21, deletes the sprinkler protection requirement for existing buildings. Once understood that in order to have breezeway stairs, the building, the breezeway and associated stairs must be sprinklered, this provision is actually a retroactive sprinkler provision for all existing buildings with breezeway stairs.

If not sprinklered, in order to keep the breezeway stairs, the building and corridor must be sprinklered. If already sprinklered with a 13R, retrofit sprinklers in the corridor must be installed.

Cost Impact: Since this is correlation between the IFC and IBC, no extra construction cost is expected. And, removing the retroactive implication to existing non-sprinklered breezeways, or 13R sprinklered breezeways without breezeway sprinklers, will reduce costs.

F137-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

903.3.1.2.2-F-GODWIN

F138 – 13

903.3, 903.3.8 (New), 903.4 (IBC [F] 903.4), 903.3.5.1 (IBC [F] 903.3.5.1), 903.3.5.2 (IBC [F] 903.3.5.2)

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

903.3 Installation requirements. *Automatic sprinkler systems* shall be designed and installed in accordance with Sections 903.3.1 through 903.3.87.

903.3.5.1.1 Limited area sprinkler systems.

~~Limited area sprinkler systems serving fewer than 20 sprinklers on any single connection are permitted to be connected to the domestic service where a wet automatic standpipe is not available. Limited area sprinkler systems connected to domestic water supplies shall comply with each of the following requirements:~~

- ~~1. Valves shall not be installed between the domestic water riser control valve and the sprinklers.~~

Exception: ~~An approved indicating control valve supervised in the open position in accordance with Section 903.4.~~

- ~~2. The domestic service shall be capable of supplying the simultaneous domestic demand and the sprinkler demand required to be hydraulically calculated by NFPA 13, NFPA 13D or NFPA 13R.~~

903.3.5.1 903.3.5.2 (IBC [F] 903.3.5.1 903.3.5.2) Residential combination services. A single combination water supply shall be allowed provided that the domestic demand is added to the sprinkler demand as required by NFPA 13R.

903.3.8 (IBC [F] 903.3.8) Limited area sprinkler systems. Limited area sprinkler systems shall be in accordance with the standards listed in Section 903.3.1 except as provided in Sections 903.3.8.1 through 903.3.8.5.

903.3.8.1 Number of sprinklers. Limited area sprinkler systems shall not exceed 6 sprinklers in any single fire area.

903.3.8.2 Occupancy hazard classification. Only areas classified by NFPA 13 as Light Hazard or Ordinary Hazard Group 1 shall be permitted to be protected by limited area sprinkler systems.

903.3.8.3 Piping arrangement. Where a limited area sprinkler system is installed in a building with an automatic-wet standpipe system, sprinklers shall be supplied by the standpipe system. Where a limited area sprinkler system is installed in a building without a wet-pipe automatic standpipe system, water shall be permitted to be supplied by the plumbing system provided that the plumbing system is capable of simultaneously supplying domestic and sprinkler demands.

903.3.8.4 Supervision. Control valves shall not be installed between the water supply and sprinklers unless the valves are of an approved indicating type that are supervised or secured in the open position.

903.3.8.5 Calculations. Hydraulic calculations in accordance with NFPA 13 shall be provided to demonstrate that the available water flow and pressure are adequate to supply all sprinklers installed in any single fire area with discharge densities corresponding to the hazard classification.

903.3.5.2 903.3.5.3 (IBC [F] 903.3.5.2 903.3.5.3) Secondary water supply. An automatic secondary on-site water supply having a capacity not less than the hydraulically calculated sprinkler demand, including the hose stream requirement, shall be provided for high-rise buildings in Seismic Design Category C, D, E or F as determined by the *International Building Code*. An additional fire pump shall not be required for the secondary water supply unless needed to provide the minimum design intake pressure at the suction side of the fire pump supplying the *automatic sprinkler system*. The secondary water supply shall have a duration of not less than 30 minutes as determined by the occupancy hazard classification in accordance with NFPA 13.

Exception: Existing buildings.

903.4 (IBC [F] 903.4) Sprinkler system monitoring and alarms. All valves controlling the water supply for automatic sprinkler systems, pumps, tanks, water levels and temperatures, critical air pressures, and water-flow switches on all sprinkler systems shall be electrically supervised.

Exceptions:

1. Automatic sprinkler systems protecting one- and two-family dwellings.
2. Limited area systems ~~serving fewer than 20 sprinklers in accordance with Section 903.3.8.~~
3. through 7. (No change to current text)

Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

This code section as it exists allows the protection of large areas by a system of automatic sprinklers that is not afforded the same level of protection required by NFPA standards 13, 13R and 25. Some of these include waterflow alarms, components listed for fire protection systems, fire department connections, testing and maintenance. This code change would reduce the number of sprinklers that may be supplied from a building plumbing system to six in a single fire area to eliminate the potential for multiple limited area sprinkler systems and combined water supply demands necessary to control a single fire event. It also limits the six sprinklers to a discharge density of Light Hazard or Ordinary Hazard Group I. The basis for these values provides coordination with longstanding requirements in NFPA 101, Life Safety Code, Section 9.7.1.2, which limits the number and discharge density of automatic sprinklers supplied from a plumbing system. Such a limit is reasonable in that it can allow for a pipe schedule design if the plumbing system is capable of satisfying the NFPA 13 pipe diameter requirements.

Cost Impact: This code change would increase the cost of construction

F138-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

903.3-F-ZUBIA-FCAC

F139 – 13

903.3.5.2 (IBC [F] 903.3.5.2); IBC [F] 403.3

Proponent: Jeffrey M. Hugo, CBO, representing the National Fire Sprinkler Association
(hugo@nfsa.org)

Revise as follows:

IBC [F] 403.3 Automatic sprinkler system. Buildings and structures shall be equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 and a secondary water supply where required by Section ~~903.3.5.2~~ 403.3.3.

~~903.3.5.2 (IBC [F] 903.3.5.2)~~ **IBC [F] 403.3.3 Secondary water supply.** An automatic secondary on-site water supply having a capacity not less than the hydraulically calculated sprinkler demand, including the hose stream requirement, shall be provided for high-rise buildings assigned to Seismic Design Category C, D, E or F as determined by the International Building Code. An additional fire pump shall not be required for the secondary water supply unless needed to provide the minimum design intake pressure at the suction side of the fire pump supplying the automatic sprinkler system. The secondary water supply shall have a duration of not less than 30 minutes

~~IBC [F] 403.3.3~~ **403.3.4 Fire pump room.** Fire pumps shall be located in rooms protected in accordance with Section 913.2.1.

Reason: Secondary water supply for high rises is in Chapter 9, whereas the requirements for high rises are in Section 403 of the *International Building Code*. Since this secondary water supply requirement only applies to high rises it is more appropriate for designers and users in Section 403.3.3 of the *International Building Code*.

Cost Impact: Will not increase the cost of construction

F139-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

903.3.5.2-FS-HUGO

F140 – 13

903.3.7

Proponent: Brad Emerick, Denver Fire Department representing the Fire Marshal's Association of Colorado (FMAC) and the Colorado Chapter of the ICC (CCICC) (brad.emerick@denvergov.org)

Revise text as follows:

903.3.7 Fire department connections. ~~The location of~~ Fire department connections shall be approved by the fire code official installed in accordance with Section 912.

Reason: Section 912 provides the more comprehensive set of requirements for FDCs and except for "fire code official" vs. "fire chief", Section 903.3.7 is redundant with Section 912.2. Pointing to the comprehensive scope contained in Section 912 reduces the opportunity for any of its requirements to be overlooked.

Cost Impact: This change will not affect the cost of construction.

F140-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

903.3.7-F-EMERICK

F141 – 13

903.3.7, 905.1 (IBC [F] 905.1), 905.2 (IBC [F] 905.2), 912.1, 912.3 (IBC [F] 912.3); IBC [F] 903.3.7 (New), IBC [F] 912.1

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

903.3.7 Fire department connections. ~~The location of fire~~ Fire department connections for automatic fire sprinkler systems shall be ~~approved by the fire code official in accordance with Section 912.~~

905.1 (IBC [F] 905.1) General. Standpipe systems shall be provided in new buildings and structures in accordance with ~~this section Sections 905.2 through 905.10. Fire hose threads used in connection with standpipe systems shall be approved and shall be compatible with fire department hose threads. The location of fire department hose connections shall be approved.~~ In buildings used for high-piled combustible storage, fire protection shall be in accordance with Chapter 32.

905.2 (IBC [F] 905.2) Installation standard. Standpipe systems shall be installed in accordance with this section and NFPA 14. Fire department connections for standpipe systems shall be in accordance with Section 912.

912.1 Installation. Fire department connections shall be installed in accordance with the NFPA standard applicable to the system design and shall comply with Sections 912.2 through ~~912.6~~ 912.7.

912.3 (IBC [F] 912.3) Fire hose threads. Fire hose threads used in connection with standpipe systems shall be approved and shall be compatible with fire department hose threads.

IBC [F] 903.3.7 Fire department connections. Fire department connections for automatic fire sprinkler systems shall be in accordance with Section 912.

IBC [F] 912.1 Installation. Fire department connections shall be installed in accordance with the NFPA standard applicable to the system design and shall comply with Sections 912.2 through ~~912.5~~ 912.6.

(Renumber subsequent sections)

Reason: Currently, there are several sections in the code which contain requirements for fire department connections. This proposal will correlate those requirements and place them into Section 912 where the bulk of the requirements exist. This proposal then either deletes the requirements found elsewhere, as in Section 905.1; or it makes reference to the requirements in Section 912.

Section 903.3.7 is shown as an addition to the IBC, since the section is in the IFC but it is not currently in the IBC.
There is no change in the requirements currently found in the code.

Cost Impact: The code change proposal will not increase the cost of construction.

F141-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

903.3.7-F-ZUBIA-FCAC

F142 – 13

903.4.2 (IBC [F] 903.4.2)

Proponent: Robert Marshall, Contra Costa County Fire Protection District representing self
(rmars@cccfd.org)

Revise as follows:

903.4.2 (IBC [F] 903.4.2) Alarms. An approved audible and visual notification device, located on the exterior of the building at the front of the building or in another ~~an approved~~ location, shall be connected to each *automatic sprinkler system*. Such sprinkler water-flow alarm devices shall be activated by water flow equivalent to the flow of a single sprinkler of the smallest orifice size installed in the system. Where a fire alarm system is installed, actuation of the *automatic sprinkler system* shall actuate the building fire alarm system.

Exceptions:

1. Existing Systems
2. Sprinkler systems utilizing a "Water Motor Gong" device shall not be required to provide visual notification.

Reason: Because of extensive fire department public education efforts, the sound of a fire alarm is recognizable, and distinguishable in nearly all circumstances. When people hear these signals, they instinctively know what to do. In the case of fire sprinkler systems however, flow alarms are typically bells, and do not command the same kind of attention as what is typically called a horn/strobe device. Typically, these appliances are located away from roads, or normal paths of travel, and are often located near burglar alarm devices, making it difficult to distinguish between the fire alarm, and burglar alarm devices. Changing the type of tone pattern does not help, because the public no longer recognizes the sound of a bell as a fire alarm. Bells are also subject to maintenance problems, such as bird nests, and wasp nests built up on the bell itself, rendering the bell useless.

Add to this that fire responders often wear hearing protection to scenes, and it becomes difficult to tell where the alarm is, and what the alarm is. By providing an audible/ visual means of notification in a readily visible location, you combat all of these problems. The audible portion notifies people of a fire event, and the visual portion alerts as to exactly which building has the problem from a distance, which is great for responders.

It also has the added benefit of reducing the long term cost of maintenance of a bell.

This code change is to combat the problems detailed above.

The removal of the reference to 907 is due to the contents of this code change. No changes to 907 need to be made to accommodate this proposal.

The code change also moves the device to a place where it is most likely to be seen or heard. The original idea of bell placement goes back to when water motor gongs were prevalent in systems. Because of this, the bells were usually placed at the riser location due to the physical need to move the water through the device. This is a practice that has continued. Because most systems are monitored, placement of an audible/visual notification device is not dependent on the riser location. While it is best for visibility for it to be on the front of the building, it may still be better to put the device on a different side that is perhaps more visible. In any case, the Fire Code Official still has final say under this proposal.

The first exception is made as to not retroactively require installation of devices, as there may be significant practical difficulties in doing this. The second exception is placed because water motor gongs are still sometimes used in locations without electricity. These are usually in limited area sprinkler systems of less than 20 heads that do not require sprinkler monitoring anyway. This practice should be allowed to continue, and this exception would allow this.

Cost Impact: This proposal will not increase the cost of construction

F142-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

903.4.2-F-MARSHALL

F143 – 13

Proponent: Jesse J. Beitel, Hughes Associates, Inc, representing United Technologies Corporation
(jbeitel@haifire.com)

Revise as follows:

904.2 (IBC [F] 904.2) Where required. Automatic fire-extinguishing systems installed as an alternative to the required automatic sprinkler systems of Section 903 shall be approved by the fire code official. Automatic fire-extinguishing systems shall not be considered alternatives for the purposes of exceptions or reductions allowed by other requirements of this code.

Exception: Automatic water mist systems in accordance with 904.12, where listed for the application and where water supply duration requirements are in accordance with Section 903.3.5 and the listing.

Reason: This proposed change adds the concept of using an automatic water mist system for protection of structures only when the water mist systems are used within the systems' listed applications. The proposed exception recognizes that based on performance, listings and field experience water mist is a viable alternative to the protection provided by automatic sprinklers. As a listed alternative to sprinkler protection for specific classifications such as Light Hazard and Ordinary Hazard, for example, the proposed change allows the proposed exceptions and reductions in the occupancies only where the listings identify the protection as appropriate. No new exceptions and reductions are requested. Water-mist systems are tested in environments identical to automatic sprinkler testing and have been found to achieve at least equal performance using less water than conventional sprinklers. It is intended that the water supply durations be consistent with their listing requirements and to that of sprinklers as noted in NFPA 13 §11.2.3.1.2 (2013) to address sufficient water supplies based on the occupancy protected.

Automatic water mist systems are similar to sprinkler systems in that both are "an integrated system of underground and overhead piping designed in accordance with fire protection engineering standards. The system includes a suitable water supply. The portion of the system above the ground is a network of specially sized or hydraulically designed piping installed in a structure or area, generally overhead, and to which automatic sprinklers are connected in a systematic pattern. The system is usually activated by heat from a fire and discharges water over the fire area" [IFC 2012 Automatic Sprinkler System Definition]. Water mist systems use nozzles, operate at various pressures and are fed from a potable water supply or pressurized bottles.

Water mist systems have been approved by FM Approvals for occupancies similar to light hazard as defined by NFPA 13. The test criteria for these listings are found in FM 5560. Water mist systems have been listed by UL for Ordinary Hazard, Group I occupancies as defined by NFPA 13 (UL ZDPA.EX15843). These listings would permit water mist to be installed as the primary suppression system in a variety of Occupancy Classifications.

Automatic water mists systems provide a water efficient alternative to sprinkler systems. Water mist systems reduce the water supply demand which can be of significance in areas where municipal water supplies may be marginal or inadequate for conventional sprinklers. Reducing the water demand for automatic fire protection systems that are tested in the same manner by recognized laboratories to conventional sprinklers, will encourage the installation of fire protection systems in cities and towns where water shortages due to drought may be a problem. Furthermore, the reduced discharge from water mist systems, compared to conventional sprinklers, in turn reduces the potential water damage.

Water mist systems are listed for several occupancies based on the hazard definitions and have been used for years in buildings and on passenger ships specifically as a "sprinkler equivalent system" per Resolution A.800(19), November 1995 (IMO A800). A.800 details the testing criteria to establish water mist sprinkler equivalency for passenger ships. These passenger ships are similar to small cities in terms of the occupancies located on board, including assembly, business, mercantile, residential, and storage. The wide variety of occupancies located on passenger ships and history of use provides strong support for the equivalency of water mist systems to sprinkler systems. Water mist systems have been used in lieu of automatic sprinklers in buildings and on passenger ships for years due to water efficient design. The listings of the systems have been used as design guidance in buildings.

The acceptance of protecting buildings entirely by water-mist is appropriate and is being done today. Water mist works to extinguish, suppress or control fires in fully open compartments. The performance of these systems depends on pre-wetting of combustibles and cooling of hot gases, the same as conventional sprinklers, and they do not require sealed enclosures. Water-mist systems are tested in environments identical to automatic sprinkler testing and have been found to achieve at least equal performance using less water than conventional sprinklers.

Cost Impact: Water mist systems on original installation can be lower cost than traditional sprinkler system. For example, automatic water mist systems in locations with marginal water supplies would potentially provide cost savings as water tanks would not be required. Obviously, if the tank occupies rentable space, the lifetime costs of the water mist system become even more compelling.

F143-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

904.2-F-BEITEL

F144 – 13

904.2 (IBC [F] 904.2), 904.2.1 (New) [IBC [F] 904.2.1 (New)], 904.12 (New) [IBC [F] 904.12 (New)], 202 (IBC 202), 902.1 (IBC [F] 902.1), Chapter 80 (IBC Chapter 35)

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

904.2 (IBC [F] 904.2) Where required permitted. Automatic fire-extinguishing systems installed as an alternative to the required *automatic sprinkler systems* of Section 903 shall be *approved* by the fire code official. ~~Automatic fire-extinguishing systems shall not be considered alternatives for the purposes of exceptions or reductions allowed by other requirements of this code.~~

904.2.1 (IBC [F] 904.2.1) Restriction on using automatic sprinkler system exceptions or reductions. Automatic fire-extinguishing systems shall not be considered alternatives for the purposes of exceptions or reductions allowed for *automatic sprinkler systems* or by other requirements of this code.

904.2.4 ~~904.2.2~~ (IBC ~~[F]~~ 904.2.4 904.2.2) Commercial hoods and duct systems. (no change)

904.12 (IBC [F] 904.12) Automatic Water Mist Systems. *Automatic water mist systems* shall be permitted in applications that are consistent with the applicable listing or approvals and shall comply with Sections 904.12.1 through 904.12.3.

904.12.1 (IBC [F] 904.12.1) Design and Installation Requirements. *Automatic water mist systems* shall be designed and installed in accordance with Sections 904.12.1.1 through 904.12.1.4.

904.12.1.1 (IBC [F] 904.12.1.1) General. *Automatic water mist systems* shall be designed and installed in accordance with NFPA 750 and the manufacturer's instructions.

904.12.1.2 (IBC [F] 904.12.1.2) Actuation. *Automatic water mist systems* shall be automatically actuated.

904.12.1.3 (IBC [F] 904.12.1.3) Water supplies. Connections to a potable water supply shall be protected against backflow in accordance with the International Plumbing Code.

904.12.1.4 (IBC [F] 904.12.1.4) Secondary water supply. Where a secondary water supply is required for an *automatic sprinkler system*, an *automatic water mist system* shall be provided with an approved secondary water supply.

904.12.2 (IBC [F] 904.12.2) Water mist system supervision and alarms. Supervision and alarms shall be provided as required for *automatic sprinkler systems* in accordance with Section 903.4.

904.12.2.1 (IBC [F] 904.12.2.1) Monitoring. Monitoring shall be provided as required for *automatic sprinkler systems* in accordance with Section 903.4.1.

904.12.2.2 (IBC [F] 904.12.2.2) Alarms. Alarms shall be provided as required for *automatic sprinkler systems* in accordance with Section 903.4.2.

904.12.2.3 (IBC [F] 904.12.2.3) Floor control valves. Floor control valves shall be provided as required for *automatic sprinkler systems* in accordance with 903.4.3.

904.12.3 (IBC [F] 904.12.3) Testing and maintenance. *Automatic water mist systems* shall be tested and maintained in accordance with the International Fire Code.

Add new definition as follows:

SECTION 202 GENERAL DEFINITIONS

AUTOMATIC WATER MIST SYSTEM. A system consisting of a water supply, a pressure source, and a distribution piping system with attached nozzles, which, at or above a minimum operating pressure, defined by its listing, discharges water in fine droplets meeting the requirements of NFPA 750 for the purpose of the control, suppression or extinguishment of a fire. Such systems include wet-pipe, dry-pipe and pre-action types. The systems are designed as engineered, pre-engineered, local-application or total flooding systems.

902.1 Definitions. The following terms are defined in Chapter 2:

AUTOMATIC WATER MIST SYSTEM

Add new standard to Chapter 80 as follows:

NFPA

750-14 Standard on Water Mist Fire Protection Systems

Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

This proposal recognizes water mist as an alternative, in some applications, to automatic fire sprinkler systems. However, no exceptions, reductions, or "trade-offs" for water mist systems are granted or permitted by this proposal, as automatic water mist systems are not considered equivalent to automatic sprinkler systems. Automatic water mist systems have been approved by FM Global for occupancies similar to Light Hazard (as defined by NFPA 13) and by UL for occupancies similar to Ordinary Hazard Group I (as defined by NFPA 13). These listings permit automatic water mist systems to be installed as the primary suppression system in a variety of occupancy classifications.

In addition to the above text in Section 904, a definition and the installation standard NFPA 750 *Standard on Water Mist Fire Protection Systems* is added as a referenced standard.

Cost Impact: This code change will not increase the cost of construction

Analysis: A review of the standard proposed for inclusion in the code, NFPA 750-14, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013.

F144-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

904.2-F-ZUBIA-FCAC

F145 – 13

904.11.5 (New) [IBC [F] 904.11.5], Chapter 80

Proponent: Bob Eugene, representing UL LLC (Robert.Eugene@ul.com)

Add new text as follows:

904.11.5 (IBC [F] 904.11.5) Residential range top extinguisher units. Where residential range top cooking appliances are permitted to be used in occupancies regulated by this Code, and an automatic fire-extinguisher unit is required to protect the cooking surface, it shall be listed and labeled in accordance with UL 300A. The extinguisher unit shall be installed in accordance with its listing and the manufacturer's installation instructions.

Add new standard to Chapter 80 as follows:

300A – 06 Outline of Investigation for Extinguishing System Units for Residential Range Top
Cooking Surfaces904.11.5

Reason: The UL 300A Outline of Investigation includes requirements for conducting fire testing with extinguisher units intended to extinguish fires occurring on residential range top cooking surfaces. To date two manufacturers have several automatic extinguisher units that are listed and comply with UL 300A, that include both wet and dry chemical extinguishing agents.

It is recognized that code officials allow residential range tops to be installed in a variety of situations in addition to dwelling units. This includes office break rooms, churches, and similar venues. It is not the intent of the proposal to require all of these installations to be protected by UL 300A extinguisher units. The proposal clearly indicates that these units are only to be provided when required.

One application where UL 300A extinguisher units will be required is for residential range tops installed in Group I-2, Condition 1 occupancies. This was recently required as a result of the public comment to proposal G65-12 that was passed at the Final Action Hearing in Portland.

Cost Impact: None

F145-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

904.11.5 (NEW)-F-EUGENE

F146 – 13

904.12 (IBC [F] 904.12) (New), 904.12.1 (IBC [F] 904.12.1 (New)), 904.12.2 (IBC [F] 904.12.2 (New)), Table 906.1 (IBC [F] Table 906.1), Chapter 80 (IBC Chapter 35)

Proponent: Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee
(cbaldassarra@RJAGroup.com)

Revise as follows:

904.12 (IBC [F] 904.12) Domestic cooking system in Group I-2 Condition 1. In Group I-2 Condition 1 occupancies where cooking facilities are installed in accordance with Section 407.2.5 of the *International Building Code*, the domestic cooking hood provided over the cooktop or range shall be equipped with an automatic fire-extinguishing system of a type recognized for protection of domestic cooking equipment. Pre-engineered automatic extinguishing systems shall be tested in accordance with UL 300A and listed and labeled for the intended application. The system shall be installed in accordance with this code, its listing and the manufacturer's instructions.

904.12.1 (IBC [F] 904.12.1) Manual system operation and interconnection. A manual actuation device for the hood suppression system shall be installed in accordance with Section 904.11.1 and 904.11.2

904.12.2 (IBC [F] 904.12.2) Portable fire extinguishers for domestic cooking equipment in Group I-2 Condition 1. A portable fire extinguisher complying with Section 906 shall be installed within 30 feet (9144 mm) travel distance of domestic cooking appliances.

**TABLE 906.1 (IBC [F] TABLE 906.1)
ADDITIONAL REQUIRED PORTABLE FIRE EXTINGUISHERS**

Section	Subject
904.12.2 (IBC 407.2.5)	Domestic cooking hoods in Group I-2 Condition 1 occupancies

(Portions of table not shown remain unchanged)

Add new standard to Chapter 80 (IBC Chapter 35) as follows:

UL

300A-2006 Outline of Investigation for Extinguishing System Units for Residential Range Top Cooking Surfaces

Reason: M76 clarified requirements for domestic appliance located in facilities such as nursing homes and assisted living where they are only used for domestic (not commercial) cooking. G65 requires a range hood with a UL300A protection system in a Group I-2 Condition 1 (nursing home). The purpose of this change is for the standard to be required in the Fire Code. The requirements follow what passed in G65 in Items 6, 7 and 9.

The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

Cost Impact: None

Analysis: The standard proposed for inclusion in the code, UL 300A, was accepted as a referenced standard in the IBC by approval of Group A code change G65-12 (AMPC).

F146-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

F147 – 13

904.12 (New) [IBC [F] 904.12 (New)], 202 (IBC 202), 902.1 (IBC [F]902.1), Chapter 80 (IBC Chapter 35)

Proponent: Jesse J. Beitel, Hughes Associates, Inc, representing United Technologies Corporation (jbeitel@haifire.com)

Revise as follows:

904.12 (IBC [F] 904.12) Automatic Water Mist Systems. Automatic water mist systems shall be permitted in applications that are consistent with the applicable listing or approvals and shall comply with Sections 904.12.1 through 904.12.3.

904.12.1 (IBC [F] 904.12.1) Design and Installation Requirements. Automatic water mist systems shall be designed and installed in accordance with Sections 904.12.1.1 through 904.12.1.4.

904.12.1.1 (IBC [F] 904.12.1.1) General. Automatic water mist systems shall be designed and installed in accordance with NFPA 750 and the manufacturer's instructions.

904.12.1.2 (IBC [F] 904.12.1.2) Actuation. Automatic water mist systems shall be automatically actuated.

904.12.1.3 (IBC [F] 904.12.1.3) Water supplies. Connections to a potable water supply shall be protected against backflow in accordance with the International Plumbing Code.

904.12.1.4 (IBC [F] 904.12.1.4) Secondary water supply. Where a secondary water supply is required for an automatic sprinkler system, an automatic water mist system shall be provided with an approved secondary water supply.

904.12.2 (IBC [F] 904.12.2) Water mist system supervision and alarms. Supervision and alarms shall be provided as required for automatic sprinkler systems in accordance with Section 903.4.

904.12.2.1 (IBC [F] 904.12.2.1) Monitoring. Monitoring shall be provided as required for automatic sprinkler systems in accordance with Section 903.4.1.

904.12.2.2 (IBC [F] 904.12.2.2) Alarms. Alarms shall be provided as required for automatic sprinkler systems in accordance with Section 903.4.2.

904.12.2.3 (IBC [F] 904.12.2.3) Floor control valves. Floor control valves shall be provided as required for automatic sprinkler systems in accordance with 903.4.3.

904.12.3 (IBC [F] 904.12.3) Testing and maintenance. Automatic water mist systems shall be tested and maintained in accordance with the International Fire Code.

Add new definition as follows:

SECTION 202 (IBC 202) GENERAL DEFINITIONS

AUTOMATIC WATER MIST SYSTEM. A system consisting of a water supply, a pressure source, and a distribution piping system with attached nozzles, which, at or above a minimum operating pressure, defined by its listing, discharges water in fine droplets meeting the requirements of NFPA 750 for the purpose of the control, suppression or extinguishment of a fire. Such systems include wet-pipe, dry-pipe and pre-action types. The systems are designed as engineered, pre-engineered, local-application or total flooding systems.

902.1 Definitions. The following terms are defined in Chapter 2:

AUTOMATIC WATER MIST SYSTEM

Add new standard to Chapter 80 (IBC Chapter 35) as follows:

NFPA

750-14 Standard on Water Mist Fire Protection Systems

Reason: This proposed change adds the concept of using an automatic water mist system for protection of structures only when the water mist systems are used within the systems' listed applications. As a listed alternative to sprinkler protection for specific classifications such as Light Hazard and Ordinary Hazard, for example, the proposed change allows water mist in the occupancies only where the listings identify the protection as appropriate. The proposal recognizes that based on performance, listings and field experience water mist is a viable alternative to the protection provided by automatic sprinklers. No new exceptions and reductions are requested. Water-mist systems are tested in environments identical to automatic sprinkler testing and have been found to achieve at least equal performance using less water than conventional sprinklers.

Automatic water mist systems are similar to sprinkler systems in that both are "an integrated system of underground and overhead piping designed in accordance with fire protection engineering standards. The system includes a suitable water supply. The portion of the system above the ground is a network of specially sized or hydraulically designed piping installed in a structure or area, generally overhead, and to which automatic sprinklers are connected in a systematic pattern. The system is usually activated by heat from a fire and discharges water over the fire area" [IFC 2012 Automatic Sprinkler System Definition]. Water mist systems use nozzles, operate at various pressures and are fed from a potable water supply or pressurized bottles.

Water mist systems have been approved by FM Approvals for occupancies similar to light hazard as defined by NFPA 13. The test criteria for these listings are found in FM 5560. Water mist systems have been listed by UL for Ordinary Hazard, Group I occupancies as defined by NFPA 13 (UL ZDPA.EX15843). These listings would permit water mist to be installed as the primary suppression system in a variety of Occupancy Classifications.

Automatic water mist systems provide a water efficient alternative to sprinkler systems. Water mist systems reduce the water supply demand which can be of significance in areas where municipal water supplies may be marginal or inadequate for conventional sprinklers. Reducing the water demand for automatic fire protection systems that are tested in the same manner by recognized laboratories to conventional sprinklers, will encourage the installation of fire protection systems in cities and towns where water shortages due to drought may be a problem. Furthermore, the reduced discharge from water mist systems, compared to conventional sprinklers, in turn reduces the potential water damage.

Water mist systems are listed for several occupancies based on the hazard definitions and have been used for years in buildings and on passenger ships specifically as a "sprinkler equivalent system" per Resolution A.800(19), November 1995 (IMO A800). A.800 details the testing criteria to establish water mist sprinkler equivalency for passenger ships. These passenger ships are similar to small cities in terms of the occupancies located on board, including assembly, business, mercantile, residential, and storage. The wide variety of occupancies located on passenger ships and history of use provides strong support for the equivalency of water mist systems to sprinkler systems. Water mist systems have been used in lieu of automatic sprinklers in buildings and on passenger ships for years due to water efficient design. The listings of the systems have been used as design guidance in buildings.

The acceptance of protecting buildings entirely by water-mist is appropriate and is being done today. Water mist works to extinguish, suppress or control fires in fully open compartments. The performance of these systems depends on pre-wetting of combustibles and cooling of hot gases, the same as conventional sprinklers, and they do not require sealed enclosures. Water-mist systems are tested in environments identical to automatic sprinkler testing and have been found to achieve at least equal performance using less water than conventional sprinklers.

Cost Impact: Water mist systems on original installation can be lower cost than traditional sprinkler system. For example, automatic water mist systems in locations with marginal water supplies would potentially provide cost savings as water tanks would not be required. Obviously, if the tank occupies rentable space, the lifetime costs of the water mist system become even more compelling.

Analysis: A review of the standard proposed for inclusion in the code, NFPA 750-14, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013.

F147-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

904.12 (NEW)-F-BEITEL

F148 – 13

905.4

Proponent: Al Godwin, CBO, CPM, Aon Fire Protection Engineering, representing Aon Fire Protection Engineering Corporation (al.godwin@aon.com)

Revise as follows:

905.4 Location of Class I standpipe hose connections. Class I standpipe hose connections shall be provided in all of the following locations:

1. In every required interior *exit stairway*, a hose connection shall be provided for each floor level above, ~~and~~ below and at grade. Hose connections shall be located at an intermediate floor level landing between floors, unless otherwise approved by the fire code official.
- 2 through 6 *(No change to current text)*

Reason: Since hose connections are placed at intermediate landings between floors, it is not clear as to which floor the hose connection serves. However, by not listing “at grade” the provision could be read that one is not required to serve the floor at grade, whichever intermediate landing that might be, leading to some challenges of its meaning. Hopefully, this provides clarification.

Cost Impact: This appears to be a correction. As such, it is not an increase in cost over what the original intent of the code provision should require.

F148-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

905.4-F-GODWIN

F149 – 13

905.9 (IBC [F] 905.9)

Proponent: Bob D. Morgan, P.E., Fort Worth, TX Fire Department representing Fire Advisory Board to North Central Texas Council of Governments

Revise as follows:

905.9 (IBC [F] 905.9) Supervision. Supervision of standpipes shall be in accordance with Sections 905.9.1 and 905.9.2.

905.9.1 (IBC [F] 905.9.1) Valve Supervision. *(unchanged)*

905.9.2 (IBC [F] 905.9.2) Manual dry standpipes. Manual dry standpipe systems shall be supervised with a minimum of 10 psig and a maximum of 40 psig air pressure and monitored by a low air pressure alarm.

Reason: Improves the integrity of such systems for utilization in a fire event, which could otherwise have all hose valves opened or develop multiple leaks without anyone knowing until such system is charged with water.

Cost Impact: The code change proposal will increase the cost of construction of such systems to install an air compressor and low air pressure alarm.

F149-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

905.2-F-MORGAN

F150 – 13

901.8.2 (New)

Proponent: William Freer, New York State Office of Fire Prevention and Control
(WFreer@DHSES.ny.gov)

Add new text as follows:

901.8.2 Removal of occupant use hose. Removal of the occupant use hose line attached to a Class II standpipe system or a Class III standpipe system shall be permitted where either of the following conditions exist:

1. The building is equipped with a Class I standpipe system.
2. The building is not required to be equipped with a Class I standpipe system and the building is equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1.

Reason: The current code does not require occupant use hoses in as many locations as were required in previous codes. There has been a shift in the philosophy of whether or not occupants should be asked to attempt to extinguish the fire or evacuate the structure. Most of the population is now being taught to evacuate the building, not fight the fire. This shift is mainly due to the safety risk of having a non-trained person attempting to fight a fire with more than a fire extinguisher. Many jurisdictions have already enacted local legislation or code changes to address this issue.

The City of Philadelphia has added the following:

F-905.11 Existing buildings. Existing structures with occupied floors located more than 50 feet (15,240 mm) above or below the lowest level of fire department vehicle access shall be equipped with standpipes installed in accordance with Section F-905. The standpipes shall have an approved fire department connection with hose connections at each floor level above or below the lowest level of fire department vehicle access. [The fire code official is authorized to approve the installation of manual standpipe systems to achieve compliance with this section where the responding fire department is capable of providing the required fire flow at the highest standpipe outlet.] *These requirements shall also apply to buildings that were granted variances prior to January 1, 2004 to omit standpipes from the required exit stairways. Buildings or structures that are not in compliance with Section F-905 on the effective date of this code, shall, with written request to and upon written approval from the Fire Department, be granted three years from the effective date of this code to comply.*

Exceptions:

1. In existing buildings having the highest occupied floors located not more than 75 feet above the lowest level of fire department vehicle access, Class I standpipe systems are permitted to be manual wet systems.
2. Standpipe systems installed prior to January 1, 1995 that provide a residual pressure of 65 psi (448 kPa) or greater at the highest hose outlet are exempt from the requirement to provide a residual pressure of 100 psi (690 kPa) at the highest hose outlet.
3. Standpipe systems with a residual pressure of less than 100 psi (690 kPa) at the topmost hose outlet are permitted where:
 - 3.1 The building existing prior to the effective date of this code;
 - 3.2 The building is equipped throughout with an automatic sprinkler system; and
 - 3.3 The highest floor level is not more than 150 feet (45 720 mm) above the lowest level of fire department vehicle access,

F-905.11.1 Removal of occupant use hoseline or Class II standpipe systems. Removal of the hoseline attached to a Class II standpipe system or a Class III standpipe system that is not required by this code, or removal of an entire Class II standpipe system is permitted where the following conditions are met:

1. Removal of hoseline only: The building is equipped with a Class I standpipe system or the building is not required to have a Class I system.
2. Removal of the Class II standpipe system is permitted where one of the following exists:
 - 2.1 The building is equipped throughout with an automatic fire-extinguishing system and has more than one Class I standpipe hose outlet riser in a multi-exit building or at least one riser in a single exit building;
 - 2.2 The building is in the process of being equipped throughout with an automatic fire-extinguishing system and there is more than one standpipe hose outlet riser in a multi-exit building or there is at least one riser in a single exit building. When the sprinklers on a floor have been placed in service, the Class II standpipe hose stations on that floor are permitted to be removed; or
 - 2.3 The building is not equipped throughout with an automatic fire-extinguishing system, there is more than one automatic wet Class I standpipe hose outlet riser in a multi-exit building and there is at least one

automatic wet riser in a single exit building.

The City of San Francisco added:

4.09 Removal of Class II Standpipe Hose Cabinets in Sprinkler Retrofitted Buildings (PDF)

Reference: 2010 S.F.F.C. 901.8

Section 901.8 of the 2010 SFFC requires written approval from the fire code official in order to remove existing fire appliances. In order to speed the permit process, buildings subject to the San Francisco High-rise Sprinkler Ordinance will be permitted to remove Class II Standpipe hose cabinets on individual floors after they have been fully sprinklered. The applicant shall state his or her intention to remove the hose cabinets on the approved sprinkler plans. Buildings not subject to the ordinance will continue to require written approval from the fire code official in order to remove any fire appliance. These written requests will be considered on a case-by-case basis.

Canada also allows the removal of occupant hoses but requires more signage in places where it is done. It should also be noted that occupant use hoses are not required by NFPA 14 as follows:

1. NFPA 14--2007, Standard for the Installation of Standpipe and Hose Systems details the design and installation of standpipe systems.
 - 7.3.4 Class III Systems. Class III systems shall be provided with hose connections as required for both Class I and Class II systems.
 - 7.3.4.1 Where the building is protected throughout by an approved automatic sprinkler system in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, and NFPA 13R, Standard for the Installation of Sprinkler Systems in Residential Occupancies up to Four Stories in Height, Class II hose stations for use by trained personnel shall not be required, subject to the approval of the local fire department, provided that each Class I hose connection is 2 1/2 in. and is equipped with a 2 1/2 in. x 1 1/2 in. reducer and a cap attached with a chain.

This code change would not increase the cost of construction but would decrease the cost of maintenance and upkeep.

Cost Impact: The code change proposal will not increase the cost of construction.

F150-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

905.11 (NEW)-F-FREER

F151 – 13

906.1 (IBC [F] 906.1)

Proponent: Dave Fable representing U.S. General Services Administration, Public Buildings Service

Revise as follows:

906.1 (IBC [F] 906.1) Where required. Portable fire extinguishers shall be installed in the following locations.

1. In new and existing Group A, B, E, F, H, I, M, R-1, R-2, R-4 and S occupancies.

Exception Exceptions:

1. In Group R-2 occupancies, portable fire extinguishers shall be required only in locations specified in Items 2 through 6 where each *dwelling unit* is provided with a portable fire extinguisher having a minimum rating of 1-A:10-B:C.
2. In new and existing Group B occupancies equipped throughout with quick-response sprinklers, portable fire extinguishers shall be required only in locations specified in Items 2 through 6.
2. Within 30 feet (9144 mm) of commercial cooking equipment.
3. In areas where flammable or *combustible liquids* are stored, used or dispensed.
4. On each floor of structures under construction, except Group R-3 occupancies, in accordance with Section 3315.1.
5. Where required by the sections indicated in Table 906.1.
6. Special-hazard areas, including but not limited to laboratories, computer rooms and generator rooms, where required by the *fire code official*.

Reason: The intent of this code change is to re-introduce an IFC code requirement that was in the past editions of the IFC (i.e., editions 2000 to 2009). However, in the 2012 edition of the IFC, the subject exception was removed from the IFC without any technical substantiation.

Exception #2 acknowledges the reliable advantages of an automatic sprinkler system designed to comply with NFPA 13. Group B occupancies are considered light hazard occupancies and must be protected by quick response sprinklers (see Section 903.3.2). The faster acting sprinklers and the lower fuel load associated with Group B occupancies alleviate the need for portable fire extinguishers to be installed throughout non-hazardous areas within this occupancy. In addition, the evacuation strategy for this occupancy is for occupants to evacuate building or relocate to a safe area within the building in lieu of delaying evacuation/relocation and having occupants attempt to utilize a portable fire extinguisher to try to extinguish a fire.

It should be noted that building occupants in Group B occupancies are not required to be trained in the use of portable fire extinguishers since training building occupants in the use of portable fire extinguishers is not addressed within the IFC nor is there a requirement in the IFC stating that portable fire extinguishers have been installed for occupant use. In addition, fire department personnel typically will also not use the portable fire extinguishers which have been installed within a building due to the uncertainty they have regarding the subject extinguisher operating when needed. Therefore, the installation of this type of manual extinguishing equipment throughout a Group B occupancy equipped with an operational sprinkler system utilizing quick-response sprinklers is questionable and not warranted or cost effective (e.g., installation costs, maintenance costs, etc.) over the life of a building.

Cost Impact: The code change proposal will not increase the cost of construction.

F151-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

906.1-F-FRABLE

F152 – 13

907.1.2 (IBC [F] 907.1.2)

Proponent: Thomas P. Hammerberg, representing Automatic Fire Alarm Association
(TomHammerberg@afaa.org)

Revise as follows:

907.1.2 (IBC [F] 907.1.2) Fire alarm shop drawings. Shop drawings for fire alarm systems shall be submitted for review and approval prior to system installation, and shall include, but not be limited to, all of the following where applicable to the system being installed:

1. A floor plan that indicates the use of all rooms.
2. Locations of alarm-initiating devices.
3. Locations of alarm notification appliances, including candela ratings for visible alarm notification appliances.
4. Design minimum audibility level for occupant notification.
- ~~45.~~ Location of fire alarm control unit, transponders and notification power supplies.
- ~~56.~~ Annunciators.
- ~~67.~~ Power connection.
- ~~78.~~ Battery calculations.
- ~~89.~~ Conductor type and sizes.
- ~~910.~~ Voltage drop calculations.
- ~~1011.~~ Manufacturers' data sheets indicating model numbers and listing information for equipment, devices and materials.
- ~~1412.~~ Details of ceiling height and construction.
- ~~1213.~~ The interface of fire safety control functions.
- ~~1314.~~ Classification of the supervising station.

Reason: The "where applicable" addition is necessary to clarify that only those items applicable to the system being installed are required to be submitted. For example, if the system is only to monitor a sprinkler system and no fire alarm notification appliances are required, there is no need to provide voltage drop calculations or minimum audibility levels that the system will be designed to meet.

The other change is necessary to assist fire alarm designers, installers and authorities having jurisdiction with meeting minimum audibility requirements per NFPA 72. This change will decrease the amount of interpretation issues that usually arise at the final acceptance test and will result in better designed and installed systems.

Cost Impact: none

F152-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

907.1.2-F-HAMMERBERG

F153 – 13

907.2 (IBC [F] 907.2)

Proponent: Gregory Nicholls, AIA, City of Mason, Ohio, representing the City of Mason

Revise as follows:

907.2 (IBC [F] 907.2) Where required—~~new buildings and structures~~. An *approved* fire alarm system installed in accordance with the provisions of this code and NFPA 72 shall be provided in ~~new~~ buildings and structures in accordance with Sections 907.2.1 through 907.2.23 and provide occupant notification in accordance with Section 907.5, unless other requirements are provided by another section of this code.

A minimum of one manual fire alarm box shall be provided in an *approved* location to initiate a fire alarm signal for fire alarm systems employing automatic fire detectors or water-flow detection devices. Where other sections of this code allow elimination of fire alarm boxes due to sprinklers, a single fire alarm box shall be installed.

Exceptions:

1. The manual fire alarm box is not required for fire alarm systems dedicated to elevator recall control and supervisory service.
2. The manual fire alarm box is not required for Group R-2 occupancies unless required by the *fire code official* to provide a means for fire watch personnel to initiate an alarm during a sprinkler system impairment event. Where provided, the manual fire alarm box shall not be located in an area that is accessible to the public.

Reason: In the 2009 IBC and IFC, this section was added based on Fire Code scoping that covered requirements for new buildings in Section 907.2 and existing buildings in Section 907.3. The IBC just had the language copied verbatim for 907.2 only, even though the “new buildings” part is not relevant. All requirements in the IBC, chapters 2-33 are about new construction, and their application is then modified by Chapters 1 and 34 for existing buildings.

In the 2012 IFC, the requirements for existing buildings moved to Chapter 11, thereby making the “new building” designation irrelevant in the Fire Code as well.

The current wording has caused mis-interpretation on the part of some owners and designers, as they have taken this to mean that change of occupancy projects, for example, do not need to comply with Section 907.2, as they are existing buildings and specifically are exempt. Deletion of references to “new” will provide clarity and remove irrelevant language for both the IFC and IBC, and make the text consistent with the rest of these documents.

Cost Impact: The code change proposal will not increase the cost of construction, as this only a matter of clarification for existing requirements.

F153-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

907.2-F-NICHOLLS

F154 – 13

907.2.1 (IBC [F] 907.2.1)

Proponent: Timothy W. Fisher, State of Alaska, Department of Public Safety, Division of Fire and Life Safety, representing Alaska State Fire Marshal's Office & ICC Alaska Central Chapter

Revise as follows:

907.2.1 (IBC [F] 907.2.1) Group A. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.5 shall be installed in Group A occupancies ~~where the occupant load due to the assembly occupancy is 300 or more where a required automatic sprinkler system is installed, the automatic sprinkler system shall be connected to the building fire alarm system. Group A occupancies not separated from one another in accordance with Section 707.3.9 of the International Building Code shall be considered as a single occupancy for the purposes of applying this section.~~ Portions of Group E occupancies occupied for assembly purposes shall be provided with a fire alarm system as required for the Group E occupancy.

Exception: Manual fire alarm boxes are not required when the building is equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 and the occupant notification appliances will activate throughout the notification zones upon sprinkler waterflow.

Reason: In the 2006 International Code Adoption, the requirement for a Fire Sprinkler System in an A-2 occupancy was reduced to an occupant load of 100 from 300. Currently, a Fire Alarm System is required in an A occupancy when the occupant load is greater than 300. This has left a void of 100 to 300 occupants.

Previously, the Fire Alarm System requirements mirrored the Fire Sprinkler System requirements at 300 occupants; it seemed prudent to also require a fire alarm system at 100 occupants in an A-2 occupancy, same as the sprinkler requirement.

The intent of the revision is to remove a set number of (300) for occupant loading from the Fire Alarm System requirements for Assembly (A) Occupancy, then requiring a Fire Alarm System based on the requirements in the Fire Sprinkler System section. Then it would render the Sentence with Section 707.3.9 "Fire Areas" obsolete as it would be based on the Fire Sprinkler System fire area requirements.

The Station Night Club incident didn't have sprinklers, causing a change in the sprinkler requirements where as the Fire Alarm System requirements were not adjusted for A-2 occupancies in the event of an emergency. This change would require notification appliances that would ensure occupants are alerted within an A-2 occupancy during a sprinkler activation or a kitchen hood and duct suppression system activation.

Revising this code section will realign the fire systems according to the historical requirements; provide an acceptable level of fire and public safety as well as providing notification appliances throughout the facility to notify occupants that there is an emergency in the facility and to promptly evacuate, saving lives.

Cost Impact: Cost varies on location, size, and company for the installation of Fire Alarm System (Notification Appliances Only)

F154-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

907.2.1-F-FISHER

F155 – 13

907.2.1 (IBC [F] 907.2.1)

Proponent: Daniel E. Nichols, P.E., New York State Department of State (dan.nichols@dos.ny.gov)

Revise as follows:

907.2.1 (IBC [F] 907.2.1) Group A. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.5 shall be installed in Group A occupancies where the occupant load due to the assembly occupancy is 300 or more. Group A occupancies that share portions of the exit or exit access or are not separated from one another in accordance with Section 707.3.9 of the *International Building Code* shall be considered as a single occupancy for the purposes of applying this section. Portions of Group E occupancies occupied for assembly purposes shall be provided with a fire alarm system as required for the Group E occupancy.

Reason: This code change proposal is to require a fire alarm system when the exits or exit access of a building is used to serve a combined occupant load of all assembly occupancies within a building above the threshold amount.

The State of New York has had experience in both fire losses and new building construction with this topic. First, the Stouffer's Inn and conference center in 1981 killed 23 top-level executives when a fire in a common hallway trapped occupants in several small (50-100 person) conference rooms. Second, the fire area method of separating A-3 occupancies has provided a way to not protect college and university lecture room buildings by separating the spaces but having room occupant loads approaching 1,000 people in the common hallway.

Cost Impact: This proposal will raise the cost of construction when combined paths of exiting are utilized.

F155-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

907.2.1-F-NICHOLS

F156 – 13

907.2.1.1 (IBC [F] 907.2.1.1), 907.5.2.2.3 (New) (IBC [F] 907.5.2.2.3 (New))

Proponent: Vince Baclawski, representing National Electrical Manufacturers Association (NEMA)
(vin_baclawski@nema.org)

Revise as follows:

907.2.1.1 (IBC [F] 907.2.1.1) System initiation in Group A occupancies with an occupant load of 1,000 or more. Activation of the fire alarm in Group A occupancies with an *occupant load* of 1,000 or more shall initiate a signal using an emergency voice/alarm communications system in accordance with Section 907.5.2.2.

Exception: ~~Where approved, the prerecorded announcement is allowed to be manually deactivated for a period of time, not to exceed 3 minutes, for the sole purpose of allowing a live voice announcement from an approved, constantly attended location.~~

907.5.2.2.3 (IBC [F] 907.5.2.2.3) Resumption of Pre-recorded Voice Messages. Where approved, the pre-recorded voice announcement shall be manually deactivated for a period of time for the sole purpose of allowing a live voice announcement from an approved, constantly attended location. A risk analysis in accordance with NFPA 72 shall be used to determine the resumption of the pre-recorded voice announcement.

(Renumber subsequent sections)

Reason: The intent of this proposal is to:

1. Relocate the resumption of pre-recorded voice message requirement from a section covering assembly occupancies only to section dealing with emergency voice alarm communication systems.
2. Leaves the decision for the length of the live voice message and automatic resumption of pre-recorded voice message up to the stakeholders after completion of the risk analysis.

This proposal relocates the resumption of pre-recorded voice message requirement so it will be applied to all occupancies requiring emergency voice alarm communication systems not just assembly occupancies.

The mandatory 3 minute time limit for live voice announcements has the potential of interrupting critical life safety instructions to the building occupants. These live instructions could exceed 3 minutes because they are usually very specific and have the potential for changing rapidly.

Every facility is unique and has specific risks. The stakeholders must clearly define the potential risks to their facility and design a system that accounts for them. The requirement for the automatic resumption of the pre-recorded announcement instructions may jeopardize the life safety of the building occupants because pre-recorded instructions could be different and in direct conflict with the live instructions by the emergency responders. The key to defining these risks is to perform a risk analysis before designing and installing an emergency voice/alarm communication system.

Cost Impact: None

F156-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

907.2.1.1-F-BACLAWSKI

F157 – 13

907.2.3 (IBC [F] 907.2.3)

Proponent: Frank G. Castelvechi, III, PE, representing County of Henrico, Virginia
(cas13@co.henrico.va.us)

Revise as follows:

907.2.3 (IBC [F] 907.2.3) Group E. A manual fire alarm system that initiates the occupant notification signal utilizing an emergency voice/alarm communication system meeting the requirements of Section 907.5.2.2 and installed in accordance with Section 907.6 shall be installed in Group E occupancies. When *automatic sprinkler systems* or smoke detectors are installed, such systems or detectors shall be connected to the building fire alarm system.

Exceptions:

1. A manual fire alarm system is not required in Group E occupancies with an *occupant load* of ~~30~~ 50 or less.
2. Manual fire alarm boxes are not required in Group E occupancies where all of the following apply:
 - 2.1. Interior *corridors* are protected by smoke detectors.
 - 2.2. Auditoriums, cafeterias, gymnasiums and similar areas are protected by *heat detectors* or other *approved* detection devices.
 - 2.3. Shops and laboratories involving dusts or vapors are protected by *heat detectors* or other *approved* detection devices.
3. Manual fire alarm boxes shall not be required in Group E occupancies where the building is equipped throughout with an *approved automatic sprinkler system* installed in accordance with Section 903.3.1.1, the emergency voice/alarm communication system will activate on sprinkler water flow and manual activation is provided from a normally occupied location.

Reason: Changing the threshold from 50 to 30 imposed this requirement on most school trailers and small daycare centers by moving the classroom size from 1000 sq ft to 600 sq ft. Requiring an expensive voice alarm system in a school trailer or small storefront daycare center is a ludicrous imposition of significant costs to schools and small businesses. In these small buildings any emergency situation would be readily apparent to all occupants—if you cannot see the flames, smell the smoke or feel the heat in a one room schoolhouse-- a synthesized voice is not going to do any good and may well interfere with the children understanding the teachers instructions.

There is no record of fire deaths and injuries in these occupancies to justify these added expenses. The children in these occupancies are required to be under competent adult supervision.

Cost Impact: This will reduce the cost of construction

F157-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

907.2.3 #1-F-CASTELVECCHI

F158 – 13

907.2.3 (IBC [F] 907.2.3)

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

907.2.3 (IBC [F] 907.2.3) Group E. A manual fire alarm system that initiates the occupant notification signal utilizing an emergency voice/alarm communication system meeting the requirements of Section 907.5.2.2 and installed in accordance with Section 907.6 shall be installed in Group E occupancies. When automatic sprinkler systems or smoke detectors are installed, such systems or detectors shall be connected to the building fire alarm system.

Exceptions:

1. A manual fire alarm system is not required in Group E occupancies with an occupant load of ~~30~~ 50 or less.
2. Emergency voice/ alarm communication systems meeting the requirements of Section 907.5.2.2 and installed in accordance with Section 907.6 shall not be required in Group E occupancies with occupant loads of 100 or less, provided that activation of the manual fire alarm system initiates an approved occupant notification signal in accordance with Section 907.5.
- ~~23.~~ Manual fire alarm boxes are not required in Group E occupancies where all of the following apply:
 - ~~2-1~~ 31. Interior corridors are protected by smoke detectors.
 - ~~2-2~~ 32. Auditoriums, cafeterias, gymnasiums and similar areas are protected by heat detectors or other approved detection devices.
 - ~~2-3~~ 33. Shops and laboratories involving dusts or vapors are protected by heat detectors or other approved detection devices.
- ~~34.~~ Manual fire alarm boxes shall not be required in Group E occupancies where the building is equipped throughout with an approved automatic sprinkler system installed in accordance with Section 903.3.1.1, the emergency voice/alarm communication system will activate on sprinkler water flow and manual activation.

Reason: Many small schools or day cares consist of one or two rooms. For such small buildings, there is no need to install a notification system to warn occupants of fires or other emergencies, as occupants are typically in close visual or audible contact with all occupied spaces and with each other. This arrangement provides for adequate means to notify all occupants of the building of potential hazardous conditions to initiate emergency actions, including evacuation.

The threshold in Exception 1 has been reduced from 50 to 30 with no apparent loss history. The testimony presented by the proponent of Code Change F107-09/10 was that the number was modified to correlate the occupant load trigger for 1-HR rated corridors. It is common that individual classrooms contain an occupant load of 30 students. It seems that a more appropriate occupant load trigger is the egress provision which requires a second exit at an occupant load of 50, not 30.

An alarm system in a single classroom, or set of small classrooms, does not appear justified. It appears that the appropriate 'occupant load trigger' is 50 since that is when a fire alarm system has been required for many years without any major incidents. Therefore, this proposal will move the trigger to an occupant load of 50 to determine when a manual fire alarm system is required.

Exception 2 is proposed to be added. This exception would require the emergency voice communication system when the occupant load exceeds 100, as buildings with larger numbers of occupants may necessitate detailed instructions regarding evacuation, relocation, or other actions to ensure safety of building occupants. Often, these buildings include multiple floors, fire areas, and egress paths, and occupants may require notification of more detailed or modified instructions on alternate courses action other than those stated in a standard evacuation plan.

The result of this proposal is that when the occupant load is:

- 50 or less – fire alarm system is not required
- 51 to 100 – manual fire alarm system is required
- 101 or more – manual fire alarm system with emergency voice/alarm communication system

Cost Impact: The code change proposal will reduce the cost of construction.

F158-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

907.2.3-F-ZUBIA-FCAC

F159 – 13

907.2.3 (IBC [F] 907.2.3)

Proponent: Frank G. Castelvechi, III, PE, representing County of Henrico, Virginia
(cas13@co.henrico.va.us)

Revise as follows:

907.2.3 (IBC [F] 907.2.3) Group E. A manual fire alarm system that initiates the occupant notification signal utilizing an emergency voice/alarm communication system meeting the requirements of Section 907.5.2.2 and installed in accordance with Section 907.6 shall be installed in Group E occupancies. When *automatic sprinkler systems* or smoke detectors are installed, such systems or detectors shall be connected to the building fire alarm system.

Exceptions:

1. A manual fire alarm system is not required in Group E occupancies with an *occupant load* of 30 or less.
2. Manual fire alarm boxes are not required in Group E occupancies where all of the following apply:
 - 2.1. Interior *corridors* are protected by smoke detectors.
 - 2.2. Auditoriums, cafeterias, gymnasiums and similar areas are protected by *heat detectors* or other *approved* detection devices.
 - 2.3. Shops and laboratories involving dusts or vapors are protected by *heat detectors* or other *approved* detection devices.
3. Manual fire alarm boxes shall not be required in Group E occupancies where the building is equipped throughout with an *approved automatic sprinkler system* installed in accordance with Section 903.3.1.1, the emergency voice/alarm communication system will activate on sprinkler water flow and manual activation is provided from a normally occupied location.
4. An occupant notification system meeting the requirements of Section 907.5.2 without emergency voice/alarm communication system features is permitted where the occupant load is 1000 or less.

Reason: Requiring a voice alarm system for educational uses imposes significant unnecessary costs on daycares and school systems that are already short of funds. Most schools already have public address systems that can be used for emergency notification. The 1000 occupant threshold proposed here is the same as that for assembly buildings with occupants that are less familiar with the building, often do not have public address systems and may involve the consumption of alcoholic beverages. Requiring an expensive voice alarm system in a small storefront daycare center, a small school, or a school trailer is a ludicrous imposition of significant costs on schools and small businesses.

The fire record these occupancies does not justify these added expenses. The children in these occupancies are required to be under competent adult supervision.

Cost Impact: This will reduce the cost of construction

F159-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

907.2.3 #2-F-CASTELVECCHI

F160 – 13

907.2.6 (IBC [F] 907.2.6), 907.5.2.1 (IBC [F] 907.5.2.1), 907.5.2.3 (IBC [F] 907.5.2.3)

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care
(john.williams@doh.wa.gov)

Revise as follows:

907.2.6 (IBC [F] 907.2.6) Group I. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.5 shall be installed in Group I occupancies. An automatic smoke detection system that activates the occupant notification system in accordance with Section 907.5 shall be provided in accordance with Sections 907.2.6.1, 907.2.6.2 and 907.2.6.3.3.

Exceptions:

1. Manual fire alarm boxes in sleeping units of Group I-1 and I-2 occupancies shall not be required at exits if located at all care providers' control stations or other constantly attended staff locations, provided such stations are visible and continuously accessible and that travel distances required in Section 907.4.2.1 are not exceeded.
2. Occupant notification systems are not required to be activated where private mode signaling installed in accordance with NFPA 72 is approved by the fire code official and staff evacuation responsibilities are included in the fire safety and evacuation plan required by Section 404.

907.5.2.1 (IBC [F] 907.5.2.1) Audible alarms. Audible alarm notification appliances shall be provided and emit a distinctive sound that is not to be used for any purpose other than that of a fire alarm.

Exceptions:

1. ~~Visible alarm notification appliances shall be allowed in lieu of audible alarm notification appliances in critical care areas of Group I-2 occupancies.~~ Audible alarm notification appliances are not required in critical care areas of Group I-2 Condition 2 occupancies that are in compliance with Section 907.2.6, Exception 2.
2. A visible alarm notification appliance installed in a nurses' control station or other continuously attended staff location in a Group I-2 Condition 2 suite shall be an acceptable alternative to the installation of audible alarm notification appliances throughout the suite in Group I-2 Condition 2 occupancies that are in compliance with Section 907.2.6, Exception 2.
- 2.3. Where provided, audible notification appliances located in each occupant evacuation elevator lobby in accordance with Section 3008.10.1 of the *International Building Code* shall be connected to a separate notification zone for manual paging only.

907.5.2.3 (IBC [F] 907.5.2.3) Visible alarms. Visible alarm notification appliances shall be provided in accordance with Sections 907.5.2.3.1 through 907.5.2.3.4.

Exceptions:

1. Visible alarm notification appliances are not required in alterations, except where an existing fire alarm system is upgraded or replaced, or a new fire alarm system is installed.
2. Visible alarm notification appliances shall not be required in exits as defined in Section 1002.1.
3. Visible alarm notification appliances shall not be required in elevator cars.
4. Visual alarm notification appliances are not required in critical care areas of Group I-2 Condition 2 occupancies that are in compliance with Section 907.2.6, Exception 2.

Reason: This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 8 open meetings and over 100 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>

The proposed changes are a clarification of the application of 'private mode' signaling as allowed by NFPA 72 and provide linkage to the emergency action plan necessary for 'private mode' to be safely implemented. A section-by-section summary follows:

Section 907.2.6: The change to Exception 2 links the use of "private mode" signaling under NFPA 72 to the emergency action plan portion of the code. The use of private mode appliances relies on a trained staff to respond and provide for occupant evacuation/defend in place actions.

Section 907.5.2.1: Exception 1 is proposed for modification to eliminate the requirement for the visible signal and the audible signal in Group I-2 hospital critical care areas, operating rooms for example. In private mode, as permitted by Section 907.2.6, Exception 1, there is still a requirement for an audible alarm notification from appliances, though at a much lower decibel level meant to alert staff of the alarm activation. The current language at Section 907.5.2.1, Exception 1 allows that audible alarm to be eliminated from critical care areas (operating rooms) in exchange for a visual notification device. However, the visual signal device also creates a distraction in critical care areas that may not be able to immediately stop a patient procedure and this proposal is to eliminate the visual alarm notification and to link the exception back to the primary allowance for private mode where we have provided for a link to the emergency action plan. The emergency action plan would include provisions for alerting of critical area staff and the actions to be taken.

A new second exception is added to this section to allow for an alarm indicator in a control area of a hospital suite in lieu of audible devices throughout the suite. In a suite arrangement the "control area" is the centrally manned location for staff monitoring patients in the separate rooms. An alarm indicator at this location will alert staff for response in a more effective and efficient manner.

Section 907.5.2.3: A fourth exception is added here to correlate the allowance for eliminating the audible and visual alarm devices from the critical care areas and to link the exception back to the primary allowance for private mode where we have provided for a link to the emergency action plan.

The emergency plan should reflect the response to the private mode alarm signals including the response necessary in critical care areas and who is responsible for alerting critical care area staff.

Cost Impact: This proposal will not increase the cost of construction.

F160-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

907.2.6-F-WILLIAMS-ADHOC

F161 – 13

907.2.9.3 (IBC [F] 907.2.9.3)

Proponent: Jeffrey M. Shapiro, International Institute of Ammonia Refrigeration
(jeff.shapiro@intlcodeconsultants.com)

Revise as follows:

907.2.9.3 (IBC [F] 907.2.9.3) Group R-2 college and university buildings. An automatic smoke detection system that activates the occupant notification system in accordance with Section 907.5 shall be installed in Group R-2 occupancies operated by a college and or university for student or staff housing buildings in the following locations:

1. Common spaces outside of *dwelling units* and *sleeping units*.
2. Laundry rooms, mechanical equipment rooms, and storage rooms.
3. All interior corridors serving *sleeping units* or *dwelling units*.

Exception: An automatic smoke detection system is not required in buildings that do not have interior corridors serving sleeping units or dwelling units and where each sleeping unit or dwelling unit either has a means of egress door opening directly to an exterior exit access that leads directly to an exit or a means of egress door opening directly to an exit.

Required smoke alarms in *dwelling units* and *sleeping units* in Group R-2 occupancies operated by a college and or university for student or staff housing buildings shall be interconnected with the fire alarm system in accordance with NFPA 72.

~~**Exception:** An automatic smoke detection system is not required in buildings that do not have interior corridors serving sleeping units or dwelling units and where each sleeping unit or dwelling unit either has a means of egress door opening directly to an exterior exit access that leads directly to an exit or a means of egress door opening directly to an exit.~~

Reason: This proposal intends to better define what constitutes “college and university buildings.” As proposed, such buildings would include those that are operated by a college or university for student or staff housing (regardless of whether the college or university actually owns the building). The difficulty with the current text is determining how it applies to off-campus housing that is open to the general public. Most apartment complexes near a university will probably contain some percentage of student tenants, and for that matter, complexes many miles away from a campus may have student tenants as well. The current code text provides no guidance in determining a threshold at which a “normal” apartment building becomes subject to the provisions of this section.

Based on a discussion last cycle with the proponents of this section, when it was added to the code, it is our understanding that the intent was to address “dormitory style” student housing that is operated by a college or university, and the proposed text intends to clarify that point so that the intended application of the code will be clearly conveyed.

In addition, the existing exception has been relocated in the section so that it is properly placed with respect to the paragraph that it applies to. No change has been made to the exception text.

Cost Impact: The code change proposal will not increase the cost of construction.

F161-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

907.2.9.3-F-SHAPIRO

F162 – 13

IFC: 907.2.11 (IBC [F] 907.2.11), 907.10 (New) (IBC [F] 907.10 (New)); IPMC: [F] 704.5

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

907.2.11 Single- and multiple-station smoke alarms. *Listed* single- and multiple-station smoke alarms complying with UL 217 shall be installed in accordance with Sections 907.2.11.1 through 907.2.11.4 and NFPA 72. Single- and multiple-station smoke alarms shall be maintained in accordance with Section 907.10.

907.10 Single- and multiple-station smoke alarms. Single- and multiple-station smoke alarms shall be tested and maintained in accordance with the manufacturer's instructions. Smoke alarms that no longer function shall be replaced. Smoke alarms installed in one- and two-family dwellings shall be replaced not more than 10 years from the date of manufacture marked on the unit, or if the date of manufacture cannot be determined.

Add new text as follows:

IPMC [F] 704.5 Maintenance. Smoke alarms shall be tested and maintained in accordance with the manufacturer's instructions. Smoke alarms that no longer function shall be replaced. Smoke alarms installed in Group R or I-1 occupancies shall be replaced not more than 10 years from the date of manufacture marked on the unit, or if the date of manufacture cannot be determined.

Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

This proposal supplements the requirements in Section 901.4 for testing and maintaining smoke alarms, and specifies when the devices need to be replaced. The proposed requirements are consistent with NFPA 72 provisions. In particular NFPA 72 requires smoke alarms installed in one- and two-family dwellings to not remain in service longer than 10 years from the date of manufacture, and UL 217 requires the date of manufacture to be marked on the smoke alarms.

It is recognized that it may not always be practical for the code official to enforce the requirements for testing, maintenance and replacement of smoke alarms in residential dwelling units. However realtors and landlords often have checklists that verify that these dwellings comply with codes and other requirements, and they may be in a position to verify compliance with the proposed provisions when the units are sold or leased.

UL 217 has required the month and date of manufacture be marked on smoke alarms for more than 10 years.

Cost Impact: This code change will not increase the cost of construction

F162-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

907.2.11-F-ZUBIA-FCAC

F163 – 13

907.2.11.2 (IBC [F] 907.2.11.2), 907.2.11.5 (New) (IBC [F] 907.2.11.5 (New))

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

907.2.11.2 (IBC [F] 907.2.11.2) Groups R-2, R-3, R-4 and I-1. Single or multiple-station smoke alarms shall be installed and maintained in Groups R-2, R-3, R-4 and I-1 regardless of *occupant load* at all of the following locations:

1. On the ceiling or wall outside of each separate sleeping area in the immediate vicinity of bedrooms.
2. In each room used for sleeping purposes.

~~**Exception:** Single or multiple station smoke alarms in Group I-1 shall not be required where smoke detectors are provided in the sleeping rooms as part of an automatic smoke detection system.~~

907.2.11.5 (IBC [F] 907.2.11.5) Smoke detection system. Smoke detectors listed in accordance with UL 268 and provided as part of the building's fire alarm system shall be an acceptable alternative to single and multiple-station smoke alarms and shall comply with the following:

1. The fire alarm system shall comply with all applicable requirements in Section 907.
2. Activation of a smoke detector in a dwelling unit or sleeping unit shall initiate alarm notification in the dwelling unit or sleeping unit in accordance with Section 907.5.2.
3. Activation of a smoke detector in a dwelling unit or sleeping unit shall not be required to activate alarm notification appliances outside of the dwelling unit or sleeping unit, provided that a supervisory signal is generated and monitored in accordance with Section 907.6.5.

Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

This proposal allow smoke detectors, provided as part of the buildings fire alarm system, to be used as an alternative to single and multiple-station smoke alarms in dwelling units or sleeping units. When a smoke detector activates, the system is required to generate an alarm signal in the dwelling unit or sleeping unit, which can easily be accomplished with an addressable fire alarm system.

There are some jurisdictions that currently allow smoke detectors to be installed in dwelling units and sleeping units under the alternate materials and methods provisions of the code. These systems may only generate alarm signals in the dwelling unit or sleeping unit, or may activate alarm notification appliances throughout the building. Both options are allowed in this proposal.

Item (3) requires smoke detection systems that only generate alarm notification in the dwelling unit or sleeping unit to transmit a supervisory alarm to an approved supervising station as required by Section 907.6.5. This monitoring is already required for fire alarm system if it also provides protection for the common areas of the building.

There are advantages if the smoke detection system option provides protection in these facilities. These include being able to automatically test smoke detector sensitivity, receive and act on trouble signals, and not have to provide both a fire alarm system and interconnected smoke alarms in the building. However, the code proposal does not prevent the smoke alarm option from being provided.

The proposal also deletes the exception to Section 907.2.11.2 that already allows these systems to be used in Group I-1 occupancies. The addition of Section 907.2.11.5 makes this exception unnecessary.

Cost Impact: This code change will not increase the cost of construction

F163-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

907.2.11.5 (NEW)-F-ZUBIA-FCAC

F164 – 13

907.2.11.5 (New) (IBC [F] 907.2.11.5 (New))

Proponent: Thomas P. Hammerberg, representing Automatic Fire Alarm Association
(TomHammerberg@afaa.org)

Revise as follows:

907.2.11.5 (IBC [F] 907.2.11.5) Automatic sprinkler system waterflow. Where an automatic sprinkler system installed in accordance with Section 903.3.1.2 or 903.3.1.3 is provided a sprinkler waterflow alarm-initiating device shall be connected to the multiple-station alarm or household fire alarm system to activate an alarm signal.

Reason: This language is currently used in NFPA-72-2013, 29.7.7.7.3. The purpose is to provide notification to occupants of waterflow activation. If a sprinkler activates in another part of the dwelling unit, this provides earlier warning of the fire situation and will allow additional time to leave the premises. Since the time to escape has reduced significantly in recent years, this will improve fire safety for the occupants.

Cost Impact: minimal

F164-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

907.2.11.5 (NEW)-F-HAMMERBERG

F165 – 12

907.2.12 (New) (IBC [F] 907.2.12 (New)), 907.12.1 (New) (IBC [F] 907.12.1 (New)), 907.12.2 (New) (IBC [F] 907.12.2 (New)), 1103.9 (New), 1103.9.1 (New), 1103.9.2 (New), 1103.9.3 (New); IRC R314.5 (new), R314.5.1 (New), R314.5.2 (New), R314.5.3 (New)

Proponent: David Frederick Scarelli representing DBA-Sentry Signal Company

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE IFC COMMITTEE. PART 2 OF THIS PROPOSAL WILL BE HEARD BY THE IRC BUILDING/ENERGY COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THE IFC AND IRC BUILDING/ENERGY CODE DEVELOPMENT COMMITTEES.

Part I - IFC

907.2.12 (IBC [F] 907.2.12) Line type heat detection. A line type heat detection system that activates at 475°F (246°C) shall be installed in Group R Occupancies in accordance with Sections 907.2.12.1 through 907.2.12.2, NFPA 72, NFPA 70 and manufacturer's instructions.

907.2.12.1 (IBC [F] 907.2.12.1) Location. Line type heat detection shall be installed in the following locations:

1. Above all NM-B Cable
2. Above all electrical boxes
3. Above or near all raceways.

(Renumber subsequent sections)

907.2.12.2 (IBC [F] 907.2.12.2) Interconnection. The line type heat detection system shall be interconnected with the smoke alarms required by Section 907.2.11 in such a manner that when the line type heat detection activates such detection shall activate the smoke alarms in all sleeping units and dwelling units.

Add new text as follows:

1103.9 Line type heat detection. A line type heat detection system that activates at 475°F (246°C) shall be installed in existing Group R Occupancies in accordance with Sections 1103.9.1 through 1103.9.3, NFPA 72, NFPA 70 and manufacturer's instructions.

1103.9.1 Location. Line type heat detection shall be installed in the following locations:

1. Above all exposed NM-B Cable
2. Above all electrical boxes
3. Above or near all raceways.

1103.9.2 Interconnection. The line type heat detection system shall be interconnected with the smoke alarms required by Section 907.2.11 in such a manner that when the line type heat detection activates such detection shall activate the smoke alarms in all sleeping and dwelling units.

1103.9.3 Power source. In existing construction required line type heat detection shall receive primary power from the building wiring where such wiring is served from a commercial source and shall be equipped with a battery backup.

Exception: Line type heat detection is not required to be equipped with battery backup where connected to an emergency electrical system.

PART II – IRC

Add new text as follows:

R314.5 Line type heat detection. Line type heat detection that activates at 475⁰F (246⁰C) shall be installed in accordance with Sections 314.5.1 through 314.5.3, NFPA 72, NFPA 70 and manufacturer's instructions.

R314.5.1 Location. Line type heat detection shall be installed in the following locations:

1. Above all NM-B Cable
2. Above all electrical boxes
3. Above or near all raceways

R314.5.2 Interconnection. The line type heat detection shall be interconnected with the smoke alarms in such a manner that when the line type heat detection activates such detection shall activate all of the alarms in the dwelling unit. Where there are two dwelling units the line type heat detection shall be interconnected with the smoke alarms in both dwelling units.

R314.5.3 Power source. Line type heat detection shall receive primary power from the building wiring where such wiring is served from a commercial source and shall be equipped with a battery backup.

Exception: Line type heat detection is not required to be equipped with battery backup where connected to an emergency electrical system.

(Renumber subsequent sections)

Reason:

Part I According to death certificate data, 25% of fire and flame deaths in 2002 were due to smoke inhalation alone, 26% due to burns and 21% to a combination of burns and smoke inhalation. There were 517,000 structural, 3,140 civilian deaths and 17,730 civilian injuries. *(page 37).

ESCAPING – all seemed savable....; SLEEPING – 1/3 estimated as savable; RESCUING OR FIREFIGHTING – ¾ estimated savable...*

Deterioration of electrical wiring caused by time or the environment is a predominant cause of ignition. *(page 24).

Fires in electrical distribution systems contribute significantly to the U.S. fire problem, accounting for a consistent portion of the problem year after year. *(page 69).

In 2006 an estimated 71,360 injuries involving electrical distribution or lighting equipment began with the ignition of products and materials often found in structural areas, including wire or cable insulation (30%), structural members or framing (12%), insulation within the structural area (5%). *(page 6).

Three-fourths (75%) of deaths in 2002-2005 home fires involving electrical distribution or lighting equipment involved victims who were outside the area of origin when the fire began. (page 6).

Branch circuit wiring (51%) accounted for half of the 2005-2005 non-confined home structure fires involving wiring. *(page 54).

Half (52%) of 2002-2005 non-confined home structure fires involving wiring began in fire areas of origin that are all concealed or exterior spaces. *(page 55).

The majority (57%) of 2002-2005 non-confined home structure fires involving overcurrent protection devices began with ignition wire or cable insulation. *(page 89).

INTENT: THE LINE TYPE HEAT DETECTION SWITCH WILL SOUND THE ALARM AT THE ORIGIN OF FIRE IGNITION WITHIN THE HOME STRUCTURE YIELDING THE MAXIMUM TIME THAT MAY BE NECESSARY TO VACATE THE HOME THEREBY MINIMIZING THE INCIDENTS OF CIVILIAN AND FIREFIGHTER INJURIES AND DEATHS AND LOSS OF PROPERTY.

Part II . According to death certificate data, 25% of fire and flame deaths in 2002 were due to smoke inhalation alone, 26% due to burns and 21% to a combination of burns and smoke inhalation. There were 517,000 structural, 3,140 civilian deaths and 17,730 civilian injuries.

ESCAPING – all seemed savable....; SLEEPING – 1/3 estimated as savable; RESCUING OR FIREFIGHTING - ¾ estimated savable...* Reanalysis of who can be saved.

Deterioration of electrical wiring caused by time or the environment is a predominant cause of ignition.

Fires in electrical distribution systems contribute significantly to the U.S. fire problem, accounting for a consistent portion of the problem year after year.

In 2006 an estimated 71,360 injuries involving electrical distribution or lighting equipment were reported to hospital emergency rooms.

Electrical distributions and lighting equipment dwelling fires are the only type of home fires that have been shown to increase in frequency with increasing dwelling age.

The majority of 2002-2005 non-confined home structure fires involving electrical distribution or lighting equipment began with the ignition of products and materials often found in structural areas, including wire or cable insulation (30%), structural members or framing (12%), and insulation within the structural area (5%).

Three-fourths (75%) of deaths in 2002-2005 home fires involving electrical distribution or lighting equipment involved victims who were outside the area of origin when the fire began.

Branch circuit wiring (51%) accounted for half of the 2002-2005 non-confined home structure fires involving wiring.

Half (52%) of 2002-2005 non-confined home structure fires involving wiring began in fire areas of origin that are all concealed or exterior spaces.

The majority (57%) of 2002-2005 non-confined home structure fires involving overcurrent protection devices began with ignition wire or cable insulation.

SUMMARY: Electrical distribution equipment is a highly significant contributor to the high number of civilian deaths and civilian injuries resulting year after year in home fires. Many lives can be saved and injuries prevented if earlier warning can be sounded.

CONCLUSION: The line type open switch activated by heat and/or fire is designed by earliest warning to prevent death by asphyxiation and burning.

Circuitry short circuits and overloads trip the circuit breakers when the breaker rating is reached. Lower leakage causes hot spots along the line and eventually causes fires that could be detected long before they could become autocatalytic. The line type open switch is designed to detect this hazard long before life is endangered.

Bibliography:

- Characteristics of Home Fire Victims, NFPA, Fire analysis and Research Division. July 2005. Pg 59, John R., Hall Jr.
- "How Many People Can be Saved From Home Fires If Given More Time to Escape? Fire Technology", 40. Pgs 117-126, 2004; John R Hall Jr. Fire Analysis and Research Division, NFPA
- "Statistics from National Electronic Injury Surveillance System (NEISS)". data obtained from the U.S. Consumer Product Safety Commission (CPSC) website, www.cpsc.gov
- Linda E. Smith and Dennis McCoskrie, "What Causes Wiring Fires in Residences?" Fire Journal, Jan/Feb 1990. Volume 84, Number 1
- "Home Structure Fires Involving Electrical Distribution and Lighting Equipment," John R. Hall, Jr., Fire Analysis and Research Division, NFPA, March 2008.

INTENT: The line type heat detection switch will sound the alarm at the origin of fire ignition within the home structure yielding the maximum time that may be necessary to vacate the home thereby minimizing the incidents of civilian and firefighter injuries and deaths; and loss of property.

Cost Impact: This code change will increase the cost of construction.

F165-13

PART I – IFC

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IRC BUILDING

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

907.2.12 (NEW)-F-SCARELLI

F166 – 13

907.2.13.1.1 (IBC [F] 907.2.13.1.1)

Proponent: Thomas P. Hammerberg, representing Automatic Fire Alarm Association (TomHammerberg@afaa.org)

Revise as follows:

907.2.13.1.1 (IBC [F] 907.2.13.1.1) Area smoke detection. Area smoke detectors shall be provided in accordance with this section. Smoke detectors shall be connected to an automatic fire alarm system. The activation of any detector required by this section shall activate the emergency voice/alarm communication system in accordance with Section 907.5.2.2. In addition to smoke detectors required by Sections 907.2.1 through 907.2.10, smoke detectors shall be located as follows:

1. In each mechanical equipment, ~~electrical, transformer,~~ telephone equipment or similar room which is not provided with sprinkler protection.
2. In each elevator machine room and in elevator lobbies
3. In each electrical transformer room

Reason: This code change proposal will provide the minimum level of fire and life safety in high rise electrical transformer rooms. 11% of High Rise fires start in the electrical distribution or lighting equipment (Source NFPA Dr. Hall-High Rise Building Fires, Dec 2011)

Electrical fires often start as smoldering fires generating smoke and toxic gases. Many of these fires can be too small to activate fire sprinklers, but can cause serious damage to building electrical equipment and hazards to first responders. There are studies to support the facts on "fires too small to activate fire sprinklers", but activate smoke detectors. In Healthcare facilities research shows that 65.4% of fires were too small to activate sprinklers. (Source Dr. Milke-Univ of Maryland, 5.14.2006)

Early warning smoke detection will bring attention to these isolated rooms for action by first responders and building engineers. Concerns about unwanted alarms is minimized the fact that these rooms are generally kept very clean and do not have sources of deceptive phenomena (cooking etc)

Key Propositions

- Fires do occur in electrical transformer rooms
- Fires often develop smoke and toxic gases
- Fires can be too small for fire sprinkler activation, but need attention
- Smoke detection is shown as effective means of detecting fires in an early stage in electrical fires

Please support this code change for the value of first responder safety, building occupant safety and protection of building system integrity. The following research sources are for your review.

Research Source 1

FM Global Standard Loss Prevention Data Sheet 5-19 (Jan 2006)

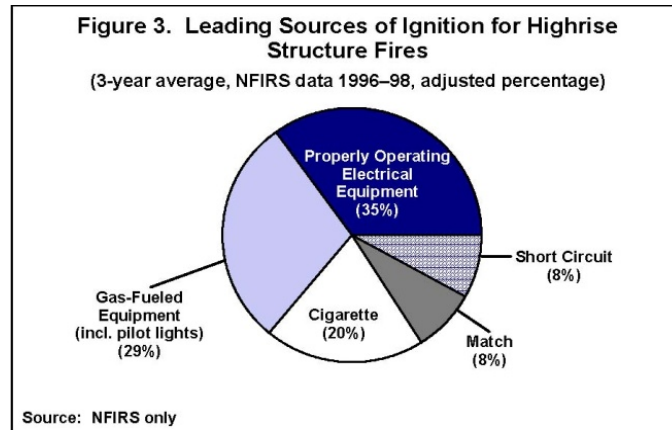
2.2.2 Provide photoelectric or combination photoelectric and ionization smoke detectors in electrical rooms to sound an alarm at a constantly attended location, regardless of any automatic sprinkler protection or heat detection that may exist. Ensure response includes notification of personnel capable of de-energizing the electrical equipment. The presence or absence of smoke detectors does not change the need for sprinklers. Ensure smoke detector spacing is in accordance with Data Sheet 5-48, *Automatic Fire Detectors*.

Research Source 2

U.S. Fire Administration TOPICAL FIRE RESEARCH SERIES, Volume 2, Issue 18 January 2002

Reports show that electrical fires are an issue in high rise buildings. This will provide for both early warning detection and fire sprinklers in the key hazard areas of electrical transformer. Many fires in these areas can be smoldering and slow developing in nature, smoke detection is of great value in these cases, when the fire develops the level of heat and flame the fire sprinklers will control the situation.

Early notification to the fire service and building occupants of these developing fires is very important.



Source: U.S. Fire Administration TOPICAL FIRE RESEARCH SERIES
Volume 2, Issue 18 January 2002

Research Source 3 Specific Examples (5) of Fires in Electrical Rooms

Example A

Electrical room fire evacuates condos in Bethany Beach

No serious injuries reported at the Sea Colony

June 24, 2010|By Jessica Anderson, the Baltimore Sun

An electrical fire forced an evacuation of the Sea Colony high-rise complex in Bethany Beach Thursday.

A power surge caused a small fire inside an electrical room in one of the buildings, causing the evacuation at about 4 p.m., said Joe Hopple, spokesman with Bethany Beach Fire Company. He said the surge was caused by a downed wire.

Example B

Friday, March 6, 2009 08:48 The Norristown Fire Department responded to Building 14 of the Norristown State Hospital for a fire in the electrical room. It took firefighters over two hours to extinguish the fire due to the energized equipment and the difficulty of reaching the fire inside the electrical equipment. Firefighters from Center Square, East Norriton, Plymouth and Swedeland assisted at the scene.





Example C

Wednesday, November 12, 2008 This morning Monroeville FD was called to one of the Office Buildings in the Oxford development for a fire alarm. Crews arrived on scene and found a small fire in the electrical room where the motors for the elevators are located. Crews extinguished and contained the fire with dry chem. Fire was caused by a cardboard box left near the motor. Crews remained on scene for minor ventilation. **ALL PICTURES COURTESY OF MONROEVILLE TV-15** Command: C-55 (R. Douthit) Units: E-12, E-31, E-42, T-5



Example D

Electrical Room Sparks Fire in Parking Garage

August 7, 2012

BOCA RATON– Boca Raton Fire Rescue Services responded to a report of an electrical room fire in the parking garage at 301 E. Yamato Road just after 11:30 a.m. Friday, Aug. 3, said fire officials.

Firefighters discovered that the electrical transformer had malfunctioned and caused the burning of some of the attached wiring. The fire was extinguished within minutes after the arrival of firefighters, preventing further damage to the electrical room of the 5-story parking garage.

No injuries were reported. Boca Raton Fire Rescue Services investigators determined that the cause was an apparent electrical malfunction

Example E

Minneapolis fire started in apartment building's electrical room

By Brady Gervais

bgervais@pioneerpress.com

Posted: 03/12/2012 12:01:00 AM CDT

Updated: 03/12/2012 10:19:03 AM CDT

Fire investigators say a three-alarm fire at a Minneapolis apartment building Friday started in an electrical room.

The fire's cause remains undetermined, Assistant Minneapolis Fire Chief Cherie Penn said in a written statement. The probable cause is an "unspecified electrical malfunction" in the electrical room.

Fire crews were called around 2 a.m. Friday to a fire that started in the basement of the building at 137 17th St. E. The fire went to a second alarm shortly before 3 a.m. and then to a third alarm because of the size of the building and the spread of the fire. One firefighter suffered a minor injury but continued working.

Cost Impact: Estimated 250.00 per detector installed, minimal cost impact to overall construction cost.

F166-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

907.2.13.1.1-F-HAMMERBERG

F167 – 13

907.2.14 (IBC [F] 907.2.14)

Proponent: Gene Boecker, AIA, Code Consultants, Inc. representing Code Consultants, Inc.

Revise as follows:

907.2.14 (IBC [F] 907.2.14) Atriums Connecting more than two stories. A fire alarm system shall be installed in occupancies with an atrium connecting more than two stories, with smoke detection installed ~~throughout the atrium in locations required by a rational analysis in Section 909.4 and in accordance with the system operation requirements in Section 909.17.~~ The system ~~must~~ shall be activated in accordance with Section 907.5. Such occupancies in Group A, E or M shall be provided with an emergency voice/alarm communication systems complying with the requirements of Section 907.5.2.2.

Reason: The purpose of this code change proposal is to correct a substantial change to the requirements for smoke detection in atriums that was made with the intent of only clarifying the existing requirements.

In the 2003 and 2006 editions, the code required smoke detection in atriums only where required by a rational analysis in accordance with Section 909. Section 909.12.3 of the 2012 edition still indicates that automatic activation of a smoke control system is required to be by, "any smoke detection required by engineering analysis." However, modifications made to Section 907.2.13 in the 2009 edition (now Section 907.2.14 in the 2012 edition), that were intended only to clarify existing requirements, appear to require smoke detection in atriums regardless of the need for smoke detection as determined by a rational analysis.

When Section 907 was modified in the 2009 edition by code change proposal F163-07/08, the intent of the code change was to correlate the organization of Section 907 with Section 903. The main purpose of the code change was to correlate the terms "automatic smoke detection systems" and "manual fire alarm system". During the course of the code change process Section 907.2.13 was modified to require both a fire alarm system and a smoke detection system in atriums, although a smoke detection system had not been required in atriums by Section 907 of the prior edition. This is clear because code change proposal F58-01 that removed the requirement for smoke detection in atriums stated in its justification, "[t]he engineering analysis would determine if (or if not) smoke detectors would be required to maintain a tenable environment for the evacuation or relocation for the occupants of the building."

The modification in this code change proposal maintains the appropriate terminology, but returns the requirements to their original intent: that the requirements for smoke detection in atriums are unique to each atrium and should be determined by the required rational analysis.

Cost Impact: The code change proposal will not increase the cost of construction.

F167-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

907.2.14-F-BOECKER

F168 – 13

907.2.22 (IBC [F] 907.2.22), 907.2.22.1 (New) [IBC [F] 907.2.22.1(New)], 907.2.22.2 (New) [IBC [F] 907.2.22.2(New)]

Proponent: Eric R. Rosenbaum, Hughes Associates, Inc. representing the Air Traffic Control Tower Fire Life Safety Task Group (erosenbaum@haifire.com+)

Revise as follows:

907.2.22 (IBC [F] 907.2.22) Airport traffic control towers. An automatic smoke detection system that activates the occupant notification system in accordance with Section 907.5 shall be provided in airport traffic control towers in all occupiable and equipment spaces accordance with Sections 907.2.22.1 and 907.2.22.2.

Exception: Audible appliances shall not be installed within the control tower cab.

907.2.22.1 (IBC [F] 907.2.22.1) Airport traffic control towers with multiple exits and automatic sprinklers. Airport traffic control towers with multiple exits and equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.3, shall be provided with smoke detectors in the following locations.

1. Airport traffic control cab
2. Electrical and mechanical equipment rooms
3. Airport terminal radar and electronics rooms
4. Outside each opening into exit enclosures
5. Along the single means of egress permitted from observation levels
6. Outside each opening into the single means of egress permitted from observation levels.

907.2.22.2 (IBC [F] 907.2.22.2) Other airport traffic control towers. -Airport traffic control towers with a single exit or where sprinklers are not equipped throughout, shall be provided with smoke detectors in the following locations.

1. Airport traffic control cab
2. Electrical and mechanical equipment rooms
3. Airport terminal radar and electronics rooms
4. Office spaces incidental to the tower operation.
5. Lounges for employees, including sanitary facilities.
6. Means of egress
7. Accessible utility shafts

Reason: The proposed change is the recommendation of the Air Traffic Control Tower Fire/Life Safety Task Group, and reflects the current approach to fire protection and life safety in airport traffic control towers and the provisions of the Life Safety Code. It is suggested that the proposed revisions provide the proper level of protection for facilities with single exits and multiple exits where delayed evacuation of the cab may be required. The change reduces the amount of detection required in multiple exit ATCT with automatic sprinkler protection based on the accepted revision to Section 412.3 of the IBC to require automatic sprinkler protection in towers where an occupied floor is located 35 ft or greater from the lowest level of fire department vehicle access. Automatic sprinklers are provided for detection and control of the fire. Smoke detection is specified as required to also detect a fire that may affect the means of egress for the tower. The changes also are intended to clarify the required locations of smoke detection in single exit ATCT based on the allowed uses in an airport traffic control tower in Section 412.3. The following is the accepted proposal to Section 412.3:

412.3 Airport traffic control towers. The provisions of Sections 412.3.1 through 412.3.511 shall apply to airport traffic control towers occupied only for the following uses:

1. Airport traffic control cab.
2. Electrical and mechanical equipment rooms.
3. Airport terminal radar and electronics rooms.
4. Office spaces incidental to the tower operation.
5. Lounges for employees, including sanitary facilities.

412.3.1 Type of construction. Airport traffic control towers shall be constructed to comply with the height limitations of Table 412.3.2.

**TABLE 412.3.2
HEIGHT LIMITATIONS FOR AIRPORT TRAFFIC CONTROL TOWERS**

TYPE OF CONSTRUCTION	HEIGHT ^a (feet)
IA	Unlimited
IB	240
IIA	100
IIB	85
IIIA	65

a. Height to be measured from grade plane to cab floor

412.3.2 Stairway Stairways in Airport traffic control towers shall conform to the requirements of Section 1009. Such *stairways* shall be a smokeproof enclosure in accordance with Section 909.20. The stair pressurization alternative in accordance with Section 909.20.5 shall be permitted to be used. *Stairways* shall not be required to extend to the roof as specified in Section 1009.11.

412.3.3 Exit access. From observation levels, airport traffic control towers shall be permitted to have a single means of exit access for a distance of travel not exceeding 100 ft (30 m). This means of egress shall be permitted to include exit access utilizing an unenclosed stair at the observation level.

412.3.4 Single means of egress. Not less than one *exit stairway* shall be permitted for airport traffic controls towers of any height provided that the *occupant load* per floor is not greater than 15 and the area per floor does not exceed 1,500 square feet (140 m²).

412.3.4.1 Arrangement of single means of egress. Airport traffic control towers permitted a single exit and located above another building shall be provided with one of the following:

1. Exit enclosure separated from the other building with no door openings to or from the other building
2. Exit enclosure leading directly to an exit enclosure serving the other building, with walls and door separating the exit enclosures from each other, and another door allowing access to the top floor of the building that provides access to a second exit serving that floor.

412.3.4.2 Interior Finish. Airport traffic control towers permitted a single exit in accordance with Section 412.3.4 shall be restricted to interior wall and ceiling finishes of Class A or Class B.

412.3.5 Automatic fire detection systems. Airport traffic control towers shall be provided with an automatic fire detection system installed in accordance with Section 907.2.

412.3.6 Automatic sprinkler system. Airport traffic control towers shall be equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.

412.3.7 Standby power. A standby power system that conforms to Chapter 27 shall be provided in airport traffic control towers more than 65 feet (19 812 mm) in height. Power shall be provided to the following equipment:

1. Pressurization equipment, mechanical equipment and lighting.
2. Elevator operating equipment.
3. Fire alarm and smoke detection systems.

412.3.8 Elevator Protection. Wires or cables that provide normal and standby power, control signals, communication with the car, lighting, heating, air conditioning, ventilation and fire-detecting systems to elevators shall be protected by construction having a minimum 1-hour *fire resistance rating* or shall be circuit integrity cable having a minimum 1-hour *fire-resistance rating*.

412.3.9 Accessibility. Airport traffic control towers need not be *accessible* as specified in the provisions of Chapter 11.

Cost Impact: This code change will increase the cost of construction from the current code requirements in some instances; however, reflects current building practices of the FAA. Cost will be reduced in instances where detection is not required.

F168-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

907.2.22-F-ROSENBAUM

F169 – 13

907.3.1 (IBC [F] 907.3.1)

Proponent: Barry Greive, representing Target Corporation (barry.greive@target.com)

Revise as follows:

907.3.1 (IBC [F] 907.3.1) Duct smoke detectors. Smoke detectors installed in ducts shall be listed for the air velocity, temperature and humidity present in the duct. Duct smoke detectors shall be connected to the building's fire alarm control unit when a fire alarm system is required by Section 907.2. Activation of a duct smoke detector shall initiate a visible and audible supervisory signal at a constantly attended location and shall perform the intended fire safety function in accordance with this code and the International Mechanical Code. Duct smoke detectors shall report as a supervisory signal not a fire alarm, and they shall not be used as a substitute for required open area detection.

Exceptions:

1. The supervisory signal at a constantly attended location is not required where duct smoke detectors activate the building's alarm notification appliances.
2. In occupancies not required to be equipped with a fire alarm system, actuation of a smoke detector shall activate a visible and an audible signal in an approved location. Smoke detector trouble conditions shall activate a visible or audible signal in an approved location and shall be identified as air duct detector trouble.

Reason: Duct detectors are widely known to be a cause of false alarms which is a safety concern for first responders. Duct detectors need to report as a supervisory signal to indicate that there is an issue and need to be repaired or replaced but should not report as a fire alarm like a water flow device. This adds clarity to a section that is not enforced uniformly and will add to fire fighter safety by lessening the amount of potential false alarms.

Cost Impact: This will not increase the cost of construction

F169-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

907.3.1-F-GRIEVE

F170 – 13

907.4.2.1 (IBC [F] 907.4.2.1)

Proponent: Daniel E. Nichols, P.E., New York State Department of State (dan.nichols@dos.ny.gov)

Revise as follows:

907.4.2.1 (IBC [F] 907.4.2.1) Location. Manual fire alarm boxes shall be located not more than 5 feet (1524 mm) from the entrance to each exit. In buildings not protected by an automatic sprinkler system in accordance with 903.3.1.1 or 903.3.1.2, additional manual fire alarm boxes shall be located so that the exit access travel distance to the nearest box does not exceed 200 feet (60 960 mm).

Reason: This code change proposal both addresses the current situation of manual pull boxes being seldom used to report fires and coordinates with Table 1016.2 on exit access travel distance.

With the exception of F-2, S-2, and U. Travel distance in unsprinklered buildings is a maximum of 200 feet (when such occupancy is permitted not to be sprinklered. Exit access travel distance is permitted to be increased by 50 feet (to 250 feet) for sprinkler installation in A, E, F-1, M, R, S-1 and 100 feet (to 300 feet) for Group B. What this proposal does is it permits the increased travel distance allowed by the sprinkler system to not then require an additional manual pull box.

The second part of the change is to coordinate with the defined term 'exit access' travel distance for the requirements for which measurements should be taken. The first part of 907.4.2.1 states the measurement is taken from each 'exit', which is the end of 'exit access'.

Cost Impact: This proposal will not affect the cost of construction.

F170-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

907.4.2.1-F-NICHOLS

F171 – 13

202, 907.5.2.3.1 (IBC [F] 907.5.2.3.1). 907.5.2.3.2 (IBC [F] 907.5.2.3.2)

Proponent: Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee
(cbaldassarra@RJAGroup.com)

Revise as follows:

IFC 907.5.2.3.1 (IBC [F] 907.5.2.3.1) *Public use areas* and *common use areas*. Visible alarm notification appliances shall be provided in *public use areas* and *common use areas*.

~~IFC 907.5.2.3.2 (IBC [F] 907.5.2.3.2) *Employee work areas*.~~ Exception: Where *employee work areas* have audible alarm coverage, the notification appliance circuits serving the *employee work areas* shall be initially designed with a minimum of 20-percent spare capacity to account for the potential of adding visible notification appliances in the future to accommodate hearing impaired employee(s).

Add new definitions as follows:

SECTION 202 GENERAL DEFINITIONS

[B] COMMON USE. Interior or exterior *circulation paths, rooms, spaces or elements that are not for public use and are made available for the shared use of two or more people.*

[B] PUBLIC-USE AREAS. Interior or exterior rooms or spaces that are made available to the general public.

[B] EMPLOYEE WORK AREA. All or any portion of a space used only by employees and only for work. *Corridors, toilet rooms, kitchenettes and break rooms are not employee work areas.*

Reason: The intent of this proposal is to use defined terms for public use and common use to avoid confusion for where visible alarms are required. The definitions are copied from IBC. This requirement would be consistent with ADA 215.2.

The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as “areas of study”. Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

Cost Impact: None – This will be required by the 2010 ADA Standard for Accessible Design.

F171-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

907.5.2.3.1-F-BALDASSARRA-CTC

F172 – 13

907.5.2.3.3 (IBC [F] 907.5.2.3.3)

Proponent: Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee
(cbaldassarra@RJAGroup.com)

Revise as follows:

907.5.2.3.3 (IBC [F] 907.5.2.3.3) Groups I-1 and R-1. Group I-1 and R-1 *dwelling units or sleeping units* in accordance with Table 907.5.2.3.3 shall be provided with a visible alarm notification ~~appliance~~ throughout the unit, activated by both the in-room smoke alarm and the building fire alarm system.

Reason: The revised language will clarify that within hotel rooms and assisted living units that visible alarms must provide full coverage.

The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as “areas of study”. Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

Cost Impact: None

F172-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

907.5.2.3.3-F-BALDASSARRA-CTC

F173 – 13

907.6 (IBC [F] 907.6)

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

907.6 (IBC [F] 907.6) Installation and monitoring. A fire alarm system shall be installed and monitored in accordance with Sections 907.6.1 through 907.6.5.2 and NFPA 72.

Reason: This section addresses installation and monitoring. The proposal simply clarifies that monitoring is part of the installation. This proposal does not change or alter the exceptions to Section 907.6.5.

Cost Impact: This code change will not increase the cost of construction

F173-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

907.6-F-ZUBIA-FCAC

F174 – 13

907.6.3 (New) (IBC [F] 907.6.3), 907.6.3.1 (New) (IBC [F] 907.6.3.1)

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Add new text as follows:

907.6.3 (IBC [F] 907.6.3) Initiating device identification. The fire alarm system shall identify the specific initiating device address, location, device type, floor level where applicable and status including indication of normal, alarm, trouble and supervisory status, as appropriate.

Exception:

1. Fire alarm systems in single story buildings less than 22,500 square feet (2090 m²) in area
2. Fire alarm systems that only include manual fire alarm boxes, water flow initiating devices, and not more than 10 additional alarm initiating devices.
3. Special initiating devices that do not support individual device identification.
4. Fire alarm systems or devices that are replacing existing equipment.

907.6.3.1 (IBC [F] 907.6.3.1) Annunciation. The initiating device status shall be annunciated at an approved on-site location.

Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

This proposal improves the ability of emergency responders to identify the status of initiating devices at the time of an emergency. This proposal will help identify problematic initiating devices and thus reduce nuisance alarms. It also eliminates the requirements for providing zone indication of system status. This is considered particularly important in high-rise buildings, where the number of initiating devices and the geometry of the building warrant a need for point monitoring of individual devices, which is not currently accommodated by single floor zones.

This proposal would allow the fire code official the flexibility to not require individual detection device identification in smaller buildings, where the source of alarm and trouble signals can be more easily determined.

Cost Impact: The code change proposal will increase the cost of construction.

F174-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

907.6.3 (NEW)-F-ZUBIA-FCAC

F175 – 13

907.6.5.3 (New) (IBC [F] 907.6.5.3 (New)), 907.6 (IBC [F] 907.6)

Proponent: Anthony C. Apfelbeck, City of Altamonte Springs Building/Fire Safety Division, representing self (ACApfelbeck@Altamonte.org)

Revise as follows:

907.6.5.3 (IBC [F] 907.6.5.3) Alarm Signal Verification. Where required by the Fire Chief, alarm signal verification shall be provided in accordance with NFPA 72.

907.6 (IBC [F] 907.6) Installation. A fire alarm system shall be installed in accordance with Sections 907.6.1 through ~~907.6.5.2~~ 907.6.5.3 and NFPA 72.

Reason: NFPA 72 was revised in the last cycle to provide specific provisions for fire departments to require Alarm Signal Verification procedures by the supervision station prior to dispatch. This code change proposal provides a pointer to NFPA 72 so that the user is aware that this type of activity is specifically allowed under the code. This code change also ensures that both the IFC and NFPA 72 match in their provisions for Alarm Signal Verification. Ensuring that the documents are consistent in their provisions is important in eliminating confusion regarding the appropriate actions and compliance expectations for the installer, supervising station, owner and fire code official.

Cost Impact: This code change will not increase the cost of construction.

F175-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

907.6.5.3 (NEW)-F-APFELBECK

F176 – 13

907.6.5.3 (New) (IBC [F] 907.6.5.3 (New)), 401.3.2

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

907.6.5.3 Alarm Signal Verification. Where permitted by the Fire Chief, an approved supervising station shall be allowed to verify an alarm signal prior to reporting it to the public safety communications center. The verification process shall be in compliance with NFPA 72.

401.3 Emergency responder notification. Notification of emergency responders shall be in accordance with Sections 401.3.1 through 401.3.3.

401.3.1 Fire events. In the event an unwanted fire occurs on a property, the *owner* or occupant shall immediately report such condition to the fire department.

401.3.2 Alarm activations. Upon activation of a fire alarm signal employees or staff shall immediately notify the fire department.

Exception: Alarm signal verification permitted by section 907.6.5.3.

401.3.3 Delayed notification. A person shall not, by verbal or written directive, require any delay in the reporting of a fire to the fire department.

Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

The intent is to allow fire departments to require verification on both commercial and residential alarm signals in order to assist in effective dispatching of resources and/or reducing the impact of nuisance alarms. Currently NFPA 72 allows verification on residential systems (but gives choice of using it to the monitoring company). This would give discretion to the fire chief, and expand use to include commercial alarms which accounts for the majority of false alarms in the U.S.

These provisions allow fire departments to require that alarm monitoring centers attempt to verify an alarm signal before reporting to the 9-1-1 center. Having better information about the cause of alarm activation is critical as many departments have much smaller responses for an automatic alarm signal than for a working structure fire. Additionally, verification has been proven effective in reducing unwanted nuisance alarms. Alarm Verification is already performed extensively on residential fire alarms; this would allow it to be mandated on some or all systems, including commercial occupancies, when required by the Chief.

The revision to Section 401.3 will clarify the intent of the code and alleviate potential interpretation and enforcement conflicts with proposed new section - Section 907.6.5.3 Alarm Signal Verification

Cost Impact: This code change will not increase the cost of construction

F176-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

907.6.5.3 (NEW)-F-ZUBIA-FCAC

F177 – 13

907.8.5.1 (New)

Proponent: Anthony C. Apfelbeck, City of Altamonte Springs Building/Fire Safety Division, representing self (ACApfelbeck@Altamonte.org)

Add new text as follows:

907.8.5.1 Fire alarm systems that cannot be repaired or serviced to eliminate reoccurring nuisance alarms or system impairments shall be replaced.

Reason: Fire Code Officials are frequently confronted with fire alarm systems that have are the end of their serviceable life and should be replaced in order to maintain system reliability. The need for system replacement is typically recommended by the fire alarm service company but, on some occasions, the owner refuses to upgrade/replace the system. Other than the maintenance requirements of NFPA 72, there is no language in the code that would allow the Fire Code Official to enforce the recommendation of the fire alarm service company to replace the system. The failure to replace an end of life fire alarm system can be a significant factor in generating nuisance alarms.

Cost Impact: This proposal will increase the cost of construction.

F177-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

907.8.5.1 (NEW)-F-APFELBECK

F178 – 13

907.8.6 (New)

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Add new text as follows:

907.8.6 Problematic systems. Where required by the fire code official, fire alarm systems that produce chronic, unwanted or nuisance alarms shall be monitored with central station service in accordance with NFPA 72 requirements. A copy of the certificate, placard or other documentation issued by the organization that listed the central station, or the prime fire alarm system contractor, shall be provided to the fire code official.

Reason: This section is intended to address the situation where a fire alarm system has not been repaired to make it fully functional or eliminate chronic unwanted or nuisance alarms. The determination of what constitutes chronic unwanted or nuisance alarms is up to the fire code official to decide based on local policies and practices. By requiring central station service it is understood that the system at the protected premise is now covered by an audit program administered by the company that listed the central station. These audit programs have shown significant success in reducing nuisance and unwanted alarms.

Cost Impact: This proposal will increase the cost of construction.

F178-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

907.8.6 (NEW)-F-ZUBIA-FCAC

F179 – 13

105.7.5 (New), 908 (IBC[F] 908)

Proponent: Daniel P Finnegan, representing Siemens Industry (daniel.finnegan@siemens.com)

Add new text as follows:

105.7.5 Emergency alarm systems. A construction permit is required for installation of or modification to emergency alarm systems. Maintenance performed in accordance with this code is not considered a modification and does not require a permit.

Revise as follows:

SECTION 908 EMERGENCY ALARM SYSTEMS

908.1 (IBC [F] 908.1) General. This section covers the application, installation, performance and maintenance of emergency alarm systems.

908.2 (IBC [F] 908.2) Construction documents. The fire code official shall have the authority to require construction documents and calculations for all emergency alarm systems and to require permits be issued for the installation, rehabilitation or modification of any emergency alarm system. Construction documents for emergency alarm systems shall be submitted for review and approval prior to system installation.

908.3 (IBC [F] 908.3) Permits. Permits shall be required as set forth in Section 105.7.

908.4 (IBC [F] 908.4) Equipment. Emergency alarm system control units and components shall be listed or approved for the purpose for which they are installed.

908.5 (IBC [F] 908.5) Acceptance tests and completion. Upon completion of the installation, the emergency alarm system shall be tested in accordance with the manufacturer's instructions and as required by the fire code official to verify it provides the required protection.

908.6 (IBC [F] 908.6) Where required. An approved emergency alarm system installed in accordance with the provisions of this code shall be provided in accordance with Sections 908.6.1 through 908.6.6.

908.1-908.6.1 (IBC [F] 908.6.1) Group H occupancies. Emergency alarms for the detection and notification of an emergency condition in Group H occupancies shall be provided as required in Chapter 50.

908.2-908.6.2 (IBC [F] 908.6.2) Group H-5 occupancy. Emergency alarms for notification of an emergency condition in an HPM facility shall be provided as required in Section 2703.12. A continuous gas detection system shall be provided for HPM gases in accordance with Section 2703.13.

908.3-908.6.3 (IBC [F] 908.6.3) Highly toxic and toxic materials. Where required by Section 6004.2.2.10, a gas detection system shall be provided for indoor storage and use of highly toxic and toxic compressed gases.

908.4-908.6.4 (IBC [F] 908.6.4) Ozone gas-generator rooms. A gas detection system shall be provided in ozone gas-generator rooms in accordance with Section 6005.3.2.

908.5-908.6.5 (IBC [F] 908.6.5) Repair garages. A flammable-gas detection system shall be provided in repair garages for vehicles fueled by nonodorized gases in accordance with Section 2311.7.2.

~~908.6~~ 908.6.6 (IBC [F] 908.6.6) Refrigeration systems. Refrigeration system machinery rooms shall be provided with a refrigerant detector in accordance with Section 606.8.

908.7 (IBC [F] 908.7) Maintenance. Emergency alarm systems shall be maintained in accordance with the original installation standards for that system. Required systems shall be extended, altered or augmented as necessary to maintain and continue protection whenever the building is altered, remodeled or added to. Alterations to emergency alarm systems shall be done in accordance with applicable standards.

908.8 (IBC [F] 908.8) Responsibility and records. The building owner shall be responsible to maintain emergency alarm systems in an operable condition at all times. A written record of the maintenance inspection and testing shall be maintained and shall be made available to the fire code official.

SECTION 915 **CARBON MONOXIDE ALARMS**

~~908.7 (IBC [F] 908.7) Carbon monoxide alarms.~~ 915.1 (IBC [F] 915.1) General. Group I or R occupancies located in a building containing a fuel-burning appliance or in a building which has an attached garage shall be equipped with single-station carbon monoxide alarms. The carbon monoxide alarms shall be listed as complying with UL 2034 and be installed and maintained in accordance with NFPA 720 and the manufacturer's instructions. An open parking garage, as defined in Chapter 2 of the *International Building Code*, or an enclosed parking garage ventilated in accordance with Section 404 of the *International Mechanical Code* shall not be considered an attached garage.

Exception: *Sleeping units or dwelling units* which do not themselves contain a fuel-burning appliance or have an attached garage, but which are located in a building with a fuel-burning appliance or an attached garage, need not be equipped with single-station carbon monoxide alarms provided that:

1. The *sleeping unit* or *dwelling unit* is located more than one story above or below any story which contains a fuel-burning appliance or an attached garage;
2. The *sleeping unit* or *dwelling unit* is not connected by duct work or ventilation shafts to any room containing a fuel-burning appliance or to an attached garage; and
3. The building is equipped with a common area carbon monoxide alarm system.

~~908.7.4~~ 915.1.1 (IBC [F] 915.1.1) Carbon monoxide detection systems. Carbon monoxide detection systems, which include carbon monoxide detectors and audible notification appliances, installed and maintained in accordance with this section for carbon monoxide alarms and NFPA 720 shall be permitted. The carbon monoxide detectors shall be *listed* as complying with UL 2075.

Reason: As written the emergency alarm system section has no specific requirements for the basic installation, testing and maintenance of these systems, and by definition these systems are not considered to be fire protection systems and are not subject to the general requirements in Section 901.

The proposal makes no changes to where emergency alarm systems are required, which are retained verbatim in Sections 908.6.1 through 908.6.6. It does include basic system requirements as noted below:

Sections 908.2, 908.3 and 908.7 are based on similar requirements in section 901.1. These sections are required in Section 908 since the Section 901 requirements only apply to fire protection systems.

Section 908.4 is based on Section 907.1.3. However, instead of requiring emergency alarm system equipment to be listed and approved, it recognizes that listed equipment is not always available for the systems covered by these requirements. Accordingly this section allows this equipment to be listed or approved.

Sections 908.5 and 908.8 include requirements similar to those in Sections 907.7 and 907.8.5.

Sections 908.6.1 through 908.6.6 are taken verbatim from Section 908.

Additionally, this proposal simply relocates CO alarm system requirements from Section 908.7 to a new Section 915, with no technical changes whatsoever. This is being done for the following reasons:

1. By definition emergency alarm systems provide indication and warning of emergency situations involving hazardous materials, which relates more closely to warning systems required by the hazardous materials chapters of this code (e.g. Chapter 50 to 67). Carbon monoxide that is generated by motor vehicle exhaust and damaged fuel burning appliances is not regulated by those chapters.

2. As currently written the CO alarm requirements in Section 908.7 stand alone, and do not relate in any way to the emergency alarm requirements in Sections 908.1 through 908.6. Thus there is no advantage to having both emergency alarm and carbon monoxide alarm requirements in the same Section.
3. This proposal relocates the carbon monoxide alarm requirements to a new Section 915, which was done so the current Sections 909 through 914 don't need to be renumbered.
4. It is recognized that there is at least one other proposal to revise the Section 908.7 CO alarm requirements. If that proposal succeeds, approval of this proposal is intended to retain the changes from the other proposal, and relocate the revised provisions into Section 915.
5. This is consistent with a similar proposal submitted by the FCAC

Cost Impact: Clarifies what should be done already-minimal cost impact

F179-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

908 (NEW)-F-FINNEGAN

F180 – 13

915 (New) [IBC [F] 915 (New)], 908.7(IBC [F] 908.7), 908.7.1 (IBC [F] 908.7.1)

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azumiamia@yahoo.com)

Revise as follows:

SECTION 915 **CARBON MONOXIDE DETECTION**

~~908.7(IBC [F] 908.7)~~ 915.1 (IBC [F] 915.1) Carbon monoxide alarms. Group I or R occupancies located in a building containing a fuel-burning appliance or in a building which has an attached garage shall be equipped with single-station carbon monoxide alarms. The carbon monoxide alarms shall be listed as complying with UL 2034 and be installed and maintained in accordance with NFPA 720 and the manufacturer's instructions. An open parking garage, as defined in Chapter 2 of the *International Building Code*, or an enclosed parking garage ventilated in accordance with Section 404 of the *International Mechanical Code* shall not be considered an attached garage.

Exception: *Sleeping units* or *dwelling units* which do not themselves contain a fuel-burning appliance or have an attached garage, but which are located in a building with a fuel-burning appliance or an attached garage, need not be equipped with single-station carbon monoxide alarms provided that:

1. The *sleeping unit* or *dwelling unit* is located more than one story above or below any story which contains a fuel-burning appliance or an attached garage;
2. The *sleeping unit* or *dwelling unit* is not connected by duct work or ventilation shafts to any room containing a fuel-burning appliance or to an attached garage; and
3. The building is equipped with a common area carbon monoxide alarm system.

~~908.7.1 (IBC [F] 908.7.1)~~ 915.2 (IBC [F] 915.2) Carbon monoxide detection systems. Carbon monoxide detection systems, which include carbon monoxide detectors and audible notification appliances, installed and maintained in accordance with this section for carbon monoxide alarms and NFPA 720 shall be permitted. The carbon monoxide detectors shall be *listed* as complying with UL 2075.

Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

This proposal simply relocates CO alarm system requirements from Section 908.7 to a new Section 915, with no technical changes whatsoever. This is being done for the following reasons:

1. By definition emergency alarm systems provide indication and warning of emergency situations involving hazardous materials, which relates more closely to warning systems required by the hazardous materials chapters of this code (e.g. Chapter 50 to 67). Carbon monoxide that is generated by motor vehicle exhaust and damaged fuel burning appliances is not regulated by those chapters.
2. As currently written the CO alarm requirements in Section 908.7 stand alone, and do not relate in any way to the emergency alarm requirements in Sections 908.1 through 908.6. Thus there is no advantage to having both emergency alarm and carbon monoxide alarm requirements in the same Section.
3. This proposal relocates the carbon monoxide alarm requirements to a new Section 915, which was done so the current Sections 909 through 914 don't need to be renumbered.
4. It is recognized that there is at least one other proposal to revise the Section 908.7 CO alarm requirements. If that proposal succeeds, approval of this proposal is intended to retain the changes from the other proposal, and relocate the revised provisions into Section 915.

Cost Impact: The proposal will not increase the cost of construction.

F180-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

915 (NEW)-F-ZUBIA-FCAC

F181 – 13

908.7 (IBC [F] 908.7); 1103.9

Proponent: Thomas G. Daly, The Hospitality Security Consulting Group, LLC, representing Hilton Worldwide, Inc.

Delete and substitute as follows:

908.7 (IBC [F] 908.7) Carbon monoxide alarms. ~~Group I or R occupancies located in a building containing a fuel-burning appliance, or a building which has an attached garage shall be equipped with single station carbon monoxide alarms. The carbon monoxide alarms shall be listed as complying with UL 2034 and be installed and maintained in accordance with NFPA 720 and the manufacturer's instructions. An open parking garage, as defined in Chapter 2, or an enclosed parking garage ventilated in accordance with Section 404 of the International Mechanical Code shall not be considered an attached garage.~~

Exception: ~~Sleeping units or dwelling units which do not themselves contain a fuel-burning appliance or have an attached garage, but which are located in a building with a fuel-burning appliance or an attached garage, need not be equipped with single station carbon monoxide alarms provided that:~~

- ~~1. The sleeping unit or dwelling unit is located more than one story above or below any story which contains a fuel-burning appliance or an attached garage;~~
- ~~2. The sleeping unit or dwelling unit is not connected by duct work or ventilation shafts to any room containing a fuel-burning appliance or to an attached garage; and~~
- ~~3. The building is equipped with a common area carbon monoxide alarm system.~~

908.7 (IBC [F] 908.7) Carbon monoxide alarms detection and warning equipment. Group I or R occupancies located in a building containing a fuel-burning appliance, fireplace or a building which has an attached garage shall be equipped with carbon monoxide detection and warning equipment.

908.7.1 (IBC [F] 908.7.1 Listings and installation. Single station carbon monoxide alarms shall be listed as complying with UL 2034 and be installed and maintained in accordance with NFPA 720 and the manufacturer's instructions.

908.7.2 (IBC [F] 908.7.2) Attached garage. An open parking garage as defined in Chapter 2 or an enclosed parking garage ventilated in accordance with Section 404 of the *International Mechanical Code* shall not be deemed to be an attached garage.

908.7.3 (IBC [F] 908.7.3) Locations. A supervised carbon monoxide detector with an integral sounding device shall be installed within 15 feet of each fuel-burning appliance or fireplace and be monitored at a constantly attended location. Connection to an existing fire alarm system to report as a supervisory signal shall be an acceptable alternative to the detector being monitored at a constantly attended location.

908.7.4 (IBC [F] 908.7.4) Sleeping and dwelling units. *Sleeping units or dwelling units* which do not themselves contain a fuel-burning appliance, fireplace or have an attached garage, but which are located in a building with a fuel-burning appliance, fireplace or an attached garage, shall be equipped with 120 vac powered single-station carbon monoxide alarms with battery back-up provided that:

1. The sleeping unit or dwelling unit is located directly above, below or immediately adjacent to any room or space containing a fuel-burning appliance, fireplace or an attached garage.
2. The sleeping unit or dwelling unit is connected by duct work or ventilation shafts to any room containing a fuel-burning appliance or to an attached garage.
3. Affected hotel guest suites and multi-room dwelling units shall be equipped with a single station carbon monoxide alarm in each sleeping and living area and such units shall be interconnected.
4. Affected accessible sleeping units and accessible dwelling units single station carbon monoxide alarms shall activate a visual alarm within such units in accordance with NFPA 720.

908.7.5 (IBC [F] 908.7.5) Combination devices. Combination single station carbon monoxide and smoke alarms and combination carbon monoxide and smoke detectors shall be permitted.

908.7.4 (IBC [F] 908.7.4) 908.7.6 (IBC [F] 908.7.6) Carbon Monoxide detection systems. *(No change to current text)*

Delete and substitute as follows:

1103.9 Carbon monoxide alarms. Existing Group I or R occupancies located in a building containing a fuel-burning appliance or a building which has an attached garage shall be equipped with single-station carbon monoxide alarms. The carbon monoxide alarms shall be listed as complying with UL 2034, and be installed and maintained in accordance with NFPA 720 and the manufacturer's instructions. An open parking garage, as defined in the International Building Code, or an enclosed parking garage ventilated in accordance with Section 404 of the International Mechanical Code shall not be deemed to be an attached garage.

Exception: ~~Sleeping units or dwelling units which do not themselves contain a fuel-burning appliance or have an attached garage, but which are located in a building with a fuel-burning appliance or an attached garage, need not be equipped with single-station carbon monoxide alarms provided that:~~

- ~~1. The sleeping unit or dwelling unit is located more than one story above or below any story that contains a fuel-burning appliance or an attached garage;~~
- ~~2. The sleeping unit or dwelling unit is not connected by duct work or ventilation shafts to any room containing a fuel-burning appliance or to an attached garage; and~~
- ~~3. The building is provided with a common area carbon monoxide alarm system.~~

1103.9 Carbon Monoxide detection and warning equipment. Existing Group I or R occupancies located in a building containing a fuel-burning appliance, fireplace or a building which has an attached garage shall be equipped with carbon monoxide detection and warning equipment.

1103.9.1 Listings and installation. Single station carbon monoxide alarms shall be listed as complying with UL 2034, and be installed and maintained in accordance with NFPA 720 and the manufacturer's instructions. Carbon monoxide detectors shall be listed as complying with UL 2075 and be installed and maintained in accordance with NFPA 720 and the manufacturer's instructions.

1103.9.2 Attached garage. An open parking garage, as defined in the *International Building Code*, or an enclosed parking garage ventilated in accordance with Section 404 of the *International Mechanical Code* shall not be deemed to be an attached garage.

1103.9.3 Locations. A supervised carbon monoxide detector with an integral sounding device shall be installed within 15 feet of each fuel burning appliance or fireplace and be monitored at a constantly attended location. Connection to an existing fire alarm system to report as a supervisory signal shall be an acceptable alternative to the detector being monitored at a constantly attended location.

1103.9.4 Sleeping and dwelling units. *Sleeping units or dwelling units* which do not themselves contain a fuel-burning appliance or have an attached garage, but which are located in a building with a fuel-burning appliance, fireplace or an attached garage, shall be equipped with 120 vac powered single-station carbon monoxide alarms with battery back-up provided that:

1. The sleeping unit or dwelling unit is located directly above, below or immediately adjacent to any room or space containing a fuel-burning appliance, fireplace or an attached garage.
2. The sleeping unit or dwelling unit is connected by duct work or ventilation shafts to any room containing a fuel burning appliance or to an attached garage.
3. Affected hotel guest suites and multi-room dwelling units shall be equipped with a single station carbon monoxide alarm in each sleeping and living area and such units shall be interconnected.

4. Affected accessible sleeping units and accessible dwelling units single station carbon monoxide alarms shall activate a visual alarm within such units in accordance with NFPA 720.

1103.9.5 Combination devices. Combination single station carbon monoxide and smoke alarms and combination carbon monoxide and smoke detectors shall be permitted.

Reason – Chapter 9: The requirements are organized in a more reader friendly format.

The proposed changes will provide for earlier detection of potential carbon monoxide (CO) exposure and as a result allow for corrective action before CO can reach occupied areas of Group R & I facilities by placing a supervised and monitored CO detector at the source of potential CO. Sleeping and dwelling units in proximity to such sources of CO exposure would also have local CO alarms therein.

The requirements mirror successful CO regulation in Massachusetts, see 527 CMR 31.00 et seq., and New Jersey, see N.J.A.C. 5:23-3.21, which have no records of CO exposure related deaths in such equipped facilities in the 7 years since those regulations similar to this proposal have been in place.

CO detectors would be permitted to be a part of existing fire alarm systems making their installation more efficient and cost effective. Cost of construction would not be increased but would be diminished.

Reliability would be improved as such systems have secondary power requirements ensuring operation of the CO detector in the event of a power failure.

Listing and installation criteria for CO detectors are added.

CO alarm requirements for multi-room sleeping and dwelling units are clarified. In such units, where the means of egress from a sleeping areas is thru the living area, typical of all suite hotels, the current requirement for a CO alarm only within the sleeping area is insufficient to warn the occupant and may result in a CO exposure when attempting to exit. CO alarms would be required in both sleeping and living units and would be interconnected similar to requirements for smoke alarms.

The use of combination CO/smoke alarms and detectors would be specifically allowed. Such units will allow for a more cost effective installation by avoiding new electrical work as those units may be replace existing 120vac smoke alarms and system smoke detectors. Cost of construction would not be increased but would be diminished.

Fireplaces, a potential source of CO exposure, would be added for clarity as this term is defined separately from 'fuel burning appliances' in NFPA 720.

Undefined terms, e.g., 'common areas' are deleted.

Battery backup for CO alarms is specified to ensure operation in the event of power failure.

Reason – Chapter 11: The 2012 IFC language (new) had the unintended consequences of requiring CO alarms in areas of buildings where there is little likelihood and little historical occurrence of CO exposures while at the same time not requiring CO warning equipment in locations where there is a greater likelihood of an adverse CO exposures. The historical record of CO exposures in commercial buildings is so rare that the CPSC which reports on such exposure incidents does not list commercial buildings as an occupancy group. See this link for the latest such report:

Non-Fire Carbon Monoxide Deaths Associated with the Use of Consumer Products: 2008 Annual Estimates (released 01/12) <http://www.cpsc.gov/LIBRARY/dataCO.html>

The changes proposed would focus the requirement for such warning equipment at the potential source of such exposure and provide a local and remote alarm to building staff to initiate corrective action. Early detection and warning would be provided under this proposal vs. the current delayed warning based on the 2012 IFC language.

Cost Impact – Chapter 9: Cost of construction would not be increased but would be diminished.

Cost Impact – Chapter 11: Compared to the 2012 IFC these changes would reduce compliance costs by 90% for a typical commercial building with a small number of gas fired appliances (e.g., boiler, emergency generator, pool heater, kitchen). The proposal would allow CO detectors to be incorporated into existing fire alarm systems ensuring proper operation, maintenance and inspections per the Fire Code provisions for such systems.

F181-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

908.7-F-DALY

F182 – 13

908.7 (IBC[F] 908.7) , 908.7.1 (New) [IBC [F] 908.7.1 (New)], 908.7.1.1 (New) [IBC [F] 908.7.1.1 (New)], 908.7.1.2 (New) [IBC [F] 908.7.1.2 (New)]

Proponent: Roger Evans, Park City Municipal Corporation, representing the Utah Chapter of ICC (revans@parkcity.org)

Revise as follows:

908.7 (IBC[F] 908.7) Carbon monoxide alarms detection. Group I or R and E occupancies located in a building containing a fuel-burning appliance or in a building which has an attached garage shall be equipped with single-station carbon monoxide alarms detection. ~~The Group I and R occupancies shall be equipped with single-station carbon monoxide alarms shall be listed as complying with UL 2034 and be installed and be installed and maintained in accordance with NFPA 720 and the manufacturer's instructions. Group E occupancies shall be equipped with carbon monoxide detection in accordance with 907.1 and 907.2.~~ An open parking garage ventilated in accordance with Section 404 of the International Mechanical Code shall not be considered an attached garage.

Exception: *Sleeping units or dwelling units* which do not themselves contain a fuel-burning appliance or have an attached garage, but which are located in a building with a fuel-burning appliance or an attached garage, need not be equipped with single-station carbon monoxide alarms provided that:

1. The *sleeping unit or dwelling unit* is located more than one story above or below any story which contains a fuel-burning appliance or an attached garage;
2. The *sleeping unit or dwelling unit* is not connected by duct work or ventilation shafts to any room containing a fuel-burning appliance or to an attached garage; and
3. The building is equipped with a common area carbon monoxide alarm system.

908.7.1 (IBC[F] 908.7.1) Group E Occupancy Locations. Where required by Section 908.7, carbon monoxide detectors in Group E occupancies shall be installed in the locations specified in Sections 908.7.2 through 908.7.2.2.

908.7.1.1 (IBC[F] 908.7.1.1) Fuel-burning appliances and fuel burning fireplaces. Carbon monoxide detectors shall be installed on the ceiling of a room containing a fuel-burning appliance or a fuel burning fireplace. The carbon monoxide alarm signal shall be automatically transmitted to a constantly attended on site location.

908.7.1.2 (IBC[F] 908.7.1.2) Forced air furnaces. Carbon monoxide detectors shall be installed on the ceiling of a room containing a fuel-burning forced air furnace or in occupied rooms served by a fuel-burning, forced air furnace. The carbon monoxide alarm signal shall be automatically transmitted to a constantly attended on site location.

908.7.1 (IBC[F] 908.7.1) 908.7.2 (IBC[F] 908.7.2) Carbon monoxide detection systems. Carbon monoxide detection systems, which include carbon monoxide detectors and audible notification appliances, installed and maintained in accordance with this section for carbon monoxide alarms and NFPA 720 shall be permitted. The carbon monoxide detectors shall be listed as complying with UL 2075.

Reason: This proposal is intended to protect students and faculty from serious injury or possibly death from unintentional non-fire related carbon monoxide (CO) exposure by mandating the installation of CO detection devices in education occupancies. In the absence of a model code for the installation of CO detection in education occupancies each jurisdiction is developing its own regulations with varying installation requirements. For example, after several CO incidents in Connecticut (Public Act 11-248) and in Maryland (SB 173), the Governors signed bills into law for the installation CO detection in education occupancies and left the location, performance, inspection, testing and maintenance of CO detection and warning equipment up to the Building Commission or the State Fire Marshal. Section 610 of the 2010 Fire Code New York State (FCNYS) requires CO detection in Group E occupancies.

Also a result of the national publicity generated from an incident at an Atlanta school (ABC News) that sent 42 students to hospitals, three states have introduced legislation requiring CO detection in schools.

. Pennsylvania:

<http://www.legis.state.pa.us/cfdocs/Legis/CSM/showMemoPublic.cfm?chamber=H&SPick=20130&cosponId=9878>

. Florida: <http://www.flsenate.gov/Session/Bill/20130116/BillText/Filed/HTML>

. Georgia: **HB 23**

Attached are fifty three (53) reports of CO incidents in schools from 2005 through 2012. Thirty (30) of these incidents were caused by problems with a permanently installed fuel burning appliance.

This proposal models the location requirements for schools after the current requirements in the 2012 edition of the IFC for detection in hotels, dormitories and apartment buildings as a basis.

The efficacy of voluntary national consensus codes, such as the IFC, ensures a collaborative, balanced and consensus-based process.

Cost Impact: Minimal cost as a percentage of the building valuation.

F182-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

908.7-F-EVANS

F183 – 13

IFC: 908.7.2 (New) (IBC [F] 908.7.2 (New)), 1103.9 (New); IRC: R315.1.1 (New), R315.3.1 (New)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART 1 WILL BE HEARD BY THE IFC COMMITTEE. PART 2 OF THIS PROPOSAL WILL BE HEARD BY THE IRC BUILDING/ENERGY COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THE IFC AND IRC BUILDING/ENERGY CODE DEVELOPMENT COMMITTEES.

Proponent: Al Godwin, CBO, CPM, Aon Fire Protection Engineering, representing Aon Fire Protection Engineering Corporation (al.godwin@aon.com)

PART I – INTERNATIONAL FIRE CODE

Add new text as follows:

908.7.2 (IBC [F] 908.7.2) Power source. In new construction, required carbon monoxide alarms shall receive their primary power from the building wiring where such wiring is served from a commercial source and shall be equipped with a battery backup. Wiring shall be permanent and without a disconnecting switch other than as required for overcurrent protection.

Exception: Carbon monoxide alarms are not required to be equipped with battery backup where they are connected to an emergency electrical system.

Add new text as follows:

1103.9 Power source. Single-station carbon monoxide alarms shall receive their primary power from the building wiring where such wiring is served from a commercial source and shall be equipped with a battery backup. Wiring shall be permanent and without a disconnecting switch other than as required for overcurrent protection.

Exceptions:

1. Carbon monoxide alarms are not required to be equipped with battery backup where they are connected to an emergency electrical system.
2. Carbon monoxide alarms are permitted to be solely battery operated in existing buildings where no construction is taking place.
3. Carbon monoxide alarms are permitted to be solely battery operated in buildings that are not served from a commercial power source.
4. Carbon monoxide alarms are permitted to be solely battery operated in existing areas of buildings undergoing alterations or repairs that do not result in the removal of interior walls or ceiling finishes exposing the structure, unless there is an attic, crawl space or basement available which could provide access for building wiring without the removal of interior finishes.

PART II – INTERNATIONAL RESIDENTIAL CODE

Add new text as follows:

R315.1.1 Power source. In new construction, required carbon monoxide alarms shall receive their primary power from the building wiring where such wiring is served from a commercial source and shall be equipped with a battery backup. Wiring shall be permanent and without a disconnecting switch other than as required for overcurrent protection.

R315.3.1 Power source. Single-station carbon monoxide alarms shall receive their primary power from the building wiring where such wiring is served from a commercial source and shall be equipped with a battery backup. Wiring shall be permanent and without a disconnecting switch other than as required for overcurrent protection.

Exceptions:

1. Carbon monoxide alarms are permitted to be solely battery operated in existing buildings where no construction is taking place.
2. Carbon monoxide alarms are permitted to be solely battery operated in buildings that are not served from a commercial power source.
3. Carbon monoxide alarms are permitted to be solely battery operated in existing areas of buildings undergoing *alterations* or repairs that do not result in the removal of interior walls or ceiling finishes exposing the structure, unless there is an attic, crawl space or *basement* available which could provide access for building wiring without the removal of interior finishes.

Reason: This proposal copies the same installation requirements as specified for smoke alarms. It would seem to be appropriate if these alarms are a life saving device.

Costs: Assuming that the original wording seems to allow carbon monoxide alarms to be only battery powered, even in new construction, this would increase the cost of construction.

F183-13

PART I – INTERNATIONAL FIRE CODE

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – INTERNATIONAL RESIDENTIAL CODE

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

908.7.2 (NEW)-F-GODWIN

F184 – 13

909.4.6 (IBC [F] 909.4.6, IMC [F] 513.4.6)

Proponent: Dave Frable representing U.S. General Services Administration, Public Buildings Service

Revise as follows:

909.4.6 (IBC [F] 909.4.6, IMC [F] 513.4.6) Duration of operation. All portions of ~~active or~~ ~~passive engineered~~ smoke control systems shall be capable of continued operation after detection of the fire event for a period of not less than either 20 minutes or 1.5 times the calculated egress time, whichever is ~~less~~ greater.

Reason: The intent of this code change is to provide clarification for determining the duration of operation for smoke control systems to ensure a tenable environment for occupants to either evacuate or relocate to a safe location within a building. In addition, the requirement has also been revised to determine the proper duration for the operation of the smoke control system to run during an emergency by correctly stating “whichever is greater” in lieu of “whichever is less”. The 20 minute maximum time duration for the operation of the smoke control system is not sufficient for all evacuation situations and by revising the subject text, a more realistic and reasonable time duration for the operation of the smoke control system will be achieved.

Cost Impact: The code change proposal will not increase the cost of construction.

F184-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

909.4.6-F-FRABLE

F185 – 13

909.4 (IBC [F] 909.4, IMC [F] 513.4), 909.4.7 (New) [IBC [F] 909.4.7 (New), IMC [F] 513.4.7 (New)]

Proponent: Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee
(cbaldassarra@RJAGroup.com)

Revise as follows:

909.4 (IBC [F] 909.4, IMC [F] 513.4) Analysis. A rational analysis supporting the types of smoke control systems to be employed, their methods of operation, the systems supporting them and the methods of construction to be utilized shall accompany the submitted *construction documents* and shall include, but not be limited to, the items indicated in Sections 909.4.1 through ~~909.4.6~~ 909.4.6.7. [F]

909.4.7 (IBC [F] 909.4.7, IMC [F] 513.4.7) Smoke control system interaction. The design shall consider the interaction effects of the operation of multiple smoke control systems for all design scenarios.

Reason: The focus of this proposal is related to the interaction of multiple mechanical smoke control systems by asking for a specific analysis of the interaction of such systems similar to that required for the interaction of HVAC systems. The study of hoistway pressurization as an option for compliance with enclosed elevator lobby provisions drives the need to understand these interactions as stair pressurization will almost always be present in these buildings as well.

The CTC studied the need for elevator lobbies for traditional elevators (Section 713.14.1), FSAE (3007) and Occupant Evacuation elevators (3008). The Study Group assigned by the CTC conducted a technical analysis that concluded with several recommendations for the need for such lobbies and in addition provided a recommendation on the need for a closer analysis of buildings with more complexities. From this technical analysis the following excerpt is relative to this proposal.

In fact in many cases a traditional enclosed elevator lobby was determined to be unnecessary but for unusual building configurations there was more of a concern for interaction of systems and the negative impact of stack effect based upon the findings of the analysis. For instance, high-rise buildings may contain an atrium and will also use stair pressurization. In some cases hoistway pressurization could also be used as an option for compliance with the enclosed elevator lobby requirements. These are three smoke control systems that when running simultaneously may not work as intended. Below is recommendation 5 from the technical analysis.

5. Elevator hoistway pressurization design

- **The design of pressurization systems for elevator hoistways shall be based on a rational analysis in accordance with Section 909.4 that utilizes a network model approved by the AHJ and which includes an analysis of possible interactions between building shafts pressurized by different systems, and between pressurized and unpressurized shafts that exceed 420 feet in height.**

Add guidance to commentary for 909.4 that the rational analysis should show that the pressurization design will maintain the estimated Fractional Effective Dose (FED) below 0.5 and the estimated visibility distance above 25 feet within the stairway for 1.5 times the estimated evacuation time for each of the design fires selected.

- *Rationale: Taller buildings with more complex flow paths require analysis utilizing a network model that can account for these interacting flow paths. The criteria suggested for commentary represents the standard of practice for a fire hazard analysis performed as the required rational analysis.*

This proposal is one of several proposals submitted by the CTC Elevator lobby SG. The ICC Executive Board directed the Code Technology Committee (CTC) to study the issue of elevator lobby separations in November 2010 due to the number of code change proposals submitted addressing this issue over a number of code change cycles. The Code Technology Committee formed a study group on the elevator lobby separation issue in December 2010. Note that this subject had been previously addressed by CABO/BCMC in 1986 with a similar conclusion. The code change proposals submitted are the result of the CTC's study of the issue. Note that the scope of the activity was as follows:

Scope

- ☐ Review the need for elevator lobbies, with emphasis on building use, building and hoistway height, active and passive fire protection features associated with the aforementioned.
- ☐ Review the differences and specific needs when dealing with elevator lobbies of traditional-use elevators, fire service elevators, and occupant evacuation elevators.
- ☐ Review related code provisions, such as egress from and through elevator lobbies.

- ☐ Review the appropriate use of alternatives including pressurization of hoistways, additional doors, roll-down style barriers, and gasketing systems.
- ☐ Review with members of elevator industry to scope the requirements of applicable elevator reference standards as it deals with elevator lobby design, use and construction.
- ☐ Review design and construction requirements for elevator lobbies, including but not limited to dimensions, location and separation.
- ☐ Review applicable code change history, technical studies and loss statistics as part of this review.

Several proposals were submitted during the Group A Cycle and discussion of the content and outcome of these proposals and the full content of the technical analysis can be found at the following link. <http://www.iccsafe.org/cs/CTC/Pages/ElevatorLobbies.aspx>

Cost Impact: This proposal will increase the cost of construction where such analysis are not currently undertaken. It can be argued that such an analysis may possibly decrease the cost of construction. Potential delays can be avoided by reducing the need for rework after problems arise during commissioning as result of an upfront analysis. Also the upfront design analysis may eliminate possible excess capacity in the equipment.

F185-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

909.4-F-BALDASSARRA-CTC

F186 – 13

909.5 (IBC [F] 909.5, IMC [F] 513.5), 909.5.1 (IBC [F] 909.5.1, IMC [F] 513.5.1), 909.5.2 (IBC [F] 909.5.2, IMC [F] 513.5.2),

Proponent: Jeffrey Tubbs, PE, FSFPE, Arup USA, Inc., representing self (jeff.tubbs@arup.com)

Revise as follows:

909.5 (IBC [F] 909.5, IMC [F] 513.5) Smoke barrier construction. Smoke barriers required for passive smoke control and a smoke control system using the pressurization method shall comply with Section 709, and shall be constructed and sealed to limit leakage areas exclusive of protected openings. The maximum allowable leakage area shall be the aggregate area calculated using the following leakage area ratios:

1. Walls: $A/A_w = 0.00100$
2. Interior *exit stairways* and *ramps* and *exit passageways*: $A/A_w = 0.00035$
3. Enclosed *exit access stairways* and *ramps* and all other shafts: $A/A_w = 0.00150$
4. Floors and roofs: $A/A_F = 0.00050$

where:

A = Total leakage area, square feet (m^2).
 A_F = Unit floor or roof area of barrier, square feet (m^2).
 A_w = Unit wall area of barrier, square feet (m^2).

The leakage area ratios shown do not include openings due to gaps around doors, and operable windows, or similar gaps. The total leakage area of the smoke barrier shall be determined in accordance with Section 909.5.1 and tested in accordance with Section 909.5.2.

909.5.1 (IBC [F] 909.5.1, IMC [F] 513.5.1) Total Leakage area. The total leakage area of the barrier is the product of the *smoke barrier* gross area multiplied by the allowable leakage area ratio, plus the area of other openings such as gaps around doors and operable windows.

909.5.2 (IBC [F] 909.5.2, IMC [F] 513.5.2) Testing of leakage area. Compliance with the maximum total leakage area shall be determined by achieving the minimum air pressure difference across the barrier with the system in the smoke control mode for mechanical smoke control systems utilizing the pressurization method. Compliance with the maximum total leakage area of passive smoke control systems shall be verified through methods such tested using other approved means such as door fan testing or other methods shall be as approved by the fire code official.

Reason: This code change clarifies leakage area calculation and testing, and clarifies requirements for passive smoke control systems.

Cost Impact: The code change may introduce a small to negligible cost impact to smoke control systems.

F186-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

909.5-F-TUBBS

F187 – 13

909.5.2 (IBC [F] 909.5.2, IMC [F] 513.5.2), 909.5.2.1 (New) [IBC [F] 909.5.2.1 (New), IMC [F] 513.5.2.1 (New)],

Proponent: Al Godwin, CBO, CPM, Aon Fire Protection Engineering, representing Aon Fire Protection Engineering Corporation (al.godwin@aon.com)

Revise as follows:

909.5.2 (IBC [F] 909.5.2, IMC [F] 513.5.2) Opening protection. Openings in *smoke barriers* shall be protected by automatic-closing devices actuated by the required controls for the mechanical smoke control system. Door openings shall be protected by fire door assemblies complying with Section 716.5.3 of the *International Building Code*.

Exceptions:

1. Passive smoke control systems with automatic-closing devices actuated by spot-type smoke detectors *listed* for releasing service installed in accordance with Section 907.3.
2. Fixed openings between smoke zones that are protected utilizing the airflow method.
3. In Group I-1 Condition 2, Group I-2 and ambulatory health care facilities, where ~~such doors are installed across corridors~~, a pair of opposite-swinging doors are installed across a corridor in accordance with Section 909.5.2.1, the doors shall not be required to be protected in accordance with Section 716 of the *International Building Code* ~~without a center mullion shall be installed having vision panels with fire-protection-rated glazing materials in fire protection-protection-rated frames, the area of which shall not exceed that tested~~. The doors shall be close-fitting within operational tolerances and shall not have a center mullion or undercuts in excess of 3/4-inch, louvers or grilles. The doors shall have head and jamb stops, and astragals or rabbets at meeting edges and ~~shall automatic-closing by smoke detection in accordance with Section 716.5.9.3 of the International Building Code~~. Where permitted by the door manufacturer's listing, ~~Positive-latching~~ devices are not required.
4. Group I-3.
5. Openings between smoke zones with clear ceiling heights of 14 feet (4267 mm) or greater and bank-down capacity of greater than 20 minutes as determined by the design fire size.

909.5.2.1 (IBC [F] 909.5.2.1, IMC [F] 513.5.2.1) Group I-1 Condition 2, I-2 and ambulatory care facilities. In Group I-1 Condition 2, Group I-2 and ambulatory care facilities, where doors are installed across a corridor, the doors shall be automatic closing by smoke detection in accordance with Section 716.5.9.3 of the *International Building Code* and shall have a vision panel with fire-protection rated glazing materials in fire-protection-rated frames, the area of which shall not exceed that tested.

909.5.2.1 (IBC [F] 909.5.2.1, IMC [F] 513.5.2.1) 909.5.2.2 (IBC [F] 909.5.2.2, IMC [F] 513.5.2.2) Ducts and air transfer openings. (No change to current text)

Reason: Code changes FS76-07/08, G15-09/10 and FS40-12 have made amendments to IBC Section 709.5, exception 1 that are not reflected in Section 909.5.2. G31-12 added a new requirement for Group I-1 Condition 2 that needs to be picked up in 909.5.2.

Cost Impact: This is just a correlation between the two codes. Thus, there will be no increase in cost not already encountered.

F187-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

909.5.2-F-GODWIN

F188 – 13

909.5.2 (IBC [F] 909.5.2, IMC [F] 513.5.2)

Proponent: John Woestman, Kellen Company, representing Builders Hardware Manufacturers Association (BHMA) (jwoestman@kellencompany.com)

Revise as follows:

909.5.2 (IBC [F] 909.5.2, IMC [F] 513.5.2) Opening protection. Openings in *smoke barriers* shall be protected by automatic-closing devices actuated by the required controls for the mechanical smoke control system. Door openings shall be protected by fire door assemblies complying with Section 716.5.3 of the *International Building Code*.

Exceptions:

1. Passive smoke control systems with automatic closing devices actuated by spot-type smoke detectors *listed* for releasing service installed in accordance with Section 907.10.
2. Fixed openings between smoke zones that are protected utilizing the airflow method.
3. In Group I-2 and ambulatory care facilities, where such doors are ~~installed across corridors, a pair of opposite-swinging doors installed across a corridor and without a center mullion, shall be installed having vision panels with fire protection-rated glazing materials in fire protection-rated frames, the area of which shall not exceed that tested.~~ The doors shall be close-fitting within operational tolerances and shall not have undercuts in excess of 1 inch, louvers or grilles. The doors shall have head and jamb stops, astragals or rabbets at meeting edges. Vision panels shall have fire-protection rated glazing materials in fire-protection-rated frames. The doors and shall be automatic-closing by smoke detection in accordance with Section 716.5.9.3 of the *International Building Code*. Where permitted by the door manufacturer's listing, Ppositive-latching devices are not required.
4. In Group I-2 and ambulatory care facilities, where such doors are special purpose horizontal sliding, accordion, or folding door assemblies installed in accordance with Section 1008.1.4.3 and are automatic closing by smoke detection in accordance with Section 716.5.9.3 of the *International Building Code*.
45. Group I-3.
56. Openings between smoke zones with clear ceiling heights of 14 feet (4267 mm) or greater and bank-down capacity of greater than 20 minutes as determined by the design fire size.

Reason: IFC Section 909.5.2 (and IBC Section 909.5.2) addresses requirements for opening protection in smoke barriers, as does IBC Section 709.5. This proposal updates IFC Section 909.5.2 (and IBC Section 909.5.2). The charging language, in IFC Section 909.5, requires smoke barriers to comply with the IBC, thus this language provides greater consistency with pertinent IBC requirements.

Also, IBC Section 709.5 includes an exception for doors complying with 1008.1.4.3 of the IBC, and IBC Section 1008.1.4.3 was revised for the 2015 IBC. The proposed language in Exception 4 for special purpose horizontal sliding, accordion, or folding door assemblies is intended to reflect this.

Cost Impact: None

F188-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

909.5.2-F-WOESTMAN

F189 – 13

909.6.3 (New) [IBC [F] 909.6.3 (New), IMC [F] 513.6.3 (New)]

Proponent: Bob D. Morgan, P.E., Fort Worth, TX Fire Department representing Fire Advisory Board to North Central Texas Council of Governments

Revise as follows:

909.6.3 (IBC [F] 909.6.3, IMC [F] 513.6.3) Pressurized stairways and elevator hoistways. When stairways or elevator hoistways are pressurized, such pressurization systems shall comply with Section 909 as smoke control systems, in addition to the requirements of the Building Code Sections 909.20 and 909.21.

Reason: Section 909.6.3 specifically requires that stairway pressurization systems must comply as smoke control systems. Currently, Sections 909.20 and 909.21 of the Building Code are not copied into the Fire Code, leading to inconsistency with regards to design and controls for such systems, as well as, uncertainty on the part of designers as to the appropriate authority with regards to such. These are complicated systems and involve coordination between fire alarm systems and mechanical components – such should be a coordinated effort between Building and Fire Code Officials.

Cost Impact: The code change proposal will not increase the cost of construction.

F189-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

909.6.3 (NEW)-F-MORGAN

F190 – 13

909.7 (IBC [F] 909.7, IMC [F] 513.7), 909.7.1 (IBC [F] 909.7.1, IMC [F] 513.7.1), 909.7.2 (IBC [F] 909.7.2, IMC [F] 513.7.2)

Proponent: Jeffrey Tubbs, PE, FSFPE, Arup USA, Inc., representing self (jeff.tubbs@arup.com)

Revise as follows:

909.7 (IBC [F] 909.7, IMC [F] 513.7) Airflow design method. When *approved* by the fire code official, smoke migration through openings fixed in a permanently open position, which are located between smoke control zones by the use of the airflow method, shall be permitted. The design airflow shall be in accordance with this section. Airflow shall be directed to limit smoke migration from the fire zone. The geometry of openings shall be considered to prevent flow reversal from turbulent effects. Smoke control systems using the airflow method shall be designed in accordance with NFPA 92.

~~**909.7.1 (IBC [F] 909.7.1, IMC [F] 513.7.1) Velocity.** The minimum average velocity through a fixed opening shall not be less than:~~

$$n = 217.2 [h(T_f - T_o)/(T_f + 460)]^{1/2} \text{ --- (Equation 9-2)}$$

$$\text{For SI: } n = 119.9 [h(T_f - T_o)/T_f]^{1/2}$$

where:

~~h = Height of opening, feet (m).~~

~~T_f = Temperature of smoke, °F (K).~~

~~T_o = Temperature of ambient air, °F (K).~~

~~n = Air velocity, feet per minute (m/minute).~~

~~**909.7.2 (IBC [F] 909.7.2, IMC [F] 513.7.2) 909.7.1 (IBC [F] 909.7.1, IMC [F] 513.7.1) Prohibited conditions.** This method shall not be employed where either the quantity of air or the velocity of the airflow will adversely affect other portions of the smoke control system, unduly intensify the fire, disrupt plume dynamics or interfere with exiting. In no case shall airflow toward the fire exceed 200 feet per minute (1.02 m/s). Where the formula in Section 909.7.1 calculated requires airflow to exceed this limit, the airflow method shall not be used.~~

Reason: This code change follows previous changes made to the exhaust method and references NFPA 92 Standard for Smoke Control Systems. NFPA 92 Section 5.10 details the use of the airflow method. Referencing NFPA 92 for the exhaust and airflow method provides a consistent approach for smoke control in atrium and other large volume spaces.

Cost Impact: The code change may introduce a small to negligible cost impact to smoke control systems.

Analysis: ADMIN UPDATE

F190-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

909.7-F-TUBBS

F191 – 13

909.10.2 (IBC [F] 909.10.2, IMC [F] 513.10.2)

Proponent: Jeffrey Tubbs, PE, FSFPE, Arup USA, Inc., representing self (jeff.tubbs@arup.com)

Revise as follows:

909.10.2 (IBC [F] 909.10.2, IMC [F] 513.10.2) Ducts. Duct materials and joints shall be capable of withstanding the probable temperatures and pressures to which they are exposed as determined in accordance with Section 909.10.1. Ducts shall be constructed and supported in accordance with the *International Mechanical Code*. Ducts shall be leak tested to 1.5 times the maximum design pressure in accordance with nationally accepted practices. Measured leakage shall not exceed 5 percent of design flow. Results of such testing shall be a part of the documentation procedure. Ducts shall be supported directly from fire-resistance-rated structural elements of the building by substantial, noncombustible supports.

~~**Exception:** Flexible connections, (for the purpose of vibration isolation) complying with the *International Mechanical Code*, that are constructed of approved fire-resistance-rated materials.~~

Reason: As written, flexible duct work may present a potential failure mode for smoke control systems. Flexible ducts that are part of a required smoke control system should be subject to requirements for rigid duct work.

Cost Impact: The code change may introduce a small to negligible cost impact to smoke control systems.

F191-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

909.10.2-F-TUBBS

F192 – 13

909.12.1 (IBC [F] 909.12.1, IMC [F] 513.12.1), 909.20.6 (New)

Proponent: Jeffrey Tubbs, PE, FSFPE, Arup USA, Inc., representing self (jeff.tubbs@arup.com)

Revise as follows:

909.12 (IBC [F] 909.12, IMC [F] 513.12) Detection and control systems. Fire detection systems providing control input or output signals to mechanical smoke control systems or elements thereof shall comply with the requirements of Section 907. Such systems shall be equipped with a control unit complying with UL 864 and *listed* as smoke control equipment.

909.12.1 (IBC [F] 909.12.1, IMC [F] 513.12.1) Verification. Control systems for mechanical smoke control systems shall include provisions for verification. Verification shall include positive confirmation of actuation, testing, manual override, and the presence of power downstream of all disconnects. A and, through a preprogrammed weekly test sequence shall, report abnormal conditions audibly, visually and by printed report. The preprogrammed weekly test shall operate all devices, equipment, and components.

Exception: Where verification of individual components tested through the preprogrammed weekly testing sequence will interfere with normal building operation and produce unwanted effects to normal building operation, such individual components are permitted to be bypassed from the weekly preprogrammed weekly testing, where approved by the code official and in accordance with the following:

1. Power supplies for components that are bypassed from the preprogrammed weekly test, such as power breakers, power disconnects, automatic transfer switches, motor starters, and motor controls, shall be electrically supervised by the listed control unit.
2. Testing of all components bypassed from the preprogrammed weekly test shall be in accordance with Section 909.20.6.

(Renumber subsequent sections)

909.20.6 Components bypassing weekly test. Where components of the smoke control system are bypassed by the preprogrammed weekly test required by Section 909.12.1 such components shall be tested semi-annually. The system shall also be tested under standby power conditions.

Reason: The current provisions require weekly tests of smoke control systems. For many systems, the weekly test requires the introduction of untreated air into the smoke zone. This can be impractical in areas with cold or hot climates, and for buildings that require close control of temperature and humidity, such as art museums and similar facilities. The introduction of the untreated air can also result in wasting energy to reheat, re-cool, humidify, or dehumidify the smoke control zone.

The intent of the current code provisions is to provide means to verify that the required systems will be available when needed. The code requires and will continue to require control units to comply with UL 864, thus all components of the control system will be supervised. The code change adds requirements for supervision of all power supply components such as power breakers, power disconnects, automatic transfer switches, motor starters, and motor controls. This will provide reasonable assurance that power will be available for all smoke control components, such as fans, dampers, doors, and windows. The code change also adds the semi-annual requirement for a complete system test. This allows the building owner to schedule complete system testing on days that will reduce the impact to the building and energy needs. The combination of additional supervision and additional testing provides a reasonable alternative to weekly testing.

Cost Impact: The code change allows optional additional features that may increase initial costs but reduce long-term operational costs.

F192-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

909.12.1 (NEW)-F-TUBBS

F193 – 13

909.18.8.3 (IBC [F] 909.18.8.3)

Proponent: Douglas H. Evans, P.E., Clark County Building, representing Southern Nevada Chapter ICC (DHE@ClarkCountyNV.gov)

Revise as follows:

909.18.8.3 (IBC [F] 909.18.8.3) Reports. A complete report of testing shall be prepared by the special inspector or special inspection agency. The report shall include identification of all devices by manufacturer, nameplate data, design values, measured values and identification tag or mark. The report shall be reviewed by the responsible registered design professional and, when satisfied that the design intent has been achieved, the responsible registered design professional shall seal, sign and date the report with a statement as follows:

I have reviewed this report and by personal knowledge and on-site observation certify that the smoke-control system is in substantial compliance with the design intent, and to the best of my understanding complies with requirements of the code.

909.18.8.3.1 Report filing. A copy of the final report shall be filed with the fire code official and an identical copy shall be maintained in an approved location at the building.

Reason: This revision requires the engineer of record to observe the actual installation to help ensure the smoke control system is in accordance with the design. When physics based smoke-control systems initially appeared in the model code, this was initially required and has been shown to make good engineering sense.

This provision gives code officials an enforcement tool to ensure that the designer of record visits the jobsite to verify the system has been installed in accordance with their design. From a designers' standpoint, it makes sense to ensure that the smoke control system is designed in accordance with the original design intent and construction documents. Engineers are required to take an oath that holds them to a certain ethical standard. By requiring the engineer/registered design professional to sign the report with the above listed statement, it holds that person accountable consistent with the oath previously taken. This specific issue has come up on various projects in Southern Nevada. Without this provision in the code, out of state designers would likely not visit the site. Although local designers may be more apt to visit the jobsite to verify the system has been installed in accordance with the design, without this provision, it's possible that even in-state designers will not visit the site if they get too busy, or have not been contracted to perform this function. This provision serves a necessary and useful purpose.

Cost Impact: Can increase costs over base code.

F193-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

909.18.8.3-F-EVANS

F194 – 13

[B] 909.21 (New)

Proponent: Joanne T. McCaughan, Code Specialist, Washington State Building Code Council, representing Washington State (joanne.mccaughan@des.wa.gov)

Add new text as follows:

[B] 909.21 Elevator hoistway pressurization alternative. Where elevator hoistway pressurization is provided in lieu of required enclosed elevator lobbies, the Pressurization system shall comply with Sections 909.21.1 through 909.21.11.

[B] 909.21.1 Pressurization requirements. Elevator hoistways shall be pressurized to maintain a minimum positive pressure of 0.10 inches of water (25 Pa) and a maximum positive pressure of 0.25 inches of water (67 Pa) with respect to adjacent occupied space on all floors. This pressure shall be measured at the midpoint of each hoistway door, with all elevator cars at the floor of recall and all hoistway doors on the floor of recall open and all other hoistway doors closed. The opening and closing of hoistway doors at each level must be demonstrated during this test. The supply air intake shall be from an outside uncontaminated source located a minimum distance of 20 feet (6096 mm) from any air exhaust system or outlet.

[B] 909.21.2 Rational analysis. A rational analysis complying with Section 909.4 shall be submitted with the construction documents.

[B] 909.21.3 Ducts for system. Any duct system that is part of the pressurization system shall be protected with the same fire-resistance rating as required for the elevator shaft enclosure.

[B] 909.21.4 Fan system. The fan system provided for the pressurization system shall be as required by Sections 909.21.4.1 through 909.21.4.4.

[B] 909.21.4.1 Fire resistance. When located within the building, the fan system that provides the pressurization shall be protected with the same fire-resistance rating required for the elevator shaft enclosure.

[B] 909.21.4.2 Smoke detection. The fan system shall be equipped with a smoke detector that will automatically shut down the fan system when smoke is detected within the system.

[B] 909.21.4.3 Separate systems. A separate fan system shall be used for each elevator hoistway.

[B] 909.21.4.4 Fan capacity. The supply fan shall either be adjustable with a capacity of at least 1,000 cfm (0.4719 m³/s) per door, or that specified by a registered design professional to meet the requirements of a designed pressurization system.

[B] 909.21.5 Standby power. The pressurization system shall be provided with standby power from the same source as other required emergency systems for the building.

[B] 909.21.6 Activation of pressurization system. The elevator pressurization system shall be activated upon activation of the building fire alarm system or upon activation of the elevator lobby smoke detectors.

Where both a building fire alarm system and elevator lobby smoke detectors are present, each shall be independently capable of activating the pressurization system.

[B] 909.21.7 Special inspection. Special inspection for performance shall be required in accordance with Section 909.18.8. System acceptance shall be in accordance with Section 909.19.

[B] 909.21.8 Marking and identification. Detection and control systems shall be marked in accordance with Section 909.14.

[B] 909.21.9 Control diagrams. Control diagrams shall be provided in accordance with Section 909.15.

[B] 909.21.10 Control panel. A control panel complying with Section 909.16 shall be provided.

[B] 909.21.11 System response time. Hoistway pressurization systems shall comply with the requirements for smoke control system response time in Section 909.17.

Reason: In the 2012 IBC, a new sub-section, 909.21 Elevator hoistway pressurization, was provided in Chapter 9. This same sub-section was not added to the 2012 IFC. For code consistency between these two codes, this sub-section should be located in both codes. Instead of the IBC being the primary code for this section, it should be maintained under the Fire Code. Currently, there is potential conflict between Building and Fire Code enforcement and interpretation of the Codes in relation to these provisions. Adoption of this language into the 2015 IFC would eliminate the potential conflict.

Cost Impact: The code change proposal will not increase the cost of construction.

F194-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

909.21 (NEW)-F-MCCAUGHAN

F195 – 13

910 (IBC [F] 910), Table 901.6.1, Table 3206.2, 3206.7, Chapter 80 (IBC Chapter 35)

Proponent: Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee
(cbaldassarra@RJAGroup.com)

Revise as follows:

SECTION 910 (IBC [F] 910) SMOKE AND HEAT REMOVAL

910.1 (IBC [F] 910.1) General. Where required by this code ~~or otherwise installed~~, smoke and heat vents or mechanical smoke ~~exhaust~~ removal systems ~~and draft curtains~~ shall conform to the requirements of this section.

Exceptions:

- ~~1. Frozen food warehouses used solely for storage of Class I and II commodities where protected by an approved automatic sprinkler system.~~
- ~~2. Where areas of buildings are equipped with early suppression fast-response (ESFR) sprinklers, automatic smoke and heat vents shall not be required within these areas.~~

910.2 (IBC [F] 910.2) Where required. Smoke and heat vents or a mechanical smoke removal system shall be installed in the roofs of buildings or portions thereof occupied for the uses set forth in as required by Sections 910.2.1 and 910.2.2. In occupied portions of a building where the upper surface of the story is not a roof assembly, a mechanical smoke removal system in accordance with Section 910.4 shall be installed.

Exceptions:

1. Frozen food warehouses used solely for storage of Class I and II commodities where protected by an approved automatic sprinkler system.
- ~~2. In occupied portions of a building where the upper surface of the story is not a roof assembly, mechanical smoke exhaust in accordance with Section 910.4 shall be an acceptable alternative.~~
2. Where areas of buildings are equipped with early suppression fast-response (ESFR) sprinklers, smoke and heat removal shall not be required within these areas.

910.2.1 (IBC [F] 910.2.1) Group F-1 or S-1. Smoke and heat vents installed in accordance with Section 910.3 or a mechanical smoke removal system installed in accordance with Section 910.4 shall be installed in buildings and portions thereof used as a Group F-1 or S-1 occupancy having more than 50,000 square feet (4645 m²) of undivided area.

Exception: Group S-1 aircraft repair hangars.

910.2.2 (IBC [F] 910.2.2) High-piled combustible storage. Smoke and heat removal required by Table 3206.2, for buildings and portions thereof containing high-piled combustible ~~stock or rack~~ storage shall be installed in accordance with Section 910.3 in unsprinklered buildings. In buildings and portions thereof containing high-piled combustible storage equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 in any occupancy group when required by Section 3206.7, a smoke and heat removal system shall be installed in accordance with Section 910.3 or 910.4.

910.3 (IBC [F] 910.3) Smoke and heat vents ~~Design and installation~~. The design and installation of smoke and heat vents ~~and draft curtains~~ shall be as specified in accordance with Sections 910.3.1 through 910.3.3 910.3.5.2 and Table 910.3.

**TABLE 910.3 (IBC [F] TABLE 910.3)
REQUIREMENTS FOR DRAFT CURTAINS AND SMOKE AND HEAT VENTS**

910.3.1 (IBC [F] 910.3.1) Design Listing and labeling. Smoke and heat vents shall be *listed* and labeled to indicate compliance with UL 793 or FM 4430.

910.3.2 (IBC [F] 910.3.2) Vent operation. Smoke and heat vents shall be capable of being operated by *approved* automatic and manual means. Automatic operation of smoke and heat vents shall conform to the provisions of Sections 910.3.2.1 through 910.3.2.3.

910.3.2.1 (IBC [F] 910.3.2.1) Gravity-operated drop-out vents. Automatic smoke and heat vents containing heat-sensitive glazing designed to shrink and drop out of the vent opening when exposed to fire shall fully open within 5 minutes after the vent cavity is exposed to a simulated fire, represented by a time-temperature gradient that reaches an air temperature of 500°F (260°C) within 5 minutes.

910.3.2.2 (IBC [F] 910.3.2.2) Sprinklered buildings. Where installed in buildings provided with an *approved automatic sprinkler system*, smoke and heat vents shall be designed to operate automatically.

910.3.2.3 (IBC [F] 910.3.2.3) Nonsprinklered buildings. Where installed in buildings not provided with an *approved automatic sprinkler system*, smoke and heat vents shall operate automatically by actuation of a heat-responsive device rated at between 100°F (38°C) and 220°F (104°C) above ambient.

Exception: Gravity-operated drop-out vents complying with Section 910.3.2.1.

910.3.3 (IBC [F] 910.3.3) Vent dimensions. The effective venting area shall not be less than 16 square feet (1.5 m²) with no dimension less than 4 feet (1219 mm), excluding ribs or gutters having a total width not exceeding 6 inches (152 mm).

910.3.2 (IBC [F] 910.3.2) - 910.3.4 (IBC [F] 910.3.4) Smoke and heat vent locations. Smoke and heat vents shall be located 20 feet (6096 mm) or more from adjacent *lot lines* and *fire walls* and 10 feet (3048 mm) or more from *fire barriers*. Vents shall be uniformly located within the roof in the areas of the building where the vents are required to be installed by Section 910.2, with consideration given to roof pitch, ~~draft curtain location~~, sprinkler location and structural members.

910.3.3 Smoke and heat vents area. The required aggregate area of smoke and heat vents shall be calculated as follows:

For buildings equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1:

$$A_{VR} = V/9000 \quad \text{(Equation 9-4)}$$

Where:

A_{VR} = the required aggregate vent area (ft²)
 V = volume (ft³) of the area that requires smoke removal

For unsprinklered buildings:

$$A_{VR} = A_{FA}/50 \quad \text{(Equation 9-5)}$$

Where:

A_{VR} = the required aggregate vent area (ft²)
 A_{FA} = the area of the floor of the area that requires smoke removal.

910.3.5 (IBC [F] 910.3.5) Draft curtains. Where required by Table 910.3, draft curtains shall be installed on the underside of the roof in accordance with this section.

Exception: Where areas of buildings are equipped with ESFR sprinklers, draft curtains shall not be provided within these areas. Draft curtains shall only be provided at the separation between the ESFR sprinklers and the non-ESFR sprinklers.

910.3.5.1 (IBC [F] 910.3.5.1) Construction. Draft curtains shall be constructed of sheet metal, lath and plaster, gypsum board or other approved materials that provide equivalent performance to resist the passage of smoke. Joints and connections shall be smoke tight.

910.3.5.2 (IBC [F] 910.3.5.2) Location and depth. The location and minimum depth of draft curtains shall be in accordance with Table 910.3.

910.4 (IBC [F] 910.4) Mechanical smoke removal systems exhaust. Where approved by the fire code official, engineered mechanical smoke removal systems exhaust shall be designed and installed in accordance with Sections 910.4.1 through 910.4.7 an acceptable alternative to smoke and heat vents.

910.4.1 Automatic sprinklers required. The building shall be equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1.

910.4.2 (IBC [F] 910.4.2) Exhaust fan construction. Exhaust fans that are part of a mechanical smoke removal system shall be rated for operation at 105 deg. C. Exhaust fan motors shall be located outside of the exhaust fan air stream.

910.4.3 (IBC [F] 910.4.3) System design criteria. The mechanical smoke removal system shall be sized to exhaust the building at a minimum rate of two air changes per hour based upon the volume of the building or portion thereof without contents. The capacity of each exhaust fan shall not exceed 30,000 cubic feet per minute.

910.4.3.1 Make-up air. Make-up air openings shall be provided within six feet (add metric) of the floor level. Operation of makeup air openings shall be manual or automatic. The minimum gross area of make-up air inlets shall be 8 ft² per 1000 cfm of smoke exhaust.

910.4.4 (IBC [F] 910.4.4) Activation. The mechanical smoke removal system shall be activated by manual controls only.

910.4.5 (IBC [F] 910.4.5) Manual control location. Manual controls shall be located so as to be accessible to the fire service from an exterior door of the building and be protected against interior fire exposure by not less than 1-hour fire barriers constructed in accordance with Section 707 of the *International Building Code* or horizontal assemblies constructed in accordance with Section 712 of the *International Building Code*, or both.

910.4.1 (IBC [F] 910.4.1) Location. Exhaust fans shall be uniformly spaced within each draft-curtained area and the maximum distance between fans shall not be greater than 100 feet (30 480 mm).

910.4.2 (IBC [F] 910.4.2) Size. Fans shall have a maximum individual capacity of 30,000 cfm (14.2 m³/s). The aggregate capacity of smoke exhaust fans shall be determined by the equation:

$$C = A \times 300 \text{ — (Equation 9-4)}$$

where:

C = Capacity of mechanical ventilation required, in cubic feet per minute (m³/s).

~~A = Area of roof vents provided in square feet (m²) in accordance with Table 910.3.~~

910.4.3 (IBC [F] 910.4.3) Operation. Mechanical smoke exhaust fans shall be automatically activated by the ~~automatic sprinkler system or by heat detectors~~ having operating characteristics equivalent to those described in Section 910.3.2. Individual manual controls for each fan unit shall also be provided.

910.4.6 (IBC [F] 910.4.6) 910.4.4 (IBC [F] 910.4.4) Control wiring and control. Wiring for operation and control of mechanical smoke removal systems ~~exhaust fans~~ shall be connected ahead of the main disconnect in accordance with Section 701.12E of NFPA 70 and be protected against interior fire exposure to temperatures in excess of 1,000°F (538°C) for a period of not less than 15 minutes. ~~Controls shall be located so as to be immediately accessible to the fire service from the exterior of the building and protected against interior fire exposure by not less than 1-hour fire barriers constructed in accordance with Section 707 of the International Building Code or horizontal assemblies constructed in accordance with Section 711 of the International Building Code, or both.~~

910.4.5 (IBC [F] 910.4.5) Supply air. Supply air for exhaust fans shall be provided at or near the floor level and shall be sized to provide a minimum of 50 percent of required exhaust. Openings for supply air shall be uniformly distributed around the periphery of the area served.

910.4.7 (IBC [F] 910.4.7) 910.4.6 (IBC [F] 910.4.6) Interlocks Controls. ~~On combination comfort air-handling/smoke removal systems or independent comfort air-handling systems, fans shall be controlled to shut down in accordance with the approved smoke control sequence. Where building air handling and mechanical smoke removal systems are combined or where independent building air-handling systems are provided, fans shall automatically shut down in accordance with the International Mechanical Code. The manual controls provided for the smoke removal system shall have the capability to override the automatic shutdown of fans that are part of the smoke removal system.~~

910.5 Maintenance. Smoke and heat vents and mechanical smoke removal ~~exhaust~~ systems shall be maintained in an operative condition in accordance with Section 910.5.1 or 910.5.2, respectively ~~NFPA 204.~~

910.5.1 Smoke and heat vents. Smoke and heat vents shall be maintained ~~in an operative condition in~~ accordance with NFPA 204 and Section 910.5.1.1

910.5.1.1 Fusible links. Fusible links ~~for smoke and heat vents~~ shall be ~~promptly~~ replaced whenever fused, damaged or painted. ~~Smoke and heat vents and mechanical smoke exhaust systems shall not be modified.~~

910.5.2 Mechanical smoke removal systems. Mechanical smoke removal systems shall be maintained in accordance with the equipment manufacturer's maintenance instructions and Sections 910.5.2.1 through 910.5.2.4.

910.5.2.1 Frequency. Systems shall be operationally tested not less than once per year. Testing shall include the operation of all system components including control elements.

910.5.2.2 Testing. Operational testing of the mechanical smoke removal system shall include all equipment such as fans, controls and make-up air openings.

910.5.2.3 Schedule. A routine maintenance and operational testing program shall be initiated and a written schedule for routine maintenance and operational testing shall be established.

910.5.2.4 Written record. A written record of mechanical smoke exhaust system testing and maintenance shall be maintained on the premises. The written record shall include the date of the maintenance, identification of the servicing personnel and notification of any unsatisfactory condition and the corrective action taken, including parts replaced.

901.6.1 Standards. Fire protection systems shall be inspected, tested and maintained in accordance with the referenced standards listed in Table 901.6.1.

**TABLE 901.6.1
FIRE PROTECTION SYSTEM MAINTENANCE STANDARDS**

SYSTEM	STANDARD
Portable fire extinguishers	NFPA 10
Carbon dioxide fire-extinguishing system	NFPA 12
Halon 1301 fire-extinguishing systems	NFPA 12A
Dry-chemical extinguishing systems	NFPA 17
Wet-chemical extinguishing systems	NFPA 17A
Water-based fire protection systems	NFPA 25
Fire alarm systems	NFPA 72
Mechanical smoke exhaust systems	NFPA 204
Smoke and heat vents	NFPA 204
Water-mist systems	NFPA 750
Clean-agent extinguishing systems	NFPA 2001

Revise as follows:

**TABLE 3206.2
GENERAL FIRE PROTECTION AND LIFE SAFETY REQUIREMENTS**

COMMODITY CLASS	SIZE OF HIGH-PILED STORAGE AREA ^a (square feet) (see Sections 3206.2 and 3206.4)	ALL STORAGE AREAS (See Sections 3206, 3207 and 3208) ^b					SOLID-PILED STORAGE, SHELF STORAGE AND PALLETIZED STORAGE (see Section 3207.3)		
		Automatic fire-extinguishing system (see Section 3206.4)	Fire detection system (see Section 3206.5)	Building access (see Section 3206.6)	Smoke and heat removal (see Section 3206.7)	Draft curtains (see Section 3206.7)	Maximum pile dimension ^c (feet)	Maximum permissible storage height ^d (feet)	Maximum pile volume (cubic feet)

(Portions of table not shown remain unchanged)

3206.7 Smoke and heat removal. Where smoke and heat removal is are required by Table 3206.2, smoke and heat vents it shall be provided in accordance with Section 910. Where draft curtains are required by Table 3206.2, they shall be provided in accordance with Section 910.3.5.

Add new standard to Chapter 80 (IBC Chapter 35) as follows:

FM

4430-12 Approval Standard for Heat and Smoke Vents 910.3.1

Reason: The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty-five meetings - all open to the public.

This proposed code change is a result of the CTC's investigation of smoke and heat removal through the Roof Vent Study Group (RVSG), which is part of the area of CTC study entitled "Balanced Fire Protection" the scope of

which is: *"To investigate what constitutes an acceptable balance between active fire protection and passive fire protection measures with respect to meeting the fire and life safety objectives of the IBC."* As part of the CTC's review of the "balanced" fire protection issue, the CTC formed the RVSG to study the issue of smoke and heat vents with specific emphasis on: building area; sprinkler versus non sprinkler operation; impact on fire-fighting operations; relationship to the on-going updating of NFPA 204; the need for smoke and heat vent design requirements, regardless if smoke and heat vents are mandated by the code. The RVSG was formed in October 2006 and has been working on this issue since January 2007 and developed code change proposal F144-09/10 which was disapproved by the ICC membership. This subsequent code change proposal is a result of continued RVSG study on the issue.

The purpose of this code change proposal is to update the provisions which mandate roof smoke and heat removal systems in industrial and storage buildings based upon technical information on the operation of roof vents which has been developed in the United States over the last 20 years. The RVSG has developed its proposed revisions to the roof vent provisions based upon the following:

- ❖ Research on the interaction of sprinklers, roof vents and draft curtains funded by the National Fire Protection Research Foundation (NFPRF) and conducted at Underwriters Laboratories (UL) in 1997/1998. This research is summarized in a document referred to as National Institute of Science and Technology Interagency Report (NISTIR) 6196-1 dated September, 1998.
- ❖ Provisions for the use of roof vents in sprinklered buildings included in the 2010 and 2013 edition of NFPA 13, including the substantiation statement for the NFPA 13 roof vent provisions.
- ❖ The capability of standard spray sprinklers to both control and/or extinguish a fire within 30 minutes of sprinkler operation, without supplemental fire department activity has been documented.
- ❖ Recommendations contained in National Institute for Occupational Safety and Health (NIOSH) 2005-132, *Preventing Injuries and Deaths of Fire Fighters Due to Truss Systems*, and NIOSH 2010-153, *Preventing Deaths and Injuries of Fire Fighters using Risk Management Principles at Structure Fires*.
- ❖ Recommendations contained in the Initial Report of the Federal Emergency Management Agency (FEMA)/National Fallen Firefighter Foundation (NFFF[®]) Firefighter Life Safety Summit held on April 14, 2004 in Tampa, Florida.

The RVSG determined that the primary purpose of smoke and heat removal from the perspective of the building code requirement is to assist fire-fighting operations after control of the fire has been achieved by the automatic sprinkler system.. Automatic smoke and heat vents and automatic sprinkler systems were developed independently of one another and their interaction has been a concern for many years. Even today, there is no accepted method of analyzing their interaction and, therefore, the installation standards for each (NFPA 204 and NFPA 13, respectively) give cautions to the designers of buildings having both systems.

The RVSG also determined that a manually-activated mechanical smoke removal system could perform the same function as roof vents. This code change increases the emphasis and acceptability of mechanical smoke removal systems as an acceptable alternative to smoke and heat vents. Mechanical smoke removal systems as prescribed in this code change provide fire-rated, grade-level enclosures for the control of the mechanical smoke removal system. This provides greater control of the system for the fire incident commander and reduces the need to place fire fighters on roofs or in other hazardous situations to operate smoke and heat venting systems. This methodology is consistent with the latest recommendations from NIOSH and NFFF for fire fighter safety, risk management and recommended fire-fighting tactics.

Summary of general provisions of the proposal:

- Either automatic roof vents or a manually-activated mechanical smoke removal system are permitted to be provided in industrial and storage buildings protected by a sprinkler system (in buildings where these provisions are applicable).
- Only roof vents should be permitted to be provided in storage buildings with high-piled storage which are not protected by a sprinkler system (i.e., buildings which contain high-piled storage with an area between 2,500 and 12,000 square feet). The rationale for this provision is that a mechanical smoke removal system capable of handling temperatures between 1,000° F and 2,000° F cannot be practically provided at a reasonable cost.
- Provisions for the design of a manually-activated mechanical smoke removal system have been included. These provisions require that the mechanical smoke removal system be sized to provide a minimum exhaust rate of 2 air changes per hour based upon the enclosed volume of the building space to be exhausted, without any deductions for the space occupied by storage or equipment. An exhaust rate of 2 air changes per hour is based on an analysis assuming a conservative approach using a Factory Mutual Research Corporation (FMRC) Standard Plastic Commodity (polystyrene cups in compartmented cartons). This commodity is recognized to represent a severe fire hazard of high density plastics. In a calculation based on this commodity, a

maximum of 68,960 cfm of smoke was generated by the design fire. Based upon an empty building volume of 2.659 million cubic feet, the exhaust rate required to achieve two air changes per hour is 88,633 cfm. Because no single fan can exceed 30,000 cfm, this building required five fans, each exhausting 25,570 cfm for a total of 127,850 cfm. This exceeds the minimum two air changes per hour by more than 40 percent. Even at the minimum required rate of two air changes per hour, the calculation results show that the mechanical smoke removal system proposed will be capable of removing the smoke from the building faster than it will be generated, ultimately removing smoke from the building once the fire is extinguished. A degree of conservatism is added to this by the calculation using an empty building volume.

- Provisions for the design of roof vents in buildings protected by a sprinkler system have been modified to require that the area of roof vents provide equivalent venting to that required for the mechanical smoke removal system (2 air changes per hour) based upon an assumption that each square foot of vent area will provide 300 cubic feet per minute (cfm) of ventilation. The reason for this requirement is that the roof vents should at least provide venting equivalent to the minimum venting provided by the mechanical smoke removal system. A factor of 300 cfm of venting per square foot of vent area is presently included in the 2012 edition of the *International Building Code*, although the use of this conversion factor is questionable at best. The actual ventilation provided by each square foot of vent area will depend upon the temperature differential between ambient conditions and the smoke layer under the roof deck or the pressure achieved if positive pressure ventilation is utilized. If the prescribed value is not practical for a given building design, designers have the option of demonstrating other values which provide the same performance under the alternate method of design provisions in the code.

- Provisions for the design of roof vents in buildings not protected by a sprinkler system have been revised (simplified) to require that the ratio of the area of the vents to the floor area be a minimum of 1:50. The rationale for this revision is that the case where roof vents will be provided without sprinkler protection will be rare: buildings which contain high-piled storage with an area between 2,500 and 12,000 square feet. Given that this situation will be rare, a complex analysis to determine the required area of roof vents is unnecessary. The ratio of vent area to floor area of 1:50 is conservative based upon the present requirements included in the International Building and Fire Codes.

- Provisions for the mechanical smoke removal system permit the system to be designed to handle air at ambient temperature provided that the fan motors are located outside the air stream. The basis for this provision is the thermocouple temperature data for the large-scale fire tests conducted at UL in 1997/1998, specifically Tests P-1 and P-4. (In Tests P-1 and P-4, no vents opened so the ceiling temperatures recorded would be unaffected by the activation of vents. See Pages 40 and 52 of the NISTIR 6196-1 report dated September 1998 (on the CTC web site) for the thermocouple temperature data recorded as a function of time.)

- The exposing temperatures and time periods were reviewed and not considered to pose a threat to the building structure, fans or power wiring.

- The sprinkler activation times and ceiling temperature data for the five large-scale fire tests summarized in NISTIR 6196-1 indicate that the exposure of mechanical exhaust fans and ducts located at the ceiling to high temperatures will be relatively short. Since it is anticipated that the exhaust system will only be activated after the arrival of fire fighters at the scene (estimated to be 7 minutes or longer after ignition), ceiling temperatures should be reduced sufficiently to allow fans rated for only ambient temperatures to be used for the exhaust system.

- The existing provisions for the design of a mechanical exhaust system indicate that the electrical power supply for the system is to be wired ahead of the main building disconnect for increased reliability and to facilitate fire-fighting operations. This existing provision will remain as no adverse experience has been cited.

- The provisions for the design of a mechanical smoke removal system indicate that wiring providing power to exhaust fans located in the interior of the building is to be protected by materials which will provide a 15 minute finish rating protection. The ceiling temperature data collected in the five large-scale fire tests summarized in NISTIR 6196-1 (cited above) show that temperatures at the ceiling will be far less than the exposure temperatures defined by the ASTM E119 time-temperature curve and that the ceiling temperatures will rapidly decrease once sprinklers activate. The ceiling temperature data included in NISTIR 6196-1 indicates that providing 15 minute finish rating protection for the interior electrical power supply is more than adequate to prevent damage to the power supply wiring for the exhaust system.

- The provisions pertaining to draft curtains included in the code have been removed. The rationale for removing the provisions for draft curtains is that research conducted by Factory Mutual Research Corporation (FMRC) in 1994 and the research conducted at UL in 1997/1998 demonstrated that draft curtains affect the sequence of operation of sprinklers and may have an adverse effect on sprinkler operation.

Although the mechanical smoke removal system or roof vent system outlined above are intended to be utilized to assist fire fighters after fire control has been achieved, either one of these systems can be utilized to assist interior manual fire-fighting operations. In order to utilize the roof vent system to assist with manual interior fire-fighting, it will likely be necessary that the vents will have to be opened manually by sending fire fighters to the roof if this is within the responding fire department's operating procedures.

It should be noted that the effectiveness of manually-opened roof vents will be marginal at best once sprinklers have operated and the ceiling temperatures drop to near ambient. Hence, in order for roof vents to be of assistance for interior manual fire-fighting, fire fighters will likely either need to pressurize the building using positive pressure ventilation (PPV) or exhaust the building with supplemental equipment.

It should also be noted that this proposed code change does not make reference to NFPA 204 for the design of

roof vent systems in either buildings protected by a sprinkler system or unsprinklered buildings. The rationale for this is that NFPA 204 does not address the use of roof vents in sprinklered buildings and the design provisions for roof vents presently included in NFPA 204 are too complex for application to relatively small buildings where vents would be permitted without sprinkler protection (i.e., buildings with high-piled storage less than 12,000 square feet in floor area).

The proposed code change developed by the RVSG is intended to incorporate the latest technology and research available on the interaction of sprinklers, roof vents and draft curtains, as well as the evolving thinking on fire fighter safety promoted by NIOSH and the NFFF into the code provisions.

The information on which this code change proposal is based did not exist when the provisions for roof vents were first included in the building and fire codes in the 1970s and 1980s. This proposal is a much needed update in the fire protection provisions for large industrial and storage buildings. A section-by-section summary follows:

910.1: The phrase "...or otherwise installed..." has been removed to clarify that these provisions are specific to required systems. None of the requirements in the section must be mandatory for non-required systems. Terminology was changed from "exhaust" to "removal" for consistency of terminology. This section is a general section but the exceptions are specific to when a smoke and heat removal system is required; therefore, the exceptions have been relocated to Section 910.2.

910.2: Exceptions 1 and 3 in this section have been relocated here from Section 910.1 as they are specific to when a smoke and heat removal system is required. In Exception 2, terminology has been changed from "exhaust" to "removal" for consistency of terminology. Additionally, the use of a mechanical smoke removal system is made mandatory instead of optional since it is the only practical way to provide smoke and heat removal in multi-story buildings.

910.2.1: This section has been editorially reworded into a complete sentence and mechanical smoke removal has been made an option for smoke and heat removal without requiring specific approval. Companion changes to the remainder of Section 910 have been made to move mechanical smoke removal as an option to smoke and heat venting.

910.2.2: This section has had a reference to IFC Table 3206.2 added and the reference to Section 3206.7 removed because Section 3206.2 sends the code user to the table first and then the table sends the user to Section 3206.7. The phrase "...stock or rack..." were removed because high-piled storage is not limited to stock or rack storage. The intent of the overall code change is to require smoke and heat vents as the method for protecting unsprinklered buildings and provide the option of vents or mechanical smoke removal for sprinklered buildings. This section was revised to accomplish that goal by referencing Section 910.3 for design of roof vents in non-sprinklered buildings and either Section 910.3 or 910.4 for sprinklered buildings.

910.3: This section has been revised to remove the reference to draft curtains as explained in the general reason statement. Additionally, the section and table references were updated to address section format changes.

Table 910.3: The table has been deleted and replaced with new Section 910.3.3 for calculation of required roof vent area.

910.3.1: The option to use FM Standard 4430 as an alternative to UL 793 has been added. Some manufacturers of roof vents only maintain an FM approval of their product, not a UL listing. Hence, making the UL standard the sole standard would require vents with only a FM approval to have their products tested by UL. FM 4430 and UL 793 are very similar in content. Permissive language contained in previous FM standards has been replaced with mandatory language in the most recent edition of the FM standard.

Current 910.3.2: Specific requirements for vent operation have been deleted. In (storage) buildings protected by a sprinkler system, the roof vent provisions contained in NFPA 13 dictate the temperature rating of the fusible element. Hence, there is no need to specify the temperature rating of the fusible element of the vent. With respect to the use of vents in unsprinklered high-piled storage areas, the temperature rating of the fusible element is not all that important. A listed fusible link or listed drop-out vent will operate when exposed to temperatures in excess of 1,000 degrees F. This issue is addressed in both the UL and FM standards for roof vents.

Proposed 910.3.2: This section has been relocated as indicated and revised to remove the reference to draft curtains as previously explained in the general reason statement.

Current 910.3.3: This section is to be deleted and replaced with new Section 910.3.3 that provides a simplified calculation for vent area. With respect to the minimum size of the vents, installing vents with dimensions less than 4

feet is not practical or economical. The more holes put in the roof, the more likely there is to be roof leakage problems. Hence, the minimum size of vents is "self-policing" from a practical and economic standpoint.

Proposed 910.3.3: The design of roof vent area has been simplified with two equations, one for sprinklered buildings and one for non-sprinklered buildings. A detailed explanation of the derivation of the equations is provided in the general reason statement.

910.3.5: The section on draft curtains has been removed. As detailed in the general reason statement, draft curtains can interfere with sprinkler operation and the RVSG found no evidence that they provided a valuable enhancement to roof vent performance.

910.4: This section has been revised to remove the qualification that a fire code official must approve the use of mechanical smoke removal systems. This code change changes mechanical smoke removal from an optional method that requires additional approval to an equally recognized, ~~if not superior~~, method of smoke removal that can be chosen without additional approval required. To address the qualifications for mechanical system use, additional prescriptive conditions were added to replace the case-by-case approval method.

910.4.1: This condition of mechanical system use requires that the building be sprinklered to protect the mechanical equipment from excessive heat.

Current 910.4.2: This section is deleted and replaced by new Section 910.4.3.

Proposed 910.4.2: This section requires exhaust fan motors be located out of the exhaust stream to protect the mechanical equipment from excessive heat.

Current 910.4.3: This section was deleted and replaced with **Section 910.4.4** and requires that mechanical systems are to be activated manually so that the fire department is in control of the system. In some situations, automatic operation could cause a fire to grow or spread, opening an excessive number of sprinklers. Automatic operation of the mechanical smoke removal system could be detrimental to the operation of the sprinkler system in a manner similar to draft curtains. The effect of the automatic mechanical smoke removal system on sprinkler operation would depend upon when the system was activated. The sooner the system is automatically activated, the greater the detrimental effect. The fire department will retain the option to shut down the exhaust system, as well.

Proposed 910.4.3. and 910.4.3.1: These sections specify the design requirement for the minimum number of air changes, maximum fan capacity, and requirements for the provision of make-up air. Based on NFPA 92-2012, Annex Section A-4.4.4.1, the maximum air velocity through the make-up air inlet is 1 m/sec or 200 ft/min. The area requirement is then derived as follows:

- Effective Vent Area = $(1000 \text{ ft}^3/\text{min}) / (200 \text{ ft}/\text{min}) = 5 \text{ ft}^2$ per 1000 cfm
- Assume an orifice coefficient of 0.6
- Gross Vent Area = $5 \text{ ft}^2 / (0.6) = 8.33 \text{ ft}^2$ per 1000 cfm, which is rounded down due to the conservative nature of the requirement

The reason for this limitation is to prevent significant deflection of the plume, which will cause more air entrainment into the plume and more smoke production. This criteria is conservative as the requirement above assumes an active fire and the design philosophy for this code proposal is to provide post-fire smoke exhaust.

Current 910.4.5: This section has been deleted and replaced with more specific make-up air requirements in Section 910.4.3.

Proposed 910.4.5: This section establishes the required placement, access and protection of the manual controls to ensure the fire fighters will have quick and protected access to the controls.

910.4.6: This current section has been renumbered from 906.4.4 and addresses wiring and control. New Section 910.4.5 addresses the control system so the control provisions were removed from this section. The remaining text is unchanged.

910.4.7: This section has been revised to require that if a mechanical smoke removal system is integrated with a standard HVAC system, then the system must shut down upon detection of smoke as required by the IMC. This is a companion change to the new requirement in proposed Section 910.4.4 that mechanical smoke removal systems shall be manually operated only.

910.5 and Table 901.6.1. The reference to NFPA 204 for the maintenance of smoke and heat vents was retained; however, the reference to NFPA 204 for mechanical systems was removed and replaced with prescriptive testing and maintenance requirements placed in proposed Section 910.5.2. The RVSG determined that the maintenance requirements in NFPA 204 were not specific enough to ensure the necessary maintenance. In Section 910.5.1.1, the statement that vents cannot be modified was removed because it is not a maintenance issue. Modification of vents can be accomplished in a code compliant manner and such modification would require a building permit.

Table 3206.2: As previously noted, draft curtain requirements have been deleted and as a companion change, the column in IFC Table 3206.2 that prescribes draft curtain installation has been deleted.

Cost Impact: This proposal will not increase the cost of constructing industrial and storage buildings, and, in many cases, will reduce the cost of constructing these types of buildings.

Analysis: A review of the standard proposed for inclusion in the code, FM 4430-12, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013.

F195-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

910.1-F-BALDASSARRA-CTC

F196 – 13

910.1 (IBC [F] 910.1), 910.3.5 (IBC [F] 910.3.5), 202, 3202, Table 3206.2

Proponent: Jeffrey M. Shapiro, International Institute of Ammonia Refrigeration
(jeff.shapiro@intlcodeconsultants.com)

Revise as follows:

910.1 General. Where required by this code or otherwise installed, smoke and heat vents, or mechanical smoke exhaust systems, and draft curtains shall conform to the requirements of this section.

Exceptions:

1. Frozen food warehouses used solely for storage of Class I and II commodities where protected by an *approved automatic sprinkler system*.
2. Where areas of buildings are equipped with early suppression fast-response (ESFR) or quick-response storage (QRS) sprinklers, automatic smoke and heat vents shall not be required within these areas.

910.3.5 (IBC [F] 910.3.5) Draft curtains. Where required by Table 910.3, draft curtains shall be installed on the underside of the roof in accordance with this section.

Exception: Where areas of buildings are equipped with ESFR or QRS sprinklers, draft curtains shall not be provided within these areas. Draft curtains shall only be provided at the separation between the ESFR sprinklers and the non-ESFR sprinklers, and between QRS and the non-QRS sprinklers.

Add new definition as follows:

SECTION 202 GENERAL DEFINITIONS

QUICK RESPONSE STORAGE (QRS) SPRINKLER. A sprinkler with a response time index of 50 or less that is listed to control a specified fire in stored commodities with 12 or fewer sprinklers.

Revise as follows:

SECTION 3202 DEFINITIONS

QUICK RESPONSE STORAGE (QRS) SPRINKLER.

**TABLE 3206.2
GENERAL FIRE PROTECTION AND LIFE SAFETY REQUIREMENTS**

COMMODITY CLASS	SIZE OF HIGH-PILED STORAGE AREA ^a (square feet) (see Sections 3206.2 and 3206.4)	ALL STORAGE AREAS (See Sections 3206, 3207 and 3208) ^b					SOLID-PILED STORAGE, SHELF STORAGE AND PALLETIZED STORAGE (see Section 3207.3)		
		Automatic fire-extinguishing system (see Section 3206.4)	Fire detection system (see Section 3206.5)	Building access (see Section 3206.6)	Smoke and heat removal (see Section 3206.7)	Draft curtains (see Section 3206.7)	Maximum pile dimension ^c (feet)	Maximum permissible storage height ^d (feet)	Maximum pile volume (cubic feet)

(Portions of table not shown remain unchanged)

a through i (No change to current text)

j. Not required when storage areas are protected by early suppression fast response (ESFR) or quick-response storage (QRS) sprinkler systems installed in accordance with NFPA 13.

Reason: Factory Mutual data sheets no longer reference special sprinkler classifications, such as ESFR. Instead, FM now classifies sprinklers as “storage” and “non-storage” and provides appropriate installation parameters. Storage sprinklers now encompass a new category of quick-response sprinklers that share the key characteristics of ESFR sprinklers, i.e. fast response thermal elements and design areas that involve 12 or fewer sprinklers, but are not designated as ESFR. These quick-response storage sprinklers require similar precautions to ESFR sprinklers with respect to not introducing unknowns that were not represented in full-scale fire tests conducted to determine listing parameters. Thereby, it is important to extend the current provisions in Chapters 9 and 32 that are applicable to ESFR sprinklers to include quick-response storage sprinklers.

Cost Impact: The code change proposal will not increase the cost of construction.

F196-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

910.1-F-SHAPIRO

F197 – 13

910.2.1 (IBC [F] 910.2.1)

Proponent: Randall R. Dahmen, P.E., Wisconsin licensed Commercial Building Inspector, representing self

Revise as follows:

910.2.1 (IBC [F] 910.2.1) Group F-1 or S-1. Buildings and portions thereof used as a Group F-1 or S-1 occupancy having more than 50,000 square feet (4645 m²) in that is undivided area by full height walls having smoke resisting characteristics as required for draft curtains in Section 910.3.5.1.

Reason: The proposed modification of the wording clearly identifies the expectations of the assembly enclosing the Group F-1 or S-1 occupancies.

Cost Impact: The code change proposal will not increase the cost of construction.

F197-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

910.2.1-F-DAHMEN

F198 – 13

910.3.5 (IBC [F] 910.3.5)

Proponent: Stephen DiGiovanni, Clark County, NV Fire Department, representing self

Revise as follows:

910.3.5 (IBC [F] 910.3.5) Draft curtains. Where required by Table 910.3, draft curtains shall be installed only in non-sprinklered buildings on the underside of the roof in accordance with this section.

~~**Exception:** Where areas of the building are equipped with ESFR sprinklers, draft curtains shall not be provided within these areas. Draft curtains shall only be provided at the separation between the ESFR sprinklers and the non-ESFR sprinklers.~~

Reason: The purpose of this amendment is to not require draft curtains in buildings protected with fire sprinklers. The basis of this amendment is from Section 12.1.1 of NFPA 13. Since NFPA 13 does not provide sprinkler design criteria that encompass the use of draft curtains, then the requirement for draft curtains needs to be exempted for buildings protected in accordance with NFPA 13

Cost Impact: The cost impact for this is actual a savings, by not requiring the installation of draft curtains in sprinklered buildings.

F198-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

910.3.5-F-DIGIOVANNI

F199 – 13

IFC Table 911.1; IBC Table [F] 414.5.1

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

**TABLE 911.1
EXPLOSION CONTROL REQUIREMENTS^f**

MATERIAL	CLASS	EXPLOSION CONTROL METHODS	
		Barricade construction	Explosion (deflagration) venting or explosion (deflagration) prevention systems
HAZARD CATEGORY			
Combustible dusts ^a	—	Not Required	Required
Cryogenic fluids	Flammable	Not Required	Required
Explosives	Division 1.1	Required	Not Required
	Division 1.2	Required	Not Required
	Division 1.3	Not Required	Required
	Division 1.4	Not Required	Required
	Division 1.5	Required	Not Required
	Division 1.6	Required	Not Required
Flammable gas	Gaseous	Not Required	Required
	Liquefied	Not Required	Required
Flammable liquids	IA ^b	Not Required	Required
	IB ^c	Not Required	Required
Organic peroxides	Unclassified detonable	Required	Not Permitted
	I	Required	Not Permitted
Oxidizer liquids and solids	4	Required	Not Permitted
Pyrophoric	Gases	Not Required	Required
Unstable (reactive)	4	Required	Not Permitted
	3 Detonable	Required	Not Permitted
	3 Nondetonable	Not Required	Required
Water-reactive liquids and solids	3	Not Required	Required
	2 ^e	Not Required	Required
SPECIAL USES			
Acetylene generator rooms	—	Not Required	Required
Grain processing	—	Not Required	Required
Liquefied petroleum gas distribution facilities	—	Not Required	Required
Where explosion hazards exist ^d	Detonation	Required	Not Permitted
	Deflagration	Not Required	Required

a. Combustible dusts that are generated during manufacturing or processing. See definition of Combustible Dust in Chapter 22 2.

b. Storage or use.

c. In open use or dispensing.

d. Rooms containing dispensing and use of hazardous materials when an explosive environment can occur because of the characteristics or nature of the hazardous materials or as a result of the dispensing or use process.

e. A method of explosion control shall be provided when Class 2 water-reactive materials can form potentially explosive mixtures.

f. Explosion venting is not required for Group H-5 Fabrication Areas complying with Chapter 27 and the International Building Code.

Revise as follows:

[F] TABLE 414.5.1
EXPLOSION CONTROL REQUIREMENTS^{a,h}

MATERIAL	CLASS	EXPLOSION CONTROL METHODS	
		Barricade construction	Explosion (deflagration) venting or explosion (deflagration) prevention systems ^b
HAZARD CATEGORY			
Combustible dusts ^c	—	Not Required	Required
Cryogenic flammables	—	Not Required	Required
Explosives	Division 1.1	Required	Not Required
	Division 1.2	Required	Not Required
	Division 1.3	Not Required	Required
	Division 1.4	Not Required	Required
	Division 1.5	Required	Not Required
	Division 1.6	Required	Not Required
Flammable gas	Gaseous	Not Required	Required
	Liquefied	Not Required	Required
Flammable liquid	IA ^d	Not Required	Required
	IB ^e	Not Required	Required
Organic peroxides	U	Required	Not Permitted
	I	Required	Not Permitted
Oxidizer liquids and solids	4	Required	Not Permitted
Pyrophoric gas	—	Not Required	Required
Unstable (reactive)	4	Required	Not Permitted
	3 Detonable	Required	Not Permitted
	3 Nondetonable	Not Required	Required
Water-reactive liquids and solids	3	Not Required	Required
	2 ^g	Not Required	Required
SPECIAL USES			
Acetylene generator room	—	Not Required	Required
Grain processing	—	Not Required	Required
Liquefied petroleum gas-distribution facilities	—	Not Required	Required
Where explosion hazards exist ^f	Detonation	Required	Not Permitted
	Deflagration	Not Required	Required

a. See Section 414.1.3.

b. See the International Fire Code.

c. As generated during manufacturing or processing.

d. Storage or use.

e. In open use or dispensing.

f. Rooms containing dispensing and use of hazardous materials when an explosive environment can occur because of the characteristics or nature of the hazardous materials or as a result of the dispensing or use process.

g. A method of explosion control shall be provided when Class 2 water-reactive materials can form potentially explosive mixtures.

h. Explosion venting is not required for Group H-5 Fabrication Areas complying with Section 415.10.1 and the International Fire Code.

Reason: This proposal is intended to reduce confusion in the application of explosion venting requirements for Group H-5 Occupancies. Currently, IBC and IFC require explosion venting where the MAQs are exceeded per IFC Table 5003.1.1 and IBC Table 307.1. However, fabrication areas of H-5 Occupancies are specifically allowed to exceed these quantities in accordance with IBC 415.10.1.1.1 and IFC 2704.2.2.1 due to the strict controls prescribed for those fabrication areas.

This proposal would clarify that explosion venting is not required in the fabrication areas of H-5 Occupancies. HPM storage rooms and gas rooms are also allowed to exceed the limits of Tables 2704.2.2.1 and IBC 415.10.1.1.1. Explosion venting would still potentially be required in the HPM storage rooms and gas rooms. This is consistent with the current text in IBC 415.10.5.5.

This proposal is consistent with current construction, industry practice and application of explosion venting requirements, as Group H-5 fabrication areas are generally constructed without explosion venting. This proposal simply provides clarification on how the Group H5 requirements correlate with MAQs and explosion venting requirements found elsewhere in code.

Cost Impact: The code change will not increase the cost of construction.

F199-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

911.1T-F-ZUBIA-FCAC

F200 – 13

912.3.1 (IBC [F] 912.3.1)

Proponent: Robert Trotter, MCP., Tennessee Code Development Committee (bobbrotter1023@aol.com)

Revise as follows:

912.3.1 (IBC [F] 912.3.1) Locking fire department connection plugs and caps. ~~The fire code official is authorized to require~~ Approved, locking plugs or caps shall be provided on every fire department connections for water-based *fire protection systems*. Swivels shall be protected from unauthorized removal. Prior to installation, where the responding fire department shall have ~~carries~~ appropriate key wrenches for removal.

Reason: While many jurisdictions are taking advantage of the current authorization that entered the Code in the 2003 edition, other jurisdictions are in need of more stringent requirements. By removing the authorization and mandating that every FDC be protected by locking plugs or caps, the Code would contain the necessary force of law to require building owners to comply. Under the current economy, the theft of brass FDC's is becoming an epidemic, a real problem that puts firefighters at risk. This proposal provides for the latest "plug" technology to protect FDC's. The health, safety and welfare of the public require FDC protection.

Here are some quotes from recently published news articles that should shock the conscience and prove there is a problem that this proposal will correct.

<http://sacramento.cbslocal.com> **Thieves Stripping Parts Out Of Fire Systems**

Metal thieves are stripping small but critical pieces out of fire sprinklers, and fire officials worry the trend could create a bigger fire danger and end up costing lives.

<http://www.pnwlocalnews.com> **Metal thieves stealing fire connections from area business and apartments**

This type of theft has been rampant throughout the Puget Sound area even though a connection, which costs a business between \$400 and \$1,500 to replace, only gets thieves \$15 to \$25 each at a salvage yard. The danger to the public and to a business is during a fire. If the FDC is missing, firefighters will not be able to supplement the sprinkler system or get water to firefighting crews inside the building of multistory businesses. This endangers not only the firefighters, but anyone inside the building. Increased damage to the building itself and higher rebuilding costs are also possible.

<http://www.beavertonvalleytimes.com> **The dark side of recycling**

...Portland Police Bureau that a band of metal thieves had found a lucrative new target: fire department connections (FDCs), the chunky brass fittings used by firefighters to connect their hoses to the internal sprinkler systems of commercial buildings. Detective Mike Malanaphy of the Portland Police Bureau now believes that Sharrow and Guild were responsible for the disappearance of more than 100 FDCs from buildings across the metro area — including the Oregon Humane Society, Legacy Salmon Creek Hospital, and the SmartPark on Southwest 10th Avenue". "It's difficult to assess the damage caused by the thefts, but Malanaphy reckons that \$30,000 would be a lowball estimate — and it doesn't take into account the possibility that a missing FDC could cripple firefighters in the event of a blaze. The pair's profit from reselling the brass? About \$3,000.

Cost Impact: The code change proposal will increase the cost of construction. The cost depends on the type of protection but is not expected to exceed \$375 per individual FDC.

F200-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

912.3.1-F-TROTTER

F201 – 13

912.4 (IBC [F] 912.4)

Proponent: Joshua D Smith, representing NYS Office of Fire Prevention and Control
(Joshua.smith@dhses.ny.gov)

Revise as follows:

912.4 (IBC [F] 912.4) Signs. A metal sign with raised letters at least 1 inch (25 mm) in size shall be mounted on at all fire department connections serving automatic sprinklers, standpipes or fire pump connections to indicate the system being supplied. ~~Such signs shall read: AUTOMATIC SPRINKLERS or STANDPIPES or TEST CONNECTION or a combination thereof as applicable. The signs and the caps of the connections shall be marked as follows:~~

1. For a connection serving only a standpipe the sign shall read STANDPIPE and the cap shall be colored red.
2. For a connection serving a combination automatic sprinkler and standpipe system the sign shall read COMBINATION STANDPIPE AND SPRINKLER and the cap shall be colored yellow.
3. For a connection serving an automatic sprinkler system only the sign shall read SPRINKLER or AUTOMATIC SPRINKLER and the cap shall be colored green.
4. For a connection serving a non-automatic sprinkler system the sign shall read NON-AUTOMATIC SPRINKLER and the cap shall be colored silver.
5. Test connections shall have signs that read TEST CONNECTION and the caps shall be colored black.

Where the fire department connection does not serve the entire building, a sign shall be provided indicating the portions of the building served.

Reason: There are often signs installed for fire department connections that are often a single color, such as chrome or brass signs, that are not easily read from the point where a fire apparatus will be able to first see the connection. The color coding of the caps will make identifying the function of the fire department connection more easily discernible from a greater distance for fire apparatus fire fighters. The more common use of mutual aid agreements between jurisdictions, and the push to standardize equipment and terminology for NIMS compliance would be of benefit from a standardized color coding system. With this in mind, no matter where a fire department or personnel may be from when they have to respond to a call when covering another jurisdiction's response area the markings of a FDC will all mean the same and the mutual aid departments can still operate efficiently.

Cost Impact:

F201-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

912.4-F-SMITH

F202 – 13

912.4 (IBC [F] 912.4)

Proponent: Joshua D Smith, representing NYS Office of Fire Prevention and Control
(Joshua.smith@dhses.ny.gov)

Revise as follows:

912.4 (IBC [F] 912.4) Signs. Signs shall be provided for fire department connections in accordance with Sections 912.4.1 through 912.4.3.

912.4.1 (IBC [F] 912.4.1) Fire department Connection Identification. A metal sign with raised letters at least 1 inch (25 mm) in size shall be mounted on all fire department connections serving automatic sprinklers, standpipes or fire pump connections. Such signs shall read: AUTOMATIC SPRINKLERS or STANDPIPES or TEST CONNECTION or a combination thereof as applicable.

912.4.2 (IBC [F] 912.4.2) Partial coverage signage. Where the fire department connection does not serve the entire building, a sign shall be provided indicating the portions of the building served.

912.4.3 (IBC [F] 912.4.3) Operating pressure. A metal sign with letters at least 1 inch (25 mm) in size shall be mounted above all fire department connections to indicate the pressure needed to supply the system being connected to.

Reason: By having a sign indicating the proper operating pressure for the system being supplied by the FDC the ability for the fire department to operate more efficiently is increased as well as the level of fire fighter safety is also increased. By knowing the proper operating pressures the system will not be under supplied, ensuring proper fire fighting operations, but the system will also not be over pressurized which can cause harm to the fire fighters but can also cause damage to the system.

Cost Impact: This will increase the cost of construction

F202-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

912.4.1 (NEW)-F-SMITH

F203 – 13

913.2.2 (New) [IBC [F] 913.2.2 (New)]

Proponent: Robert J Davidson, Davidson Code Concepts, LLC, representing self
(rjd@davidsoncodeconcepts.com)

Revise as follows:

913.2.2 (IBC [F] 913.2.2) Fuel line piping protection. Fuel lines supplying diesel engine driven fire pumps shall be protected by an approved fuel line protective system with a fire-resistance rating equivalent to the fire resistance rating of the construction enclosing the fire pump room where such piping is located in areas outside the fire pump room.

Reason: When electric powered fire pumps are installed Section [F] 913.2 and the referenced standards, (NFPA 20 and NFPA 70), require protection against exposure from fire for the fire pump, the components and the wiring supplying the electric powered fire pump.

NFPA 20 INSTALLATION OF STATIONARY PUMPS FOR FIRE PROTECTION

Chapter 9 Electric Drive for Pumps

9.1.4* All power supplies shall be located and arranged to protect against damage by fire from within the premises and exposing hazards.

NFPA 70 ARTICLE 695 Fire Pumps

(E) Arrangement. All power supplies shall be located and arranged to protect against damage by fire from within the premises and exposing hazards. [20:9.1.4]

Multiple power sources shall be arranged so that a fire at one source does not cause an interruption at the other source.

913.2-F-DAVIDSON

913.2-F-DAVIDSON

Additional NFPA 20 protection language

4.12* Equipment Protection.

4.12.1* General Requirements. The fire pump, driver, controller, water supply, and power supply shall be protected against possible interruption of service through damage caused by explosion, fire, flood, earthquake, rodents, insects, windstorm, freezing, vandalism, and other adverse conditions.

4.12.1.1* Indoor Fire Pump Units.

4.12.1.1.1 Fire pump units serving high-rise buildings shall be protected from surrounding occupancies by a minimum of 2-hour fire-rated construction or physically separated from the protected building by a minimum of 50 ft (15.3 m).

4.12.1.1.2 Indoor fire pump rooms in non-high-rise buildings or in separate fire pump buildings shall be physically separated or protected by fire-rated construction in accordance with Table 4.12.1.1.2.

4.12.1.1.3 The location of and access to the fire pump room shall be preplanned with the fire department.

However, the same protection against fire exposure is not provided for fuel lines serving diesel engine powered fire pumps, a component just as important to ensure availability of fire flows as the other fire pump components.

NFPA 20 INSTALLATION OF STATIONARY PUMPS FOR FIRE PROTECTION

11.4.4* Fuel Piping.

11.4.4.1 Flame-resistant reinforced flexible hose listed for this service with threaded connections shall be provided at the engine for connection to fuel system piping.

11.4.4.2 Fuel piping shall not be galvanized steel or copper.

11.4.4.3 The fuel return line shall be installed according to the engine manufacturer's recommendation.

11.4.4.4 There shall be no shutoff valve in the fuel return line to the tank.

11.4.4.5* Fuel Line Protection. A guard, pipe protection, or approved double-walled pipe shall be provided for all exposed fuel lines.

11.4.4.6 Fuel Solenoid Valve. Where an electric solenoid valve is used to control the engine fuel supply, it shall be capable of manual mechanical operation or of being manually bypassed in the event of a control circuit failure.

This proposal adds a new Section "913.2.2 / [F] 913.2.3 Fuel line piping protection" that provides for a level of fire resistance protection equal to the fire-resistance rating of the fire pump room enclosing construction for those portions of the fuel oil piping that are installed outside of the fire pump room where they may be exposed to a fire in the occupancy protected.

The IBC language is shown here for visualization of how the added language would appear in that document.

[F] 913.2 Protection against interruption of service. The fire pump, driver and controller shall be protected in accordance with NFPA 20 against possible interruption of service through damage caused by explosion, fire, flood, earthquake, rodents, insects, windstorm, freezing, vandalism and other adverse conditions.

913.2.1 Protection of fire pump rooms. Fire pumps shall be located in rooms that are separated from all other areas of the building by 2-hour fire barriers constructed in accordance with Section 707 or 2-hour horizontal assemblies constructed in accordance with Section 711, or both.

Exceptions:

1. In other than high-rise buildings, separation by 1-hour fire barriers constructed in accordance with Section 707 or 1-hour horizontal assemblies constructed in accordance with Section 711, or both, shall be permitted in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2.
2. Separation is not required for fire pumps physically separated in accordance with NFPA 20.

[F] 913.2.2 Fuel line piping protection: In addition to complying the requirements of NFPA 20, Fuel lines supplying diesel powered fire pumps shall be protected against fire by an approved fuel line protective system with a fire-resistance rating equivalent to the rating of the construction enclosing the fire pump room where portions of the fuel line piping are located in areas outside the room the fire pump is located in.

Cost Impact: The code change proposal will increase the cost of construction.

F203-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

913.2-F-DAVIDSON

F204 – 13

913.2.2 (IBC [F] 913.2.2 (New)), Chapter 80 (IBC Chapter 35)

Proponent: Bob Eugene, representing Underwriters Laboratories (Robert.Eugene@ul.com)

Add new text as follows:

913.2.2 (IBC [F] 913.2.2) Circuits supplying fire pumps. Cables used for survivability of circuits supplying fire pumps shall be listed in accordance with UL 2196. Electrical circuit protective systems shall be installed in accordance with their listing requirements.

Add new standard to Chapter 80 (IBC Chapter 35) as follows:

UL

2196-2001 Tests for Fire Resistive Cables, with revisions through December 7, 2003.....913.2.2

Reason: UL 2196 is the ANSI approved standard for tests of fire resistive cables. NFPA 20 (fire pumps) includes selective survivability requirements to assure integrity of certain critical circuits. NFPA 70 does not specify the applicable standard within the mandatory provisions of the code, but recognizes electrical circuit protective systems as an alternate to listed cables. An electrical circuit protective system is a field assembly of components that must be installed according to the listing requirements and manufacturer's instructions in order to maintain the listing for the system. There are more than two dozen electrical circuit protective systems listed in the UL Fire Resistance Directory.

Cost Impact: None.

Analysis: A review of the standard proposed for inclusion in the code, UL 2196-2001, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013.

F204-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

913.2.2 (NEW)-F-EUGENE

F205 – 13

913.3 (New) [IBC [F] 913.3(New)]

Proponent: Jeffrey M. Hugo, CBO, representing the National Fire Sprinkler Association
(hugo@nfsa.org)

Add new text as follows:

913.3 (IBC [F] 913.3) Fire Pump rooms egress and access. Fire pump rooms located on levels other than the level of exit discharge shall discharge into an exit passageway constructed in accordance with Section 1023 or directly into a interior exit stairway in accordance with Section 1022.

Reason: New sections are necessary as NFPA 20 permits fire pump rooms to be located on floors that are not always on the same floor as the level of exit discharge. While the fire pump is operating, NFPA 20 requires building personnel to be in the room for testing and during a fire event and requires the exit of the fire pump room to go into an exit passageway.

During a fire, the person being sent to the pump room on an upper or lower floor than the level of exit discharge needs to be able to safely get from the stairwell to the pump room without encountering the fire. Therefore, the exit stairwell or an exit passageway needs to lead to the pump room.

Cost Impact: Will not increase the cost of construction

F205-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

913.2.1.2 (NEW)-FS-HUGO

F206 – 13

914.8.2 (New)

Proponent: Eric R. Rosenbaum, Hughes Associates, Inc. representing the Air Traffic Control Tower Fire Life Safety Task Group (erosenbaum@haifire.com+)

Revise as follows:

914.8.2 Fire suppression for new airport traffic control towers. Where an occupied floor is located more than 35 feet (10668 mm) above the lowest level of fire department vehicle access, new airport traffic control towers shall be equipped with an *automatic sprinkler system* in accordance with Section 903.3.1.

914.8.2 914.8.3 Fire suppression for aircraft hangars Aircraft hangars shall be provided with a fire suppression system designed in accordance with NFPA 409, based upon the classification for the hangar given in Table 914.8.2.

Exception: When a fixed base operator has separate repair facilities on site, Group II hangars operated by a fixed base operator used for storage of transient aircraft only shall have a fire suppression system, but the system shall be exempt from foam requirements.

Reason: The proposed change reflects changes accepted in Section 412.3 of the IBC regarding new airport traffic control towers. The accepted change in the IBC requires an automatic sprinkler system in all new air traffic control towers with an occupiable floor 35 ft or more above the lowest level of fire department vehicle access. This change clarifies the application of the criteria in Section 914.8 Aircraft-related occupancies. A copy of the accepted change in the IBC is as follows:

412.3 Airport traffic control towers. The provisions of Sections 412.3.1 through 412.3.11 shall apply to airport traffic control towers occupied only for the following uses:

1. Airport traffic control cab.
2. Electrical and mechanical equipment rooms.
3. Airport terminal radar and electronics rooms.
4. Office spaces incidental to the tower operation.
5. Lounges for employees, including sanitary facilities.

412.3.1 Type of construction. Airport traffic control towers shall be constructed to comply with the height limitations of Table 412.3.2.

TABLE 412.3.2
HEIGHT LIMITATIONS FOR AIRPORT TRAFFIC CONTROL TOWERS

TYPE OF CONSTRUCTION	HEIGHT ^a (feet)
IA	Unlimited
IB	240
IIA	100
IIB	85
IIIA	65

a. Height to be measured from grade plane to cab floor

412.3.2 Stairway Stairways in Airport traffic control towers shall conform to the requirements of Section 1009. Such *stairways* shall be a smokeproof enclosure in accordance with Section 909.20. The stair pressurization alternative in accordance with Section 909.20.5 shall be permitted to be used. *Stairways* shall not be required to extend to the roof as specified in Section 1009.11.

412.3.3 Exit access. From observation levels, airport traffic control towers shall be permitted to have a single means of exit access for a distance of travel not exceeding 100 ft (30 m). This means of egress shall be permitted to include exit access utilizing an unenclosed stair at the observation level.

412.3.4 Single means of egress. Not less than one *exit stairway* shall be permitted for airport traffic controls towers of any height provided that the *occupant load* per floor is not greater than 15 and the area per floor does not exceed 1,500 square feet (140 m²).

412.3.4.1 Arrangement of single means of egress. Airport traffic control towers permitted a single exit and located above another building shall be provided with one of the following:

1. Exit enclosure separated from the other building with no door openings to or from the other building

2. Exit enclosure leading directly to an exit enclosure serving the other building, with walls and door separating the exit enclosures from each other, and another door allowing access to the top floor of the building that provides access to a second exit serving that floor.

412.3.4.2 Interior Finish. Airport traffic control towers permitted a single exit in accordance with Section 412.3.4 shall be restricted to interior wall and ceiling finishes of Class A or Class B.

412.3.5 Automatic fire detection systems. Airport traffic control towers shall be provided with an automatic fire detection system installed in accordance with Section 907.2.

412.3.6 Automatic sprinkler system. Airport traffic control towers shall be equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.

412.3.7 Standby power. A standby power system that conforms to Chapter 27 shall be provided in airport traffic control towers more than 65 feet (19 812 mm) in height. Power shall be provided to the following equipment:

1. Pressurization equipment, mechanical equipment and lighting.
2. Elevator operating equipment.
3. Fire alarm and smoke detection systems.

412.3.8 Elevator Protection. Wires or cables that provide normal and standby power, control signals, communication with the car, lighting, heating, air conditioning, ventilation and fire-detecting systems to elevators shall be protected by construction having a minimum 1-hour *fire resistance rating* or shall be circuit integrity cable having a minimum 1-hour *fire-resistance rating*.

412.3.9 Accessibility. Airport traffic control towers need not be *accessible* as specified in the provisions of Chapter 11.

Cost Impact: This code change will increase the cost of construction from the current code requirements in some instances; however, reflects current building practices of the FAA.

Analysis: The accepted code change mentioned in the proposal is G86-12 (AMPC).

F206-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

914.8.2 (NEW)-F-ROSENBAUM

F207 – 13

IBC 1001.2, IBC [F] 1001.3

Proponent: Robert Rice, Josephine County, OR, representing Oregon Building Officials Association (structdesigner@yahoo.com)

Revise as follows:

IBC 1001.2 ~~Minimum requirements.~~ Alterations to existing means of egress. It shall be unlawful to alter a building or structure in a manner that will reduce the number of *exits*, or the capacity of the *means of egress* to less than required by this code. **~~[F] 1001.3 Maintenance.~~ Means of egress shall be maintained in accordance with the *International Fire Code* and a permit is required prior to construction, alteration or addition in accordance with Section 105.1.**

(Renumber remaining section.)

Reason: This proposal is to rename the title of Section 1001.2. This section states that it is unlawful to alter the means of egress system. The title "Minimum requirements" does not fit with the content of the section. The existing code-designed means of egress may or may not be the minimum requirements but, that's not what this section is addressing. Technically speaking, it could further be argued that this section of code is totally unnecessary and pointless. Any time the structure is altered, including the means of egress, Section 105.1 requires a permit to do the alteration(s) as stated,

[A] 105.1 Required. *Any owner or authorized agent who intends to construct, enlarge, alter, repair, move, demolish, or change the occupancy of a building or structure, or to erect, install, enlarge, alter, repair, remove, convert or replace any electrical, gas, mechanical or plumbing system, the installation of which is regulated by this code, or to cause any such work to be done, shall first make application to the building official and obtain the required permit.*

Cost Impact: None. This proposal does not add any new requirement or limitation to the code. It is intended to make the section title consistent with the contents of the section.

Analysis: If this code change is approved, the future maintenance scoping of the revised section will be determined by the ICC Code Correlation Committee.

F207-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1001.2-F-RICE

F208 – 13

1030.2.1

Proponents: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care (john.williams@doh.wa.gov) and Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee (cbaldassarra@RJAGroup.com); John Woestman, Kellen Company, representing Builders Hardware Manufacturers Association (BHMA) (jwoestman@kellencompany.com)

Revise as follows:

1030.2.1 Security devices and egress locks. Security devices affecting *means of egress* shall be subject to approval of the *fire code official*. ~~Special Security devices and locking arrangements in the means of egress including, but not limited to access-controlled egress doors, security grills, locks and latches, and delayed egress locks that restrict, control, or delay egress shall be installed and maintained as required by this chapter.~~

Reason:

Williams/Baldassarra: Revisions approved in the 2012 ICC code development cycle for Chapter 10 of the 2015 IBC, and corresponding sections of Chapter 10 of the 2015 IFC, regarding “shall be permitted” locking systems should be coordinated in this section of the IFC.

The proposed modification deletes the “including, but not limited to” clause and clarifies that any security device or locking arrangement that restricts, controls, or delays egress is to be maintained as required by this chapter of the IFC. The table below lists the expected titles of these extensively revised sections, and the code change proposals affecting these sections.

2012 IBC and 2012 IFC	2015 IBC and 2015 IFC	Code Change Proposals
1008.1.9.6 Special locking arrangements in Group I-2.	1008.1.9.6 Controlled egress doors in Group I-1 and I-2.	E66-12 AMPC E67-12 AM E69-12 AMPC
1008.1.9.7 Delayed egress locks.	1008.1.9.7 Delayed egress.	E70-12 AM E72-12 AM E74-12 AMPC
1008.1.9.8 Access-controlled egress doors.	1008.1.9.8 Sensor release of electrically locked egress doors.	E77-12 AS E78-12 AM E80-12 AS
1008.1.9.9 Electromagnetically locked egress doors.	1008.1.9.9 Electromagnetically locked egress doors.	E77-12 AS E81-12 AS E82-12 AM

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering, a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>.

This proposal is being co-sponsored by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as “areas of study”. Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

Woestman: Revisions approved in the 2012 ICC code development cycle for Chapter 10 of the 2015 IBC, and corresponding sections of Chapter 10 of the 2015 IFC, regarding “shall be permitted” locking systems should be coordinated in this section of the IFC.

The proposed modification deletes the “including, but not limited to” clause and clarifies that any security device or locking arrangement that restricts, controls, or delays egress is to be maintained as required by this chapter of the IFC.

The table below lists the expected titles of these extensively revised sections, and the code change proposals affecting these sections.

2012 IBC and 2012 IFC	2015 IBC and 2015 IFC	Code Change Proposals
1008.1.9.6 Special locking arrangements in Group I-2.	1008.1.9.6 Controlled egress doors in Group I-1 and I-2.	E66-12 AMPC E67-12 AM E69-12 AMPC
1008.1.9.7 Delayed egress locks.	1008.1.9.7 Delayed egress.	E70-12 AM E72-12 AM E74-12 AMPC
1008.1.9.8 Access-controlled egress doors.	1008.1.9.8 Sensor release of electrically locked egress doors.	E77-12 AS E78-12 AM E80-12 AS
1008.1.9.9 Electromagnetically locked egress doors.	1008.1.9.9 Electromagnetically locked egress doors.	E77-12 AS E81-12 AS E82-12 AM

Cost Impact: None

F208-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

1030.2.1-F-WOESTMAN

F209 – 13

1030.3.1 (New)

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care (john.williams@doh.wa.gov) and Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee (cbaldassarra@RJAGroup.com)

Add new text as follows:

1030.3.1 Group I-2. In Group I-2, the required clear width for aisles, corridors and ramps that are part of the required means of egress shall comply with Section 1018.2. The facility shall have a plan to maintain the required clear width during emergency situations.

Exception: In areas required for bed movement, equipment shall be permitted in the required width where all the following provisions are met:

1. The equipment is low hazard and wheeled.
2. The equipment does not reduce the effective clear width for the means of egress to less than 5 feet (1525 mm).
3. The equipment is limited to:
 - 3.1 Equipment and carts in use;
 - 3.2 Medical emergency equipment;
 - 3.3 Infection control carts; and
 - 3.4 Patient lift and transportation equipment.
4. Medical emergency equipment and patient lift and transportation equipment, when not in use, is required to be located on one side of the corridor.
5. The equipment is limited in number to a maximum of one per patient sleeping room or patient care room within each smoke compartment.

Reason: The new language in Section 1030.3.1 is to be placed in the International Fire Code as a procedural requirement. It is recognized that the 8'-0" wide corridor in an Group I-2 occupancy where beds are moved is to remain at 8'-0" in width. The language recognizes and identifies the fact that certain movable pieces of equipment will be present in the corridor during normal operations of the patient care units and seeks to restrict the types and number of such pieces of equipment and the restrictions the equipment may impose on the means of egress.

The language also recognizes that during emergencies facilities must have an emergency management plan that address the steps that must be taken by the facility and responding staff to ensure that the required 8'-0" wide corridor is kept clear of movable obstructions.

The terminology is consistent with NFPA 101.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering, a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>.

This proposal is being co-sponsored by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

Cost Impact: None

F209-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1030.3.1 (NEW)-F-BALDASSARRA-WILLIAMS-ADHOC

F210 – 13

1101.3

Proponent: David S. Collins, FAIA, The Preview Group, Inc., representing The American Institute of Architects (dcollins@preview-group.com); Robert J Davidson, Davidson Code Concepts, LLC

Revise as follows:

1101.3 Permits. Permits for alterations necessary to comply with this section shall be required as set forth in Sections ~~105.6 and 105.7 and the International Building Code~~ 105.1 of the *International Existing Building Code*.

Reason: This change will direct the code user to the correct reference section for obtaining a permit to make any alterations necessary to conform to this section of the IFC. Sections 105.6 and 105.7 are for operational permits for various operations or the installation of certain systems, not alterations to an existing building. With the deletion of Chapter 34 from the IBC, the only provisions in the ICC family of codes for permits for existing buildings are found in the IEBC.

Cost Impact: There is no cost impact of this change.

F210-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1101.3 (NEW)-F-COLLINS

F211 – 13

1103.1

Proponent: David S. Collins, FAIA, The Preview Group, Inc., representing The American Institute of Architects (dcollins@preview-group.com); Robert J Davidson, Davidson Code Concepts, LLC

Revise as follows:

1103.1 Required construction. Existing buildings shall comply with not less than the minimum provisions specified in Table 1103.1 and as further enumerated in Sections 1103.2 through 1103.9.

The provisions of this chapter shall not be construed to allow the elimination of fire protection systems or a reduction in the level of fire safety provided in buildings constructed in accordance with previously adopted codes.

Exceptions:

1. Group U occupancies.
2. Work performed under a permit in accordance with Section 105.1 of the International Existing Building Code.

Reason: The language in this section has been interpreted to mean that once a building is built, none of the features in a fire protection systems may be removed, or the fire safety elements modified based on newer code provisions. Doing so under the system of permits required to modify or remove such a system should be permitted by the code.

Many codes required fire safety features such as rated partitions and opening protection that is not required in modern building codes. If such features or protections are allowed to be removed by the code in effect for such facilities, those changes should be allowed.

Cost Impact: This proposal will not increase the cost of construction.

F211-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1103.1-F-COLLINS

F212 – 13

1103.1, 1104.1; IEBC 804.2.2.2 (NEW)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IFC CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE IEBC CODE DEVELOPMENT COMMITTEE AS SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care
(john.williams@doh.wa.gov)

PART I – INTERNATIONAL FIRE CODE

Revise as follows:

SECTION 1103 FIRE SAFETY REQUIREMENTS FOR EXISTING BUILDING

1103.1 Required construction. Existing buildings shall comply with not less than the minimum provisions specified in Table 1103.1 and as further enumerated in Sections 1103.2 through 1103.9.

The provisions of this chapter shall not be construed to allow the elimination of fire protection systems or a reduction in the level of fire safety provided in buildings constructed in accordance with previously adopted codes.

Exceptions:

1. Where approved in accordance with Section 102.4, in Group I-2 Condition 2 buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 has been added and the building is now sprinklered throughout, the existing fire resistance ratings, opening protectives, penetrations and joints in assemblies are not required to be maintained where such fire resistance ratings, opening protectives, penetrations and joints are not required in new construction for sprinklered buildings.
2. Group U occupancies.

SECTION 1104 MEANS OF EGRESS FOR EXISTING BUILDINGS

1104.1 General. *Means of egress* in existing buildings shall comply with the minimum egress requirements when specified in Table 1103.1 as further enumerated in Sections 1104.2 through 1104.23, and the building code that applied at the time of construction. Where the provisions of this chapter conflict with the building code that applied at the time of construction, the most restrictive provision shall apply. Existing buildings that were not required to comply with a building code at the time of construction shall comply with the minimum egress requirements when specified in Table 1103.1 as further enumerated in Sections 1104.2 through 1104.24.

Exception: Where approved in accordance with Section 102.4, in Group I-2 Condition 2 buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 has been added and the building is now sprinklered throughout, the existing fire resistance ratings, opening protectives, penetrations and joints in assemblies are not required to be maintained where such fire resistance ratings, opening protectives, penetrations and joints are not required in new construction for sprinklered buildings.

PART II – INTERNATIONAL EXISTING BUILDING CODE

Add new text as follows:

804.2.2.2 Group I-2. Where approved, in Group I-2 Condition 2 buildings where an automatic sprinkler system installed in accordance with Section 903.3.1.1 of the *International Building Code* has been added and the building is now equipped throughout with an automatic sprinkler system, the existing fire resistance ratings, opening protectives, penetrations and joints in assemblies are not required to be maintained where such fire resistance ratings, opening protectives, penetrations and joints are not required in new construction for buildings equipped throughout with an automatic sprinkler system.

Reason: The changes provide tradeoffs for installation of automatic sprinkler systems consistent with those allowed for new construction and also with those allowed by CMS. In many editions of the legacy codes and the ICC Codes dating from the 1980s and even before, the same or similar tradeoffs were allowed when a facility elected to provide sprinkler protection. The AD Hoc Committee on Health Care is proposing requiring retrofit of sprinklers in Hospitals that we feel provide the best protection available and feel because of this the tradeoffs are justified in existing facilities as has been vetted and justified in new construction for many years. These requirements are part of a package of retrofit requirements that provide a minimum level of safety considered necessary for patients, staff and first responders in an environment in which patients are in many instances not capable of self preservation and must be protected in place. Automatic sprinkler protection is key to any plan for protecting residents in place and for the safety of those responding to emergencies by providing the extra time needed to respond. The requirements are also consistent with current CMS standards that apply to all hospitals nationwide receiving Medicare/Medicaid funding and would not add additional requirements to those facilities beyond current nationwide Federal requirements but would allow the facilities to better meet those requirements without possible costly conflicts in other codes.

If this proposal is successful and the proposal for a new Section 1105 is also approved, the Adhoc Health Care committee will bring forward a corresponding exception to be applicable for the new Section 1105.1 as follows:

SECTION 1105 CONSTRUCTION REQUIREMENTS FOR EXISTING GROUP I-2

1105.1 General. Existing Group I-2 shall meet the following requirements:

1. The minimum fire safety requirements in Section 1103, and
2. The minimum egress requirements in Section 1104, and
3. The additional egress and construction requirements in Sections 1105.2 through 1105.7.5.2.

Where the provisions of this chapter conflict with the construction requirements that applied at the time of construction, the most restrictive provision shall apply.

Exception: Where approved in accordance with Section 102.4, in Group I-2 Condition 2 buildings where a sprinkler system installed in accordance with Section 903.3.1.1 has been added and the building is now sprinklered throughout, the existing fire resistance ratings, opening protectives, penetrations and joints in assemblies are not required to be maintained where such fire resistance ratings, opening protective, penetrations and joints are not required in new construction for sprinklered buildings.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering, a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>.

Cost Impact: None

F212-13

PART I – INTERNATIONAL FIRE CODE

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – INTERNATIONAL EXISTING BUILDING CODE

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1103.1-F-WILLIAMS-ADHOC

F213 – 13

1103.1.1 (New), [A] 102.6, Chapter 80

Proponent: Adolf Zubia. Chairman, IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Add new next as follows:

1103.1.1 Historic Buildings. Facilities designated as *historic buildings* shall develop a fire protection plan in accordance with Chapter 10 and 11 of NFPA 914. The fire protection plans shall comply with the maintenance and availability provisions in Section 404.4 and 404.5.

Revise as follows:

[A] 102.6 Historic buildings. The provisions of this code relating to the construction, *alteration*, repair, enlargement, restoration, relocation or moving of buildings or structures shall not be mandatory for existing buildings or structures identified and classified by the state or local jurisdiction as historic buildings when such buildings or structures do not constitute a distinct hazard to life or property. Fire protection in designated historic buildings ~~and structures~~ shall be provided ~~in accordance~~ with an approved fire protection plan as required in Section 1103.1.1.

Add new standard Chapter 80 as follows:

NFPA

914—2010 Code for Fire Protection of Historic Structures.1103.1.1

Reason: The intent of this code change is to clarify the requirements in the IFC with respect to the fire protection plan for historic buildings. This proposal does not change the current requirements for fire protection system, but only provides clarity.

IFC Section 102.6 currently requires an “approved fire protection plan.” But then the code provides no guidance as to what the plan needs to address, or what needs to be in the “approved fire protection plan.” This proposal adds a reference to NFPA 914 in Chapter 11 (new section 1103.1.1) which now establishes specific criteria to evaluate the historic building in accordance with NFPA 914 and requires maintenance and availability of the plan in accordance with current requirements for Fire Safety Plans as per Section 404 . This change will provide more specific guidance to code officials, design professionals and building owners as to the provisions that are applicable to fire protection plans for historic buildings in order to provide a reasonable level of building and life safety provisions.

Cost Impact: The code change will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, NFPA 914 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

F213-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1103.1.1-F-ZUBIA-FCAC

F214 – 13

1103.3

Proponent: Ron Burton, PTW Advisors, LLC, representing BOMA international (ronburton@ptwadvisors.com)

Revise as follows:

1103.3 Elevator operation. Existing elevators with a travel distance of 25 feet (7620 mm) or more above or below the main floor or other level of a building and intended to serve the needs of emergency personnel for fire-fighting or rescue purposes shall be provided with emergency operation in accordance with ASME A17.3.

Exception: Buildings without occupied floors located more than 75 feet above the lowest level of fire department vehicle access where provided with automatic sprinkler systems installed in accordance with Section 903.3.1.1 or 903.3.1.2.

Reason: The purpose of this proposed change is to:

- Clearly identify the fire code as the scoping document for the requirement of retroactive fire safety building features;
- Clarify the intent of the code with respect to which elevators must be retrofitted with Phase I emergency recall operation and

Phase II emergency in-car operation; and,

- Provide the opportunity to substitute fire sprinkler installation for Phase I emergency recall operation and Phase II emergency in-car operation retrofits in low and mid-rise buildings.

These changes are needed because of the exceeding expense of compliance for many of these retrofits. It is not unknown for application of the mandatory Phase I and Phase II retrofits required by the A17.3 Safety Code for Existing Elevators and Escalators to trigger complete replacement of the elevator machinery at costs running into the hundreds of thousands of dollars. What is a relatively inexpensive fire safety feature in a new elevator installation is unreasonably onerous when applied to existing elevators. It's therefore reasonable to codify alternate methods for building owners to meet the intent of the codes.

It's important to note that the 25 foot travel threshold for ASME A17.3 emergency operation retrofit is not mitigated by occupant load; number of stories; elevator use; building fire or smoke compartment conditions; the presence of sprinklers; or any building specific operational firefighting considerations. For elevators installed prior to the adoption of newer elevator emergency operations features, many existing 3 story buildings require retrofit; elevators in non-atmospherically segregated spaces like low-rise atriums require retrofits; vintage freight elevators, regardless of maintenance condition or the ability of building occupants to access them, require retrofits. The problem of inflexible compliance options is magnified by the usual division of professional jurisdictions because elevator authorities typically do not have the expertise to assess fire risk on a total building basis; hence the need for the fire code to scope retroactive fire safety provisions.

By allowing for more affordable or effective alternatives to the Phase I and Phase II retrofits, less opposition should exist to adoption of ASME A17.3 and its other safety requirements such as safety bulkheads for hydraulic elevators and door restrictors, thereby enhancing overall elevator safety.

Status of State Adoptions of ASME A17.3 Phase I and Phase II FF Service Retroactive Requirements	
22	States adopt ASME A17.3
1	State modifies ASME A17.3 to trigger FF service retrofit at 70 feet of travel.
1	State amends away FF service retrofit for existing elevators.
1	State only requires FF service retrofit where triggered by other alterations; no blanket retroactivity.
1	State adopts ASME A17.3 "for regulatory guidance only for elevators classified as remodeled."
1	State amends ASME A17.3 to change 25 foot travel trigger to 3 stories.
1	State adopts ASME A17.3 but has a 5 year (until mid-2015) moratorium on required PH II retrofits.
28	States Do Not Adopt ASME A17.3

Intents of the Code

The intents of Phase I emergency recall are to prevent elevator users from being discharged at a floor that is engaged in a fire; from accessing an elevator during a fire; and, in a detected fire condition, to return the elevator car to a designated floor for firefighter access for operations and rescue.

The intent of Phase II emergency in-car operation is to provide firefighters the ability to operate the elevator for firefighting operations and rescue.

The proposed exception recognizes that there is no documentation of civilian or firefighter life loss while in an elevator during a structural fire in a building protected with automatic fire sprinklers. It is reasonable that if an owner has already provided superior fire safety features in an existing building that they not be required to retrofit expensive fire safety features of limited value.

Additionally, the most recent comprehensive professional review of sprinkler system reliability concluded that "when sprinklers are present in the fire area of a fire large enough to activate sprinklers in a building not under construction, sprinklers operate 91% of the

time. When they operate, they are effective 96% of the time, resulting in a combined performance of operating effectively in 88% of reported fires where sprinklers were present in the fire area and fire was large enough to activate sprinklers.”¹ This is contrasted with an eight-year study of 178 high-rise fires in New York City in which elevators with Phase I and Phase II “firefighter service” were used revealed the following disturbing findings:

- 59 elevators failed either on arrival of the firefighters or during the fire. (33 percent)
- 37 percent of the 59 failures were the result of fire or water damage to the elevator electrical system.²

There is no record of elevator occupant fire fatalities in a sprinklered building.

For buildings within the scope of the exception, which are not already sprinklered, the exception provides an incentive to provide fire sprinklers.

The references to Sections 903.3.1.1 and 903.3.1.2 mean that only a fire sprinkler system installed in accordance with the appropriate technical standard will permit relaxation of the Phase I and Phase II emergency operations requirements.

The codification of these substitutions is consistent with Section 1.3, Purpose and Exceptions, of ASME A17.3 which states:

“The purpose of this Code is to provide for the safety of life and limb, and to promote the public welfare.

Where a requirement, because of practical difficulty, cannot be complied with literally or where its literal application would cause undue hardship, the authority having jurisdiction may, upon proper application, grant exceptions, but only when it is clearly evident that reasonable safety is assured.

The authority having jurisdiction may also grant exceptions or permit alternate methods where it is assured that equivalent objectives can be achieved by establishing and maintaining effective safety.”

No suggestion is being made that new elevator systems should not be required to comply.

Finally, a corresponding request for a revision to ASME A17.3 will be submitted to clarify that the requirement for retrofitting the fire safety features of Phase I emergency recall operation and Phase II emergency in-car operation is triggered by the fire code.

¹ U.S. Experience with Sprinklers, John R. Hall Jr. March 2012

<http://www.nfpa.org/assets/files/pdf/os.sprinklers.pdf>

² Dunn's Dispatch: Deadly Elevators, Fire Engineering, December 2007, Vincent Dunn,

<http://www.fireengineering.com/content/fe/en/articles/2007/12/dunns-dispatch-deadly-elevators.html>

Cost Impact: The change should reduce the cost of compliance by providing more flexibility for owners to comply.

F214-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1103.3-F-BURTON

F215 – 13

1103.3

Proponent: Greg Johnson, Johnson Consulting Services, representing self
(gjohnsonconsulting@gmail.com)

Revise as follows:

1103.3 Elevator operation. Existing elevators with a travel distance of 25 feet (7620 mm) or more above or below the main floor or other level of a building and intended to serve the needs of emergency personnel for fire-fighting or rescue purposes shall be provided with emergency operation in accordance with ASME A17.3.

Exceptions:

1. Buildings without occupied floors located more than 55 feet above the lowest level of fire department vehicle access where protected at the elevator shaft openings with additional fire doors in accordance with Section 716.5 of the *International Building Code* and where all of the following conditions are met:
 - 1.1 The doors shall be provided with vision panels of approved fire-protection-rated glazing so located as to furnish clear vision of the approach to the elevator. Such glazing shall not exceed 100 square inches in area.
 - 1.2 The doors shall be held open but be automatic-closing by activation of a fire alarm initiating device installed in accordance with the requirements of NFPA 72 as for Phase I Emergency Recall Operation, and shall be located at each floor served by the elevator; in the associated elevator machine room, control space, or control room; and in the elevator hoistway, when sprinklers are located in those hoistways.
 - 1.3 The doors, when closed, shall have signs visible from the approach area stating: WHEN THESE DOORS ARE CLOSED OR IN FIRE EMERGENCY, DO NOT USE ELEVATOR. USE EXIT STAIRS.
2. Buildings without occupied floors located more than 55 feet above the lowest level of fire department vehicle access when provided with automatic sprinkler systems installed in accordance with Section 903.3.1.1 or 903.3.1.2.
3. Freight elevators in buildings provided with both automatic sprinkler systems installed in accordance with Section 903.3.1.1 or 903.3.1.2 and at least one ASME 17.3 compliant elevator serving the same floors.

The provisions of this section shall not be construed to allow the elimination of previously installed Phase I emergency recall or Phase II emergency in-car systems.

Reason: Rule 211.3 of ASME A17.3, Firefighters' Service — Automatic Elevators, requires that: "*All automatic (nondesignated attendant) operation elevators having a travel of 25 ft (7.62 m) or more above or below the designated level shall conform to the requirements of this Rule.*"

The purpose of this proposed change is to:

- Clearly identify the fire code as the scoping document for the requirement of retroactive fire safety building features;
- Clarify the intent of the code with respect to which elevators must be retrofitted with Phase I emergency recall operation and Phase II emergency in-car operation;
- Provide the opportunity in existing low-rise buildings to substitute additional opening protectives at elevator shaft openings for Phase I emergency recall operation and Phase II emergency in-car operation retrofits; and,
- Provide the opportunity to substitute fire sprinkler installation for Phase I emergency recall operation and Phase II emergency in-car operation retrofits in low-rise buildings.

These changes are needed because of the exceeding expense of compliance for many of these retrofits. It is not unknown for application of the mandatory Phase I and Phase II retrofits required by the A17.3 Safety Code for Existing Elevators and Escalators to trigger complete replacement of the elevator machinery at costs running into the hundreds of thousands of dollars. What is a relatively inexpensive fire safety feature in a new elevator installation is unreasonably onerous when applied to existing elevators. It's therefore reasonable to codify alternate methods for building owners to meet the intent of the codes.

It's important to note that the 25 foot travel thresh-hold for ASME A17.3 emergency operation retrofit is not mitigated by occupant load; number of stories; elevator use; building fire or smoke compartment conditions; the presence of sprinklers; or any building specific operational firefighting considerations. For elevators installed prior to the adoption of newer elevator emergency operations features, many existing 3 story buildings require retrofit; elevators in non-atmospherically segregated spaces like low-rise atriums require retrofits; vintage freight elevators, regardless of maintenance condition or the ability of building occupants to access them, require retrofits. The problem of inflexible compliance options is magnified by the usual division of professional jurisdictions because elevator authorities typically do not have the expertise to assess fire risk on a total building basis; hence the need for the fire code to scope retroactive fire safety provisions.

By allowing for more affordable or effective alternatives to the Phase I and Phase II retrofits, less opposition should exist to adoption of ASME A17.3 and its other retroactive safety requirements such as safety bulkheads for hydraulic elevators and door restrictors, thereby enhancing overall elevator safety.

Status of State Adoptions of ASME A17.3 Phase I and Phase II FF Service Retroactive Requirements	
22	States adopt ASME A17.3
1	State modifies ASME A17.3 to trigger FF service retrofit at 70 feet of travel.
1	State amends away FF service retrofit for existing elevators.
1	State only requires FF service retrofit where triggered by other alterations; no blanket retroactivity.
1	State adopts ASME A17.3 <i>"for regulatory guidance only for elevators classified as remodeled."</i>
1	State amends ASME A17.3 to change 25 foot travel trigger to 3 stories.
1	State adopts ASME A17.3 but has a 5 year (until mid-2015) moratorium on required PH II retrofits.
28	States Do Not Adopt ASME A17.3

Intents of the Code

The intents of Phase I emergency recall are to prevent elevator users from being discharged at a floor that is engaged in a fire; from occupants accessing an elevator during a fire; and, in a detected fire condition, to return the elevator car to a designated floor for firefighter access for operations and rescue.

The intent of Phase II emergency in-car operation is to provide firefighters the ability to operate the elevator for firefighting operations.

Proposed Exception 1 meets the intent of the code by:

- Providing an additional fire door, with a vision panel, between elevator occupants and a fire engaged floor. This protects occupants from car and hoistway doors automatically opening directly to a fire event. The vision panel lets occupants view fire risk and select another floor to travel to for egress. This door provides an additional barrier to smoke and water contamination of the hoistway and improves building compartmentation.
- Providing additional signs on the added door immediately at the elevator opening telling building occupants to not use the elevator when the door is closed. In other words, if you can read the sign you shouldn't use the elevator.
- Recognizing that common firefighting operations policy requires firefighters to use the stairs to address any fire on the 6th floor or lower in a building; meaning that in low rise buildings immediate firefighter access to the elevators is not as critical. The 6th floor of a building typically corresponds to the building and fire codes' definition of a high-rise building as one with *"an occupied floor located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access."* This is broadly recognized as the elevation at which a compromise is achieved between the inherent hazard of using an elevator in a structural fire response and the need to respond in a timely way to the fire.

Exception 1 also tacitly acknowledges that these are not elevators that were ever *"intended to serve the needs of emergency personnel for fire-fighting or rescue purposes"* as the charging section states.

Locations of fire alarm initiating devices used to initiate door closing are identical to those used to initiate Phase I operations via reference to NFPA 72 by ASME A17.3.

Proposed Exception 2 recognizes that there is no documentation of civilian or firefighter life loss while in an elevator during a structural fire in a building protected with automatic fire sprinklers. It is reasonable that if an owner has already provided superior fire safety features in an existing building that they not be required to retrofit expensive fire safety features of limited value. For buildings within the scope of the exception, which are not already sprinklered, Exception 2 provides an incentive to provide fire sprinklers.

The references to Sections 903.3.1.1 and 903.3.1.2 mean that only a fire sprinkler system installed in accordance with the appropriate technical standard will permit relaxation of the Phase I and Phase II emergency operations requirements.

55 feet was selected as the upper limit for the floor height of buildings within the scope of the proposed change after soliciting the advice of the Fire Code Action Committee at its November 2012 meeting. Committee members suggested a height limit of around four stories would be preferable when considering response factors associated with ascertaining elevator occupant locations and conditions. Since 55 feet is the elevation at which automatic sprinkler protection is triggered, and since it roughly corresponds to 4 stories, it is offered as a suitable threshold.

Proposed Exception 3 recognizes that buildings which already have an elevator equipped with Phase I and Phase II emergency operations already meet the intent of Phase II firefighter operations provisions. The fire sprinkler requirement and the limited passenger use of freight elevators means that the likelihood of life loss in the freight elevator is virtually nil. For buildings without fire sprinklers this provision provides an incentive to install fire sprinkler systems.

The codification of these substitutions is consistent with Section 1.3, Purpose and Exceptions, of ASME A17.3 which states: *"The purpose of this Code is to provide for the safety of life and limb, and to promote the public welfare."*

Where a requirement, because of practical difficulty, cannot be complied with literally or where its literal application would cause undue hardship, the authority having jurisdiction may, upon proper application, grant exceptions, but only when it is clearly evident that reasonable safety is assured.

The authority having jurisdiction may also grant exceptions or permit alternate methods where it is assured that equivalent objectives can be achieved by establishing and maintaining effective safety."

No suggestion is being made that new elevator systems should not be required to comply.

Finally, a corresponding request for a revision to ASME A17.3 will be submitted to clarify that the requirement for retrofitting the fire safety features of Phase I emergency recall operation and Phase II emergency in-car operation is triggered by the fire code.

Cost Impact: The change should reduce the cost of compliance by providing more flexibility for owners to comply.

F215-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1103.3-F-JOHNSON

F216 – 13

1103.3 (New), 1103.3.1 (New)

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care
(john.williams@doh.wa.gov)

Revise as follows:

1103.3 Existing elevators. Existing elevators, escalators and moving walks shall comply with the requirements of Sections 1103.3.1 and 1103.3.2.

1103.3.1 Elevators, escalators and moving walks. Existing elevators, escalators and moving walks in Group I-2 Condition 2 occupancies shall comply with ASME A17.3.

1103.3.2 Elevator emergency operation. Existing elevators with a travel distance of 25 feet (7620 mm) or more above or below the main floor or other level of a building and intended to serve the needs of emergency personnel for fire-fighting or rescue purposes shall be provided with emergency operation in accordance with ASME A17.3.

Reason: The healthcare industry has historically been required to comply with regulations set forth by accreditation and certification agencies, such as The Joint Commission. Because the ICC family of codes does not currently have an existing elevator standard, ASME A17.3 *Safety Code for Existing Elevators and Escalators* is proposed for compliance of existing elevators in Group I-2 Condition 2 occupancies. ASME A17.3 has been referenced by guidelines adopted by The Joint Commission for over a decade and this code change will provide correlation of the IFC with the mandated healthcare industry standard.

Adding a reference to ASME A17.3 will require that existing elevators escalators and moving walks and their related operating equipment in Group I-2 Condition 2 occupancies comply with a minimum level of safety. Because the occupants of these types of facilities are often incapable of self-preservation, it will also provide important features essential for occupant safety including escalator and moving walk emergency stop buttons and automatic skirt obstruction stop features. A new Section 1103.3 is included editorially to conform to established code style for multiple requirement sections.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>

Cost Impact: The code change proposal should not increase the cost of construction because compliance with similar requirements is already mandated by facility licensure requirements.

F216-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1103.3 (NEW)-F-WILLIAMS-ADHOC

F217 – 13

1103.4, 1103.4.1, 1103.4.2, 1103.4.3, 1103.4.4, 1103.4.8 (New)

Proponent: Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee
(cbaldassarra@RJAGroup.com)

Revise as follows:

SECTION 1103 FIRE SAFETY REQUIREMENTS FOR EXISTING BUILDINGS

1103.4 Vertical openings. Interior vertical ~~shafts~~ openings, including but not limited to *stairways*, elevator hoistways, service and utility shafts, that connect two or more stories of a building, shall be enclosed or protected as specified in Sections 1103.4.1 through 1103.4.7.

1103.4.1 Group ~~I-2~~ and ~~I-3~~ occupancies. In Group ~~I-2~~ and ~~I-3~~ occupancies, interior vertical openings connecting two or more stories shall be protected with 1-hour fire-resistance-rated construction.

Exception: In Group I-3 occupancies, exit stairways or ramps and exit access stairways or ramps constructed in accordance with Section 408 in the *International Building Code*.

1103.4.2 Three to five stories. In other than Group ~~I-2~~ and ~~I-3~~ occupancies, interior vertical openings connecting three to five stories shall be protected by either 1-hour fire-resistance-rated construction or an *automatic sprinkler system* shall be installed throughout the building in accordance with Section 903.3.1.1 or 903.3.1.2.

Exceptions:

1. Vertical opening protection is not required for Group R-3 occupancies.
2. Vertical opening protection is not required for open parking garages ~~and ramps~~.
3. Vertical opening protection for escalators shall be in accordance with Section 1103.4.5, 1103.4.6 or 1103.4.7.
4. Exit access stairways and ramps shall be in accordance with Section 1103.4.8.

1103.4.3 More than five stories. In other than Group ~~I-2~~ and ~~I-3~~ occupancies, interior vertical openings connecting more than five stories shall be protected by 1-hour fire-resistance-rated construction.

Exceptions:

1. Vertical opening protection is not required for Group R-3 occupancies.
2. Vertical opening protection is not required for open parking garages ~~and ramps~~.
3. Vertical opening protection for escalators shall be in accordance with Section 1103.4.5, 1103.4.6 or 1103.4.7.
4. Exit access stairways and ramps shall be in accordance with Section 1103.4.8.

1103.4.4 Atriums and covered malls. In other than Group ~~I-2~~ and ~~I-3~~ occupancies, interior vertical openings in a covered mall building or a building with an atrium shall be protected by either 1-hour fire-resistance-rated construction or an *automatic sprinkler system* shall be installed throughout the building in accordance with Section 903.3.1.1 or 903.3.1.2.

Exceptions:

1. Vertical opening protection is not required for Group R-3 occupancies.
2. Vertical opening protection is not required for open parking garages ~~and ramps~~.

3. Exit access stairways and ramps shall be in accordance with Section 1103.4.8.

1103.4.5 Escalators in Group B and M occupancies. Escalators creating vertical openings connecting any number of stories shall be protected by either 1-hour fire-resistance-rated construction or an *automatic sprinkler system* in accordance with Section 903.3.1.1 installed throughout the building, with a draft curtain and closely spaced sprinklers around the escalator opening.

1103.4.6 Escalators connecting four or fewer stories. In other than Group B and M occupancies, escalators creating vertical openings connecting four or fewer stories shall be protected by either 1-hour fire-resistance-rated construction or an *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2 shall be installed throughout the building, and a draft curtain with closely spaced sprinklers shall be installed around the escalator opening.

1103.4.7 Escalators connecting more than four stories. In other than Group B and M occupancies, escalators creating vertical openings connecting five or more stories shall be protected by 1-hour fire-resistance-rated construction.

1103.4.8 Occupancies other than Group I-2 and I-3. In other than Group I-2 and I-3 occupancies, floor openings containing exit access stairways or ramps that do not comply with one of the conditions listed in this section shall be protected by 1-hour fire-resistance-rated construction.

1. Exit access stairways and ramps that serve, or atmospherically communicate between, only two stories. Such interconnected stories shall not be open to other stories.
2. In Group R-1, R-2 or R-3 occupancies, exit access stairways and ramps connecting four stories or less serving and contained within an individual dwelling unit or sleeping unit or live/work unit.
3. Exit access stairways and ramps in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1, where the area of the vertical opening between stories does not exceed twice the horizontal projected area of the stairway or ramp, and the opening is protected by a draft curtain and closely spaced sprinklers in accordance with NFPA 13. In other than Groups B and M occupancies, this provision is limited to openings that do not connect more than four stories.
4. Exit access stairways and ramps within an atrium complying with the provisions of Section 404 of the International Building Code.
5. Exit access stairways and ramps in open parking garages that serve only the parking garage.
6. Exit access stairways and ramps serving open-air seating complying with the exit access travel distance requirements of Section 1028.7 of the International Building Code.
7. Exit access stairways and ramps serving the balcony, gallery or press box and the main assembly floor in occupancies such as theaters, places of religious worship, auditoriums and sports facilities.

Reason: The intent of this code change is to resolve conflicts between the means of egress requirements in chapter 10 of both the IBC and IFC, and chapter 11 of the IFC regarding open exit access stairway and ramp construction. There are a number of building code provisions for new construction in current IBC/IFC chapter 10 Means of Egress that permit exit access stair floor openings without a fire rated enclosure. Many of these permitted floor openings are required to be fire rated by IFC chapter 11 Construction Requirements for Existing Buildings. This sets up a direct conflict not just between the IBC and IFC but between two chapters in the IFC. A building constructed under the 2012 IBC/IFC and in full compliance with chapter 10 of both codes is in violation of IFC sections 1103.4 through 1104.3.7 as soon as the certificate of occupancy issued. Clearly it was not the intent of IFC chapter 11 to contradict chapter 10 of the IFC or IBC. This code change takes the conditions that permit exit access stair and ramp floor openings and places them in IFC chapter 11 so that the requirements of IFC chapter 11 are consistent with IFC chapter 10 and IBC chapter 10.

Specific section changes:

Section 1103.4.1 was modified to specifically address groups I-2 and I-3 and 1103.4.2 through 1103.4.4 was modified to include I-1 and I-4 occupancies. This was done because the specific conditions that allow unenclosed exit access stairs in IBC and IFC chapter 10 differ based on that distinction. In addition the group I-3 exception was added to 1103.4.1 to be consistent with the current exception #10 to IFC/IBC section 1009.3 and the current single exception to IFC/IBC section 1022.2.

Sections 1103.4.2 through 1103.4.4 each had an exception added to refer to new section 1103.4.3 for conditions that allow unenclosed exit access stairs.

Section 1103.4.3 was added to provide all of the current conditions that allow an un-enclosed exit access stair or ramp. All of these conditions are existing from IFC/IBC chapter 10 section 1009.3. Note that in the 2015 IBC and IFC these conditions will be in new IFC/IBC section 1018. It is very important to note that this section and these conditions only apply to exit access stairs and ramps. This new section does not apply to exit stairs. Exit stairs are not exempted from enclosure.

The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

Cost Impact: None

F217-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1103.4-F-BALDASSARRA-CTC

F218 – 13

1103.4.1

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care
(john.williams@doh.wa.gov)

Revise as follows:

IFC 1103.4.1 Group I occupancies. In Group I occupancies, interior vertical openings connecting two or more stories shall be protected with 1-hour fire-resistance-rated construction.

Exceptions:

1. In Group I-2 Condition 2 equipped throughout with an automatic sprinkler system, vertical opening connecting two or more stories need not be protected with 1-hour fire-resistance-rated construction where both of the following conditions are met:
 - 1.1. The atrium volume is accounted for in the design of a smoke control system in accordance with Section 909.
 - 1.2 The floor levels within the vertical opening shall contain only low or ordinary fire hazard uses.
2. In Group I-2 Condition 2, where an automatic sprinkler system is installed in accordance with Section 404.6 of the *International Building Code*, glass walls shall be considered to be equivalent to 1-hour fire-resistance-rated construction for purposes of this section. Where glass doors are provided in the glass wall, they shall be either self-closing or automatic-closing.
3. In Group I-2 Condition 2, 1-hour fire-resistance-rated construction is not required where a glass-block wall assembly complying with Section 2110 of the *International Building Code* and having a ¾-hour fire protection rating is provided.

Reason: The intent of this code change is to make the IFC consistent with federal standards that are in place for the maintenance of Group I-2 Condition 2 (hospitals) and to clarify the allowable use and construction of atria in hospitals. This adds language to clarify the fire hazard class allowed in the existing atrium (no higher than ordinary), as opposed to only low hazard class in new. A smoke control system is also acknowledged as a factor when it comes to separation of the atrium, and clarifies that the smoke control system's engineering analysis must account for any spaces open to it.

Glass walls points back to the language in IBC Section 404.6 in an attempt to set that as a minimum, retroactive standard. It is far simpler to address a potential deficiency with addition of a smoke control system or properly installed sprinklers at the glass, rather than reconstructing the walls themselves.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 5 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>

Cost impact: This proposal would make the IFC consistent with federal standards that are in place for the maintenance of hospitals, and therefore would not represent an increase in cost.

F218-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

907.2.6-F-WILLIAMS-ADHOC

F219 – 13

1103.4.1

Proponent: Robert J Davidson, Davidson Code Concepts, LLC, representing self (BFICOCS)
(rjd@davidsoncodeconcepts.com)

Revise as follows:

1103.4.1 Group I-3 occupancies. In Group I-3 occupancies, interior vertical openings connecting two or more stories shall be protected with 1-hour fire-resistance-rated construction.

Exceptions:

1. In Group I-3 equipped throughout with an automatic sprinkler system, vertical opening connecting two or more stories need not be protected with 1-hour fire-resistance-rated construction where both of the following conditions are met:
 - 1.1. The atrium and connecting stories are accounted for in the design of a smoke control system in accordance with Section 909.
 - 1.2. The floor levels within the vertical opening shall contain only low or ordinary fire hazard uses.
2. In Group I-3 where an automatic sprinkler system is installed throughout the building and in accordance with Section 404.6 of the *International Building Code*, glass walls shall be considered to be equivalent to 1-hour fire-resistance-rated construction for purposes of this section. Where glass doors are provided in the glass wall, they shall be either self-closing or automatic-closing.
3. In Group I-3, 1-hour fire-resistance-rated construction is not required where a glass- block wall assembly complying with Section 2110 of the *International Building Code* and having a $\frac{3}{4}$ -hour fire protection rating is provided.

Reason: The intent of this code change is to clarify the allowable use and construction of atria in jail. This adds language to clarify the fire hazard class allowed in the existing atrium (no higher than ordinary), as opposed to only low hazard class in new. A smoke control system is also acknowledged as a factor when it comes to separation of the atrium, and clarifies that the smoke control systems engineering analysis must account for any spaces open to it.

Glass walls points back to the language in the IBC in an attempt to set that as a minimum, retroactive standard. It is far simpler to address a potential deficiency with addition of a smoke control system or properly installed sprinklers at glass, rather than reconstructing the walls themselves.

This is intended to coordinate with the Group I-2 provisions.

Cost impact:

F219-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1103.4.1-F-DAVIDSON

F220 – 13

1103.4.8 (New), 1103.4.9 (New), 603.8.6 (New), 603.8.7 (New)

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care (john.williams@doh.wa.gov) and Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee (cbaldassarra@RJAGroup.com)

Add new text as follows:

1103.4.8 Waste and linen chutes. In Group I-2 occupancies, existing waste and linen chutes shall comply with Sections 1103.4.8.1 through 1103.4.8.5.

1103.4.8.1 Enclosure. Chutes shall be enclosed with 1-hour fire-resistance-rated construction. Opening protectives shall be in accordance with Section 716 of the *International Building Code* and have a fire protection rating of not less than 1-hour.

1103.4.8.2 Chute intakes. Chute intakes shall comply with Section 1103.4.8.2.1 or 1103.4.8.2.2.

1103.4.8.2.1 Chute intake direct from corridor. Where intake to chutes is direct from a corridor, the intake opening shall be equipped with a chute intake door in accordance with Section 716 of the *International Building Code* and having a fire protection rating of not less than 1-hour.

1103.4.8.2.2 Chute intake via a chute intake room. Where the intake to chutes is accessed through a chute intake room, the room shall be enclosed with 1-hour fire-resistance rated construction. Opening protectives for the intake room shall be in accordance with Section 716 of the *International Building Code* and have a fire protection rating of not less than ¾ hour. Opening protective for the chute enclosure shall be in accordance with Section 1103.4.8.1.

1103.4.8.3 Automatic sprinkler system. Chutes shall be equipped with an *approved automatic sprinkler system* in accordance with Section 903.2.11.2.

1103.4.8.4 Chute discharge rooms. Chutes shall terminate in a dedicated chute discharge room. Such rooms shall be separated from the remainder of the building by a minimum of 1-hour fire-resistance-rated construction. Opening protectives shall be in accordance with Section 716 of the *International Building Code* and have a fire protection rating of not less than 1-hour.

1103.4.8.5 Chute discharge protection. Chute discharges shall be equipped with a self-closing or automatic-closing opening protective in accordance with Section 716 of the *International Building Code* and having a fire protection rating of not less than 1-hour.

1103.4.9 Flue-fed incinerators. Existing flue-fed incinerator rooms and associated flue shafts shall be protected with 1-hour fire-resistance-rated construction and have no other vertical openings connected with the space other than the associated flue. Opening protectives shall be in accordance with Section 716 of the *International Building Code* and have a fire protection rating of not less than 1-hour.

Add new text as follows:

603.8.6 Flue-fed incinerators in Group I-2. In Group I-2 occupancies, the continued use of existing flue-fed incinerators is prohibited.

603.8.7 Incinerator inspections in Group I-2. Incinerators in Group I-2 occupancies shall be inspected at least annually in accordance with the manufacturer's instructions. Inspection records shall be maintained on the premises and made available to the fire code official upon request.

Reason: The intent of this code change is to clarify the allowable use and construction of chutes and incinerators in Group I-2 occupancies. These items are still used as an integral part of the operation of a healthcare facility, especially the waste or linen chutes. Some incinerators are still in use, but this proposed requirement seeks to separate them from other vertical openings, especially a trash chute, by requiring a separate discharge room from the incinerator. Although newer incinerators are designed to contemporary codes, standards and regulations, most older incinerators are not in use or are otherwise abandoned in existing facilities because of other regulation from entities such as the EPA, this requirement seeks to separate and protect any potential hazard of inactive incinerator systems from the rest of the building.

Also, in older facilities that pre-date current requirements, there is the occasion that the chute door opens into a corridor. It was not prohibited at the time of construction, so it is not practical to reconstruct the chute to meet modern standards. Therefore, this section aims to directly address that situation by defining requirements for which it should be safely maintained.

This proposal would make the IFC consistent with federal standards that are in place to maintain hospitals, and therefore would not represent an increase in cost.

This proposal is submitted by the ICC Ad Hoc Committee on Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>

This proposal is being co-sponsored by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public. In 2012, three of the 25 face-to-face meetings were held. In addition to the CTC meetings, the CTC established Study Groups (SG) of interested parties for each of the areas of study. These SG's are responsible for reviewing the available information and making recommendations to the CTC. All totaled, the SG's held over 70 conference calls in 2012.

Cost Impact: No increase in the cost of construction is associated with this code change. This change is consistent with existing federal certification requirements.

F220-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1103.4.8 (NEW)-F-BALDASSARRA-WILLIAMS-ADHOC-CTC

F221 – 13

1103.5.3 (New), Table 1103.1

Proponent: Anthony C. Apfelbeck, City of Altamonte Springs Building/Fire Safety Division, representing self (ACApfelbeck@Altamonte.org)

Revise as follows:

1103.5.3 Group A-2. An automatic sprinkler system shall be provided throughout Group A-2 fire areas where the occupant load exceeds 300. The automatic sprinkler system shall be provided throughout the floor where the Group A-2 occupancy is located, and in all floors between the Group A-2 occupancy and the level of exit discharge.

**Table 1103.1
OCCUPANCY AND USE REQUIREMENTS**

Section	Use			Occupancy Classification																		
				A	B	E	F	H-1	H-2	H-3	H-4	H-5	I-1	I-2	I-3	I-4	M	R-1	R-2	R-3	R-4	S
1103.5.3	-	-	-	R ^a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

(Portions of table not shown remain unchanged)

a. Only applies to Group A-2 occupancies

Reason: Recommendation #2 of the "Report of the Technical Investigation of the Station Nightclub Fire" recommends that fire sprinklers be provided "for existing nightclubs with an occupancy limit greater than 100." An extract of this recommendation is listed below:

"Recommendation 2

The results of the investigation clearly demonstrated the value of an NFPA 13 compliant automatic fire sprinkler system in extending the time the nightclub remained tenable. Recommendation 2 mirrors the action already taken by NFPA to strengthen the requirement for sprinklers in new and existing nightclubs and festival seating venues.

NIST recommends that model codes require sprinkler systems, and that state and local authorities adopt and aggressively enforce this provision:

a) for all new nightclubs regardless of size, and

b) for existing nightclubs with an occupancy limit greater than 100 people."

As indicated in the NIST report, this recommendation has already been implemented in NFPA 101. However, not all jurisdictions adopt NFPA 101. In many jurisdictions, the IFC is the only adopted document that regulates life safety in existing buildings. Therefore, for existing occupancies in IFC only states, there is no current requirement for fire sprinklers in existing assembly occupancies. The lack of a requirement addressing this issue presents the adopting jurisdiction with a false perception that a reasonable level of life safety protection is provided in existing unsprinklered nightclubs with a high-occupant load. If an adopting jurisdiction chooses to remove this code provision during the adoption process, that is their local prerogative. However, it is the burden of the ICC process to promulgate codes based on technical merit and not a potential political implication at the local level. The NIST report clearly recommends that a reasonable level of life safety is only provided when an existing nightclub is protected by a fire sprinkler system. A copy of the NIST report justifying this code change recommendation is available on-line at: http://www.nist.gov/public_affairs/releases/Vol_I_NCSTAR2.pdf

While the NIST report recommends a 100 person threshold, the committee may not be comfortable with that stringent of a number considering the 100 threshold would apply to all A-2 occupancies. This code change takes into consideration that impact and utilizes a 300 person threshold rather than a 100 person threshold. This threshold will exempt out many existing small restaurants and other A-2 occupancies that outside of the scope anticipated by NIST in the "Report of the Technical investigation of the Station Nightclub Fire."

Cost Impact: This code change will not increase the cost of construction but will have a financial impact on existing A-2 occupancies that are currently not fire sprinkler protected and exceed an occupant load of 300.

F221-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1103.5.3 (NEW) #2-F-APFELBECK

F222 – 13

1103.5.3 (New), Table 1103.1

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

1103.5.3 Group A-2. An automatic sprinkler system shall be installed in accordance with Section 903.3.1.1 throughout existing buildings or portions thereof used as Group A-2 occupancies with an occupant load of 300 or more.

Table 1103.1
OCCUPANCY AND USE REQUIREMENTS

Section	Use			Occupancy Classification																		
				A	B	E	F	H-1	H-2	H-3	H-4	H-5	I-1	I-2	I-3	I-4	M	R-1	R-2	R-3	R-4	S
1103.5.3	-	-	-	R ^a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

(Portions of table not shown remain unchanged)

a. Only applies to Group A-2 occupancies

Reason: This requirement implements the Recommendation #1 included in the NIST Report of the Technical Investigation of The Station Nightclub Fire (NIST NCSTAR 2: Vol. I). *Recommendation 1* of the NIST report states:

"Model codes should require sprinkler systems for all new and existing nightclubs regardless of size."

There is a list of fires in Group A-2 occupancies. This list includes the Station Nightclub, Beverly Hill Supper Club, the Coconut Grove and others. Each of these fires have resulted in a significant loss of life.

Group A-2 occupancies involve conditions such as large occupant loads, high occupant density, significant fuel loading and moveable furnishings and decorations. Group A-2 occupancies also include the potential for reduced lighting levels, high noise levels, combustible decorations, strobe and flashing lights, alcohol consumption, and confusing egress paths. Each of these alone can be a significant issue, but when combined they lead to the inability of the occupants to promptly and safely exit the building under fire conditions.

This proposal considers the arrangement of the IBC occupancy classifications and the inclusion of other uses in addition to nightclubs within the Group A-2 classification. Therefore, this proposal does not reach as far as the recommendation from NIST. While the NIST proposal recommends fire sprinklers in ALL facilities, this proposal will require existing Group A-2 occupancies to be retrofitted with a fire sprinkler system only if the occupant load exceeds 300. Setting the threshold at 300 occupants will place the requirement where the higher potential for loss of life exists.

The proposed section only requires that the Group A-2 occupancy is provided with a fire sprinkler system. The section does not require the entire fire area to be protected, nor does it require the entire floor to be protected. The fire sprinkler system would be installed in the portion of the building which contains the Group A-2 occupancy.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

Cost Impact: The code change will not increase the cost of new construction, but it will create a cost for existing unsprinklered buildings classified as Group A-2.

F222-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

1103.5.3 (NEW) #1-F-ZUBIA-FCAC

F223 – 13

1103.5.3 (New), 1103.5.3.1 (New), 1103.5.3.2 (New)

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Add new text as follows:

1103.5.3 High-Rise Buildings. An automatic sprinkler system installed in accordance with Section 903.3.1.1 shall be provided throughout existing high-rise buildings.

Exceptions:

1. Airport traffic control towers.
2. Open parking structures.
3. Group U Occupancies.
4. Occupancies in Group F-2.
5. Buildings with an engineered fire protection plan in accordance with Section 1103.5.3.2

1103.5.3.1 Compliance Schedule. Building owners shall file a compliance schedule with the fire code official no later than 180 days after the first effective date of this code. The compliance schedule shall not exceed 12 years for an automatic sprinkler system retrofit and 5 years for an approved engineered fire protection plan.

1103.5.3.2 Engineered Fire Protection Plan. An approved engineered fire protection plan shall be developed by a design professional with experience in fire protection engineering. The engineered fire protection plan shall address the following fire protection and life safety goals:

1. The building is designed and equipped with safeguards against the spread of fire and products of combustion so that no person not directly adjacent to or involved in the ignition of a fire shall suffer serious injury or death from a fire and;
2. The building is designed and equipped with safeguards against the spread of fire so that the property losses are limited to the compartment of origin and;
3. The building is designed and constructed with fire protection features so that fire fighters can appropriately perform rescue operations, protect property, and utilize fire-fighting equipment and controls without unreasonable risk exposure and;
4. Other fire protection and life safety goals as specified by the fire code official based on the unique occupancy, size, construction and features of the building.

Reason: Modern fire and building codes require complete automatic fire sprinkler protection and a variety of other safety features in new high-rise construction. Many older high-rise buildings lack automatic fire sprinkler protection and other basic fire protection features necessary to protect the occupants, emergency responders, and the structure itself. Without complete automatic fire sprinkler protection, fire departments cannot provide the level of protection that high-rise buildings demand. Existing high-rise buildings that are not protected with fire sprinklers represent a significant hazard to the occupants and firefighters. Additionally, High-Rise fires can significantly impact a communities' infrastructure and the economic viability.

Between 2003 and 2006, there was an average of 13,400 reported structure fires in high-rise buildings annually. These incidents resulted in 62 civilian deaths, 490 civilian injuries, and \$179 million in direct property damage per year. Furthermore, from 1977 to 2009, 25 firefighters died from non-stress related cardiac death during fire suppression operations in high-rise buildings. By their very nature, high-rise fires present unique firefighting challenges that are extremely difficult for firefighters to mitigate without the presence of fire sprinkler systems. Some of these challenges include:

High-rise structure fires require significantly more resources, such as personnel and equipment, to extinguish than do fires in other types of occupancies. This further strains the responding fire department and firefighters.

Due to their height, smoke movement in high-rise structures is very different from that of other structures. Temperature gradients result in varying pressures throughout the structure, which can allow for the rapid, uncontrolled movement of smoke and flame (known as the "stack effect").

By design, exits from high-rise structures are limited. In an emergency, the movement of people out of a building is particularly difficult. A prime example of this hazard is the One Meridian Plaza fire. This fire occurred on the 22nd floor of the 38-story Meridian Bank Building and was reported to the Philadelphia Fire Department on February 23, 1991 at approximately 2040 hours and burned for more than 19 hours. The fire caused three firefighter fatalities and injuries to 24 firefighters. The 12-alarms brought 51 engine

companies, 15 ladder companies, 11 specialized units, and over 300 firefighters to the scene. It was the largest high-rise office building fire in modern American history, completely consuming eight floors of the building, and was only controlled only when it reached a floor that was protected by automatic sprinklers. In 1999 the building was torn down amidst a storm of litigation. The HVAC and other utilities in some high-rises service multiple levels and can facilitate the spread of smoke and flame through a building due to the height of the building, response times for the fire department to reach the actual fire itself are extended, contributing to larger fire growth thereby attributing to extensive smoke spread throughout the building.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

Cost Impact: This change will increase the cost of operating an existing High-Rise building.

F223-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1103.5.3 (NEW) #2-F-ZUBIA-FCAC

F224 – 13

1103.5.3 (New), Table 1103.1

Proponent: Anthony C. Apfelbeck, City of Altamonte Springs Building/Fire Safety Division, representing self (ACApfelbeck@Altamonte.org)

Revise as follows:

1103.5.3 High-Rise Buildings. Existing high-rise buildings shall be equipped with either:

1. An automatic sprinkler system installed throughout the building in accordance with Section 903.3.1.1 or;
2. An approved engineered fire protection plan in accordance with Section 1103.5.3.1.

Exception: The provisions of this section shall not apply to the following:

1. Airport traffic control towers.
2. Open parking structures.
3. Group U Occupancies.
4. Occupancies in Group F-2.
5. Open air portions of Group A-5 Occupancies.

1103.5.3.1 Engineered Fire Protection Plan. Where required by Section 1103.5.3, an approved engineered fire protection plan shall be developed by a licensed design professional with experience in fire protection engineering. The fire protection plan shall address the following fire protection and life safety goals:

1. The building shall be designed, equipped and maintained with safeguards against the spread of fire and products of combustion so that no person not directly adjacent to or involved in the ignition of a fire shall suffer serious injury or death from a fire and;
2. The building shall be designed, equipped and maintained with safeguards that restrict the spread of fire through the building and;
3. The building shall be designed, equipped and maintained with fire protection features so that fire fighters can perform rescue operations, protect property, and utilize fire-fighting equipment and controls without being unduly hindered in suppression or rescue operations and;
4. Other fire protection and life safety goals based on the unique occupancy, size, construction and features of the building.

1103.5.3.2 Compliance Schedule. Building owners shall file a compliance schedule with the fire code official no later than 180 days after the first effective date of Section 1103.5.3. The compliance schedule shall not exceed 12 years for an automatic sprinkler system retrofit in accordance with Section 1103.5.1 (1) or 6 years for an engineered fire protection plan in accordance with Section 1103.5.3 (2).

1103.5.3.2.1 Compliance Extensions. The fire code official is authorized to approve up to two one year extensions to the compliance schedule specified in Section 1103.5.3.2 where the building owner has demonstrated to the fire code official that the compliance schedule has been pursued with due diligence.

**Table 1103.1
OCCUPANCY AND USE REQUIREMENTS**

Section	Use	Occupancy Classification																		
	High rise	A	B	E	F	H-1	H-2	H-3	H-4	H-5	I-1	I-2	I-3	I-4	M	R-1	R-2	R-3	R-4	S
1103.5.3	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R

(Portions of table not shown remain unchanged)

Reason: Existing unsprinklered high-rise buildings continue to be a hazard to occupants, firefighters and their ability to mitigate damage from fires. As an example:

1. 1988 First Interstate Bank: \$200 million in direct property damage, 64 fire companies, gutted 12th-16th floor.
2. 1991 One Meridian Plaza: \$100 million in direct property damage, 18 hour fire gutting 22 floors.
3. 1996 Rockefeller Center: Fires in 5 separate electrical rooms, 300+ firefighters responded, television broadcasts interrupted.
4. 2003 Cook County Office Building: Six civilian deaths.
5. 2004 Caracas Tower: Fire spread to 26 floor and burned for 17 hours, 40 firefighters injured.
6. 2005 Madrid Windsor: 32 Story totally destroyed by fire.

The concern with existing high-rise buildings is best summed up in the Cook County Administration Fire Report, authored by James Lee Witt Associates, in major finding number 1: "Lack of an automatic fire sprinkler system. The building was not equipped with an automatic fire sprinkler system that would have controlled or extinguished the fire in the incipient stage." The recommendations in the Cook County Administration Fire Report further state, "The State of Illinois and City of Chicago should amend their codes to include provisions for the mandatory retrofit installation of complete automatic fire sprinkler systems in all existing-high rise structures." It is important to note that Mr. Witt brings significant credibility to this finding and recommendation as he is also the past CEO of the ICC.

If this finding and recommendation is valid for the City of Chicago and the State of Illinois for the protection of their citizens and firefighters, then this finding and recommendation is also valid as a base level of building and life safety protection within the IFC.

In addition, the NIST Final Report of the Collapse of the World Trade Center Tower states in recommendation 26: "NIST recommends that state and local jurisdictions adopt and aggressively enforce available provisions in building codes to ensure that egress and sprinkler requirements are met by existing buildings."

The NFPA 101 Life Safety Code requires a similar level of protection as this proposal in requiring existing high-rise buildings to be equipped with fire sprinkler protection or an Engineered Life Safety System. This language has been in place within the Life Safety Code for numerous cycles. It is unclear why NFPA 101 specifies this level of protection but the IFC fails to provide a similar level of protection for the occupants and emergency responders.

This proposal attempts to mitigate some of the obvious economic impact by allowing for the use of a fire protection plan prepared by a design professional. While this fire protection plan will not provide an equivalent level of protection to a complete automatic fire sprinkler system, it will assist in addressing, and mitigating, a significant number of the risk factors to high-rise occupants and fire fighters who must confront these extremely hazardous fire conditions. The broad goals of the fire protection plan contained in 1103.5.2.1 are specifically derived from the goals contained in the ICC Code for Performance Based Design. These broad goals provide the designer with maximum flexibility in developing a reasonable code compliant approach.

Unfortunately, this and other fire sprinkler retrofit issues have been discussed as an issue of politics rather than as a technical code issue in past code change cycles. As an example: "The retroactive requiring of sprinklers in buildings should be left as a local decision due to the economic and political impact of such requirements." (F116-04/05) By taking this type of response on a code issue, the committee removes itself from the making a technical decision based on the technical merit code change and inserts itself as a local political policy making body. The two roles are distinctly different. It is the responsibility of the code promulgation body to determine if there is sufficient technical justification to warrant the code change and if the code change is within the scope of the document. The scope of the IFC states:

102.1 Construction and design provisions.

The construction and design provisions of this code shall apply to:

1. Structures, facilities and conditions arising after the adoption of this code.
2. Existing structures, facilities and conditions not legally in existence at the time of adoption of this code.
3. Existing structures, facilities and conditions when required in Chapter 11.
4. Existing structures, facilities and conditions which, in the opinion of the fire code official, constitute a distinct hazard to life or property.

This code change, and all retrofit code changes, are clearly within the scope of the IFC. The only question for the committee to answer is: Does an existing unsprinklered high-rise building provide a reasonable level of property protection, civilian life safety protection and firefighter protection? The technical evidence indicates that this is clearly not the case. By ignoring the technical need and deflecting responsibility for retrofit of existing high-rise as a political issue, a message is sent via this code to state and local government, that an unsprinklered existing high-rise building does provide a reasonable level of building and life safety protection. This is clearly not the case.

Cost Impact: This proposal will increase the code of construction. The impact of this change will be on existing high-rise buildings.

F224-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1103.5.3 (NEW) #1-F-APFELBECK

F225 – 13

1103.5.3 (New)

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care
(john.williams@doh.wa.gov)

Add new text as follows:

1103.5.3 Group I-2 Condition 2. In addition to the requirements of Section 1103.5.2, existing buildings of Group I-2 Condition 2 occupancy shall be equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1. The automatic sprinkler system shall be installed by [DATE TO BE INSERTED BY THE JURISDICTION].

Reason: The intent of this code change is to make mandatory the use of an approved automatic sprinkler system throughout existing hospital (Group I-2 Condition 2) occupancies. The healthcare industry recognizes sprinkler systems are a vital component of the safety of the overall building systems and components. The current mandatory sprinkler retrofit requirement in Section 1103.5.2 first entered the Fire Code in the 2009 version, but does not require sprinklering the entire building throughout. The Ad Hoc for Healthcare, which is made up of representatives from both regulated facilities and enforcement, believe that it is time to take the requirement a step further and require the ENTIRE building to be sprinklered within a reasonable time frame.

To ensure continuous operation in healthcare facilities, the installation of sprinklers systems needs to be carefully planned so as to not adversely affect patient health. Accessing and exposing ceiling spaces can create conditions that will lead to infection and possibility death to patients with compromised or suppressed immune systems. In many situations, hospitals may not be able to appropriately retrofit the installation of a fire suppression system; in those situations, a time frame is needed to replace facilities. . The period for adoption of this proposed requirement has been left to the local authority having jurisdiction. Coordinating the timeframe for adoption with federal requirements is recommended. It is currently anticipated that the Centers for Medicaid and Medicare (the federal authority having jurisdiction) will require retroactive sprinklering of hospitals by the year 2021. However, the exact timeframe is uncertain at the time of development of this change.

Regardless, the federal government is considering the reasons noted above. This is an important next step in ensuring the safety of fragile population. Facilities need some time to accomplish this safety, without adversely affected the health of patients and disrupting patient care. These are the same factors that a jurisdiction should consider when choosing a date for adoption. It should be also clear that this change is a separate measure that must be taken in addition to the current requirement. It is not intended to allow a facility to have a timeframe for installing the current requirement (although jurisdictions may choose to do this). Nor is it intended to imply that the entire building containing a hospital should be sprinklered immediately. At a minimum, a three year timeframe is recommended for implementation of this requirement. This considers the process planning, capital approval, regulatory approval, design and installation of the sprinkler system. The capital planning piece of a large scale initiative, such as a building-wide sprinkler system, normally spans multiple fiscal years, and more can be considered if the regulatory environment allows.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>

Cost impact: This proposal would make the IFC consistent with the direction that federal standards are taking to maintain hospitals and therefore would not represent an increase in cost.

Analysis: The "Group I-2 Condition 2" terminology used in this proposal in lieu of "Group I-2 hospital" is the result of approved Group A code change G257-12.

F225-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1103.5.3 (NEW)-F-WILLIAMS-ADHOC

F226 – 13

1103.5.3 (New)

Proponent: Thomas G. Daly representing The Hospitality Security Consulting Group, LLC

Add new text as follows:

1103.5.3 Group R-1 hotels and motels. *An automatic sprinkler system shall be provided throughout existing Group R-1 hotels and motels.*

Exception: Group R-1 hotels and motels of one story in height where all individual guestrooms and contiguous attic and crawl spaces are separated from each other and public and common areas by at least 1-hour fire partitions and each individual guestroom has an exit directly to a public exit court or yard.

Reason:

- A. Background: In the United States civilian fire deaths in Group R-1 hotels and motels over the past two decades have occurred exclusively in non-sprinklered and multi-story low-rise hotels/motels as predicted by the hotel industry. Notable National Fire Protection Association (NFPA) *and/or* media reported multiple loss of life low-rise hotel/motel fires include:
1. Fontana Hotel - Miami Beach, FL - three stories - 9 civilian fire deaths - 4/6/1990
 2. Paxton Hotel- Chicago, IL - four stories - 21 civilian fire deaths - 3/23/1993
 3. Howard Johnson Hotel - Bowling Green, KY - two stories - 4 civilian deaths - 1/6/1996
 4. Comfort Inn Hotel- Greenville, SC - three stories - 6 civilian deaths - 1/25/2004
 5. Mason Hotel- San Diego, CA - three stories - 2 civilian deaths - 12/17/2004
 6. Mitzpah Hotel- Reno, NV - three stories -12 civilian deaths -10/31/2006
 7. Zanzibar Motel- Reno, NV - two stories - 2 civilian deaths -12/10/2007
 8. Days Inn Hotel- Hoover, AL - two stories - 4 civilian deaths - 1/16/2010
- Civilian fire deaths in hotels/motels averaged 7.7 per 1000 fires with no automatic suppression system present for the 1994-1998 timeframe. Civilian fire deaths in hotel/motel fires averaged 11 each year from 2003-2007"- Civilian fire injuries in hotel/motel fires averaged 151 per year for the period 2003-2007.4
- B. Code provisions remain inadequate to address hazard. Despite firesafety improvements for existing buildings mandated by the IFC starting in 20005 those changes have not resulted in a reduction in the annual civilian fire death statistics in nonsprinklered hotels/motels. Comparatively, no fire civilian fire deaths have been reported in sprinklered Group R-1 hotels/motels. After a decade of these codes changes fire deaths and injuries continue to occur in low-rise non-sprinklered Group R-1 hotels/motels. Without further code enhancements for existing hotels/motels, this carnage will continue. As such, a 'distinct hazard' continues to be present to occupants of non-sprinklered Group R-1 hotels and motels with regard to fires therein.
- C. Cost/benefits: The U.S. lodging industry has largely completed the mostly voluntary sprinkler retrofitting of existing high-rise hotels, an effort which resulted in zero fire fatalities over the past two decades in such hotels? Leading lodging operators and franchisors including Hilton, Marriott and Starwood have also completed the sprinkler retrofitting of their low-rise hotels, dispelling the myth that such retrofit costs are prohibitive. Those costs are no more expensive than the routinely scheduled replacement of furnishings, fixtures and equipment (FF&E) including mattresses, case goods, carpeting, draperies and wall covering done by the industry. A hotel/motel sprinkler retrofit project is a one-time capital cost whereas the replacement of FF&E is a continuing periodic capital cost which the industry routinely bears. A hotel/motel sprinkler retrofit provides for a reduction in property insurance premiums and reduces the risk to firefighters engaged in fire suppression activities therein. As a result of these sprinkler system retrofits none of those cited hotel chains has experienced a civilian fire fatality in any of their hotels in the last two decades. Nonetheless, some lodging chains and many independent low-rise hotel owners/operators have not taken the same proactive action to protect their guests. The cost of such retrofits for commercial buildings including hotels and motels has been mitigated significantly by the permitted use of NFPA 13R as the installation standard for residential occupancies of 4 stories and less, the use of listed CPVC pipe in lieu of steel pipe or copper tube, the use of extended coverage sprinklers, the lack of the need in most cases for a fire pump in low rise Group R-1 buildings and through tax incentives in the forms of grants, tax credits, tax deductions and/or low interest loans for doing so see, for examples, state statutes in Alaska, South Carolina 10 and California 11 as well as numerous local ordinances.

Summary: Existing IFC provisions have failed to prevent hotel/motel fire fatalities and thus a 'distinct hazard' to Group R-1 hotel and motel occupants continues to exist. The code change proposed herein, if adopted, will eliminate the 'distinct hazard' to life for such occupants.

Bibliography:

1. Tri-Data Corporation, Arlington, VA., 'A Review of the Validity of Estimates of Hotel and Motel Fire Deaths – Final Report', December 1994, pg. 23.
2. Ahrens, Marty – National Fire Protection Association, 'U.S. Fires in Selected Occupancies – Hotels and Motels, March 2006, p. 103.
3. Flynn, Jennifer D. – National Fire Protection Association, 'U.S. Fires in Selected Occupancies – Hotels and Motels, March 2010, Table 2.
4. Ibid., Table 1

5. See, for example, 2000 IFC Sec. 907.3.1.6 mandating fire alarm systems in existing hotels of more than 20 guestrooms regardless of height or exiting arrangements and multiple provisions of the 2009 IFC Sec. 4603.5 for Group R-1 occupancies.
6. Op cit., Ahrens, Marty NFPA *U.S. Fires in Selected Occupancies – Hotels and Motels 2006*, page 103.
7. NFPA Journal, September-October 2010, p 12.
8. See, for example, 2003 IFC Sec. 903.3.1.2 and 2003 IBC Sec. 903.3.1.2.
9. Alaska Statutes, Article 45.81.200-210.
10. South Carolina Act 357 (2008), R385, H4470 AN ACT TO AMEND THE CODE OF LAWS OF SOUTH CAROLINA, 1976, BY ADDING SECTION 58-5-390 SO AS TO PROVIDE THAT A PUBLIC OR PRIVATE UTILITY MAY NOT IMPOSE A TAP FEE, RECURRING MAINTENANCE FEE, OR OTHER FEE, HOWEVER DESCRIBED FOR THE INSTALLATION AND MAINTENANCE OF A FIRE SPRINKLER SYSTEM THAT EXCEEDS THE ACTUAL COSTS ASSOCIATED WITH THE WATER LINE TO THE SYSTEM AND TO DEFINE ACTUAL COSTS; BY ADDING SECTION 12-6-3622 SO AS TO ALLOW A PROPERTY TAX CREDIT, AT THE OPTION OF THE PROPERTY-TAXING ENTITY FOR TWENTY-FIVE PERCENT OF THE COSTS OF INSTALLING A FIRE SPRINKLER SYSTEM IN A COMMERCIAL OR RESIDENTIAL STRUCTURE WHEN SUCH INSTALLATION IS NOT REQUIRED BY LAW, TO ALLOW AN INCOME TAX CREDIT IN THE AMOUNT OF THE PROPERTY TAX CREDIT, TO PROVIDE THE MANNER IN WHICH THESE CREDITS ARE USED WHEN EARNED BY PASS-THROUGH ENTITIES, AND TO MAKE UNUSED CREDITS TRANSFERABLE BY THE STRUCTURE'S OWNER TO A TENANT; TO AMEND SECTION 12-37-3130, AS AMENDED, RELATING TO DEFINITIONS FOR PURPOSES OF THE SOUTH CAROLINA REAL PROPERTY VALUATION REFORM ACT, SO AS TO PROVIDE THAT THE INSTALLATION OF A FIRE SPRINKLER SYSTEM IN A COMMERCIAL OR RESIDENTIAL STRUCTURE WHEN THE INSTALLATION IS NOT REQUIRED BY LAW IS NOT AN ADDITION OR IMPROVEMENT; BY ADDING SECTION 10-1-80 SO AS TO PROHIBIT ENFORCEMENT OF THAT PORTION OF THE INTERNATIONAL FIRE CODE OR NATIONALLY RECOGNIZED FIRE CODE THAT PROHIBITS THE USE OF NATURAL CUT TREES IN CELEBRATIONS IN HOUSES OF WORSHIP; AND TO AMEND SECTION 12-37-220, AS AMENDED, RELATING TO PROPERTY TAX EXEMPTIONS, SO AS TO EXEMPT THE VALUE OF FIRE SPRINKLER SYSTEM EQUIPMENT INSTALLED IN A COMMERCIAL OR RESIDENTIAL STRUCTURE WHEN THE INSTALLATION IS NOT REQUIRED BY LAW AND TO PROVIDE THAT THIS EXEMPTION APPLIES UNTIL THE PROPERTY UNDERGOES AN ASSESSABLE TRANSFER OF INTEREST.
11. California Constitution Article 13A Tax Limitation Sec. 2(c)(2) & Taxation & Revenue Code Sec. 74(a)-(e)

Cost Impact: The proposal will increase the cost of construction.

F226-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1103.5.3 (NEW)-F-DALY

F227 – 13

1103.7.2

Proponent: Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee
(cbaldassarra@RJAGroup.com)

Revise as follows:

1103.7.2 Group I-1. An automatic ~~fire alarm~~ smoke detection system shall be installed in existing Group I-1 ~~residential care/assisted living~~ facilities in accordance with Section 907.2.6.1.

Exceptions:

1. Manual fire alarm boxes in resident or patient sleeping areas shall not be required at *exits* if located at all nurses' control stations or other constantly attended staff locations, provided such stations are visible and continuously accessible and that travel distances required in Section 907.5.2 are not exceeded.
2. Where each sleeping room has a *means of egress* door opening directly to an exterior egress balcony that leads directly to the *exits* in accordance with Section 1019, and the building is not more than three stories in height.

Reason: The deletion after Group I-1 is for consistency with the terminology established in G31-12. The change of terminology is for consistency with Section 907.2.6.1. See below.

907.2.6.1 Group I-1. An automatic smoke detection system shall be installed in *corridors*, waiting areas open to *corridors* and *habitable spaces* other than *sleeping units* and kitchens. The system shall be activated in accordance with Section 907.5.

Exceptions:

1. Smoke detection in *habitable spaces* is not required where the facility is equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1.
2. Smoke detection is not required for exterior balconies.

This will not change the single-station smoke detector requirements in Section 1103.8.

The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

Cost Impact: None

F227-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1103.7.2-F-BALDASSARRA-CTC

F228 – 13

1103.7.6

Proponent: Jeffrey M. Shapiro, International Institute of Ammonia Refrigeration
(jeff.shapiro@intlcodeconsultants.com)

Revise as follows:

1103.7.6 Group R-2. A manual fire alarm system that activates the occupant notification system in accordance with Section 907.6 shall be installed in existing Group R-2 occupancies more than three stories in height or with more than 16 *dwelling* or *sleeping units*.

Exceptions:

1. Where each living unit is separated from other contiguous living units by *fire barriers* having a *fire-resistance rating* of not less than 0.75 hour, and where each living unit has either its own independent *exit* or its own independent stairway or ramp discharging at grade.
2. A separate fire alarm system is not required in buildings that are equipped throughout with an *approved supervised automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2 and having a local alarm to notify all occupants.
3. A fire alarm system is not required in buildings that do not have interior *corridors* serving *dwelling units* and are protected by an *approved automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2, provided that *dwelling units* either have a *means of egress* door opening directly to an exterior *exit access* that leads directly to the *exits* or are served by open ended *corridors* designed in accordance with Section 1026.6, Exception 4.
4. A fire alarm system is not required in buildings that do not have interior *corridors* serving *dwelling units*, do not exceed 3 stories in height and comply with all of the following:
 - 4.1 Each *dwelling unit* is separated from other contiguous *dwelling units* by *fire barriers* having a *fire-resistance rating* of not less than $\frac{3}{4}$ hour
 - 4.2 Each *dwelling unit* is provided with interconnected smoke alarms complying with Section 907.2.11 in all sleeping rooms, plus not less than one hardwired smoke alarm in the common area of each floor or mezzanine level. Interconnection shall be permitted to be hardwired or by listed smoke alarms with wireless interconnect capability

Reason: The proposal provides a reasonable alternative to retrofitting a manual fire alarm system in existing Group R-2 occupancy buildings not exceeding three stories in height and having exits that lead directly to the outside. Fire risk in apartments tends to be greatest for occupants inside the dwelling unit where a fire originates, and money spent to retrofit firesafety equipment in apartments is better spent within dwelling units, as opposed to common areas.

Countless existing apartment buildings have only a single smoke alarm in the common area, and the IFC does not require retrofitting of smoke alarms in sleeping rooms when such alarms weren't required at the time of construction. The lack of smoke alarms in bedrooms, and particularly the lack of interconnecting alarm signals, increases the risk of injury or death in a unit of fire origin and other units that experience smoke infiltration. An additional consequence may be delayed recognition of a fire event, which increases the risk of harm to other building occupants and may delay notification of the fire department.

The alternative of a manual fire alarm system is less beneficial from a safety perspective because it requires an occupant to detect a fire event (which may take more time with fewer smoke alarms) and then find and activate a pull stations. Occupants must then respond to the alarm signal, and with the history of false alarms associated with manual fire alarm systems in apartment buildings, a response without other indications of a fire is questionable.

Cost Impact: The code change proposal will not increase the cost of construction.

F228-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1103.7.6-F-SHAPIRO

F229 – 13

1103.8.1

Proponent: David S. Collins, FAIA, The Preview Group, Inc., representing The American Institute of Architects (dcollins@preview-group.com); Robert J Davidson, Davidson Code Concepts, LLC

Revise as follows:

1103.8.1 Where required. Existing Group I-1 and R occupancies shall be provided with single-station smoke alarms in accordance with Section 907.2.11 of the *International Building Code*, except as ~~provided~~ required in Sections 1103.8.2. ~~and or~~ 1103.8.3.

Reason: The provisions of 1103.8.2 and 1103.8.3 aren't exceptions, but additional requirements for interconnection and power source for specific applications. Each of these two sections can be applied independently without connection to one another.

Cost Impact: The proposal will not increase the cost of construction.

F229-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1103.8.1-F-COLLINS-DAVIDSON

F230 – 13

1103.10 (New)

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care

Add new text as follows:

1103.10 Medical gases. Medical gases stored and transferred in healthcare related facilities shall be in accordance with Chapter 53.

Reason: This proposal adds a retroactive requirement in Chapter 11 that requires compliance with Chapter 53 compressed gases when medical gases are stored and transferred in healthcare related facilities. It was felt necessary to make sure that all existing facilities comply with these requirements to meet CMS guidelines. A general reference was made since it would not simply be compliance with Section 5306 that is necessary but with the compressed gas requirements in general. The medical gas requirements are only one aspect of the regulation of compressed gases.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>

Cost impact: The code change proposal should not increase the cost of construction because compliance is already required by facility licensure requirements.

F230-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1103.10 (NEW)-F-WILLIAMS-ADHOC

F231 – 13

1104.2

Proponent: David S. Collins, FAIA, The Preview Group, Inc., representing The American Institute of Architects (dcollins@preview-group.com); Robert J Davidson, Davidson Code Concepts, LLC

Revise as follows:

1104.2 Elevators, escalators and moving walks. Elevators, escalators and moving walks shall not be used as a component of a required means of egress.

Exceptions:

1. Elevators used as an accessible means of egress where allowed by Section 1007.4 of the *International Building Code*.
2. Previously approved elevators, escalators and moving walks in existing buildings.

Reason: Chapters 4 and 30 of the IBC include occupant evacuation elevators for use in lieu of a third egress stair from high rise buildings of Group R-2 over 420 feet in height. If such elevators are “previously approved” the IFC should not prohibit their use.

Cost Impact: This will decrease the cost of construction by the elimination of conflicts within code enforcement documents.

F231-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1104.2-F-COLLINS

F232 – 13

1104.5

Proponent: David S. Collins, FAIA, The Preview Group, Inc., representing The American Institute of Architects (dcollins@preview-group.com); Robert J Davidson, Davidson Code Concepts, LLC

Revise as follows:

1104.5 Illumination emergency power. ~~Where means of egress illumination is provided, the power~~ supply shall normally be provided by the premises' electrical supply. In the event of power supply failure, illumination shall be automatically provided from an emergency system for the following occupancies where such occupancies require two or more means of egress:

Reason: It isn't clear in the current wording when the power must be provided and for what purpose.

Cost Impact: There will be no cost impact with this change.

F232-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1104.5-F-COLLINS

F233 – 13

1104.7

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care
(john.williams@doh.wa.gov)

Revise as follows:

1104.7 Size of doors. The minimum width of each door opening shall be sufficient for the *occupant load* thereof and shall provide a clear width of not less than 28 inches (711 mm). Where this section requires a minimum clear width of 28 inches (711 mm) and a door opening includes two door leaves without a mullion, one leaf shall provide a clear opening width of 28 inches (711 mm). The maximum width of a swinging door leaf shall be 48 inches (1219 mm) nominal. In ambulatory care facilities, doors serving as means of egress from patient treatment rooms or patient sleeping rooms shall provide a clear width of not less than 32 inches (813 mm). ~~Means of egress doors in an occupancy~~ In Group I-2, doors serving as means of egress and used for the movement of beds shall provide a clear width not less than 41.5 inches (1054 mm). The maximum width of a swinging door leaf shall be 48 inches (1219 mm) nominal. The height of doors openings shall not be less than 80 inches (2032 mm).

Exceptions:

1. The minimum and maximum width shall not apply to door openings that are not part of the required *means of egress* in occupancies in Groups R-2 and R-3.
2. Door openings to storage closets less than 10 square feet (0.93 m²) in area shall not be limited by the minimum width.
3. Width of door leaves in revolving doors that comply with Section 1008.1.4.1 shall not be limited.
4. Door openings within a *dwelling unit* shall not be less than 78 inches (1981 mm) in height.
5. Exterior door openings in *dwelling units*, other than the required *exit* door, shall not be less than 76 inches (1930 mm) in height.
6. *Exit access* doors serving a room not larger than 70 square feet (6.5 m²) shall be not less than 24 inches (610 mm) in door width.
7. Door closers and door stops shall be permitted to be 78 inches (1980 mm) minimum above the door.

Reason: Most of this proposal is an editorial coordination with IBC Section 1008.1.1. The addition of the 32" inch clear width for Ambulatory Care Facilities is based on the nature of the activities within the space. This will also coordinate with the federal requirements for accessibility in the 1994 ADAAG and 2010 ADA Standard for Accessible Design for these necessary facilities.

This proposal is submitted by the ICC Ad Hoc Committee on Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 5 open meetings and over 80 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>.

Cost Impact: None

F233-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1104.7-F-WILLIAMS-ADHOC

F234 – 13

1104.8

Proponent: John Woestman, Kellen Company, representing Builders Hardware Manufacturers Association (BHMA) (jwoestman@kellencompany.com)

Revise as follows:

1104.8 Opening force for doors. The opening force for interior side-swinging doors without closers shall not exceed a 5 pound (22 N) force. These forces do not apply to the force required to retract latch bolts or disengage other devices that hold the door in a closed position. For other side-swinging, sliding and folding doors, the door latch shall release when subjected to a force of not more than 15 pounds (66 N). The door shall be set in motion when subjected to a force not exceeding 30 pounds (133 N). The door shall swing to a full-open position when subjected to a force of not more than 50 pounds (222 N). Forces shall be applied to the latch side.

Reason: Revisions approved in the 2012 ICC code development cycle for the 2015 IBC should be coordinated in this section of the IFC. The proposed revisions to this section of the IFC is consistent with the revisions to section 1008.1.3 of the 2015 IBC and section 1008.1.3 of the 2015 IFC, resulting from code change proposal E62-12 which was approved "as modified" in 2012.

Cost Impact: None

F234-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1104.8-F-WOESTMAN

F235 – 13

1104.22

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

1104.22 Minimum aisle width. The minimum clear width of *aisles* shall be:

1. Forty-two inches (1067 mm) for stepped aisles ~~aisle stairs~~ having seating on each side.

Exception: Thirty-six inches (914 mm) where the *aisle* serves less than 50 seats.

2. Thirty-six inches (914 mm) for stepped *aisles* having seating on only one side.

Exceptions:

1. Thirty inches (760 mm) for catchment areas serving not more than 60 seats.
2. Twenty-three inches (584 mm) between a stepped aisle handrail and seating where an aisle does not serve more than five rows on one side.

3. Twenty inches (508 mm) between a stepped *aisle* handrail or guard and seating when the *aisle* is subdivided by the *handrail*.
4. Forty-two inches (1067 mm) for level or ramped *aisles* having seating on both sides.

Exception: Thirty-six inches (914 mm) where the *aisle* serves less than 50 seats.

5. Thirty-six inches (914 mm) for level or ramped *aisles* having seating on only one side.

Exception: Thirty inches (760 mm) for catchment areas serving not more than 60 seats.

- ~~6. Twenty-three inches (584 mm) between a stepped stair handrail and seating where an aisle does not serve more than five rows on one side.~~

Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

The language for aisles has been revised in IFC/IBC Section 1028.9.1 to relocate Item 6 to Exception 2 under Item 2 by E143-09/10. This section should be coordinated. The current section is inconsistent when using the term "stepped aisle" and "aisle stair". E86-12 has changed the term to "stepped aisles" throughout the IBC. Below is the revised IBC text for clarity:.

1028.9.1 Minimum aisle width. The minimum clear width for *aisles* shall be as shown:

1. Forty-eight inches (1219 mm) for *stepped aisles* having seating on each side.

Exception: Thirty-six inches (914 mm) where the *aisle* serves less than 50 seats.

2. Thirty-six inches (914 mm) for *aisle stairs* having seating on only one side.

Exception: Twenty-three inches (584 mm) between an *aisle stair handrail* and seating where an *aisle* does not serve more than five rows on one side

3. Twenty-three inches (584 mm) between an *aisle stair handrail* or *guard* and seating where the aisle is subdivided by a handrail.
4. Forty-two inches (1067 mm) for level or ramped *aisles* having seating on both sides.

Exceptions:

1. Thirty-six inches (914 mm) where the *aisle* serves less than 50 seats.
2. Thirty inches (762 mm) where the *aisle* does not serve more than 14 seats.
5. Thirty-six inches (914 mm) for level or ramped *aisles* having seating on only one side.

Exception: Thirty inches (762 mm) where the *aisle* does not serve more than 14 seats.

Cost Impact: This change will not increase the cost of construction

F235-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1104.22-F-ZUBIA-FCAC

F236 – 13

1105 (New)

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care (john.williams@doh.wa.gov) and Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee (cbaldassarra@RJAGroup.com)

Add new text as follows:

SECTION 1105 **INCIDENTAL USES IN EXISTING GROUP I-2**

1105.1 General. Incidental uses associated with and located within existing single occupancy or mixed occupancy Group I-2 buildings and that generally pose a greater level of risk to such occupancies shall comply with the provisions of Sections 1105.2 through 1105.4.2.1. Incidental uses in Group I-2 occupancies are limited to those listed in Table 1105.1.

1105.2 Occupancy classification. Incidental uses shall not be individually classified in accordance with Section 302.1 of the *International Building Code*. Incidental uses shall be included in the building occupancies within which they are located.

1105.3 Area limitations. Incidental uses shall not occupy more than 10 percent of the *building area* of the *story* in which they are located.

1105.4 Separation and protection. The incidental uses listed in Table 1105.1 shall be separated from the remainder of the building or equipped with an *automatic sprinkler system*, or both, in accordance with the provisions of that table.

1105.4.1 Separation. Where Table 1105.1 specifies a fire-resistance-rated separation, the incidental uses shall be separated from the remainder of the *building* in accordance with Section 509.4.1 of the *International Building Code*.

1105.4.2 Protection. Where Table 1105.1 permits an *automatic sprinkler system* without a fire-resistance-rated separation, the incidental uses shall be separated from the remainder of the building by construction capable of resisting the passage of smoke in accordance with Section 509.4.2 of the *International Building Code*.

1105.4.2.1 Protection limitation. Except as otherwise specified in Table 1105.1 for certain incidental uses, where an *automatic sprinkler system* is provided in accordance with Table 1105.1, only the space occupied by the incidental use need be equipped with such a system.

TABLE 1105.1
INCIDENTAL USES IN EXISTING GROUP I-2 OCCUPANCIES

<u>ROOM OR AREA</u>	<u>SEPARATION AND/OR PROTECTION</u>
<u>Furnace room where any piece of equipment is over 400,000 Btu per hour input.</u>	<u>1 hour or provide automatic sprinkler system</u>
<u>Rooms with boilers where the largest piece of equipment is over 15 psi and 10 horsepower</u>	<u>1 hour or provide automatic sprinkler system</u>
<u>Refrigerant machinery room</u>	<u>1 hour or provide automatic sprinkler system</u>
<u>Hydrogen cutoff rooms, not classified as Group H</u>	<u>2 hours</u>
<u>Incinerator rooms</u>	<u>2 hours and provide automatic sprinkler system</u>
<u>Paint shops not classified as Group H</u>	<u>2 hours; or 1 hour and provide automatic sprinkler</u>

<u>ROOM OR AREA</u>	<u>SEPARATION AND/OR PROTECTION</u>
	<u>system</u>
<u>Laboratories and vocational shops, not classified as Group H</u>	<u>1 hour or provide automatic sprinkler system</u>
<u>Laundry rooms over 100 square feet</u>	<u>1 hour or provide automatic sprinkler system</u>
<u>Patient rooms equipped with padded surfaces</u>	<u>1 hour or provide automatic sprinkler system</u>
<u>Physical plant maintenance shops.</u>	<u>1 hour or provide automatic sprinkler system</u>
<u>Waste and linen collection rooms with containers with total volume of 10 cubic feet or greater.</u>	<u>1 hour or provide automatic sprinkler system</u>
<u>Storage rooms greater than 100 square feet</u>	<u>1 hour or provide automatic sprinkler system</u>
<u>Stationary storage battery systems having a liquid electrolyte capacity of more than 50 gallons for flooded lead-acid, nickel cadmium or VRLA, or more than 1,000 pounds for lithium-ion and lithium metal polymer used for facility standby power, emergency power or uninterruptable power supplies</u>	<u>2 hours</u>

For SI: 1 square foot = 0.0929 m², 1 pound per square inch (psi) = 6.9 kPa, 1 British thermal unit (Btu) per hour = 0.293 watts, 1 horsepower = 746 watts, 1 gallon = 3.785 L.

(Renumber subsequent sections)

Reason: This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>

This proposal is being co-sponsored by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public. In 2012, three of the 25 face-to face meetings were held. In addition to the CTC meetings, the CTC established Study Groups (SG) of interested parties for each of the areas of study. These SG's are responsible for reviewing the available information and making recommendations to the CTC. All totaled, the SG's held over 70 conference calls in 2012.

The provisions of this code change are being proposed for the IFC to establish requirements for the protection of incidental use areas in existing Group I-2 occupancies. Incidental use area provisions are applicable to new construction in Section 509 of the IBC, however similar provisions are needed for existing Group I-2 occupancies since the hazards posed by such rooms or spaces are no different for existing buildings than for new. Proposed Section and Table 1105.1 are very similar to and based upon IBC Section and Table 509, except that references to occupancies other than Group I-2 are not included. The basic requirements proposed for incidental uses in existing healthcare occupancies rely upon the provisions of the IBC for the specifics of construction and protection. Proposed Sections 1105.2 through 1105.4.2.1 are based on IBC Sections 509.2 through 509.4.2.1, editorially corrected for the IFC and for correlation. These proposed provisions will provide correlation with not only the IBC but also with the current operational and CMS program standards for existing Group I-2 occupancies. A section-by-section summary follows:

1105.1: This proposed section establishes the scope of Section 1105 and its applicability to Group I-2 occupancies. Incidental uses are rooms or areas that constitute special hazards or risks to life safety that are not typically addressed by the provisions for the occupancy group in which they occur even though such rooms or areas may functionally be an extension of the primary use. Only those rooms or areas indicated in Table 1105 are to be regulated as incidental uses. Incidental uses can be located within both single-occupancy and mixed-occupancy buildings. The concern is that those areas designated as incidental uses pose a risk to the remainder of the building, and as such, some degree of protection is required. In general, the nature of these incidental uses is such that they are small areas that are not frequented by the building occupants very often in which a fire could get underway and go unnoticed for a longer time than in a part of the building that is constantly occupied.

1105.2: Consistent with the IBC, this proposed section expressly states that incidental uses are not considered as separate and distinct occupancy classifications but, rather, are classified the same as the occupancies in which they are located. As an example, a waste and linen collection room in a hospital would be classified as a portion of the Group I-2 occupancy even though it may present a level of hazard more akin to a Group S-1 occupancy if it were to be classified separately.

1105.3: The proposed floor area limitation of 10 percent for incidental uses emphasizes the ancillary nature of such rooms and areas and correlates with the IBC. Each incidental use would be limited to a maximum floor area of 10 percent of the floor area of the story in which it is located. Where there are two or more tenants located on the same story, the 10 percent limitation is based upon the floor area of each individual tenant space rather than that of the entire story. The application of the limit on a tenant-by-tenant basis is consistent with the concept of incidental uses typically being ancillary only to a portion of the building, i.e., the specific tenant occupancy.

1105.4: In addition to identifying those rooms or areas that warrant regulation as incidental uses, proposed Table 1105.1 will also indicate the required degree of protection or separation. The requirements identified in Table 1105.1 vary depending on the incidental use. In some cases, a specific type of separation and/or protection is required, while in others there is an option.

1105.4.1: Where a fire-resistance rated separation would be required, the incidental use would need to be separated from other portions of the building in accordance with assemblies complying with the IBC.

1105.4.2: In this proposed section, where Table 1105.1 would allow protection by an automatic sprinkler system without a fire-resistance-rated separation, the construction enclosing the incidental use would still need to resist the passage of smoke. Construction details for resisting the passage of smoke are provided in the IBC.

1105.4.2.1: This proposed section makes it clear that the sprinkler systems stipulated in Table 1105 would be required for the incidental use area only.

TABLE 1105.1: Proposed Table 1105.1 identifies the incidental uses and the required separation or other protection that would need to be provided in all Group I-2 occupancies.

Information note: IBC Table 509 was revised by approved Group A code change G130-12, also submitted by the AHC, which is reproduced here below for reference purposes only:

G130 – 12
Table 509

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care

Revise as follows:

TABLE 509
INCIDENTAL USES

ROOM OR AREA	SEPARATION AND/OR PROTECTION
Furnace room where any piece of equipment is over 400,000 Btu per hour input.	1 hour or provide automatic sprinkler system
Rooms with boilers where the largest piece of equipment is over 15 psi and 10 horsepower	1 hour or provide automatic sprinkler system
Refrigerant machinery room	1 hour or provide automatic sprinkler system
Hydrogen cutoff rooms, not classified as Group H	1 hour in Group B, F, M, S and U occupancies; 2 hours in Group A, E, I and R occupancies.
Incinerator rooms	2 hours and provide automatic sprinkler system
Paint shops, not classified as Group H, located in occupancies other than Group F	2 hours; or 1 hour and provide automatic sprinkler system
<u>In Group E occupancies, laboratories and vocational shops; not classified as Group H, located in Group E or I-2 occupancy</u>	1 hour or provide automatic sprinkler system
<u>In Group I-2 occupancies, laboratories not classified as Group H</u>	<u>1 hour and provide automatic sprinkler system</u>
<u>In ambulatory care facilities, laboratories not classified as Group H</u>	<u>1 hour or provide automatic sprinkler system</u>
Laundry rooms over 100 square feet	1 hour or provide automatic sprinkler system
<u>In Group I-2, laundry rooms over 100 square feet</u>	<u>1 hour</u>
Group I-3 cells and <u>Group I-2 patient rooms</u> equipped with padded surfaces	1 hour
<u>In Group I-2, physical plant maintenance shops.</u>	<u>1 hour</u>
<u>In ambulatory care facilities or Group I-2 occupancies, waste and linen collection rooms located in either Group I-2 occupancies or ambulatory care facilities with containers that have an aggregate volume of 10 cubic feet or greater</u>	1 hour
<u>In other than ambulatory care facilities and Group I-2 occupancies, waste and linen collection rooms over 100 square feet</u>	1 hour or provide automatic sprinkler system
<u>In ambulatory care facilities or Group I-2 occupancies, storage rooms greater than 100 square feet</u>	<u>1 hour</u>
Stationary storage battery systems having a liquid electrolyte capacity of more than 50 gallons for flooded lead-acid, nickel cadmium or	1 hour in Group B, F, M, S and U occupancies; 2 hours in Group A, E, I and R occupancies.

VRLA, or more than 1,000 pounds for lithium-ion and lithium metal polymer used for facility standby power, emergency power or uninterruptable power supplies	
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For SI: 1 square foot = 0.0929 m², 1 pound per square inch (psi) = 6.9 kPa, 1 British thermal unit (Btu) per hour = 0.293 watts, 1 horsepower = 746 watts, 1 gallon = 3.785 L.

Reason: This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 5 open meetings and over 80 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>

Currently, more detail is needed in the Incidental Use table to add spaces currently being maintained in healthcare and ambulatory care occupancies. The above chart makes the noted tables consistent with current operational and programmatic standards in the Group I-2 occupancy.

The current version of the table does not address the occasion when materials in a laboratory increases, most notably in the aggregate of larger histology / cytology laboratories. Materials such as xylene, hydrochloric acid, ethanol and fixatives (among others) are present in these areas. Although they are stored in gallon and liter quantities, and not bulk storage, the quantities add up over the larger lab control areas when they are in use at the benches.

The distinction between smaller stat labs, largely found in ambulatory care facilities, and larger clinical labs, found in hospitals, is being proposed. Ambulatory care facilities has been added to the current laboratory category to address those support spaces such as stat labs that are set up for a specific time-sensitive purpose, such as blood draw and chemotherapy, to save time in the Group B occupancy setting. Larger scale or non-critical lab operations are typically sent out to proprietary labs from ambulatory facilities. When addressing labs crossing the threshold into one hour rated construction, these labs are typically constructed as stand-alone operations and commonly appear in Group B occupancies, and are subject to the current occupancy separation requirements.

Volume thresholds are being considered in waste and linen collection rooms because basic exam spaces contain some level of waste containers and linen hampers without rising to the level of storage. The 10 cubic foot threshold represents essentially two medium sized linen hampers and/or trash receptacles. Larger linen and waste receptacle containers, and not the smaller containers typically found in an exam room or patient sleeping room, are subject to volume rather than square footage of the room because a relatively small space, with the 10 cubic foot threshold crossed in a space well below, for example, 100 square feet.

Group I-2 is also being added to the requirement for one hour rating with rooms equipped with padded surfaces. The instance of these rooms existing in a hospital is rare. It is prudent, however, to add the requirement where there is the occasion that such rooms are used in areas such as emergency departments, inpatient psychiatric units, or similar areas.

Physical plant and maintenance shops are a very specific function in a hospital building, and are being added to the table to ensure protection due to the stored materials related to the physical plant operation.

Addition of storage rooms as an area requiring 1 hour rated protection is a key functional aspect of a Group I-2 healthcare building. Areas that become unused become storage areas very quickly. Specifically calling out storage areas helps define and control the storage of combustibles, and avoid creating random storage in otherwise unmonitored or unprotected areas.

Areas addressed in the past, but are no longer included in the table, are addressed in the International Fire Code (IFC). For example, storage of combustible gases is addressed in IFC Section 5306.2 and has specific references to the Group I-2 occupancy. Gift shops, formerly listed as an incidental area requiring protection, have largely been eliminated from these requirements in the I-Codes and other model codes, and are addressed in the context of being open to the corridor. In consideration of ambulatory care facilities, where not otherwise specifically called out, categories that are required for both Group B and I occupancies are assumed to cover Group I-2 and ambulatory care facilities. Examples of this interpretation are hydrogen cut-off rooms and stationary battery storage.

Cost Impact: None

Cost Impact: The code change proposal should not increase the cost of construction because compliance with similar requirements is already required by facility licensure requirements.

F236-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1105 (NEW) #2-F-BALDASSARRA-WILLIAMS-ADHOC

F237 – 13

1105 (New), 1105.1 (New), 1105.7 (New), 1105.8 (New); Table 1103.1; 1103.5.2, 1103.7.3

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care (john.williams@doh.wa.gov) and Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee (cbaldassarra@RJAGroup.com)

Add new text as follows:

SECTION 1105 CONSTRUCTION REQUIREMENTS FOR EXISTING GROUP I-2

IFC 1105.1 General. Existing Group I-2 shall meet the following requirements:

1. The minimum fire safety requirements in Section 1103, and
2. The minimum mean of egress requirements in Section 1104, and
3. The additional egress and construction requirements in Sections 1105.

Where the provisions of this chapter conflict with the construction requirements that applied at the time of construction, the most restrictive provision shall apply.

1105.7 Group I-2 automatic sprinkler system. An automatic sprinkler system installed in accordance with Section 903.3.1 shall be provided throughout existing Group I-2 fire areas. The sprinkler system shall be provided throughout the floor where the Group I-2 occupancy is located, and in all floors between the Group I-2 occupancy and the level of exit discharge.

1105.8 Group I-2 automatic fire alarm system. An automatic fire alarm system shall be installed in existing Group I-2 occupancies in accordance with Section 907.2.6.2.

Exception: Manual fire alarm boxes in patient sleeping areas shall not be required at exits if located at all nurses' control stations or other constantly attended staff locations, provided such stations are visible and continuously accessible and that travel distances required in Section 907.5.2.1 are not exceeded.

Revise as follows:

**TABLE 1103.1
OCCUPANCY AND USE REQUIREMENTS^a**

Section n	Use			Occupancy Classification																		
	High rise	Atrium or covered mall	Under- ground building	A	B	E	F	H -1	H -2	H -3	H -4	H -5	I- 1	I- 2	I- 3	I- 4	M	R -1	R -2	R -3	R -4	S
1104	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
1105	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	R	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮

(Portions of table not shown remain unchanged)

R = The building is required to comply.

- a. Existing buildings shall comply with the sections identified as "Required" (R) based on occupancy classification or use, or both, whichever is applicable.

1103.5.2 Group I-2. ~~An automatic sprinkler system shall be provided throughout existing Group I-2 fire areas. The sprinkler system shall be provided throughout the floor where the Group I-2 occupancy is located, and in all floors between the Group I-2 occupancy and the level of exit discharge. In Group I-2, an automatic sprinkler system shall be provided in accordance with Section 1105.7.~~

1103.7.3 Group I-2. ~~An automatic fire alarm system shall be installed in existing Group I-2 occupancies in accordance with Section 907.2.6.2. In Group I-2, an automatic fire alarm system shall be installed in accordance with Section 1105.8.~~

Exception: ~~Manual fire alarm boxes in resident or patient sleeping areas shall not be required at exits if located at all nurses' control stations or other constantly attended staff locations, provided such stations are visible and continuously accessible and that travel distances required in Section 907.5.2.1 are not exceeded.~~

Reason: This change adds minimum requirements for existing Group I-2 into Chapter 11. The intent is to increase the bare minimum safety requirements due to the fragile and sensitive populations within these facilities. These requirements are meant to be applied retroactively. This is not a new concept for these facilities – it aligns with the current approach by the Center for Medicaid and Medicare Services (CMS), the federal authority having jurisdiction. Hospitals are now required by CMS to have a life safety survey on a regular basis. If the facility does not meet certain life safety minimums, they are required to upgrade their existing facility. This code change will align the Fire Code with those CMS minimum requirements and will hopefully lead to industry consolidation. These retroactive requirements are added to assist code officials and surveyors during the ongoing regular inspection of hospital facilities and are consistent with the inspections required by federal laws for certification and reimbursement. The requirements consider the minimum previously approved construction methods. These requirements will provide jurisdictions the ability to adopt minimum retroactive provisions that have been vetted by the industry as well as code officials and that are consistent with current national standards used by the Federal Government providing a more uniform level of safety and eliminating many of the current code conflicts for existing facilities.

We looked at several sources to determine what the appropriate minimum bar should be, including the current building and fire code, current CMS guidelines, and previous versions of the ICC and model codes. On all issues, enforcement agencies and the regulated facilities weighed in to ensure that these changes are both necessary and achievable.

The intent of this proposal is to create a new Section 1105, to have a section for Group I-2 specific and unique requirements. Section 1105.1 General, provides a general scoping for this section. Areas in the hospital and nursing homes not in patient care areas will use the general provisions in Section 1103 and 1104. Where there are more restrictive provisions for hospitals or nursing homes, they will be listed in Section 1105.

Current provisions that were relocated to this section (1105.7 – automatic sprinkler system; 1105.8 – automatic fire alarm system) will remain applicable to all Group I-2. Section 1105.7, sprinkler requirements is relocated from 1103.5.2. Section 1105.8, automatic fire alarm system is relocated from 1103.7.3.

There is a package of proposal that are intended to be incorporated into this section. Below is how a new Section 1105 will look if all the proposals are accepted.

IFC SECTION 1105 CONSTRUCTION REQUIREMENTS FOR EXISTING GROUP I-2

IFC 1105.1 General. Existing Group I-2 shall meet the following requirements:

1. The minimum fire safety requirements in Section 1103, and
2. The minimum mean of egress requirements in Section 1104, and
3. The additional egress and construction requirements in Sections 1105.

Where the provisions of this chapter conflict with the construction requirements that applied at the time of construction, the most restrictive provision shall apply.

1105.2 Construction. Group I-2 Condition 2 shall not be located on a floor level higher than the floor level limitation in Table 1105.2 based on the type of construction.

**Table 1105.2
FLOOR LEVEL LIMITATIONS FOR GROUP I-2 Condition 2**

Construction Type	Automatic Sprinkler System	Allowable Floor Level ^a			
		1	2	3	4 or more
IA	Note b	P	P	P	P
	Note c	P	P	P	P
IB	Note b	P	P	P	P

Construction Type	Automatic Sprinkler System	Allowable Floor Level ^a			
		1	2	3	4 or more
	Note c	P	P	P	P
IIA	Note b	P	P	P	NP
	Note c	P	NP	NP	NP
IIB	Note b	P	P	NP	NP
	Note c	NP	NP	NP	NP
IIIA	Note b	P	P	NP	NP
	Note c	P	NP	NP	NP
IIIB	Note b	P	NP	NP	NP
	Note c	NP	NP	NP	NP
IV	Note b	P	P	NP	NP
	Note c	NP	NP	NP	NP
VA	Note b	P	P	NP	NP
	Note c	NP	NP	NP	NP
VB	Note b	P	NP	NP	NP
	Note c	NP	NP	NP	NP

P = Permitted; NP = Not Permitted

- Floors level shall be counted based on the number of stories above grade.
- The building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.
- The building is equipped with an automatic sprinkler system in accordance with Section 1105.7.

1105.3 Corridor construction. In Group I-2, in areas housing patient sleeping or care rooms, corridor walls and the opening protectives therein shall provide a barrier designed to resist the passage of smoke in accordance with Sections 1105.3.1 through 1105.3.7.

1105.3.1 Materials. The walls shall be of materials permitted by the building type of construction.

1105.3.2 Fire-resistance rating. Unless required elsewhere in the code, corridor walls are not required to have a fire-resistance rating.

1105.3.3 Corridor Walls Continuity. Corridor walls shall extend from the top of the foundation or floor below to one of the following:

- The underside of the floor or roof sheathing, deck or slab above.
- The underside of a ceiling above where the ceiling membrane is constructed to limit the passage of smoke.
- The underside of a lay-in ceiling system where the ceiling tiles weigh at least one pound per square foot of tile.

1105.3.4 Openings in corridor walls. Openings in corridor walls shall provide protection in accordance with 1105.3.4.1 through 1105.3.4.3.

1105.3.4.1 Windows. Windows in corridor walls shall be sealed to limit the passage of smoke, or the window shall be automatic closing upon detection of smoke, or the window opening shall be protected by an automatic closing device that closes upon detection of smoke.

Exception: In smoke compartments not containing patient sleeping rooms, pass-through windows or similar openings shall be permitted in accordance with Section 1105.3.4.3.

1105.3.4.2 Doors. Doors in corridor walls shall comply with Sections 1105.3.4.2.1 through 1105.3.4.2.3.

1105.3.4.2.1 Louvers. Doors in corridor walls shall not include louvers, transfer grills or similar openings.

Exception: Doors shall be permitted to have louvers, transfer grills or similar openings at toilet rooms or bathrooms; storage rooms that do not contain storage of flammable or combustible material; and storage rooms that are not required to be separated as incidental uses.

1105.3.4.2.2 Corridor doors. Doors in corridor walls shall limit the transfer of smoke by complying with the following:

1. Doors shall be constructed of not less than 1-3/4 inch (44 mm) thick solid bonded core wood or capable of resisting fire for a minimum of 1/3 hours.

Exception: Corridor doors in buildings equipped throughout with an automatic sprinkler system.

2. Frames for side hinged swinging doors shall have stops on the sides and top to limit transfer of smoke.
3. Where provided, vision panels in doors shall be a fixed glass window assembly installed to limit the passage of smoke. Existing wired glass panels with steel frames shall be permitted to remain in place.
4. Doors undercuts shall not exceed 1 inch (25 mm).
5. Doors shall be positive latching with devices that resist not less than 5 pounds (22.2 N). Roller latches are prohibited.
6. Mail slots or similar openings shall be permitted in accordance with Section 1105.3.4.3.

1105.3.4.2.3 Dutch doors. Where provided, dutch doors shall comply with Section 1105.3.4.2.2. In addition, dutch doors shall be equipped with latching devices on either the top or bottom leaf to allow leaves to latch together. The space between the leaves shall be protected with devices such as astragals to limit the passage of smoke.

1105.3.4.2.4 Self- or automatic-closing doors. Where self- or automatic-closing doors are required, closers shall be maintained in operational condition.

1105.3.4.3 Openings in corridor walls and doors. Mail slots, pass through windows or similar openings shall not be required to be protected where the aggregate area of the openings between the corridor and a room are not greater than 80 square inches (51 613 mm²) and are located with the top edge of any opening no higher than 48 inches above the floor.

1105.3.5 Penetrations. The space around penetrating items shall be filled with an *approved* material to limit the passage of smoke.

1105.3.6 Joints. Joints shall be filled with an *approved* material to limit the passage of smoke.

1105.3.7 Ducts and air transfer openings. The space around a duct penetrating a smoke partition shall be filled with an *approved* material to limit the passage of smoke. Air transfer openings in smoke partitions shall be provided with a *smoke damper* complying with Section 717.3.2.2 of the International Building Code.

Exception: Where the installation of a *smoke damper* will interfere with the operation of a required smoke control system in accordance with Section 909, *approved* alternative protection shall be utilized.

1105.4 Means of egress. In addition to the means of egress requirements in Section 1104, Group I-2 facilities shall meet the means of egress requirements in Section 1105.4.1 through 1105.4.7.

1105.4.1 Exit signs and emergency illumination. The power system for exit signs and emergency illumination for the means of egress shall provide power for not less than 90 minutes and consist of storage batteries, unit equipment or an on-site generator.

1105.4.2 Emergency power for operational needs. The essential electrical system shall be capable of supplying services in accordance with NFPA 99.

1105.4.3 Size of Door. Means of egress doors used for the movement of patients in beds shall provide a minimum clear width of 41.5 inches (1054 mm). The height of door opening shall not be less than 80 inches (2032 mm).

Exception: Door closers and door stops shall be permitted to be 78 inches minimum above the floor.

1105.4.4 Ramps. In areas where ramps are used for movement of patients in beds, the clear width of the ramp shall not be less than 48 inches (1219 mm).

1105.4.5 Corridor width. In areas where corridors are used for movement of patients in beds, the clear width of the corridor shall not be less than 48 inches (1219 mm).

1105.4.6 Dead end corridors. In smoke compartments containing patient sleeping rooms and treatment rooms, dead end corridors shall not exceed 30 feet unless approved by the fire official.

1105.4.7 Aisles. In areas where aisles are used for movement of patients in beds, the clear width of the aisle shall not be less than 48 inches (1219 mm).

1105.5 Smoke compartments. Smoke compartments shall be provided in existing Group I-2 Condition 2, in accordance with Sections 1105.5.1 through 1105.5.4.

1105.5.1 Design. Smoke barriers shall be provided to subdivide each story used for patients sleeping with an occupant load of more than 30 patients into no fewer than two smoke compartments.

1105.5.1.1 Refuge areas. Refuge areas shall be provided within each smoke compartment. The size of the refuge area shall accommodate the occupants and care recipients from the adjoining smoke compartment. Where a smoke compartment is adjoined

by two or more smoke compartments, the minimum area of the refuge area shall accommodate the largest occupant load of the adjoining compartments.

The size of the refuge area shall provide the following:

1. Not less than 30 net square feet (2.8 m²) for each care recipient confined to bed or stretcher.
2. Not less than 15 square feet (1.4 m²) for each resident in a Group I-2 using mobility assistance devices.
3. Not less than 6 square feet (0.56 m²) for each occupant not addressed in Items 1 and 2.

Areas of spaces permitted to be included in the calculation of the refuge area of corridors, sleeping areas, treatment rooms, lounge or dining areas and other low-hazard areas.

1105.5.2 Smoke barriers. Smoke barriers shall be constructed in accordance with Section 709 of the *International Building Code*.

Exceptions:

1. Existing smoke barriers with a minimum of 1/2 –hour fire-resistance rating are permitted to remain.
2. Smoke barriers shall be permitted to terminate at an atrium enclosure in accordance with Section 404.6 of the *International Building Code*.

1105.5.3 Opening protectives. Openings in smoke barriers shall be protected in accordance with Section 716 of the *International Building Code*. Opening protectives shall have a minimum fire-protection-rating of 1/3 hours.

Exception: Wired glass vision panels in doors shall be permitted to remain.

1105.5.4 Duct and air transfer openings. Penetrations in a smoke barrier by duct and air transfer openings shall comply with Section 717 of the *International Building Code*.

Exception: Where existing duct and air transfer openings in smoke barriers exist without smoke dampers, they shall be permitted to remain. Any changes to existing smoke dampers shall be submitted for review and approved in accordance with IBC Section 717 of the *International Building Code*.

1105.6 Group I-2 care suites. Care suites in existing Group I-2 Condition 2 occupancies shall comply with Section 407.4.3 through 407.4.3.6.2 of the *International Building Code*.

1105.7 Group I-2 automatic sprinkler system. An automatic sprinkler system installed in accordance with Section 903.3.1 shall be provided throughout existing Group I-2 fire areas. The sprinkler system shall be provided throughout the floor where the Group I-2 occupancy is located, and in all floors between the Group I-2 occupancy and the level of exit discharge.

1105.8 Group I-2 automatic fire alarm system. An automatic fire alarm system shall be installed in existing Group I-2 occupancies in accordance with Section 907.2.6.2.

Exception: Manual fire alarm boxes in patient sleeping areas shall not be required at exits if located at all nurses' control stations or other constantly attended staff locations, provided such stations are visible and continuously accessible and that travel distances required in Section 907.5.2.1 are not exceeded.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering, a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>.

This proposal is being co-sponsored by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

Cost Impact: None

F237-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1105 (NEW) #1-F-BALDASSARRA-WILLIAMS-ADHOC

F238 – 13

1105.2 (New), Table 1105.2 (New)

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care

Add new text as follows:

SECTION 1105 **CONSTRUCTION REQUIREMENTS FOR EXISTING GROUP I-2**

1105.2 Construction. Group I-2 Condition 2 shall not be located on a floor level higher than the floor level limitation in Table 1105.2 based on the type of construction.

Table 1105.2
FLOOR LEVEL LIMITATIONS FOR GROUP I-2 Condition 2

<u>Construction Type</u>	<u>Automatic Sprinkler System</u>	<u>Allowable Floor Level^a</u>			
		<u>1</u>	<u>2</u>	<u>3</u>	<u>4 or more</u>
<u>IA</u>	<u>Note b</u>	<u>P</u>	<u>P</u>	<u>P</u>	<u>P</u>
	<u>Note c</u>	<u>P</u>	<u>P</u>	<u>P</u>	<u>P</u>
<u>IB</u>	<u>Note b</u>	<u>P</u>	<u>P</u>	<u>P</u>	<u>P</u>
	<u>Note c</u>	<u>P</u>	<u>P</u>	<u>P</u>	<u>P</u>
<u>IIA</u>	<u>Note b</u>	<u>P</u>	<u>P</u>	<u>P</u>	<u>NP</u>
	<u>Note c</u>	<u>P</u>	<u>NP</u>	<u>NP</u>	<u>NP</u>
<u>IIB</u>	<u>Note b</u>	<u>P</u>	<u>P</u>	<u>NP</u>	<u>NP</u>
	<u>Note c</u>	<u>NP</u>	<u>NP</u>	<u>NP</u>	<u>NP</u>
<u>IIIA</u>	<u>Note b</u>	<u>P</u>	<u>P</u>	<u>NP</u>	<u>NP</u>
	<u>Note c</u>	<u>P</u>	<u>NP</u>	<u>NP</u>	<u>NP</u>
<u>IIIB</u>	<u>Note b</u>	<u>P</u>	<u>NP</u>	<u>NP</u>	<u>NP</u>
	<u>Note c</u>	<u>NP</u>	<u>NP</u>	<u>NP</u>	<u>NP</u>
<u>IV</u>	<u>Note b</u>	<u>P</u>	<u>P</u>	<u>NP</u>	<u>NP</u>
	<u>Note c</u>	<u>NP</u>	<u>NP</u>	<u>NP</u>	<u>NP</u>
<u>VA</u>	<u>Note b</u>	<u>P</u>	<u>P</u>	<u>NP</u>	<u>NP</u>
	<u>Note c</u>	<u>NP</u>	<u>NP</u>	<u>NP</u>	<u>NP</u>
<u>VB</u>	<u>Note b</u>	<u>P</u>	<u>NP</u>	<u>NP</u>	<u>NP</u>
	<u>Note c</u>	<u>NP</u>	<u>NP</u>	<u>NP</u>	<u>NP</u>

P = Permitted; NP = Not Permitted

a. Floors level shall be counted based on the number of stories above grade.

b. The building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

c. The building is equipped with an automatic sprinkler system in accordance with Section 1105.7.

Reason: This change adds minimum requirements for existing hospitals (Group I-2, Condition 2) into Chapter 11. The intent is to increase the bare minimum safety requirements due to the fragile and sensitive populations within these facilities. These requirements are meant to be applied retroactively. This is not a new concept for these facilities – it aligns with the current approach by the Center for Medicaid and Medicare Services (CMS), the federal authority having jurisdiction. Hospitals are now required by CMS to have a life safety survey on a regular basis. If the facility does not meet certain life safety minimums, they are required to upgrade their existing facility. This code change will align the Fire Code with those CMS minimum requirements and will hopefully lead to industry consolidation. These retroactive requirements are added to assist code officials and surveyors during the ongoing regular inspection of hospital facilities and are consistent with the inspections required by federal laws for certification and reimbursement. The requirements consider the minimum previously approved construction methods. These requirements will

provide jurisdictions the ability to adopt minimum retroactive provisions that have been vetted by the industry as well as code officials and that are consistent with current national standards used by the Federal Government providing a more uniform level of safety and eliminating many of the current code conflicts for existing facilities.

We looked at several sources to determine what the appropriate minimum bar should be, including the current building and fire code, current CMS guidelines, and previous versions of the ICC and model codes. On all issues, enforcement agencies and the regulated facilities weighed in to ensure that these changes are both necessary and achievable.

These provisions are written specifically for hospitals (Group I-2, Condition 2). These retroactive requirements are added to assist code officials and surveyors during the ongoing regular inspection of hospital facilities. These inspections are required by federal laws for certification and reimbursement. This requirement considers the minimum previously approved construction methods. This is consistent with the federal requirements that these facilities are currently held too.

The revision to Section 1105.2 is proposed this retroactive limitation requirement for the allowable height based upon construction type because it is a key component of the regulatory approval for a health care facility, and so that surveying and licensing requirements can be documented and provided for in the IFC. Without these limitations provided for in the IFC, to which the healthcare industry is required to comply and support, the implementation and use of the IFC as a compliance document could not be possible. While most if not all existing hospitals were constructed to comply with these minimum construction requirements, many were constructed using methods that pre-dated the current construction type matrix, and were comprised of an "assembly" (i.e. minimum thickness concrete slab with a metal lath and plaster ceiling below) which provided the necessary fire rating. This section will allow all hospitals to be evaluated on an ongoing basis to verify the system/assembly used to obtain the required fire rating will be maintained or replaced with an equivalent system/assembly.

The existing allowance for the occupancies as stipulated in the proposed table, are less than that for new construction and do not increase the cost of construction and operations beyond what is currently mandated for healthcare facilities.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering, a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>.

Cost Impact: None

F238-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1105.2 (NEW)-F-WILLIAMS-ADHOC

F239 – 13

1105.3 (New); 202 (New)

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care (john.williams@doh.wa.gov) and Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee (cbaldassarra@RJAGroup.com)

Add new text as follows:

IFC SECTION 1105 **CONSTRUCTION REQUIREMENTS FOR EXISTING GROUP I-2**

1105.3 Corridor construction. In Group I-2, in areas housing patient sleeping or care rooms, corridor walls and the opening protectives therein shall provide a barrier designed to resist the passage of smoke in accordance with Sections 1105.3.1 through 1105.3.7.

1105.3.1 Materials. The walls shall be of materials permitted by the building type of construction.

1105.3.2 Fire-resistance rating. Unless required elsewhere in the code, corridor walls are not required to have a fire-resistance rating.

1105.3.3 Corridor Walls Continuity. Corridor walls shall extend from the top of the foundation or floor below to one of the following:

1. The underside of the floor or roof sheathing, deck or slab above.
2. The underside of a ceiling above where the ceiling membrane is constructed to limit the passage of smoke.
3. The underside of a lay-in ceiling system where the ceiling tiles weigh at least one pound per square foot of tile.

1105.3.4 Openings in corridor walls. Openings in corridor walls shall provide protection in accordance with 1105.3.4.1 through 1105.3.4.3.

1105.3.4.1 Windows. Windows in corridor walls shall be sealed to limit the passage of smoke, or the window shall be automatic closing upon detection of smoke, or the window opening shall be protected by an automatic closing device that closes upon detection of smoke.

Exception: In smoke compartments not containing patient sleeping rooms, pass-through windows or similar openings shall be permitted in accordance with Section 1105.3.4.3.

1105.3.4.2 Doors. Doors in corridor walls shall comply with Sections 1105.3.4.2.1 through 1105.3.4.2.3.

1105.3.4.2.1 Louvers. Doors in corridor walls shall not include louvers, transfer grills or similar openings.
Exception: Doors shall be permitted to have louvers, transfer grills or similar openings at toilet rooms or bathrooms; storage rooms that do not contain storage of flammable or combustible material; and storage rooms that are not required to be separated as incidental uses.

1105.3.4.2.2 Corridor doors. Doors in corridor walls shall limit the transfer of smoke by complying with the following:

1. Doors shall be constructed of not less than 1-3/4 inch (44 mm) thick solid bonded core wood or capable of resisting fire for a minimum of 1/3 hours.

Exception: Corridor doors in buildings equipped throughout with an automatic sprinkler system.

2. Frames for side hinged swinging doors shall have stops on the sides and top to limit transfer of smoke.
3. Where provided, vision panels in doors shall be a fixed glass window assembly installed to limit the passage of smoke. Existing wired glass panels with steel frames shall be permitted to remain in place.
4. Doors undercuts shall not exceed 1 inch (25 mm).
5. Doors shall be positive latching with devices that resist not less than 5 pounds (22.2 N). Roller latches are prohibited.
6. Mail slots or similar openings shall be permitted in accordance with Section 1105.3.4.3.

1105.3.4.2.3 Dutch doors. Where provided, dutch doors shall comply with Section 1105.3.4.2.2. In addition, dutch doors shall be equipped with latching devices on either the top or bottom leaf to allow leaves to latch together. The space between the leaves shall be protected with devices such as astragals to limit the passage of smoke.

1105.3.4.2.4 Self- or automatic-closing doors. Where self- or automatic-closing doors are required, closers shall be maintained in operational condition.

1105.3.4.3 Openings in corridor walls and doors. Mail slots, pass through windows or similar openings shall not be required to be protected where the aggregate area of the openings between the corridor and a room are not greater than 80 square inches (51 613 mm²) and are located with the top edge of any opening no higher than 48 inches above the floor.

1105.3.5 Penetrations. The space around penetrating items shall be filled with an *approved* material to limit the passage of smoke.

1105.3.6 Joints. Joints shall be filled with an *approved* material to limit the passage of smoke.

1105.3.7 Ducts and air transfer openings. The space around a duct penetrating a smoke partition shall be filled with an *approved* material to limit the passage of smoke. Air transfer openings in smoke partitions shall be provided with a *smoke damper* complying with Section 717.3.2.2 of the International Building Code.

Exception: Where the installation of a *smoke damper* will interfere with the operation of a required smoke control system in accordance with Section 909, *approved* alternative protection shall be utilized.

1104.17 Corridors construction. Corridors serving an occupant load greater than 30 and the openings therein shall provide an effective barrier to resist the movement of smoke. Transoms, louvers, doors and other openings shall be kept closed or be self closing. In Group I-2, corridors in areas housing patient sleeping or care rooms shall comply with Section 1105.3.

Exceptions:

1. Corridors in occupancies other than in Group H ~~and I-2~~, which are equipped throughout with an approved automatic sprinkler system.
2. ~~Patient room doors in corridors in occupancies in Group I-2 where smoke barriers are provided in accordance with the International Building Code.~~
32. Corridors in occupancies in Group E where each room utilized for instruction or assembly has at least one-half of the required means of egress doors opening directly to the exterior of the building at ground level.
43. Corridors that are in accordance with the *International Building Code*.

SECTION 202 **GENERAL DEFINITIONS**

Dutch door. A door divided horizontally so that the top can be operated independently from the bottom.

Reason: This change adds minimum requirements for existing Group I-2 into Chapter 11 by adding specific retrofit requirements. This change will move the existing retrofit requirements for corridors in I-2 occupancies to proposed new section 1105.3 and add more detailed specific requirements. The intent is to increase the bare minimum safety requirements due to the fragile and sensitive populations within these facilities. These requirements are meant to be applied retroactively. This is not a new concept for these facilities as it aligns with the current approach by the Center for Medicaid and Medicare Services (CMS), the federal authority having jurisdiction. Hospitals are now required by CMS to have a life safety survey on a regular basis. If the facility does not meet certain life safety minimums, they are required to upgrade their existing facility. These retroactive requirements are added to assist code officials and surveyors during the ongoing regular inspection of hospital facilities and are consistent with the inspections required by federal laws for certification and reimbursement. The requirements consider the minimum previously approved construction methods. These requirements will provide jurisdictions the ability to adopt minimum retroactive provisions that provide a more uniform level of safety and eliminate many of the current code conflicts for existing facilities.

We looked at several sources to determine what the appropriate minimum bar should be, including the current building and fire code, current CMS guidelines, and previous versions of the ICC and model codes. On all issues, enforcement agencies and the regulated facilities weighed in to ensure that these changes are both necessary and achievable.

These provisions are written specifically for hospitals (Group I-2, Condition 2). These are retrofit requirements that provide a minimum level of safety considered necessary for patients, staff and first responders in an environment in which patients are in many instances not capable of self preservation and must be protected in place. The changes also provide tradeoffs for automatic sprinkler systems consistent with those allowed for new construction and also with those allowed by CMS. In no way does this affect the existing requirement that existing, approved construction must be maintained in the manner that it was approved. It simply provides a tool for evaluating historical construction techniques.

Specific points include:

- Existing corridor construction should primarily be evaluated for its ability to resist or limit the transfer of smoke, regardless of the code at the time of construction.. Corridor walls, even if they were built 60 years ago, should be regularly assessed confirm that they minimize the transfer of smoke. This section describes some criteria by which this can be assessed.
- The requirements clearly indicate that portions of corridor walls required to have a fire resistance ratings by other code provisions must meet those provisions. This addresses where a corridor wall also happens to be a smoke barrier, incidental use area separation, etc.
- The Ad Hoc Committee added a specific section on dutch doors. Dutch doors have been used in health care facilities for many years for various necessary operational reasons. While existing language in the IBC does not specifically speak of dutch doors, their use is not prohibited but if used must meet the requirements contained in Section 407.3 including positive latching and limiting the transfer of smoke. This change will provide clarity for existing installations by giving specific guidance on the minimum acceptable requirements including positive latching and smoke transfer for their use in corridor walls. A definition is provided for additional clarity.
- The Ad Hoc committee also proposes similar detail for doors, windows, louvers and other potential penetrations or openings in corridor walls in an attempt to add clarity to the intent of the code on limiting the transfer of smoke. These proposals are consistent with current CMS standards.
- There are exceptions that deal with existing mail slot, pass-through and similar openings that are commonly found in hospitals. These are needed for privacy, medication security and other operational needs. Our proposal places restrictions on these existing openings similar to the current federal requirements.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering, a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>.

This proposal is being co-sponsored by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

Cost Impact: None

F239-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1105.3 (NEW)-F-BALDASSARRA-WILLIAMS-ADHOC

F240 – 13

1105.4 (New), 1104.5.1, 1104.7, 1104.15, 1104.17.2, Table 1104.17.2, 1104.22

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care (john.williams@doh.wa.gov) and Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee (cbaldassarra@RJAGroup.com)

Revise as follows:

SECTION 1105 **CONSTRUCTION REQUIREMENTS FOR EXISTING GROUP I-2**

1105.4 Means of egress. In addition to the means of egress requirements in Section 1104, Group I-2 facilities shall meet the means of egress requirements in Section 1105.4.1 through 1105.4.7.

1105.4.1 Exit signs and emergency illumination. The power system for exit signs and emergency illumination for the means of egress shall provide power for not less than 90 minutes and consist of storage batteries, unit equipment or an on-site generator.

1105.4.2 Emergency power for operational needs. The essential electrical system shall be capable of supplying services in accordance with NFPA 99.

1105.4.3 Size of Door. Means of egress doors used for the movement of patients in beds shall provide a minimum clear width of 41.5 inches (1054 mm). The height of door opening shall not be less than 80 inches (2032 mm).

Exception: Door closers and door stops shall be permitted to be 78 inches minimum above the floor.

1105.4.4 Ramps. In areas where ramps are used for movement of patients in beds, the clear width of the ramp shall not be less than 48 inches (1219 mm).

1105.4.5 Corridor width. In areas where corridors are used for movement of patients in beds, the clear width of the corridor shall not be less than 48 inches (1219 mm).

1105.4.6 Dead end corridors. In smoke compartments containing patient sleeping rooms and treatment rooms, dead end corridors shall not exceed 30 feet unless approved by the fire official.

1105.4.7 Separation of exit access doors. Any patient sleeping room, or any suite that includes patient sleeping rooms, of more than 1,000 square feet shall have at least two exit access doors placed a distance apart equal to not less than one-third of the length of the maximum overall diagonal dimension of the patient sleeping room or suite to be served, measured in a straight line between exit access doors.

1105.4.8 Aisles. In areas where aisles are used for movement of patients in beds, the clear width of the aisle shall not be less than 48 inches (1219 mm).

1104.5.1 Emergency power duration and installation. In other than Group I-2, ~~systems requiring the emergency power system~~ shall provide power for not less than 60 minutes and consist of storage batteries, unit equipment or an on-site generator. In Group I-2, ~~the emergency power essential electrical systems shall comply with Sections 1105.4.1 and 1105.4.2 provide power for not less than 90 minutes and consist of storage batteries, unit equipment or an on-site generator.~~ The installation of the emergency power system shall be in accordance with Section 604.

1104.7 Size of doors. The minimum width of each door opening shall be sufficient for the occupant load thereof and shall provide a clear width of not less than 28 inches (711 mm). Where this section requires a minimum clear width of 28 inches (711 mm) and a door opening includes two door leaves without a

mullion, one leaf shall provide a clear opening width of 28 inches (711 mm). ~~The maximum width of a swinging door leaf shall be 48 inches (1219 mm) nominal. In Group I-2, doors serving as means of egress doors in an occupancy in Group I-2 and used for the movement of patients in beds shall comply with Section 1105.4.3. provide a clear width not less than 41.5 inches (1054 mm). The maximum width of a swinging door leaf shall be 48 inches (1219 mm) nominal.~~ The height of doors openings shall not be less than 80 inches (2032 mm).

Exceptions:

1. The minimum and maximum width shall not apply to door openings that are not part of the required means of egress in occupancies in Groups R-2 and R-3.
2. Door openings to storage closets less than 10 square feet (0.93 m²) in area shall not be limited by the minimum width.
3. Width of door leaves in revolving doors that comply with Section 1008.1.4.1 shall not be limited.
4. Door openings within a dwelling unit shall not be less than 78 inches (1981 mm) in height.
5. Exterior door openings in dwelling units, other than the required exit door, shall not be less than 76 inches (1930 mm) in height.
6. Exit access doors serving a room not larger than 70 square feet (6.5 m²) shall be not less than 24 inches (610 mm) in door width.
7. Door closers and door stops shall be permitted to be 78 inches (1980 mm) minimum above the door.

1104.15 Width of ramps. ~~Existing~~ Ramps are permitted to have a minimum width of 30 inches (762 mm) but not less than the width required for the number of occupants served as determined by Section 1005.1. In Group I-2, ramps serving as a means of egress and used for the movement of patients in beds shall comply with Section 1105.8.

~~1104.17.2~~ 1104.18 Dead ends end corridors. Where more than one exit or exit access doorway is required, the exit access shall be arranged such that dead ends do not exceed the limits specified in Table 1104.47-2 18. In Group I-2, in smoke compartments containing patient sleeping rooms and treatment rooms, dead end corridors shall be comply with Section 1105.7.

Exception: A dead-end passageway or corridor shall not be limited in length where the length of the dead end passageway or corridor is less than 2.5 times the least width of the dead-end passageway or corridor.

**TABLE 1104.17.2 1104.18
COMMON PATH, DEAD-END AND TRAVEL DISTANCE LIMITS (by occupancy)**

OCCUPANCY	COMMON PATH LIMIT		DEAD-END LIMIT		TRAVEL DISTANCE LIMIT	
	Unsprinklered (feet)	Sprinklered (feet)	Unsprinklered (feet)	Sprinklered (feet)	Unsprinklered (feet)	Sprinklered (feet)
Group I-1	75	75	20	50	200	250
Group I-2 (Health care)	NR ^e	NR ^e	NR- <u>Note f</u>	NR- <u>Note f</u>	150	200 ^c
Group I-3 (Detention and correctional — Use Conditions II, III, IV, V)	100	100	NR	NR	150 ^c	200 ^c
Group I-4 (Day Care Centers)	NR	NR	20	20	200	250

(Portions of table not shown remain unchanged)

NR = No requirements.

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m².

- a. 20 feet for common path serving 50 or more persons; 75 feet for common path serving less than 50 persons.
- b. See Section 1028.9.5 for dead-end aisles in Group A occupancies.
- c. This dimension is for the total travel distance, assuming incremental portions have fully utilized their allowable maximums. For travel distance within the room, and from the room exit access door to the exit, see the appropriate occupancy chapter.
- d. See the *International Building Code* for special requirements on spacing of doors in aircraft hangars.
- e. In Group I-2, separation of exit access doors within a Any patient sleeping room, or any suite that includes patient sleeping rooms, of more than 1,000 square feet shall have at least two exit access doors placed a distance apart equal to not less than one-third of the length of the maximum overall diagonal dimension of the patient sleeping room or suite to be served, measured in a straight line between exit access doors shall comply with Section 1105.4.7.
- f. In Group I-2, in smoke compartments containing patient sleeping rooms and treatment rooms, dead end corridors shall comply with Section 1105.4.6.
- g.f. Where a tenant space in Group B, S and U occupancies has an occupant load of not more than 30, the length of a common path of egress travel shall not be more than 100 feet.

1104.22 Minimum aisle width. The minimum clear width of aisles shall be:

1. Forty-two inches (1067 mm) for aisle stairs having seating on each side.

Exception: Thirty-six inches (914 mm) where the aisle serves less than 50 seats.

2. Thirty-six inches (914 mm) for stepped aisles having seating on only one side.

Exception: Thirty inches (760 mm) for catchment areas serving not more than 60 seats.

3. Twenty inches (508 mm) between a stepped aisle handrail or guard and seating when the aisle is subdivided by the handrail.
4. Forty-two inches (1067 mm) for level or ramped aisles having seating on both sides.

Exception: Thirty-six inches (914 mm) where the aisle serves less than 50 seats.

5. Thirty-six inches (914 mm) for level or ramped aisles having seating on only one side.

Exception: Thirty inches (760 mm) for catchment areas serving not more than 60 seats.

6. Twenty-three inches (584 mm) between a stepped stair handrail and seating where an aisle does not serve more than five rows on one side.

7. In Group I-2, where aisles are used for movement of patients in beds aisles shall comply with 1105.4.8.

Reason: This change adds minimum requirements for existing Group I-2 into Chapter 11. The intent is to increase the bare minimum safety requirements due to the fragile and sensitive populations within these facilities. These requirements are meant to be applied retroactively. This is not a new concept for these facilities – it aligns with the current approach by the Center for Medicaid and Medicare Services (CMS), the federal authority having jurisdiction. Hospitals are now required by CMS to have a life safety survey on a regular basis. If the facility does not meet certain life safety minimums, they are required to upgrade their existing facility. This code change will align the Fire Code with those CMS minimum requirements and will hopefully lead to industry consolidation. These retroactive requirements are added to assist code officials and surveyors during the ongoing regular inspection of hospital facilities and are consistent with the inspections required by federal laws for certification and reimbursement. The requirements consider the minimum previously approved construction methods. These requirements will provide jurisdictions the ability to adopt minimum retroactive provisions that have been vetted by the industry as well as code officials and that are consistent with current national standards used by the Federal Government providing a more uniform level of safety and eliminating many of the current code conflicts for existing facilities.

We looked at several sources to determine what the appropriate minimum bar should be, including the current building and fire code, current CMS guidelines, and previous versions of the ICC and model codes. On all issues, enforcement agencies and the regulated facilities weighed in to ensure that these changes are both necessary and achievable.

These retroactive requirements are added to assist code officials and surveyors during the ongoing regular inspection of hospital facilities. These inspections are required by federal laws for certification and reimbursement, and is designed to assist those that are already tasked with performing those inspections. It is not the intention to add responsibility to the fire official to perform additional inspections. Rather, it is the intention to better define the minimum previously approved construction methods as it relates to the healthcare building type, and are consistent with the federal requirements that these facilities are currently held too.

This newly proposed section has been formatted to consolidate requirements, and is mostly just a move of existing fire code provisions. Since the current provisions are applicable to all Group I-2, this section is written addressing all Group I-2 where

applicable. Means of egress in areas where there are movement of patients in stretchers or beds has been reordered to be consistent with IFC 1104. It is noted that many areas of nursing homes do not include movement of patients in beds.

The following is a synopsis of the provisions listed above that have been relocated from other sections:

- 1105.4 Means of egress - Means of egress in areas where there are movement of patients in beds. The order is consistent with IFC 1104.
- 1105.4.1 Exit signs and emergency illumination – existing facilities can continue to use battery packs for exits signs and emergency lighting
- 1105.4.2 Emergency power for operational needs – extending section 1104.5.1 by adding requirements from and references to NFPA 99. Similar to IFC 604.3, requires the facility to analyze the hazards in their particular region and prepare accordingly.
- 1105.4.3 Size of door – Existing language that has been transferred from IFC 1104.7; follows format of IBC 1008.1.1.
- 1105.4.4 Ramps – References from IFC 1104.15 to the healthcare specific requirements.
- 1105.4.5 Corridor width – Follows current federal guidance for existing buildings.
- 1105.4.6 Dead end corridors – References from IFC 1104.15 to the healthcare specific requirements.
- 1105.4.7 Separation of exit access doors – Moved a healthcare specific requirement from footnote e in Table 1014.7.2 into Section 1105.
- 1105.4.8 Aisles – Provides a reference from IFC 1104.22 to more specific healthcare requirements.

Finally, in no way does this change affect the current requirement that existing, approved construction must be maintained in the manner that it was approved. The fire code clearly states that existing, approved safety feature must be maintained to the code at the time of construction. Most hospitals have been around for many decades and have several vintages of construction. This change simply provides a tool for evaluating historical conditions.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering, a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>.

This proposal is being co-sponsored by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as “areas of study”. Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

Cost Impact: None

F240-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1105.4 (NEW)-F-BALDASSARRA-WILLIAMS-ADHOC

F241 – 13

1105.5 (New)

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care
(john.williams@doh.wa.gov)

Add new text as follows:

SECTION 1105

CONSTRUCTION REQUIREMENTS FOR EXISTING GROUP I-2

1105.5 Smoke compartments. Smoke compartments shall be provided in existing Group I-2 Condition 2, in accordance with Sections 1105.5.1 through 1105.5.4.

1105.5.1 Design. Smoke barriers shall be provided to subdivide each story used for patients sleeping with an occupant load of more than 30 patients into no fewer than two smoke compartments.

1105.5.1.1 Refuge areas. Refuge areas shall be provided within each smoke compartment. The size of the refuge area shall accommodate the occupants and care recipients from the adjoining smoke compartment. Where a smoke compartment is adjoined by two or more smoke compartments, the minimum area of the refuge area shall accommodate the largest occupant load of the adjoining compartments.

The size of the refuge area shall provide the following:

1. Not less than 30 net square feet (2.8 m²) for each care recipient confined to bed or stretcher.
2. Not less than 15 square feet (1.4 m²) for each resident in a Group I-2 using mobility assistance devices.
3. Not less than 6 square feet (0.56 m²) for each occupant not addressed in Items 1 and 2.

Areas of spaces permitted to be included in the calculation of the refuge area of corridors, sleeping areas, treatment rooms, lounge or dining areas and other low-hazard areas.

1105.5.2 Smoke barriers. Smoke barriers shall be constructed in accordance with Section 709 of the *International Building Code*.

Exceptions:

1. Existing smoke barriers with a minimum of 1/2 –hour fire-resistance rating are permitted to remain.
2. Smoke barriers shall be permitted to terminate at an atrium enclosure in accordance with Section 404.6 of the *International Building Code*.

1105.5.3 Opening protectives. Openings in smoke barriers shall be protected in accordance with Section 716 of the *International Building Code*. Opening protectives shall have a with a minimum fire-protection-rating of 1/3 hours.

Exception: Wired glass vision panels in doors shall be permitted to remain.

1105.5.4 Duct and air transfer openings. Penetrations in a smoke barrier by duct and air transfer openings shall comply with Section 717 of the *International Building Code*.

Exception: Where existing duct and air transfer openings in smoke barriers exist without smoke dampers, they shall be permitted to remain. Any changes to existing smoke dampers shall be

submitted for review and approved in accordance with IBC Section 717 of the *International Building Code*.

Reason: This change adds minimum requirements for existing hospitals (Group I-2, Condition 2) into Chapter 11. The intent is to increase the bare minimum safety requirements due to the fragile and sensitive populations within these facilities. These requirements are meant to be applied retroactively. This is not a new concept for these facilities – it aligns with the current approach by the Center for Medicaid and Medicare Services (CMS), the federal authority having jurisdiction. Hospitals are now required by CMS to have a life safety survey on a regular basis. If the facility does not meet certain life safety minimums, they are required to upgrade their existing facility. This code change will align the Fire Code with those CMS minimum requirements and will hopefully lead to industry consolidation. These retroactive requirements are added to assist code officials and surveyors during the ongoing regular inspection of hospital facilities and are consistent with the inspections required by federal laws for certification and reimbursement. The requirements consider the minimum previously approved construction methods. These requirements will provide jurisdictions the ability to adopt minimum retroactive provisions that have been vetted by the industry as well as code officials and that are consistent with current national standards used by the Federal Government providing a more uniform level of safety and eliminating many of the current code conflicts for existing facilities.

We looked at several sources to determine what the appropriate minimum bar should be, including the current building and fire code, current CMS guidelines, and previous versions of the ICC and model codes. On all issues, enforcement agencies and the regulated facilities weighed in to ensure that these changes are both necessary and achievable.

This provision is written in regard to the design, construction and application of smoke compartments for Group I-2 hospital facilities. Smoke compartments are a key component of the defend in place strategy, a strategy where victims are protected from fire without relocation, used in healthcare facilities to limit the movement of smoke. These compartments act as safe locations for patients by preventing the spread of smoke. Through compartmentalization, patients may remain safely in their rooms as fire suppression systems and fire responders extinguish the fire. Under severe fire conditions that threaten the immediate compartment area, patients may be evacuated horizontally to the safety of an adjacent compartment on the same floor. Being able to do this is critical since due to the health status of many patients their evacuation from the building might put them in grave danger. The proper design, construction and application of smoke compartments will provide added protection, buy valuable time and save lives of critically ill patients before a total evacuation may become necessary.

These retroactive requirements are added to assist code officials and surveyors during the ongoing regular inspection of hospital facilities. These inspections are required by federal laws for certification and reimbursement. This requirement considers the minimum previously approved construction methods. This is consistent with the federal requirements that these facilities are currently held too. Specific concepts include:

- 1105.5 Smoke compartments – The defend-in-place concept is a basic minimum level of safety for these facilities. Every facility should be equipped at least two smoke compartments for temporary relocation of patients.
- 1105.5.1 Design - This section addresses existing acceptable configuration of smoke barrier walls and smoke barriers for existing hospitals in areas with sleeping rooms.
- 1105.5.1.1 Refuge area – Addresses adequate sizing of refuge areas. IBC 407.5.1 also includes requirements for independent egress and horizontal assemblies.
- 1105.5.2 Smoke barriers – The intent is to bring noncompliant smoke barriers to at least ½ hour fire resistance rating. Previously approved smoke barriers are not intended to be reduced to ½. Chapter 7 of the IFC would require maintenance of approved construction.
- 1105.5.3 Opening protectives - Address doors in smoke barriers in existing Group I-2 occupancies. Reference to 716 is so you that don't lose other requirements.
- 1105.5.4, Guides the inspector of existing facilities on how they would look at opening protectives. Smoke dampers have not always been required in hospitals, and the 2015 IBC would not require them. Therefore, in those hospitals that were originally approved without smoke dampers required, that condition is allowed to remain in place. Any modification of existing smoke dampers would have to go through the normal process for making an alteration to existing construction.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering, a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>.

Cost Impact: None

F241-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1105.5 (NEW)-F-WILLIAMS-ADHOC

F242 – 13

1105.6 (New), Table 1104.17.2

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care

Revise as follows:

IFC SECTION 1105 CONSTRUCTION REQUIREMENTS FOR EXISTING GROUP I-2

1105.6 Group I-2 care suites. Care suites in existing Group I-2 Condition 2 occupancies shall comply with Section 407.4.3 through 407.4.3.6.2 of the *International Building Code*.

**TABLE 1104.17.2 1104.18
COMMON PATH, DEAD-END AND TRAVEL DISTANCE LIMITS (by occupancy)**

OCCUPANCY	COMMON PATH LIMIT		DEAD-END LIMIT		TRAVEL DISTANCE LIMIT	
	Unsprinklered (feet)	Sprinklered (feet)	Unsprinklered (feet)	Sprinklered (feet)	Unsprinklered (feet)	Sprinklered (feet)
Group I-1	75	75	20	50	200	250
Group I-2 (Health care)	NR-Note e	NR-Note e	NR	NR	150	200 ^c
Group I-3 (Detention and correctional Use Conditions II, III, IV, V)	100	100	NR	NR	150 ^c	200 ^c
Group I-4 (Day Care Centers)	NR	NR	20	20	200	250

(Portions of table not shown remain unchanged)

NR = No requirements.

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m².

- 20 feet for common path serving 50 or more persons; 75 feet for common path serving less than 50 persons.
- See Section 1028.9.5 for dead-end aisles in Group A occupancies.
- This dimension is for the total travel distance, assuming incremental portions have fully utilized their allowable maximums. For travel distance within the room, and from the room exit access door to the exit, see the appropriate occupancy chapter.
- See the *International Building Code* for special requirements on spacing of doors in aircraft hangars.
- In Group I-2 Condition 2, Any patient care recipient sleeping room, or any suite that includes patient sleeping rooms, of more than 1,000 square feet shall have at least two exit access doors placed a distance apart equal to not less than one-third of the length of the maximum overall diagonal dimension of the patient sleeping room or suite to be served, measured in a straight line between exit access doors shall comply with Section 1105.6.
- Where a tenant space in Group B, S and U occupancies has an occupant load of not more than 30, the length of a common path of egress travel shall not be more than 100 feet.

Reason: This change adds minimum requirements for existing hospitals (Group I-2, Condition 2) into Chapter 11. The intent is to increase the bare minimum safety requirements due to the fragile and sensitive populations within these facilities. These requirements are meant to be applied retroactively. This is not a new concept for these facilities – it aligns with the current approach by the Center for Medicaid and Medicare Services (CMS), the federal authority having jurisdiction. Hospitals are now required by CMS to have a life safety survey on a regular basis. If the facility does not meet certain life safety minimums, they are required to upgrade their existing facility. This code change will align the Fire Code with those CMS minimum requirements and will hopefully lead to industry consolidation. These retroactive requirements are added to assist code officials and surveyors during the ongoing regular inspection of hospital facilities and are consistent with the inspections required by federal laws for certification and reimbursement. The requirements consider the minimum previously approved construction methods. These requirements will provide jurisdictions the ability to adopt minimum retroactive provisions that have been vetted by the industry as well as code officials and that are consistent with current national standards used by the Federal Government providing a more uniform level of safety and eliminating many of the current code conflicts for existing facilities.

We looked at several sources to determine what the appropriate minimum bar should be, including the current building and fire code, current CMS guidelines, and previous versions of the ICC and model codes. On all issues, enforcement agencies and the regulated facilities weighed in to ensure that these changes are both necessary and achievable.

This proposal defines the requirements for care suites (both sleeping and non-sleeping) which are an integral design concept for many areas within a hospital. Typical uses include ICU's, Operating Rooms, Emergency Departments and Imaging Departments. The suites allow for better and safer care than non-suite options. The new provisions deal with common path of travel, separation of exit access doors, and number of doors passed through (i.e. previously intervening rooms) in suites. This is much more complete than the current text.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering, a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>.

Cost Impact: None

F242-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1105.6-F-WILLIAMS-ADHOC

F243 – 13

1105.9 (New)

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care
(john.williams@doh.wa.gov)

Section 1105.9 Essential electrical systems. Essential electrical systems in Group I-2 Condition 2 occupancies shall be in accordance with Sections 1105.9.1 and 1105.9.2.

1105.9.1 Where required. In Group I-2 Condition 2 occupancies where life support is being provided, an essential electrical system shall be provided in accordance with NFPA 99.

1105.9.2 Installation and duration. In Group I-2, Condition 2 Occupancies, the installation and duration of operation of existing essential electrical systems shall be based upon a hazard vulnerability analysis conducted in accordance with NFPA 99.

Reason: This proposal addresses CMS Ktag K146 for existing buildings. The proposal does two things. First, it requires that existing I-2 Condition 2 occupancies provide essential electrical systems where life support is being provided. Second it requires in Group I-2 Condition 2 occupancies that the existing installations and duration of operation of the essential electrical system be assessed based upon a hazard vulnerability analysis in accordance with NFPA 99.

Both of these elements are important. New Section 1105.9.1 requires any buildings that would not be addressed by CMS but have similar risks to provide the necessary power resources. The other requires a reassessment of the essential electrical systems based upon a hazard vulnerability analysis to make sure that the systems meet the needs of the facilities for emergencies. A specific requirement was not provided for the IEBC with regard to ASCE 24 since the IEBC would require compliance with ASCE 24 anytime there are substantial improvements made to a building. The term Substantial improvement is a specifically defined term as follows as excerpted from the IEBC.

SUBSTANTIAL IMPROVEMENT. For the purpose of determining compliance with the flood provisions of this code, any *repair, alteration, addition*, or improvement of a building or structure, the cost of which equals or exceeds 50 percent of the market value of the structure, before the improvement or *repair* is started. If the structure has sustained *substantial damage*, any repairs are considered *substantial improvement* regardless of the actual *repair* work performed. The term does not, however, include either:

1. Any project for improvement of a building required to correct existing health, sanitary, or safety code violations identified by the *code official* and that is the minimum necessary to ensure safe living conditions; or
2. Any *alteration* of a historic structure, provided that the *alteration* will not preclude the structure's continued designation as a historic structure.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>

Cost impact: The code change proposal should not increase the cost of construction because compliance is already required by facility licensure requirements.

F243-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

1105.9 (NEW)-F-WILLIAMS-ADHOC

F244 – 13

2004.7 (New), Chapter 80

Proponent: Christopher M Wanka, College Park Volunteer Fire Department, representing self

Add new text as follows:

2004.7 Other Aircraft Maintenance. All maintenance, repairs, modifications, or construction performed upon aircraft not addressed elsewhere in this code shall be conducted in accordance with NFPA 410.

Add new standard to Chapter 80 as follows:

NFPA 410-10 Standard on Aircraft Maintenance.....2004.7

Reason: Aircraft maintenance is often a hazardous procedure due to the inherent hazards of aircraft. NFP 410 is a consensus document created that specifies minimum safety requirements to be performed during specified maintenance operations such as fuel or oxygen system maintenance, cleaning of aircraft, and hazardous operations such as defueling aircraft. It provides additional fire safety requirements to these procedures as well as additional fire protection requirements be in place for other specified procedures.

NFPA 410: Standard for Aircraft Maintenance would be a newly referenced standard in the IFC

Cost Impact: This will not affect any construction cost. It may impact business operation cost due to increased work times due to following additional safety precautions.

Analysis: A review of the standard proposed for inclusion in the code, NFPA 410-10, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013.

F244-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

2004.7-F-WANKA

F245 – 13

2204.1

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

2204.1 Standards. ~~The fire code official is authorized to enforce applicable provisions of the c-Codes and standards listed in Table 2204.1 to prevent and control dust explosions shall apply to operations involving combustible dust.~~

Reason: This change is based on a recommendation from the Chemical Safety Board (CSB) following their investigation of the dust explosions at the Hoeganaes Corporation in Gallatin, Tennessee. The CSB determined that the state of Tennessee considered the language in this code section to be a discretionary (not mandatory) code requirements; the state of Tennessee did not adopt this section of the IFC because it considered the requirement as not mandatory. This code change is intended to clarify the intent of this code section as to when the applicable dust standards must be enforced to prevent dust accumulations that could lead to dust explosions.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

Cost Impact: This code change will not increase the cost of construction

F245-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

2204.1-F-ZUBIA-FCAC

F246 – 13

2306.8.1, 2306.8.2 (New), Chapter 80

Proponent: Bob Eugene, representing UL LLC

Revise as follows:

2306.8 Alcohol-blended fuel-dispensing operations. The design, fabrication and installation of alcohol-blended fuel dispensing systems shall also be in accordance with Section 2306.7 and Sections 2306.8.1 through 2306.8.5.

2306.8.1 ~~Listed Approval of equipment.~~ Dispensers ~~shall be listed~~ in accordance with UL 87A. Hoses, nozzles, breakaway fittings, swivels, flexible connectors or dispenser emergency shutoff valves, vapor recovery systems, leak detection devices and pumps used in alcohol-blended fuel-dispensing systems shall be listed ~~or approved~~ for the specific purpose.

2306.8.2 Compatibility. Dispensers shall only be used with the fuels for which they have been listed, which are marked on the product. Field installed components including hose assemblies, breakaway couplings, swivel connectors and hose nozzle valves shall be provided in accordance with the listing and the marking on the unit.

(Renumber subsequent sections)

Add a new standard to Chapter 80 as follows:

UL

87A – 12 Outline of Investigation for Power-Operated Dispensing Devices for Gasoline and Gasoline/ethanol Blends with Nominal Ethanol Concentrations up to 85 Percent

Reason: In 2007 UL submitted proposal F230 07/08 which added the section on alcohol-blended fuel-dispensing operations. This was done to address the growing number of E-85 installations. Part of that proposal allowed alcohol-blended fuel-dispensers and components to be listed or approved, where normal gasoline dispensers were required to be listed. This was done in recognition that standards and listings for these dispensers did not exist at the time.

The UL 87A Outline of Investigation for Power-Operated Dispensing Devices for Gasoline and Gasoline/ethanol Blends with Nominal Ethanol Concentrations up to 85 Percent was subsequently developed to cover dispensers intended for use with high concentration ethanol blends. Listed dispensers and the related hanging hardware are now listed for high concentration ethanol blends, and are being installed across the U.S. This proposal recognizes the current E-85 dispensing practices and accomplishes the following:

1. Reintroduces the requirements for these dispensers and related hardware to be listed, rather than listed or approved.
2. Includes reference to the UL 87A Outline of Investigation used to investigate these products.

Cost Impact: None

Analysis: A review of the standard proposed for inclusion in the code, UL 87A-12, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013.

F246-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

2306.8.1-F-EUGENE

F247 – 13

2306.8.3

Proponent: Bob Eugene, representing UL LLC (Robert.Eugene@ul.com)

Delete without substitution:

~~**2306.8.3 Facility identification.** Facilities dispensing alcohol-blended fuels shall be identified by an approved means.~~

Reason: In 2007 UL submitted proposal F230 07/08 which added the section on alcohol-blended fuel-dispensing operations. This was done to address the growing number of E-85 installations across the country. Part of this proposal included requirements for the dispensing facility to be identified by an approved means. This was in addition to the Section 2306.8.4 requirements for the dispensers to be marked to identify the types of alcohol fuel blends to be dispensed. We have been advised by installers and code enforcers that this facility identification is not necessary.

Cost Impact: None

F247-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

2306.8.3-F-EUGENE

F248 – 13

2307.2 (IFGC [F] 412.2), 2307.2.2 (IFGC [F] 412.4); 2307.2.3 (IFGC [F] 412.5) (New)

Proponent: Bruce Swiecicki representing National Propane Gas Association (bswiecicki@npga.org)

Revise as follows:

2307.2 (IFGC [F] 412.2) Approvals. Storage vessels and equipment used for the storage or dispensing of LP-gas shall be *approved* or *listed* in accordance with Sections 2307.2.1 ~~and 2307.2.2~~ through 2307.2.3.

2307.2.1 (IFGC [F] 412.3) Approved equipment. Containers, pressure relief devices (including pressure relief valves), pressure regulators, and piping for LP-gas shall be *approved*.

2307.2.2 (IFGC [F] 412.4) Listed equipment. Hoses, hose connections, vehicle fuel connections, ~~dispensers~~, LP-gas pumps and electrical equipment used for LP-gas shall be *listed*.

2307.2.3 (IFGC [F] 412.5) LP-Gas dispensers. Where installed at facilities that are not intended for public refueling of vehicles, LP-gas dispensing equipment shall be approved. Where installed at facilities that are intended for public refueling of vehicles, LP-gas dispensers shall be listed.

Reason: The vast majority of LP-gas motor fuel dispensers in use today are not listed units. However, these dispensers are not available to the general public to refuel its vehicles. They are installed at private companies for use with fleet vehicles or for filling portable motor fuel cylinders used with forklift trucks, lawn mowers and other motorized applications. Requiring these dispensers to be “approved” rather than “listed” allows for their continued installation and use. The code official is able to approve the installation whether the “packaged” dispenser system itself is listed or not, using the requirements in Section 2307 and Chapter 61 of the IFC, as well as referenced standard NFPA 58 “LP-Gas Code.” These references provide all the necessary requirements for approving the installation of a dispenser. The individuals that use these dispensers are properly trained on the hazards of LP-gas and the safe use of the filling equipment.

Dispensers may also be located at public refueling stations (gasoline stations) along with other fuels. We are proposing in paragraph 2307.2.3 that for these applications, propane dispenser systems must be listed units to make them equivalent to the units that are being installed for self-service gasoline and diesel applications. These units would be factory-assembled with a storage container, pump, meter and dispenser hose and hose end valve on a common base or skid and shipped to the site for installation as a packaged unit. Or, they may be assembled at a factory and fully contained within a cabinet, shipped to the site for installation on an island and served by a remote LP-gas tank, similar to gasoline dispensers,

Cost Impact: This proposal will not increase the cost of construction.

F248-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

2307.2.2-F-SWIECICKI

F250 – 13

2307.4 (IFGC [F] 412.6)

Proponent: Bruce Swiecicki representing National Propane Gas Association (bswiecicki@npga.org)

Revise as follows:

2307.4 (IFGC [F] 412.6) Location of dispensing operations and equipment. ~~In addition to the requirements of Section 2306.7, the point of transfer for LP-gas dispensing operations shall be 25 feet (7620 mm) or more from buildings having combustible exterior wall surfaces, buildings having noncombustible exterior wall surfaces that are not part of a 1-hour fire-resistance-rated assembly, or buildings having combustible overhangs, lot lines of property which could be built on, public streets, or sidewalks and railroads; and at least 10 feet (3048 mm) from driveways and buildings having noncombustible exterior wall surfaces that are part of a fire-resistance-rated assembly having a rating of 1-hour or more. The point of transfer for LP-Gas dispensing operations shall be separated from buildings and other exposures in accordance with the following:~~

1. Not less than 25 feet from buildings in which the exterior wall is not part of a fire-resistance-rated assembly having a rating of 1 hour or greater.
2. Not less than 25 feet from combustible overhangs on buildings, measured from a vertical line dropped from the face of the overhang at a point nearest the point of transfer.
3. Not less than 25 feet from the lot line of property that can be built upon.
4. Not less than 25 feet from mainline railroad track centers.
5. Not less than 10 feet from public streets, highways, thoroughfares, sidewalks and driveways.
6. Not less than 10 feet from buildings in which the exterior wall is part of a fire resistance rated assembly having a rating of 1 hour or greater.

Exception: The point of transfer for LP-gas dispensing operations need not be separated from canopies that are constructed in accordance with the *International Building Code* and that provide weather protection for the dispensing equipment. LP-gas containers shall be located in accordance with Chapter 61. LP-gas storage and dispensing equipment shall be located outdoors ~~and in accordance with Section 2306.7.~~

Reason: The changes to section 2307.4 are necessary in order to make the paragraph easier to understand and to eliminate reference to Section 2306.7, which addresses dispenser installations for gasoline and diesel fuels, neither of which are similar to LP-gas. Therefore, Section 2306.7 contains many requirements that do not make sense when applied to LP-gas installations. We are therefore proposing a new section (2307.5) that will contain just those requirements from 2306.7 that are applicable to LP-gas dispensers.

Also included in the new formatting are proposed changes that will bring the IFC into agreement with NFPA 58 "LP-Gas Code" with respect to separation distances.

Cost Impact: This proposal will not increase the cost of construction.

F250-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

2307.4-F-SWIECICKI

F251 – 13

2307.5 (IFGC [F] 412.7.6) (New), 2307.6 (IFGC [F] 412.7), 2307.6.1 (IFGC [F] 412.7) (New), 2307.6.3 (IFGC [F] 412.7.4) (New)

Proponent: Bruce Swiecicki representing National Propane Gas Association (bswiecicki@npga.org)

Revise as follows:

2307.5 (IFGC [F] 412.7.6) Additional Requirements for LP-Gas Dispensers and Equipment. LP-gas dispensers and related equipment shall comply with the following provisions.

1. Pumps shall be fixed and shall be designed to allow control of the flow and to prevent leakage or accidental discharge.
2. Dispensing devices installed within 10 feet of where vehicle traffic occurs, shall be protected against physical damage by mounting on a concrete island 6 inches or more in height, or shall be protected in accordance with Section 312.
3. Dispensing devices shall be securely fastened to their mounting surface in accordance with the dispenser manufacturer's instructions.

2307.5-2307.6 (IFGC [F] 412.7) Installation of LP-gas dispensing devices and equipment. The installation and operation of LP-gas dispensing systems shall be in accordance with Sections ~~2307.5.1~~ 2307.6.1 through ~~2307.5.3~~ 2307.6.4 and Chapter 61. LP-gas dispensers and dispensing stations shall be installed in accordance with the manufacturer's specifications and their listing.

~~**2307.5.1 (IFGC [F] 412.7.1) Valves** A manual shutoff valve and an excess flow-control check valve shall be located in the liquid line between the pump and the dispenser inlet where the dispensing device is installed at a remote location and is not part of a complete storage and dispensing unit mounted on a common base. An excess flow-control check valve or an emergency shutoff valve shall be installed in or on the dispenser at the point at which the dispenser hose is connected to the liquid piping. A differential backpressure valve shall be considered equivalent protection. A listed shutoff valve shall be located at the discharge end of the transfer hose.~~

2307.6.1 (IFGC [F] 412.7) Product Control Valves. The dispenser system piping shall be protected from uncontrolled discharge in accordance with the following:

1. Where mounted on a concrete base, a means shall be provided and installed within ½-inch of the top of the concrete base that will prevent flow from the supply piping in the event that the dispenser is displaced from its mounting.
2. A manual shutoff valve and an excess flow-control check valve shall be located in the liquid line between the pump and the dispenser inlet where the dispensing device is installed at a remote location and is not part of a complete storage and dispensing unit mounted on a common base.
3. An excess flow-control check valve or an emergency shutoff valve shall be installed in or on the dispenser at the point at which the dispenser hose is connected to the liquid piping.
4. A listed automatic-closing type hose nozzle valve with or without a latch-open device shall be provided on island-type dispensers.

~~**2307.5.2- 2307.6.2 (IFGC [F] 412.7.2) Hoses.**~~ Hoses and piping for the dispensing of LP-gas shall be provided with hydrostatic relief valves. The hose length shall not exceed 18 feet (5486 mm). An *approved* method shall be provided to protect the hose against mechanical damage.

2307.6.3 (IFGC [F] 412.7.4) Breakaway Protection. Dispenser hoses shall be equipped with a listed emergency breakaway device designed to retain liquid on both sides of the breakaway point. Where hoses are attached to hose-retrieving mechanisms, the emergency breakaway device shall be located such that the breakaway device activates to protect the dispenser from being displaced.

2307.5.3 (IFGC [F] 412.7.3) 2307.6.4 (IFGC [F] 412.7.5) Vehicle impact protection. ~~Vehicle impact protection for LP-gas storage containers, pumps and dispensers shall be provided in accordance with Section 2306.4. Where installed within 10 feet of vehicle traffic, LP-gas storage containers, pumps and dispensers shall be protected in accordance with Section 2307.5 (2).~~

Reason: This proposal is a companion change to revisions proposed to Section 2307.4, which eliminated reference to Section 2306.7. Because Section 2306.7 addresses dispenser installations for gasoline and diesel fuels, neither of which are similar to LP-gas, it therefore contains many requirements that do not make sense when applied to LP-gas installations.

New 2307.5 contains three requirements extracted from current Section 2306.7 that would be applicable to LP-gas dispensers. Proposed #1 is based on current 2306.7.2 and proposed #2 and #3 are based on 2306.7.3.

New 2307.6 has been revised editorially to reflect the changed section numbers.

Paragraph 2307.6.1 has moved the requirements from 2306.7 that are applicable to LP-gas dispensers into the more appropriate location. Requirement #1 is based on current code section 2306.7.4 but since the hardware performance requirements in that section for gasoline and diesel dispensers differ from what is available for LP-gas dispenser systems, the text more closely resembles the requirements currently appearing in NFPA 30A *Motor Fuel Dispensing Facilities and Repair Garages*, with the exception that the inch location for the protective means must be within ½-inches of the top of the concrete, as required in 2306.7.4. Requirement #2 is based on NFPA 58 *LP-Gas Code* and provides protection for the piping system where the storage container is located remotely from the dispenser. Requirements #3 is based on requirements in NFPA 58. Requirement #4 is pulled from current section 2306.7.6.

New Section 2307.6.3 is based on current Section 2306.7.5.1, but provides a performance requirement rather than a specified protection point where a hose retrieval mechanism is installed.

Section 2307.6.4 specifies where protection from vehicle impact is required, which is consistent with what will appear in the 2014 edition of NFPA 58.

Cost Impact: This proposal will not increase the cost of construction.

F251-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

2307.5 (NEW)-F-SWIECICKI

F252 – 13

2307.6 (IFGC [F] 412.8), 2307.7

Proponent: Bruce Swiecicki representing National Propane Gas Association (bswiecicki@npga.org)

Revise as follows:

2307.6 (IFGC [F] 412.8) ~~Private~~ Public fueling of motor vehicles. ~~Self-service LP-gas dispensing systems, including key, code and card lock dispensing systems, shall not be open to the public and shall be limited to the filling of permanently mounted fuel containers on LP-gas powered vehicles. Self-service LP-Gas dispensing systems, including key, code and card lock dispensing systems, shall be limited to the filling of containers providing fuel to the LP-Gas powered vehicle.~~

~~In addition to the requirements of Sections 2305 and 2306.7, The requirements for self-service LP-gas dispensing systems shall be in accordance with the following:~~

- ~~1. The arrangement and operation of the transfer of product into a vehicle shall be in accordance with this section and Chapter 61.~~
- ~~2. The system shall be provided with an emergency shutoff switch located within 100 feet (30 480 mm) of, but not less than 20 feet (6096 mm) from, dispensers.~~
- ~~23. The owner of the LP-gas motor fuel-dispensing facility or the owner's designee shall provide for the safe operation of the system and the training of users.~~
- ~~4. The dispenser and hose-end valve shall release not more than 4cc of liquid to the atmosphere upon breaking the connection with the fill valve on the vehicle.~~
- ~~5. Fire extinguishers shall be provided in accordance with Section 2305.4.~~
- ~~6. Warning signs shall be provided in accordance with Section 2305.6.~~
- ~~7. The area around the dispenser shall be maintained in accordance with Section 2305.7.~~

2307.7 Overfilling. LP-gas containers shall not be filled with LP-gas in excess of the volume determined using the fixed maximum liquid level gauge installed on the container, the volume determined by the overfilling prevention device installed on the container, outage installed by the manufacturer or the weight determined by the required percentage of the water capacity marked on the container stamped on the tank.

Reason: Propane is recognized as an alternative motor vehicle fuel by the U.S. government. In order for the public to take full advantage of the benefits of its reduced emissions and cleaner burning properties, the code must be changed to recognize the technologies that are available to ensure the safe refueling of LP-gas vehicles, which in turn will result in increasing acceptance of this smart alternative fuel.

The current provisions in Section 2307.6, which prohibit public access to self-service equipment, are too restrictive and without any basis in safety or technical experience. There are no reasons to prohibit anyone who has been properly trained to perform the refueling operation from refueling their LP-gas vehicle at a public refueling facility. Propane (LP-Gas) refueling technology provides the following features:

- Liquid product will not flow out of the hose end valve unless the valve is completely connected and securely in place on the fill valve of the vehicle.
- Propane hose end valves will mate with the fill valve on the vehicle and upon disconnect will release no more than 4 cubic centimeters of liquid to the atmosphere.
- The propane refueling system is a closed system, which means that there is no opportunity for air, water or any other contaminant to enter the system.
- Individuals must be trained in order to use the filling equipment. This requirement is ensured by the use of key, code and card lock dispensing systems. Only trained individuals are issued the necessary security devices to enable the refueling of the vehicle.

Regarding the proposed changes to 2307.6, the deletion of references to Sections 2305 and 2306.7 are necessary because those sections are mostly intended to be used for the installation of Class I or Class II liquids. Since propane is a liquefied petroleum gas, many of the provisions in those sections are not applicable to propane installations. The applicable requirements from those two sections have been relocated to 2307.6. In addition, proposed requirement #4 is based on NFPA 30A *Motor Fuel Dispensing Facilities and Repair Garages*.

The proposed change to 2307.7 is necessary in order to incorporate the correct terminology and also recognize that sometimes, the fixed maximum liquid level gauge is installed by a trained service technician. This is especially the case if repairs are being made to the container or the valve. In addition, some vehicles rely upon an overfilling prevention device and the fixed maximum liquid level gauge is not used. Therefore, it is necessary to list that device as an approved means for filling the container.

Cost Impact: This proposal will not increase the cost of construction.

F252-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

2307.6-F-SWIECICKI

F253 – 13

2308.4 (IFGC [F] 413.5)

Proponent: James Ranfone, American Gas Association (jranfone@aga.org)

Revise as follows:

2308.4 (IFGC [F] 413.5) Private fueling of motor vehicles. Self-service CNG-dispensing systems, including key, code and card lock dispensing systems, shall be limited to the filling of permanently mounted fuel containers on CNG-powered vehicles. Self-service CNG-dispensing systems shall be installed in accordance with Section 2304 (IFGC: the *International Fire Code*).

~~In addition to the requirements in Section 2305, the owner of a self-service CNG motor fuel-dispensing facility shall ensure the safe operation of the system and the training of users.~~

Reason: The requirement that the owners ensures the safe operation and provide training is unenforceable.

Cost Impact: None.

F253-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

2308.4-F-RANFONE

F254 – 13

2309.3.1.1, 2309.3.1.2, Chapter 80

Proponent: Robert J Davidson, Davidson Code Concepts, LLC, representing the National Renewable Energy Laboratory (NREL) (rjd@davidsoncodeconcepts.com)

Revise as follows:

2309.3.1.1 Outdoors. Generation, compression, or storage equipment shall be allowed outdoors in accordance with Chapter 58 and NFPA 2.

2309.3.1.2 Indoors. Generation, compression, storage and dispensing equipment shall be located in indoor rooms or areas constructed in accordance with the requirements of the *International Building Code*, the *International Fuel Gas Code* and, the *International Mechanical Code* and ~~one of the following:~~ NFPA 2.

- ~~1. Inside a building in a hydrogen cutoff room designed and constructed in accordance with Section 421 of the *International Building Code*.~~
- ~~2. Inside a building not in a hydrogen cutoff room where the gaseous hydrogen system is listed and labeled for indoor installation and installed in accordance with the manufacturer's installation instructions.~~
- ~~3. Inside a building in a dedicated hydrogen fuel dispensing area having an aggregate hydrogen delivery capacity no greater than 12 standard cubic feet per minute (SCFM) and designed and constructed in accordance with Section 703.1 of the *International Fuel Gas Code*.~~

Add new standard to Chapter 80 as follows:

NFPA

2-11 Hydrogen Technologies Code 2309.3.1.1, 2309.3.1.2

Reason: This proposal adds a reference to NFPA 2 "Hydrogen Technologies Code" in Section 2309.3.1.1 and to Section 2309.3.1.2, along with a deletion of the three methods currently in the code.

NFPA 2 has been formed to provide a source document for the storage, use and handling of hydrogen and much work has gone into refining terms and requirements. For increased safety and consistency in the application of hydrogen technologies, the addition of NFPA 2 as a reference for outdoor installations of motor fueling and for the requirements for indoor fueling in conjunction with the other requirements contained within the relevant I-Codes is an appropriate step to take.

From the 2011 edition of NFPA 2:

Origin and Development of NFPA 2

"With the increased interest in hydrogen being used as a fuel source, the National Fire Protection Association was petitioned to develop an all-encompassing document that establishes the necessary requirements for hydrogen technologies. In 2006, the Technical Committee on Hydrogen Technology was formed and tasked to develop a document that addresses all aspects of hydrogen storage, use, and handling, that draws from existing NFPA codes and standards, and that identifies and fills technical gaps for a complete functional set of requirements for code users and enforcers. This document is also structured so that it works seamlessly with building and fire codes."

Extensive requirements have been developed and are located within NFPA 2 (see Sections 10.3.2.2 Indoor Public Fueling and 10.3.3.2 Indoor Nonpublic Fueling of that standard), and the practical method to utilize the extensive requirements is through adding references to that document. A review of the requirements identifies that trying to add the actual technical requirements to the IFC would require extensive work and then might not get around copyright issues.

As part of the proposal is to add NFPA 2 to Chapter 80 as a referenced standard.

NFPA 2-2011 can be viewed at this location: <http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=2>

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, NFPA 2-11, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013.

F254-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

2309.3.1.1-F-DAVIDSON

F255 – 13

2309.4.1

Proponent: Robert Boyd, Boyd Hydrogen, LLC, representing self (Bob@BoydH2.com)

Revise as follows:

2309.4.1 Dispensing Systems. Dispensing systems shall be equipped with an overpressure protection device set at not greater than 140 percent of the service pressure of the fueling nozzle it supplies.

Reason: There is no technical or system safety reason why the overpressure protecting device in a H2 dispenser must be set at 140 percent of the service pressure of the fueling nozzle.

SAE and NFPA-52 and NFPA-2 requirements for the overpressure protection are that the device is to be **set at no greater** than 140 times the service pressure (1.1 x 1.25 x Service pressure).

Some dispenser manufactures may want to provide systems that have a lower set point for the overpressure protection device. For example some dispensers may want to set the maximum fill pressure to 110% of service pressure and set the overpressure device to 125% of service pressure. This would have no impact on the relative safety of the dispensing system and should be allowed.

The proposed revised language will allow for more dispenser options without any additional risks.

Cost Impact: None

F255-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

2309.4.1-F-BOYD

F256 – 13

2309.6 (New), 2311.8

Proponent: Robert J Davidson, Davidson Code Concepts, LLC, representing the National Renewable Energy Laboratory (NREL) (rjd@davidsoncodeconcepts.com)

Revise as follows:

~~2311.8~~ 2309.6 Defueling of hydrogen from ~~motor vehicle~~ fuel storage containers. The discharge or defueling of hydrogen from ~~motor vehicle~~ fuel storage tanks for the purpose of maintenance, cylinder certification, calibration of dispensers or other activities shall be in accordance with Sections ~~2311.8.1~~ 2309.6.1 through ~~2311.8.1.2.4~~ 2309.6.1.2.4.

~~2311.8.1~~ 2309.6.1 Methods of discharge. The discharge of hydrogen from ~~motor vehicle~~ fuel storage tanks shall be accomplished through a closed transfer system in accordance with Section ~~2311.8.1.1~~ 2309.6.1.1 or an approved method of atmospheric venting in accordance with Section ~~2311.8.1.2~~ 2309.6.1.2.

~~2311.8.1.1~~ 2309.6.1.1 Closed transfer system. *(No change to current text)*

~~2311.8.1.2~~ 2309.6.1.2 Atmospheric venting of hydrogen from ~~motor vehicle~~ fuel storage containers. When atmospheric venting is used for the discharge of hydrogen from ~~motor vehicle~~ fuel storage tanks, such venting shall be in accordance with Sections ~~2311.8.1.2.1~~ 2309.6.1.2.1 through ~~2311.8.1.2.4~~ 2309.6.1.2.1.4.

~~2311.8.1.2.1~~ 2309.6.1.2.1 Defueling equipment required at vehicle maintenance and repair facilities. All facilities for repairing hydrogen systems on hydrogen fueled vehicles shall have equipment to defuel ~~vehicle storage tanks~~. Equipment used for defueling shall be listed and labeled or approved for the intended use.

~~2311.8.1.2.1.1~~ 2309.6.1.2.1.1 Manufacturer's equipment required. Equipment supplied by the ~~vehicle~~ manufacturer shall be used to connect the ~~vehicle~~ storage tanks to be defueled to the vent pipe system.

~~2311.8.1.2.1.2~~ 2309.6.1.2.1.2 Vent pipe maximum diameter. *(No change to current text)*

~~2311.8.1.2.1.3~~ 2309.6.1.2.1.3 Maximum flow rate. *(No change to current text)*

~~2311.8.1.2.1.4~~ 2309.6.1.2.1.4 Isolated use. *(No change to current text)*

~~2311.8.1.2.2~~ 2309.6.1.2.2 Construction documents. *(No change to current text)*

~~2311.8.1.2.3~~ 2309.6.1.2.3 Stability of cylinders, containers and tanks. *(No change to current text)*

~~2311.8.1.2.4~~ 2309.6.1.2.4 Grounding and bonding. *(No change to current text)*

~~2311.8.2~~ 2309.6.2 Repair of hydrogen piping. Piping systems containing hydrogen shall not be opened to the atmosphere for repair without first purging the piping with an inert gas to achieve 1 percent hydrogen or less by volume. Defueling operations and exiting purge flow shall be vented in accordance with Section ~~2311.8.1.2~~ 2309.6.1.2.

~~2311.8.3~~ 2309.6.3 Purging. *(No change to current text)*

~~2311.8.3.1~~ 2309.6.3.1 System purge required. *(No change to current text)*

SECTION 2311 REPAIR GARAGES

2311.5 Preparation of vehicles for repair. For vehicles powered by gaseous fuels, the fuel shutoff valves shall be closed prior to repairing any portion of the vehicle fuel system.

Vehicles powered by gaseous fuels in which the fuel system has been damaged shall be inspected and evaluated for fuel system integrity prior to being brought into the repair garage. The inspection shall include testing of the entire fuel delivery system for leakage.

2311.8 Defueling equipment required at vehicle maintenance and repair facilities. Facilities for repairing hydrogen fuel systems on hydrogen-fueled vehicles shall have equipment to defuel vehicle storage tanks. Where work must be performed on a vehicle's fuel storage tank for the purpose of maintenance, repair or cylinder certification, defueling and purging shall be conducted in accordance with Section 2309.6 .

Reason: The primary reason for moving the language is to eliminate some confusion in applying the code. There are some in the industry and code enforcement world that mistakenly believe defueling is required every time a hydrogen fueled vehicle is repaired. That is not true, see Section 2311.5.

If you view Section 2308.8 for CNG fueling activities you will find similar language directly within the dedicated CNG section of the code, the same concept which is being proposed here for hydrogen with the movement of the language.

An additional benefit is that the ability to defuel hydrogen is needed for repair and servicing of the fixed hydrogen fuel compression, storage and dispensing equipment located at these facilities.

By moving the language to new Section 2909.6 and modifying the language to apply to "fuel storage", instead of "motor vehicle fuel storage", the language is more generic and applicable.

At Section 2311.8.1.2.1, (New 2309.6.1.2.1), the stricken language is left at 2311.8 with a pointer to this location to direct motor vehicle fuel storage cylinder defueling operations to these requirements. In addition, the word "approved" is added for the acceptance of the equipment. as this is still an emerging technology and there needs to be an option for "approved" by the code official.

In Section 2311, New Section 2311.8 is inserted. By taking out the defueling language it eliminates some confusion and by pointing to the relocated the language at Section 2309.6 we make sure it is applied only in those cases where defueling of the motor vehicle fuel cylinder is necessary.

There is no loss in current code requirements. There is an enhancement by providing for the defueling of fixed site equipment and eliminating a misapplication of the defueling requirements.

Cost Impact: The code change proposal will not increase the cost of construction.

F256-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

2311.8-F-DAVIDSON

F257 – 13

2310.5.3

Proponent: Marcelo M Hirschler, GBH International (gbhint@aol.com)

Revise as follows:

2310.5.3 Rubbish containers. ~~Metal containers with tight-fitting or self-closing lids shall be provided for the temporary storage of combustible trash or rubbish.~~ Containers with tight-fitting or self-closing lids shall be provided for temporary storage of combustible debris, rubbish and waste material. The rubbish containers shall be constructed entirely of materials that comply with any one of the following:

1. Noncombustible materials.
2. Materials that meet a peak rate of heat release not exceeding 300 kW/m² when tested in accordance with ASTM E 1354 at an incident heat flux of 50 kW/m² in the horizontal orientation.

Reason: Rubbish containers need not be constructed of metal but can be constructed of other noncombustible materials, including materials that have been shown to be safe by meeting a very severe fire test, just like those required by section 808 for I1, I2 and I3 occupancies. The key requirement that the lids be tight fitting or self closing is retained in the proposal. Note that the requirement covers all type of rubbish and is not intended to address spills of combustible or flammable liquids (or Class I, II or IIIA liquids), covered by 2310.5.2. The use of the phrase “combustible debris, rubbish and waste” makes this section consistent with other sections of the IFC.

Cost Impact: This should lower costs by offering more alternatives.

F257-12

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

2310.5.3-F-HIRSCHLER

F258 – 13

2311.7

Proponent: Spencer Quong, Quong & Associates, Inc. representing Toyota Technical Center (squong@squong.com)

Revise as follows:

2311.7 Repair garages for vehicles fueled by lighter-than air fuels. Repair garages for the conversion and repair of vehicles which use CNG, liquefied natural gas (LNG), hydrogen or other lighter-than-air motor fuels shall be in accordance with Sections 2311.7 through 2311.7.2.3 in addition to the other requirements of Section 2311.

Exceptions:

1. Repair garages where work is not performed on the fuel system and is limited to exchange of parts and maintenance requiring no open flame or welding.
2. Repair garages where all of the following conditions exist:
 - 2.1 Work is not performed on the hydrogen storage tank and is limited to exchange of parts and maintenance requiring no open flame or welding.
 - 2.2 Where work is performed on the hydrogen fuel system, the hydrogen fuel storage container shall be securely sealed such that it is a closed system during maintenance using manufacturer approved procedures.
 - 2.3 The entire fuel system shall be defueled in accordance with Section 2311.8 to a quantity that is less than 200 cubic feet (5.6 m³).

Reason: This proposal is requesting to modify exception to Section 2311.7 to allow work on the fuel system, except for the hydrogen storage tank without having to install additional ventilation and gas detection systems in the repair garage. If work is performed on the fuel system, the vehicle's shutoff valve must be securely closed on the fuel storage container so that it is a closed system and no gas can escape during maintenance operations. In addition, the proposal also requires that entire vehicle fuel system, including the storage container, be defueled to less than 200 cubic feet (NTP).

Although each hydrogen passenger vehicle is different, typically their storage containers hold between 5000-50000 cubic feet (NTP) of hydrogen at high pressure (5000-10000 psi). However, the hydrogen leaving the storage container is regulated to a lower pressure, typically less than 250 psi and less than 10 cubic feet (NTP) of hydrogen.

Any release of hazardous material can pose a problem. However, this proposal addresses the issues in two ways. First, it requires that the shutoff valve on the fuel storage container to be securely closed. Hydrogen vehicles are required to have a manual valve that can be shut off for maintenance¹. In most vehicles, the shutoff valve fails shut, so the standard operating procedure to ensure that the valve is closed is to disconnect the 12V battery. For manual valves, it can be tagged and locked in the off position. Since almost all of the hydrogen is in the fuel storage container, this requirement will ensure only a minimal amount of hydrogen is left in the remainder of the fuel system.

Second, in the event that the fuel storage container is opened during repairs and all of the hydrogen is allowed to escape, this proposal requires that the entire fuel system be defueled to less than 200 cubic feet (NTP). **This is less than 20% of the Maximum Allowable Quantity (MAQ) per control area** listed in Table 5003.1.1(1) through 5003.1.1(4). In addition, Section 5308.1.1 allows for the indoor storage and use of cylinders of non-liquefied compressed, flammable gases not exceeding a capacity of 250 cubic feet NTP used for maintenance purposes without any ventilation and gas detection systems. Finally, according to Table 105.6.8, an operational permit is not required for less than 200 cubic feet (NTP) of flammable, compressed gases.

With more and more hydrogen vehicles on the road, there is a need to be able to work on the low pressure side of the fuel system at any repair garage without adding additional ventilation and gas detection systems. This proposal allows for this work as long as two requirements are met: the fuel storage container is closed and amount of hydrogen is less than **the existing IFC limitations for hazardous materials, and flammable and compressed gases**. Already, repair garages have industrial cylinders of acetylene and other flammable gases without additional ventilation and detection equipment. Even if the repair garages meet the requirements in this exception, they will still need to be in accordance with Sections 5001 and 5003.

¹ Section 4.1.1.3 of SAEJ2579 "Standard for Fuel Systems in Fuel Cell and Other Hydrogen Vehicles"

Cost Impact: The code change proposal will not increase the cost of construction.

F258-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

2311.7-F-QUONG

F259 – 13

2311.7, 2311.7.1 (IMC [F] 502.16), 2311.7.1.1 (IMC [F] 502.16.1), 2311.7.1.1 (New), 2311.7.1.2 (New)

Proponent: James Ranfone, American Gas Association (jranfone@aga.org)

Revise as follows:

2311.7 Repair garages for vehicles fueled by lighter-than-air fuels. Repair garages for the conversion and repair of vehicles which use CNG, liquefied natural gas (LNG), hydrogen or other lighter-than-air motor fuels shall be in accordance with Sections 2311.7 through 2311.7.3 in addition to the other requirements of Section 2311.

Exception: Repair garages where work is not performed on the fuel system and is limited to minor repairs such as the exchange of parts and maintenance requiring no open flame or welding.

2311.7.1 (IMC [F] 502.16) Ventilation. Repair garages used for the major repair such as engine overhauls, painting, body and fender work, and repairs that require draining of the motor vehicle fuel tank are performed on, of natural gas- or hydrogen-fueled vehicles shall be provided with an approved mechanical ventilation system. ~~The mechanical ventilation system shall be in accordance with the International Mechanical Code and Sections 2311.7.1.1 and 2311.7.1.2 meet the requirements in 2311.7.1.1 or 2311.7.1.2.~~

2311.7.1.1 Electrical systems and equipment located within 18 inches (46 cm) of the ceiling shall be listed for installation in a flammable gas location.

2311.7.1.2. The area within 18 in. (46 cm) of the ceiling shall be provided with ventilation of at least 1 ft³/min/ft² of floor area taken from a point within 18 in. (46 cm) of the highest point in the ceiling.

Exception: ~~Repair garage with natural ventilation when approved.~~

2311.7.1.1 (IMC [F] 502.16.1) Design. Indoor locations shall be ventilated utilizing air supply inlets and exhaust outlets arranged to provide uniform air movement to the extent practical. Inlets shall be uniformly arranged on exterior walls near floor level. ~~Outlets shall be located at the high point of the room in exterior walls or the roof.~~

Ventilation shall be by a continuous mechanical ventilation system or by a mechanical ventilation system activated by a continuously monitoring natural gas detection system or, for hydrogen, a continuously monitoring flammable gas detection system, each activating at a gas concentration of not more than 25 percent of the lower flammable limit (LFL). In all cases, the system shall ~~shut down the fueling system alarm~~ in the event of failure of the ventilation system.

~~The ventilation rate shall be at least 1 cubic foot per minute per 12 cubic feet [0.00139 m³ x (s x m³)] of room volume.~~

Reason: The industry standard for repair garages is NFPA 30A, Code for Motor Fuel Dispensing Facilities and Repair Garages. NFPA 30A does not require general mechanical ventilation for repair garages that service either liquid or lighter-than-air odorized fuels. For odorized gases fuels NFPA30A does require that the area within 18 inches below the roof either be classified as a hazardous location (therefore requiring the installation of electrical equipment listed for hazardous locations) or be provided with mechanical ventilation (and therefore that area is no longer considered a hazardous location). This type of site-specific requirement is consistent with IFC section 2311.4.3 for liquid fuels, requiring mechanical ventilation for below grade locations to prevent the accumulation of flammable vapors. There is no technical justification to require general mechanical or natural ventilation for an entire repair garage that services either liquid or gaseous fueled vehicles.

Proposed revisions would:

- Make the IFC ventilation requirements consistent with NFPA 30A.
- Introduce the concept of minor and major repairs as means to clarify when code requirements are to be installed. This is consistent with NFPA 30A.
- The requirement that the fueling system be shut down in the event of a mechanical ventilation failure makes no sense since fueling operations are not occurring in the repair garage. The failure of such system should sound an alarm.

- The 1 ft³/m/12 ft³ room volume is being deleted in favor of 4 air changes per hour to be consistent with NFPA 30A.

Cost Impact: None.

F259-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

2311.7-F-RANFONE

F260 – 13

2404.6.1.2.1

Proponent: Geoff Raifsnider, P.E., Global Finishing Solutions representing self
(graifsnider@globalfinishing.com)

Revise as follows:

2404.6.1.2.1 Interlocks. The spraying apparatus, drying apparatus and ventilating system for the spray booth or spray room shall be equipped with interlocks arranged to:

1. Prevent operation of the spraying apparatus while drying operations are in progress.
2. Where the drying apparatus is located in the spray booth or spray room, prevent operation of the drying apparatus until a timed purge of spray vapors from the spray booth or spray room is complete. This purge time shall be based upon completing not less than 4 air changes of spray booth or spray room volume. Purge spray vapors from the spray booth or spray room for a period of not less than 3 minutes before the drying apparatus is rendered operable.
3. Have the ventilating system maintain a safe atmosphere within the spray booth or spray room during the drying process and automatically shut off drying apparatus in the event of a failure of the ventilating system.
4. Shut off the drying apparatus automatically if the air temperature within the booth exceeds 200°F (93°C).

Reason: The current language does not state how the value is calculated. The proposed language clarifies how to calculate the purge time and bases it upon the amount of fresh air introduced in the same manner that is used for purging an oven. This is appropriate since the drying operation has turned the spray booth into an oven.

As mentioned this proposal is based upon the language in NFPA 86 Standard for Ovens and Furnaces 2011 Edition. The idea is to replace the air in the booth at least four times (4 ft³ of air/ft³ of booth) to ensure that the concentration at the end of the purge interval is less than 25% of the lower flammable limit.

The IFC (2406.1.2) currently requires compliance with Chapter 30 when utilizing drying in a spray booth. Section 3007.2 states that a nameplate shall be provided that, among other information, indicates the required purge time (2107.2(3)). The code official can initially verify that the purge timer is set to this value. If there is cause to doubt this information the calculations mentioned can be performed to verify the minimum purge time.

The purge interval is a function of the spray booth size (cubic feet) and the ventilation rate (cubic feet per minute). Both of these values are documented and measurable for a given spray booth.

To verify that the purge time is sufficient to meet the code, multiply the volume of the booth by four (4) and divide by the exhaust flow rate. An example would be a spray booth that measures 10 ft wide x 10 ft high x 14 ft long (volume = 1,400 ft³). If this booth was designed for 100 feet per minute downdraft the exhaust flow rate would be 14,000 ft³/min (10 ft x 14 ft x 100 fpm). To calculate the minimum purge time you would multiply 1400 ft³ by four (4) and divide by 14,000 ft³/min. The resulting minimum purge time would be 0.4 minutes (1400x4/14000=0.4).

For booths that elevate the air temperature for curing via the same supply air unit used for tempering the air for painting, there is no need for a post paint purge of spray vapors. One type of spray/cure booth elevates the incoming (outside) air temperature and does not recirculate. This type poses no risk of bringing spray vapors back around and through the heating source. The other type of spray/cure booth switches to a recirculation mode during cure. In this mode, the spray/cure booth functions just like an oven and since other sections of the code require the concentration in the exhaust air stream to be less than 25% of the LFL the concentration that could be seen at the burner is not flammable. However if the drying apparatus is in the spray area and could be directly exposed to spray vapors, it makes sense to purge that space prior to energizing the drying apparatus.

There are many paint finishing operations, typically in the automotive refinish industry, that are negatively affected by the delay between painting and curing at an elevated temperature. By allowing the proposed changes, the spray booth designer can take into account the importance the purge interval may have on the process. By designing for the correct air flow, both a safe environment for energizing the drying apparatus and a minimum time between spray and cure can be achieved.

Cost Impact: This code change proposal will not increase the cost of construction

F260-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

2404.6.1.2.1-F-RAIFSNIDER

F261 – 13

2404.7.3 (IMC [F] 502.7.3.3)

Proponent: Geoff Raifsnider, P.E., Global Finishing Solutions representing self (graifsnider@globalfinishing.com)

Revise as follows:

2404.7.3 (IMC [F] 502.7.3.3) Air velocity. ~~Ventilation systems shall be designed, installed and maintained such that the average air velocity over the open face of the booth, or booth cross section in the direction of airflow during spraying operations, shall not be less than 100 feet per minute (0.51 m/s). Each spray area shall be provided with mechanical ventilation in accordance with Sections 2404.7.3.1 through 2404.7.3.3 (IMC 502.7.3.3.1 through 502.7.3.3.3).~~

2404.7.3.1 (IMC [F] 502.7.3.3.1) Open face or open front spray booth. For spray application operations conducted in an open face or open front spray booth, the ventilation system shall be designed, installed and maintained such that the average air velocity into the spray booth through all openings shall be not less than 100 feet per minute (0.51 m/s).

Exception: For fixed or automated electrostatic spray application equipment the average air velocity into the spray booth through all openings shall be not less than 50 feet per minute (0.25 m/s).

2404.7.3.2 (IMC [F] 502.7.3.3.2) Enclosed spray booth or spray room. For spray application operations conducted in an enclosed spray booth or spray room, the ventilation system shall be designed, installed and maintained so that the flammable contaminants are diluted in noncontaminated air to maintain concentrations in the exhaust air flow below 25 percent of the contaminant's lower flammable limit (LFL).

2404.7.3.3 (IMC [F] 502.7.3.3.3) Enclosed spray booth or spray room with openings for product conveyance. In addition to the requirements of 2404.7.3.2, the ventilation system shall be designed, installed and maintained so that the average air velocity into the spray booth through openings shall be not less than 100 feet per minute (0.51 m/s).

Exception: Where methods are used to reduce cross drafts that can draw vapors and overspray through openings from the spray booth or spray room, the average air velocity into the spray booth or spray room shall be capable of capturing and confining vapors and overspray to the spray booth or spray room.

Reason: For spray application using flammable and combustible materials, the industry standards are OSHA 1910.107 and 1910.94, Chapter 24 of the International Fire Code (IFC), and NFPA 33.

With regards to ventilating spray booths and spray rooms, NFPA 33 and the IFC have similar language stating that the concentration of flammable materials in the exhaust system must be kept below 25 percent of the lower flammable limit (LFL).^{1,2} From this requirement alone the minimum ventilation rate of a spray booth or spray room could be calculated. And by dividing this ventilation rate by the cross sectional area of the booth in the direction of air flow a minimum average velocity can be calculated. OSHA requirements for average air velocity were based upon the 1969 edition of NFPA 33 and were intended to provide a measureable that could be used to check the effectiveness of maintaining the booth exhaust below 25% of the LFL.⁵ OSHA has recognized that the requirements for average air velocity were not intended for totally enclosed booths.⁶

Current language in the IFC specifies 100 feet per minute minimum air velocity and offers explanation in their commentary that the objective is containment within a designated spraying space and limiting the overspray.^{3,4} It goes on to explain that 100 FPM is the minimum capture velocity for particulate spray material. In an open face booth, it may be necessary to have a face velocity of 100 FPM or higher to provide the capture needed; but in an enclosed booth the enclosure provides the containment.

The following ventilation design basis for paint spray booths is common in the industry and has been effective in providing clean, safe and reliable painting environments which are in compliance with the intent of the International Fire Code, OSHA, and NFPA 33.

1. The total exhaust ventilation rate shall be based upon the minimum amount of air required to maintain the concentration of flammable vapors in the exhaust below 25%
2. Where appropriate the exhaust rate shall be increased by the amount of air needed to:

- maintain a minimum average velocity through all openings which prevent the escape of overspray from the spray booth
- achieve the desired collection of overspray toward the exhaust filters
- achieve the desired paint transfer efficiency

There are many types of booths and rooms in which the 100 fpm value would be detrimental to the quality of the product and based upon the amount of paint used is well in excess of the minimum dilution air needed to keep the exhaust below 25% of the LFL. This extra air also increases the operating costs. The air velocities for a specific spray booth or spray room should be specific to the individual design that accomplishes the desired performance (i.e. 25% LFL or containment of overspray at openings). Chapter 13.75 of Industrial Ventilation – A Manual of Recommended Practice 26th Edition Published by ACGIH, lists many recommended air velocity ranges for various painting operations, some above and some below 100 fpm. This publication could be referenced in the standard or commentary.

This proposal does not require additional knowledge or tools for the AHJ. The designer or owner of the spray booth or room can provide calculations showing the minimum ventilation rate based upon the type and amount of paint being sprayed. The ventilation rate can be converted into an average velocity in the spray area. The AHJ can ask for balancing information to confirm the installation meets the code requirements or can independently measure the design velocity in the same manner as currently used by the AHJ to confirm 100 FPM.

The following are the references indicated above:

1. Chapter 7.2, NFPA 33, Standard for Spray Application Using Flammable or Combustible Materials 2007 Edition
"Each spray area shall be provided with mechanical ventilation that is capable of confining and removing vapors and mists to a safe location and is capable of confining and controlling combustible residues, dusts, and deposits. The concentration of the vapors and mists in the exhaust stream of the ventilation system shall not exceed 25 percent of the lower flammable limit."
2. Chapter 510.3, 2012 International Mechanical Code® 2012 Edition
"The design and operation of the exhaust system shall be such that flammable contaminants are diluted in noncontaminated air to maintain concentrations in the exhaust flow below 25 percent of the contaminant's lower flammability limit."
3. Chapter 2404.7.3, 2012 International Fire Code® 2012 Edition
"Air velocity. Ventilation systems shall be designed, installed and maintained such that the average air velocity over the open face of the booth, or booth cross section in the direction of airflow during spraying operations, shall not be less than 100 feet per minute (0.51 m/s)."
4. Chapter 1504.7.3, 2006 International Fire Code® Commentary

"To facilitate the keeping of flammable vapors within a designated spraying space and limiting the amount of overspray, the code requires that the exhaust system be adequately sized to maintain an average velocity over the open face of the booth or booth cross section of no less than 100 feet per minute (0.51 m/s), which is the minimum velocity to capture particulate spray material. Velocities exceeding 200 lineal feet per minute (1.01 m/s) have been determined to be too great for this purpose. To determine the minimum ventilation/exhaust capacity in cubic feet per minute (cfm), multiply the booth width (feet) by booth height (feet) by 100 (lineal per feet)."

1. OSHA Directive STD 01-05-010 - STD 1-5.10 - Clarification of 29 CFR 1910.107(b)(5)(i) Average Air Velocity of Spray Booths, June 1, 1973
"The average air velocity requirements over the open face of the booth stated in this paragraph for spray finishing operations using flammable and combustible liquids were taken from NFPA-33-1969 and pertain to those hazards associated with fire protection or the removal of flammable vapor accumulation from the interior of the booth during spraying operations. This paragraph applies to maintaining the concentration of flammable vapors below the lower explosive limit (LEL) in a spray booth but does not apply to maintaining operator exposures to within the permissible exposure limits (PEL)."
2. OSHA Standard Interpretations 10/22/2001 - Clarification of minimum face velocity requirements for spray booths, October 22, 2001

Question: 29 CFR 1910.107(b)(5) only refers to a dry filter spray booth. What is the minimum air velocity requirement for a waterwash spray booth or an enclosed booth with no openings?

Reply: OSHA currently does not have specific standards addressing velocity requirements for a waterwash spray booth or an enclosed booth with no openings. However, 1910.94(c)(6)(ii) requires that the vapor concentration in all area of the booth remain at a level below 25 percent of the lower explosive limit (LEL). This requirement corresponds to the requirements of NFPA 33, section 5.2, Ventilation, performance requirements (2000 edition)."

Cost Impact: This code change proposal will not increase the cost of construction.

F261-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

2404.7.3-F-RAIFSNIDER

F262 – 13

2703.15.3 (IBC [F] 415.10.10.3) (New)

Proponent: Patrick A. McLaughlin McLaughlin & Associates, representing the Semiconductor Industry Association (pmclaughma@aol.com)

Add new text as follows:

2703.15.3 (IBC [F] 415.10.10.3) Emergency power protection level. Where emergency power is required, the system shall meet the requirements for a Protection Level 2, Class 2 system in accordance with NFPA 110.

Reason: : Some jurisdictions have interpreted NFPA 110 classification level for semiconductor facilities to be Level 1 when it should be Level 2. Level 1 requires 96 hour of fuel and applies to hospitals and similar occupancies. The rationale is supported by the following:

- This would align H5 occupancies with NFPA 55 – Compressed Gases and Cryogenic Fluids Code
 - 6.6.2 Emergency Power. When emergency power is required, the system shall meet the requirements for a Protection **Level 2** system in accordance with NFPA 110, *Standard for Emergency and Standby Power Systems*.
- Semiconductor facilities meet the definition of Level 2 systems: “shall be installed when failure of the EPSS to perform is **less critical to human life and safety** and where the authority having jurisdiction shall permit a higher degree of flexibility than that provided by a Level 1 system”. Failure of the EPSS in a H5 occupancy would not “result in loss of human life or serious injuries” as defined by NFPA 110. Level 1 systems are intended for facilities such as hospitals “when failure of the equipment to perform could **result in loss of human life or serious injuries**”.
- Existing H5 facilities worldwide have Level 2 EPSS.
- EPSS manufacturers suggest that a H5 is not Level 1.
- Due to the large energy usage and backup systems in an H5 occupancy, fuel handling/storage for 96 hours poses increased environmental/public safety/security risks. A typical H5 occupancie utilizes 10 hours of EPSS. A comparison of the fuel storage between 10 hrs and 96 hrs is provided below:
 - 10hr: = 41,790 gallons
 - 96hr = 401,184 gallon

Cost Impact: The code change proposal will not increase the cost of construction.

F262-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

2703.15.3 (NEW)-F-MCLAUGHLIN

F263 – 13

2705.2.3.1, 202 (IBC 202)

Proponent: Patrick A. McLaughlin, McLaughlin & Associates, representing The Semiconductor Industry Association (pmclaugma@aol.com)

Revise as follows:

2705.2.3.1 Construction. Workstations in *fabrication areas* shall be constructed of materials compatible with the materials used and stored at the workstation. The portion of the workstation that serves as a cabinet for HPM gases, ~~and HPM Class I flammable liquids, Class II or Class IIIA combustible liquid~~ shall be noncombustible and, if of metal, shall be not less than 0.0478-inch (18 gage) (1.2 mm) steel.

SECTION 202 (IBC [F] 202) GENERAL DEFINITIONS

~~**HPM FLAMMABLE LIQUID.** An HPM liquid that is defined as either a Class I flammable liquid or a Class II or Class IIIA combustible liquid.~~

Reason: HPM flammable liquids, which include Class I, II and IIIA liquid, are mentioned only once in the Codes in IFC Section 2705.2.3.1. This change deletes the definition of HPM flammable liquids and replaces it in Section 2705.2.3.1 with the text from the HPM flammable liquids definition. The result will be that Section 2705.2.3.1 will still apply to the same materials, and the requirements in the Code that apply to other HPMs, will not be misapplied to Class II and IIIA combustible liquids. There is no justification to treat Class II and IIIA combustible liquids the same as flammable liquids in H5 occupancies. No other occupancy does so. The corresponding IBC definition is also deleted.

Cost Impact: The code change proposal will not increase the cost of construction.

F263-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

2705.2.3.1-F-MCLAUGHLIN

F264 – 13

2808.3

Proponent: Robert J Davidson, Davidson Code Concepts, LLC, representing the Biomass Feedstock Industry Committee on Codes and Standards (BFICOCs) (rjd@davidsoncodeconcepts.com)

Revise as follows:

2808.3 Size of piles. Piles shall not exceed 25 feet (7620 mm) in height, 150 feet (45 720 mm) in width and 250 feet (76 200 mm) in length.

Exception: The *fire code official* is authorized to allow the pile size to be increased when a fire protection plan is provided for approval that includes, but is not limited to the following:

1. Storage yard areas and materials-handling equipment selection, design, and arrangement shall be based upon sound fire prevention and protection principles.
2. Factors that lead to spontaneous heating shall be identified in the plan and control of the various factors shall be identified and implemented, including provisions for monitoring the internal condition of the pile.
3. The plan shall include means for early fire detection, reporting to the public fire department; and facilities needed by the fire department for fire extinguishment including a water supply and fire hydrants.
4. Fire apparatus access roads around the piles and access roads to the top of the piles shall be established, identified and maintained.
5. Regular yard inspections by trained personnel shall be included as part of an effective fire prevention maintenance program.

Additional fire protection called for in the plan ~~is~~ shall be provided and shall be installed in accordance with ~~Chapter 9 this code~~. The increase of the pile size shall be based upon the capabilities of the ~~system~~ installed fire protection systems and features.

Reason: The purpose of this proposal is to provide better tools and guidance for fire code officials when proposals to increase pile size are submitted. The current language for the exception to Section 2808.3 is:

Exception: The fire code official is authorized to allow the pile size to be increased when additional fire protection is provided in accordance with Chapter 9. The increase shall be based upon the capabilities of the system installed.

The language provides no actual guidance other than a statement that the pile size is based upon the systems installed in accordance with Chapter 9. A review of Chapter 9 provides no additional guidance.

In reality, the protection needed for increased pile size include fire flows through a hydrant system, fire apparatus access roads, means for monitoring pile temperatures, a means of notifying the fire department and a sound fire prevention maintenance program. The language added to modify the existing exception provides for these features to be addressed in a fire protection plan submittal to the fire code official for approval. Because the systems installed may be covered by various portions of the code such as fire apparatus access roads covered by Chapter 5, the reference to Chapter 9 was changed to "this code".

The basis of this language should not be new to experienced fire code officials, it can be found in the discontinued standard NFPA 46 which was referenced by some legacy fire code editions and it was located in NFPA 230 which was referenced by the 2003 edition of the IFC. When NFPA eliminated NFPA 230 and put some of the requirements in NFPA 13 with the bulk going to NFPA 1, no work was done to add language to the later editions of the IFC to replace language relied upon from the referenced standard.

Extract from NFPA 230-2003 PROTECTION OF STORAGE OF FOREST PRODUCTS

11.6.2 General.

11.6.2.1* *The fire hazard potential inherent in storage piles shall be controlled by a positive fire prevention program under the direct supervision of upper level management that shall include the following:*

- (1) *Selection, design, and arrangement of storage yard areas and materials-handling equipment based upon sound fire prevention and protection principles*
- (2) *Establishment of control over the various factors that lead to spontaneous heating, including provisions for monitoring the internal condition of the pile*
- (3) *Means for early fire detection and extinguishment*

- (4) *Driveways around the piles and access roads to the top of the piles for effective fire-fighting operations*
- (5) *Facilities for calling the public fire department and facilities needed by the fire department for fire extinguishment*
- (6) *Effective fire prevention maintenance program, including regular yard inspections by trained personnel*

The Biomass Feedstock Industry Committee on Codes and Standards (BFICOCS), led by Oak Ridge National Laboratory (ORNL), is an initiative of the Department of Energy Biomass Technologies Office (BTO). As part of the BTO integrated biorefinery efforts, the BFICOCS was assembled to conduct analysis of existing fire and building codes and to prepare proposed code changes designed to facilitate the development of the commercial-scale biomass industry while maintaining a focus on safety. The committee is made up of managers, engineers and code officials from industry, government laboratories, consulting firms, and the American Society of Agricultural and Biological Engineers.

Fire codes related to storage, handling, and preprocessing of biomass are based on industries that operate in a significantly different manner than the growing biomass-based energy industry. Applying current research on biomass properties and knowledge of conventional and emerging storage, handling, and preprocessing technologies, the BFICOCS has identified changes in the IFC that benefit industry and the public.

Cost Impact: The code change proposal will not increase the cost of construction.

F264-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

2808.3-F-DAVIDSON

F265 – 13

2810 (New), 2801.1

Proponent: Robert J Davidson, Davidson Code Concepts, LLC, representing self
(rjd@davidsoncodeconcepts.com)

Add new text as follows:

SECTION 2810

WOOD AND PLASTIC PALLET STORAGE AND REHABILITATION

2810.1 General. All facilities with either storage or rehabilitation of pallets shall be in accordance with Sections 2810.2 through 2810.5.2 and Section 2803.

2810.2 Fire Flow. The minimum required fire flow in pallet storage yards exceeding 3200 sq feet of pallet storage areas shall be not less than 2,000 gpm (7571 L/m). For storage yards with stable piles greater than 6,200 sq. ft. (576 m²) the required fire flow shall be not less than 3,000 gpm (8516 L/m). Pallet storage yards shall not exceed the available fire hydrant flow and spacing.

2810.3 Fire Hydrants. Fire hydrants required for fire flow purposes for pallet storage arrays shall be installed in accordance with Section 507 within three hundred (300) feet (152.4m) of pallet locations measured along unobstructed access paths.

2810.4 Fire Department Access. Fire apparatus access roads in accordance with Section 503 shall be located within one hundred fifty (150) feet (45,720mm) of all portions of the pallet storage array(s). Permanent delineation of on-site fire apparatus access roads shall be provided as required by the fire code official.

2810.5 Idle Pallet Storage. Pallet storage shall be in compliance with Sections 2810.5.1 or 2810.5.2 as applicable.

2810.5.1 Exterior pallet repair and storage areas greater than 3,200 sq ft. Exterior pallet storage arrays greater than 3200 square feet shall comply with all of the following:

1. Stacks shall not exceed a height of fifteen (15) ft. (4.57 m).
2. Stacks shall be no closer than eight (8) ft. (2.44 m) to any property line or a distance equal to the stack height, whichever is greater.
3. Stacks shall be no closer than eight (8) ft. (2.44 m) to any other on-site storage area.
4. Stacks shall be no closer than fifteen (15) ft. (4.57 m) to any on-site structure.
5. Stacks shall be arranged to form stable piles.
6. Piles shall not contain more than six thousand (6,000) cu. ft. (170 m³) of pallets.
7. Piles shall be separated from other piles by a minimum distance of eight (8) ft. (2.44 m).
8. Piles shall be arranged in a grid system to form pallet storage arrays with a maximum dimension of fifty (50) ft. by fifty (50) ft. (15.25 m by 15.25 m).
9. Pallet storage arrays shall be separated by a minimum distance of twenty four (24) ft. (7.32 m).

2810.5.2 Exterior storage not greater than 3200 sq ft in area. Exterior pallet storage not greater than 3200 square feet shall comply with all of the following:

1. Stacks shall be no closer than eight (8) ft. (2.44 m) to any property line or a distance equal to the stack height, whichever is greater.
2. Stacks shall be no closer than eight (8) ft. (2.44 m) to any other on-site storage.
3. Stacks shall be no closer than fifteen (15) ft. (4.57 m) to any on-site structure.

Exception: Where approved by the fire code official, stacks located closer than fifteen (15) ft. to an on-site structure shall maintain minimum horizontal clearances based on the quantity of pallets and the level of protection provided by the building construction as follows:

1. The minimum horizontal clearance for 50 pallets or less adjacent to a masonry wall without openings located within twenty (20) ft. (6 m) horizontally of the pallet stacks, or adjacent to a masonry wall with 2 hour fire-resistance rated protected openings shall be zero (0) feet (0 m).
2. The minimum horizontal clearance for 51 to 200 pallets adjacent to a masonry wall without openings located within twenty (20) ft. (6 m) horizontally of the pallet stacks, or a masonry wall with 2 hour fire-resistance rated protected openings shall be eight (8) feet (2.44 m).
3. The minimum horizontal clearance for 50 pallets or less adjacent to a wood or metal building equipped throughout with an approved automatic sprinkler system shall be eight (8) ft. (2.44 m).
4. Stacks located less than fifteen (15) ft. (4.57 m) from an exterior building wall shall not exceed a height equal to thirty (30) inches below the roof line elevation, or fifteen (15) feet (4.57 m), whichever is less.
5. Stacks shall be arranged to form stable piles.

Revise as follows:

SECTION 2801 GENERAL

2801.1 Scope. The storage, manufacturing and processing of timber, lumber, plywood, non-metallic pallets, veneers and byproducts shall be in accordance with this chapter.

Reason: There have been an increasing number of large scale fires involving the repair and outdoor storage of combustible pallets. Numerous local jurisdictions have been adding local requirements to their fire code adoptions to deal with this increased fire threat. These new requirements are to provide code language in the IFC addressing the high challenge fire protection issues involving large amounts of idle pallets. The concepts for the technical language in this proposal were taken from the Clark County, Nevada fire code amendments, a county that has dealt with large scale fires and developed the requirements in response to those conflagrations.

Section 2810.2 specifies that the requirements apply to facilities that store or rehabilitate wood or plastic pallets. The rehabilitation activities include storage along with additional hazards introduced by the rehabilitation activities.

Fires in pallet storage areas are fast growing and spreading requiring an adequate fire flow. Threshold of 2,000 GPM for greater than 3,200 sq. ft. of storage will provide for up to 4 - 500 GPM master stream appliances to be utilized when required, increasing to 3,000 GPM when piles larger than 6,200 sq. ft. exist.

Referring to IFC Table B105.1 for required fire flows the 2,000 GPM requirement is for Type V-B buildings of 4,401 - 6,200 sq. ft., since the open array of the pallets provide for a faster fire spread and greater need for master stream appliances than a completed building typically would, the 2,000 GPM is appropriate for the minimum flow required. Since pile size and separation from individual piles is provided for in Section 2810.5 a fire flow 3,000 GPM was utilized for areas of storage over 6,200 sq. ft.

Fire department access roads are required in section 2810.4.

Section 2810.5 provides for the storage arrangement of piles and stacks addressing height, maximum pile size and distances from exposures. A stack is an individual stack of pallets, a pile is a group of 2 or more stacks of pallets grouped together.

Cost Impact: The code change proposal will increase the cost of construction.

F265-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

2801.1-F-DAVIDSON

F266 – 13

3101.1, 3103.1

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

3101.1 Scope. Tents and membrane structures shall comply with this chapter. The provisions of Section 3103 are applicable only to temporary tents and membrane structures. The provisions of Section 3104 are applicable to temporary and permanent tents and membrane structures. Other temporary structures shall comply with the *International Building Code*.

3103.1 General. ~~All temporary tents~~ Tents and membrane structures used for temporary periods shall comply with this section. Other temporary structures erected for a period of 180 days or less shall comply with the *International Building Code*.

Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

Background – There has been confusion with attempting to apply the IFC requirements in Chapter 31 to temporary structures. Typically this occurs because the fire code official is already involved with the temporary event regarding other operational permits required by the IFC.

For example, a weekend concert is planned at the fair. The fire code official is already involved with various IFC operational permits for Place of Assembly, Carnival/Fair, and Temporary Membrane Structures and Tents. However, when a stage, platform or other temporary structure is erected the IBC regulates the construction.

The proposal adds a sentence to IFC 3101.1 to send the code user to the IBC for temporary structures. IBC 108.2 and 3103 clearly address the design requirements for temporary structures. IBC 3103.1 has a similar reference back to the IFC to temporary membrane structures and temporary tents. Clearly, the IFC is designed to address 'temporary tents' and 'temporary membrane structures', while IBC 3103 is intended to address 'temporary structures'.

This reference to the IBC is repeated in IFC 3103.1. Normally a redundant sentence is not needed in the code, but since this has been an area of confusion, it is warranted to repeat the reference again.

See link for incident at Indiana State Fair - <http://www.youtube.com/watch?v=4jEmtxnrVCI>

Cost Impact: The code change will not increase the cost of construction.

F266-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

3101.1-F-ZUBIA-FCAC

F267 – 13

3103.3.1 (New)

Proponent: Brad Emerick, Denver Fire Department representing the Fire Marshal's Association of Colorado (FMAC) and the Colorado Chapter of the ICC (CCICC) (brad.emerick@denvergov.org)

Add new text as follows:

3103.3.1 Special Amusement. Tents and other membrane structures erected for the purpose of a special amusement building shall comply with the provisions of Section 411 of the *International Building Code*.

Reason: The scoping language in Section 3101 doesn't leave much room for stepping outside Chapter 31 for proposed uses other than those contemplated in Chapter 31. However, temporary membrane structures are being used for an increasingly wider variety of occupancies. One of the more hazardous is special amusement buildings.

The growing popularity of haunted houses usually erected within a month of Halloween and dismantled shortly thereafter, has enticed producers to (try to) utilize temporary membrane structures for these events. Due to the intentionally disorienting nature of these occupancies, additional life-safety measures beyond those prescribed in Chapter 31 (which really only contemplates large, open, usually seated assembly occupancies) are required. The section cited in the IBC addresses temporary special amusement buildings as well as permanent, and provides established life-safety measures.

Cost Impact: This change will not affect the cost of construction.

F267-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

3103.3.1-F-EMERICK

F268 – 13

3103.9; 3103.9.1 (New), 3103.9.2 (New)

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

3103.9 Anchorage required. Tents or membrane structures and their appurtenances shall be adequately roped, braced and anchored to withstand the elements of weather and prevent against collapsing. ~~Documentation of structural stability shall be furnished to the fire code official on request.~~

3103.9.1 Structural design. Tents and membrane structures shall be designed and constructed to comply with Chapter 16 of the *International Building Code* where any of the following conditions occur:

1. The occupant load of the tent or membrane structure exceeds 100.
2. The tent or membrane structure is classified as a Group A, E, or I.
3. The tent or membrane structure is classified as a Group R Occupancy with an occupant load exceeding 50, or
4. The tent or membrane structure exceeds one story.

3103.9.2 Documentation. Documentation of structural stability shall be furnished to the fire code official upon request.

Reason: There has been confusion with attempting to apply the IFC requirements in Chapter 31 to temporary tents and membrane structures relative to structural stability.

These structures can be seen at concerts, outdoor functions, fairs, etc. Even though the provision of 'temporary' limits the usability of these structures to less than 180 days, improper structural design can still lead to problems.

Many of these temporary tents and temporary membrane structures have multiple floors, and over 30 feet in height. As the height increases, the impact of collapse increases and typically these structures are surrounded by hundreds of people.

This proposal revises IFC Section 3103.9 to include requirements for temporary tents and membrane structures to comply with IBC Chapter 16 structural requirements when there is a significant life hazard within the structure, as reflected in Section 3103.9.1. The relative significance is based on the occupancy classification, the occupant load, or the number of levels within the tent or membrane structure.

The requirement for documentation is relocated from 3103.9 to 3103.9.2.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

Cost Impact: This code change may increase the cost of construction

F268-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

3103.9-F-ZUBIA-FCAC

F269 – 13

3105 (New), 202 (New), 3101.1, 3102.1, 105.6.43, 105.7.16, Chapter 80

Proponent: Anne vonWeller, representing Witt Associates; Karl Ruling, Technical Standards Manager, Professional Lighting and Sound Association representing self; Scott Adams, Deputy Chief Park City Fire District, representing self

Add new text as follows:

SECTION 3105 **TEMPORARY STAGE CANOPIES**

3105.1 General. Temporary stage canopies shall comply with Section 3104, Sections 3105.2 through 3105.8 and ANSI E1.21.

3105.2 Approval. Temporary stage canopies in excess of 400 square feet shall not be erected operated or maintained for any purpose without first obtaining approval and a permit from the fire code official.

3105.3 Permits. Permits shall be required as set forth in Sections 105.6 and 105.7.

3105.4 Use period. Temporary stage canopies shall not be erected for a period of more than 45 days.

3105.5 Required documents. All of the following documents shall be submitted to the fire code official for review before a permit is approved:

1. Construction documents: Construction documents shall be prepared by a registered design professional in accordance with the *International Building Code*. Construction documents shall include:
 - 1.1. A summary sheet showing design criteria, loads and support reactions.
 - 1.2. Detailed construction and installation drawings.
 - 1.3. Design calculations.
 - 1.4. Operating limits of the structure explicitly outlined by the design professional including environmental conditions and physical forces.
 - 1.5. Effects of additive elements such as video walls, supported scenery, audio equipment, vertical and horizontal coverings.
 - 1.6. Means for adequate stability including specific requirements for guying and cross-bracing, ground anchors or ballast for different ground conditions.
2. Designation of responsible party: The owner of the temporary stage canopy shall designate in writing a person to have responsibility for the temporary stage canopy on the site. The designated person shall have sufficient knowledge of the construction documents, manufacturer's recommendations and operations plan to make judgments regarding the structure's safety and to coordinate with the fire code official.
3. Operations plan: The operations plan shall reflect manufacturer's operational guidelines, procedures for environmental monitoring and actions to be taken under specified conditions consistent with the construction documents.

3105.6 Inspections. Inspections shall comply with Section 106 and Sections 3105.6.1 and 3106.6.2.

3105.6.1 Independent inspector. The owner of a temporary stage canopy shall employ a qualified, independent approved agency or individual to inspect the installation of a temporary stage canopy.

3105.6.2 Inspection report. The inspecting agency or individual shall furnish an inspection report to the fire code official. The inspection report shall indicate that the temporary stage canopy was inspected and was or was not installed in accordance with the approved construction documents. Discrepancies shall be

brought to the immediate attention of the installer for correction. Where any discrepancy is not corrected, it shall be brought to the attention of the fire code official and the designated responsible party.

3105.7 Means of egress. The means of egress for temporary stage canopies shall comply with Chapter 10.

3105.8 Location. Temporary stage canopies shall be located a distance from property lines and buildings to accommodate distances indicated in the construction drawings for guy wires, cross-bracing, ground anchors or ballast. Location shall not interfere with egress from a building or encroach on fire apparatus access roads.

SECTION 202 GENERAL DEFINITIONS

TEMPORARY STAGE CANOPY. A temporary stage canopy is a temporary ground-supported structure used to cover stage areas and support equipment in the production of outdoor entertainment events.

Revise as follows:

SECTION 3101 GENERAL

3101.1 Scope. Tents, canopies, temporary stage canopies and membrane structures shall comply with this chapter. The provisions of Section 3103 are applicable only to temporary membrane structures. The provisions of Section 3104 are applicable to temporary and permanent membrane structures.

SECTION 3102 DEFINITIONS

3102.1 Definitions. The following terms are defined in Chapter 2:

AIR-INFLATED STRUCTURE.
AIR-SUPPORTED STRUCTURE.
MEMBRANE STRUCTURE.
TEMPORARY STAGE CANOPY.
TENT.

[A] 105.6.43 Temporary membrane structures and tents. An operational permit is required to operate an air-supported temporary membrane structure, a temporary stage canopy or a tent having an area in excess of 400 square feet (37 m2).

Exceptions: 1. and 2. (No change to current text.)

[A] 105.7.16 Temporary membrane structures and tents. A construction permit is required to erect an air-supported temporary membrane structure, a temporary stage canopy or a tent having an area in excess of 400 square feet (37 m2).

Exceptions: 1. through 3. (No change to current text.)

Add new standard to Chapter 80 as follows:

ANSI

E1.21-2006 Entertainment Technology: Temporary Ground Supported Overhead Structures Used to Cover the Stage Areas and Support Equipment in the Production of Outdoor Entertainment Events.

Reason: There were four high-profile temporary stage canopy collapses during the 2011 summer concert season: one on August 7th at Brady District Block Party, Tulsa Oklahoma; one on July 17th at the Cisco Ottawa Blues Festival in Ottawa, Canada; one on August 13, 2011, at the Indiana State Fairgrounds which resulted in the loss of seven lives and the injury of fifty more; and another on August 18th at the Pukkelpop Festival in Kiewit, Belgium. Again, in the summer of 2012 an additional life was lost at a Radiohead concert in Toronto. All resulted in tremendous property damage and two in multiple fatalities. The obvious concern is for the safety of the performers and audiences, stage-hands, lighting technicians, security personnel and every other profession or individual that necessitates proximity to a temporary stage.

Temporary stage canopies are very specialized and complex. The nature of the structures must accommodate a wide variety of changing components such as audio equipment, video walls and scenery. The entertainment industry is continually evolving with new ways to improve shows creating larger and more complex spectacles.

Due to the nearly unique design of temporary stage canopies, it is difficult for most fire inspectors to find adequate guidance in current code language to satisfactorily regulate these specialized structures.

Witt Associates contracted with the Indiana State Fair Commission to complete a comprehensive assessment of the 2011 State Fair collapse incident. The assessment included a review of applicable laws and model codes as well as a nationwide survey of best practices. A major recommendation of the assessment was:

“National model building and fire codes should adopt more specific standards for temporary membrane stage structures reflecting the increasing complexity of these structures”

The complete report may be reviewed at www.wittassociates.com/clients-projects/project-list/indiana-state-fair-collapse-independent-assessment. This proposal addresses the report recommendation, incorporates a reasonable industry standard and best practices.

- 3105.1 - An ANSI standard exists which is specifically targeted to temporary stage canopies. ANSI E1.21-2006 was produced by the Entertainment Services and Technology Association (ESTA). ESTA recently merged with an international organization, Professional Lighting and Sound Association (PLASA). Fire and building code officials may download the standard at no charge provided they register at www.plasa.org.
- 3105.2 - The trigger starting regulation at 400 square feet is consistent with the current International Fire Code.
- 3104.4 - The 45 day duration is consistent with ANSI E1.21.
- 3105.5 - This section is a summary of the relevant requirements of ANSI E1.21 necessary to provide guidance to regulating authorities. Stage canopies are subject to more diverse loads than most permanent structures. Because of the variable weights of equipment for different shows, the need to monitor changing weather conditions and the requirement to be able to raise and lower the roof to install equipment, there is a necessity for a design professional to fully analyze the structure and a need to designate a responsible person on site who understands this complexity of considerations.
- 3105.6 - It is unlikely many fire inspectors will be familiar with the specialized nature of these structures. That is the reason we are recommending a qualified specialized inspector be employed by the owner to inspect and report to the authority having jurisdiction and the designated responsible person. An Entertainment Technician Certification Program (ETCP) certification exists which would demonstrate competence to inspect the majority of temporary stage canopies. For large, unusually complex canopies there is latitude for the fire official to require inspection by structural engineer familiar with these types of temporary structures.
- 3105.7 and
- 3105.8 - This language is for general safety and is consistent with the International Fire Code.
- 3102 - Definitions were added to describe the specialized structure to be regulated.

Cost Impact: The code change proposal will increase the cost of construction

F269-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

3105-F-VONWELLER

F270 – 13

3203

Proponent: Jeffrey M. Hugo, CBO, representing the National Fire Sprinkler Association
(hugo@nfsa.org)

Revise as follows:

3203.1 Classification of commodities. Commodities shall be classified as Class I, II, III, IV in accordance with NFPA 13. ~~or high hazard in accordance with this section.~~ High hazard commodities shall be classified in accordance with Section 3203.3. Materials listed within each commodity classification are assumed to be unmodified for improved combustibility characteristics. Use of flame-retarding modifiers or the physical form of the material could change the classification. ~~See Section 3203.7 for classification of Group A, B and C plastics.~~

3203.2. Plastics. Plastics shall be designated as Group A, B or C in accordance with NFPA 13.

3203.2 Class I commodities. ~~Class I commodities are essentially noncombustible products on wooden or nonexpanded polyethylene solid deck pallets, in ordinary corrugated cartons with or without single-thickness dividers, or in ordinary paper wrappings with or without pallets. Class I commodities are allowed to contain a limited amount of Group A plastics in accordance with Section 3203.7.4. Examples of Class I commodities include, but are not limited to, the following:~~

- ~~Alcoholic beverages not exceeding 20 percent alcohol~~
- ~~Appliances noncombustible, electrical~~
- ~~Cement in bags~~
- ~~Ceramics~~
- ~~Dairy products in nonwax-coated containers (excluding bottles)~~
- ~~Dry insecticides~~
- ~~Foods in noncombustible containers~~
- ~~Fresh fruits and vegetables in nonplastic trays or containers~~
- ~~Frozen foods~~
- ~~Glass~~
- ~~Glycol in metal cans~~
- ~~Gypsum board~~
- ~~Inert materials, bagged~~
- ~~Insulation, noncombustible~~
- ~~Noncombustible liquids in plastic containers having less than a 5-gallon (19 L) capacity~~
- ~~Noncombustible metal products~~

3203.3 Class II commodities. ~~Class II commodities are Class I products in slatted wooden crates, solid wooden boxes, multiple-thickness paperboard cartons or equivalent combustible packaging material with or without pallets. Class II commodities are allowed to contain a limited amount of Group A plastics in accordance with Section 3203.7.4. Examples of Class II commodities include, but are not limited to, the following:~~

- ~~Alcoholic beverages not exceeding 20 percent alcohol, in combustible containers~~
- ~~Foods in combustible containers~~
- ~~Incandescent or fluorescent light bulbs in cartons~~
- ~~Thinly coated fine wire on reels or in cartons~~

3203.4 Class III commodities. ~~Class III commodities are commodities of wood, paper, natural fiber cloth, or Group C plastics or products thereof, with or without pallets. Products are allowed to contain limited amounts of Group A or B plastics, such as metal bicycles with plastic handles, pedals, seats and tires.~~

Group A plastics shall be limited in accordance with Section 3203.7.4. Examples of Class III commodities include, but are not limited to, the following:

- Aerosol, Level 1 (see Chapter 28)
- Combustible fiberboard
- Cork, baled
- Feed, bagged
- Fertilizers, bagged
- Food in plastic containers
- Furniture: wood, natural fiber, upholstered, nonplastic, wood or metal with plastic-padded and covered armrests
- Glycol in combustible containers not exceeding 25 percent
- Lubricating or hydraulic fluid in metal cans
- Lumber
- Mattresses, excluding foam rubber and foam plastics
- Noncombustible liquids in plastic containers having a capacity of more than 5 gallons (19 L)
- Paints, oil base, in metal cans
- Paper, waste, baled
- Paper and pulp, horizontal storage, or vertical storage that is banded or protected with *approved wrap*
- Paper in cardboard boxes
- Pillows, excluding foam rubber and foam plastics
- Plastic-coated paper food containers
- Plywood
- Rags, baled
- Rugs, without foam backing
- Sugar, bagged
- Wood, baled
- Wood doors, frames and cabinets
- Yarns of natural fiber and viscose

3203.5 Class IV commodities. Class IV commodities are Class I, II or III products containing Group A plastics in ordinary corrugated cartons and Class I, II and III products with Group A plastic packaging, with or without pallets. Group B plastics and free-flowing Group A plastics are also included in this class. The total amount of nonfree-flowing Group A plastics shall be in accordance with Section 3203.7.4. Examples of Class IV commodities include, but are not limited to, the following:

- Aerosol, Level 2 (see Chapter 51)
- Alcoholic beverages, exceeding 20 percent but less than 80 percent alcohol, in cans or bottles in cartons
- Clothing, synthetic or nonviscose
- Combustible metal products (solid)
- Furniture, plastic upholstered
- Furniture, wood or metal with plastic covering and padding
- Glycol in combustible containers (greater than 25 percent and less than 50 percent)
- Linoleum products
- Paints, oil base in combustible containers
- Pharmaceutical, alcoholic elixirs, tonics, etc.
- Rugs, foam back
- Shingles, asphalt
- Thread or yarn, synthetic or nonviscose

3203.6 3203.3 High-hazard commodities. High-hazard commodities are high-hazard products presenting special fire hazards beyond those of Class I, II, III or IV. Group A plastics not otherwise classified are included in this class.

Examples of high-hazard commodities include, but are not limited to, the following:

Aerosol, Level 3 (see Chapter 51)
Alcoholic beverages, exceeding 80-percent alcohol, in bottles or cartons
Commodities of any class in plastic containers in carousel storage
Flammable solids (except solid combustible metals)
Glycol in combustible containers (50 percent or greater)
Lacquers, which dry by solvent evaporation, in metal cans or cartons
Lubricating or hydraulic fluid in plastic containers
Mattresses, foam rubber or foam plastics
Pallets and flats which are idle combustible
Paper and pulp, rolled, in vertical storage which is unbanded or not protected with an approved wrap
Paper, asphalt, rolled, horizontal storage
Paper, asphalt, rolled, vertical storage
Pillows, foam rubber and foam plastics
Pyroxylin
Rubber tires
Vegetable oil and butter in plastic containers

3203.7 Classification of plastics. Plastics shall be designated as Group A, B or C in accordance with Sections 3203.7.1 through 3203.7.4.

3203.7.1 Group A plastics. Group A plastics are plastic materials having a heat of combustion that is much higher than that of ordinary combustibles, and a burning rate higher than that of Group B plastics. Examples of Group A plastics include, but are not limited to, the following:

ABS (acrylonitrile-butadiene-styrene copolymer)
Acetal (polyformaldehyde)
Acrylic (polymethyl methacrylate)
Butyl rubber
EPDM (ethylene-propylene rubber)
FRP (fiberglass-reinforced polyester)
Natural rubber (expanded)
Nitrile rubber (acrylonitrile-butadiene rubber)
PET or PETE (polyethylene terephthalate)
Polybutadiene
Polycarbonate
Polyester elastomer
Polyethylene
Polypropylene
Polystyrene (expanded and unexpanded)
Polyurethane (expanded and unexpanded)
PVC (polyvinyl chloride greater than 15-percent plasticized, e.g., coated fabric unsupported film)
SAN (styrene acrylonitrile)
SBR (styrene-butadiene rubber)

3203.7.2 Group B plastics. Group B plastics are plastic materials having a heat of combustion and a burning rate higher than that of ordinary combustibles, but not as high as those of Group A plastics. Examples of Group B plastics include, but are not limited to, the following:

Cellulosics (cellulose acetate, cellulose acetate butyrate, ethyl cellulose)
Chloroprene rubber
Fluoroplastics (ECTFE, ethylene-chlorotrifluoroethylene copolymer; ETFE, ethylene-tetrafluoroethylene copolymer; FEP, fluorinated ethylene-propylene

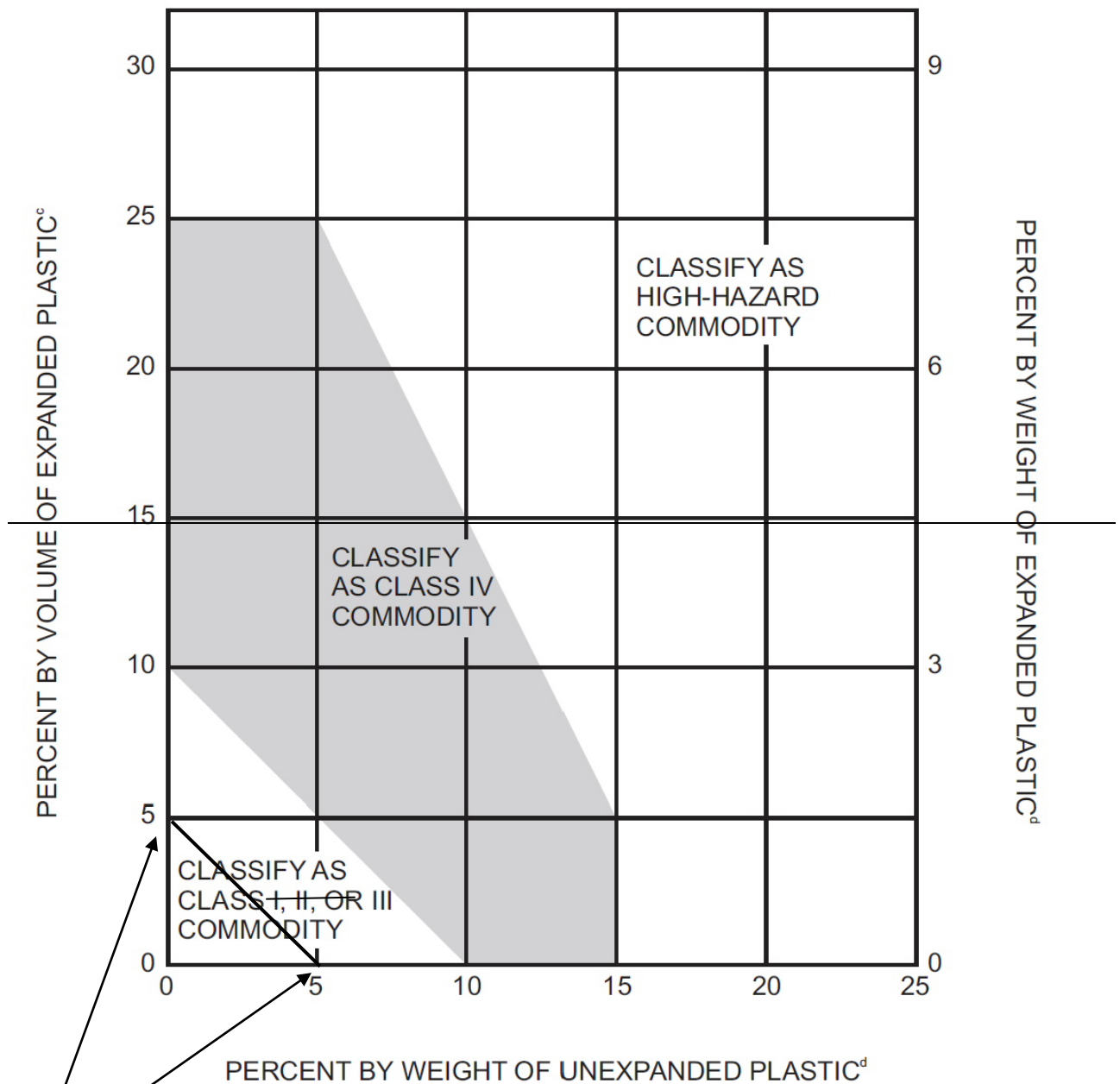
~~copolymer)~~
~~Natural rubber (nonexpanded)~~
~~Nylon (Nylon 6, Nylon 6/6)~~
~~PVC (polyvinyl chloride greater than 5 percent, but not exceeding 15 percent plasticized)~~
~~Silicone rubber~~

~~3203.7.3 Group C plastics.~~ ~~Group C plastics are plastic materials having a heat of combustion and a burning rate similar to those of ordinary combustibles. Examples of Group C plastics include, but are not limited to, the following:~~

~~Fluoroplastics (PCTFE, polychlorotrifluoroethylene;
PTFE, polytetrafluoroethylene)
Melamine (melamine formaldehyde)
Phenol
PVC (polyvinyl chloride, rigid or plasticized less than 5 percent, e.g., pipe, pipe fittings)
PVDC (polyvinylidene chloride)
PVDF (polyvinylidene fluoride)
PVF (polyvinyl fluoride)
Urea (urea formaldehyde)~~

~~3203.4 3203.7.4 Limited quantities of Group A plastics in mixed commodities.~~ ~~Figure 3203.4 3203.7.4 shall be used to determine the quantity of Group A plastics allowed to be stored in a package or carton or on a pallet without increasing the commodity classification.~~

Figure 3203.4 3203.7.4 Mixed Commodities^{a,b}



Shade in new area starting at 5% by weight and 5 % by volume instead of 10% by weight and 10% by volume.

- This figure is intended to determine the commodity classification of a mixed commodity in a package, carton or on a pallet where plastics are involved.
- The following is an example of how to apply the figure: A package containing a Class III commodity has 12-percent Group A expanded plastic by volume. The weight of the unexpanded Group A plastic is 10 percent. This commodity is classified as a Class IV

commodity. If the weight of the unexpanded plastic is increased to 14 percent, the classification changes to a high-hazard commodity.

$$\text{c. Percent by volume} = \frac{\text{Volume of plastic in pallet load}}{\text{Total volume of pallet load, including pallet}}$$

$$\text{d. Percent by weight} = \frac{\text{Volume of plastic in pallet load}}{\text{Total volume of pallet load, including pallet}}$$

Reason: The majority of these examples are in sync with the commodities of NFPA 13, however, there are several that conflict with the current and soon to be referenced edition of NFPA 13. These conflicts can cause significant problems for designers and incorrect storage protection for owners and communities. Removing the examples does not change the technical requirements of this chapter, but only directs the user to NFPA 13 to get the appropriate design commodity.

Cost Impact: Will not increase the cost of construction

F270-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

3203.2-F-HUGO

F271 – 13

3203.2

Proponent: Elley Klausbruckner representing Klausbruckner & Associates Inc (ek@klausbruckner.com)

Revise as follows:

3203.2 Class I commodities. Class I commodities are essentially noncombustible products on wooden or ~~nonexpanded polyethylene solid deck pallets~~, in ordinary corrugated cartons with or without single-thickness dividers, or in ordinary paper wrappings with or without pallets. Class I commodities are allowed to contain a limited amount of Group A plastics in accordance with Section 3203.7.4. Examples of Class I commodities include, but are not limited to, the following:

- Alcoholic beverages not exceeding 20-percent alcohol
- Appliances noncombustible, electrical
- Cement in bags
- Ceramics
- Dairy products in nonwax-coated containers (excluding bottles)
- Dry insecticides
- Foods in noncombustible containers
- Fresh fruits and vegetables in nonplastic trays or containers
- Frozen foods
- Glass
- Glycol in metal cans
- Gypsum board
- Inert materials, bagged
- Insulation, noncombustible
- Noncombustible liquids in plastic containers having less than a 5-gallon (19 L) capacity
- Noncombustible metal products

Reason: Nonexpanded Polyethylene Solid Deck Pallets increase the fuel load of pallet considerably. In NFPA 13, the commodity classification of products stored on plastic pallets are increased by 1-2 classes depending on the type of plastic pallets. In some cases [depending on the weights], it can even be classified as High Hazard Commodity when using Figure 3203.7.4.

Based on research of databases etc., there is no substantiation for classifying products stored on these types of pallets as Class I. However, there are major incidences such as the Post and Paddock Fire prepared by Scott Stookey [former ICC Senior Staff] which point to the possibility of sprinkler failure if the protection of noncombustible materials on nonexpanded polyethylene solid deck is based on Class I Commodity.

Additionally with the rampant use of non-listed plastic pallets [mainly shipped from overseas], these products are a major concern to fire fighter safety.

Cost Impact: The code change proposal will not increase the cost of construction.

F271-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

3203.2-F-KLAUSBRUCKNER

F272 – 13

3206.4.1 (New), 3208.2.1

Proponent: Robert J Davidson, Davidson Code Concepts, LLC, representing self
(rjd@davidsoncodeconcepts.com)

Revise as follows:

3206.4.1 Pallets. Automatic sprinkler system requirements based upon the presence of pallets shall be in accordance with NFPA 13.

3208.2.1 Plastic pallets and shelves. Storage on plastic pallets or plastic shelves shall be protected by approved specially engineered fire protection systems.

Exception: Plastic pallets listed and labeled in accordance with UL 2335 shall be treated as wood pallets for determining required sprinkler protection.

Reason: As currently written, Chapter 32 gives the impression that pallets are only a factor when involving rack storage. This is not the case, NFPA 13 has extensive requirements for pallet use and storage based upon the type of pallet that must be designed for and maintained during occupancy.

This proposal deletes references to plastic pallets and adds a section pointing the user of the code to NFPA 13 for design and installations requirements relative to the presence of pallets.

Example language from NFPA 13-2010

<http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=13>

- 3.9.1.11*** Conventional Pallets. A material-handling aid designed to support a unit load with openings to provide access for material-handling devices. (See Figure A.3.9.1.11.)
- 3.9.1.21** Plastic Pallet. A pallet having any portion of its construction consisting of a plastic material.
- 3.9.1.22*** Reinforced Plastic Pallet. A plastic pallet incorporating a secondary reinforcing material (such as steel or fiberglass) within the pallet.
- 3.9.1.27** Wood Pallet. A pallet constructed entirely of wood with metal fasteners.

5.6.2 Pallet Types.

- 5.6.2.1** **General.** When loads are palletized, the use of wood or metal pallets, or listed pallets equivalent to wood, shall be assumed in the classification of commodities.
- 5.6.2.2*** **Unreinforced Plastic Pallets.** For Class I through Class IV commodities, when unreinforced polypropylene or unreinforced high-density polyethylene plastic pallets are used, the classification of the commodity unit shall be increased one class.
- 5.6.2.2.1** Unreinforced polypropylene or unreinforced high-density polyethylene plastic pallets shall be marked with a permanent symbol to indicate that the pallet is unreinforced.
- 5.6.2.3*** For Class I through Class IV commodities, when reinforced polypropylene or reinforced high-density polyethylene plastic pallets are used, the classification of the commodity unit shall be increased two classes except for Class IV commodity, which shall be increased to a cartoned unexpanded Group A plastic commodity.
- 5.6.2.3.1** Pallets shall be assumed to be reinforced if no permanent marking or manufacturer's certification of nonreinforcement is provided.
- 5.6.2.4** No increase in the commodity classification shall be required for Group A plastic commodities stored on plastic pallets.
- 5.6.2.5** For ceiling-only sprinkler protection, the requirements of 5.6.2.2 and 5.6.2.3 shall not apply where plastic pallets are used and where the sprinkler system uses spray sprinklers with a minimum K-factor of K-16.8 (240).
- 5.6.2.6** The requirements of 5.6.2.2 through 5.6.2.7 shall not apply to nonwood pallets that have demonstrated a fire hazard that is equal to or less than wood pallets and are listed as such.
- 5.6.2.7** For Class I through Class IV commodities stored on plastic pallets when other than wood, metal, or polypropylene or high-density polyethylene plastic pallets are used, the classification of the commodity unit shall be determined by specific testing conducted by a national testing laboratory or shall be increased two classes.

12.12* Protection of Idle Pallets.

12.12.1 Wood Pallets.

- 12.12.1.1*** Wood pallets shall be permitted to be stored in the following arrangements:

- (1) Stored outside
- (2) Stored in a detached structure
- (3) Stored indoors where arranged and protected in accordance with 12.12.1.2

Table 12.12.1.2(a) Control Mode Density/Area Sprinkler Protection for Indoor Storage of Idle Wood Pallets

12.12.2 Plastic Pallets.

12.12.2.1 Plastic pallets shall be permitted to be stored in the following manners:

- (1) Plastic pallets shall be permitted to be stored outside.
- (2) Plastic pallets shall be permitted to be stored in a detached structure.
- (3) Plastic pallets shall be permitted to be stored indoors where arranged and protected in accordance with the requirements of 12.12.2.2.

Cost Impact: The code change proposal will not increase the cost of construction.

F272-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

3206.4.1 (NEW)-F-DAVIDSON

F273 – 13

3206.6.1.1

Proponent: Elley Klausbruckner representing Klausbruckner & Associates Inc (ek@klausbruckner.com)

Revise as follows:

3206.6.1.1 Number of doors required. A minimum of one access door shall be provided in each 100 lineal feet (30 480 mm), or fraction thereof, of the exterior walls that face required fire apparatus access roads. The required access doors shall be distributed such that the lineal distance between adjacent access doors does not exceed 100 feet (30 480 mm).

Exception: The lineal distance between adjacent access doors can exceed 100 feet (30 480 mm) in existing building where no change in occupancy is proposed. Final number and distribution of access doors in existing building shall be approved.

Reason: Many existing buildings do not meet the requirements of 100 foot distribution required in the second sentence of 3206.6.1.1. The section stating "The required access doors shall be distributed such that the lineal distance between adjacent access doors does not exceed 100 feet (30 480 mm)" was proposed and first appeared in the 2009 Edition of the Fire Code. Existing warehouses where one tenant moves out and a new tenant moves in will require a new high piled storage permit. As part of the permit, the current/adopted edition of Chapter 32 is applied which would result in many cases cutting holes in [in many cases concrete] exterior walls and/or restriction in business as a result of adding doors where currently roll up doors exist. This would allow a small amount of flexibility for building owners of existing buildings and the fire code official when adding doors appears costly and/or impractical.

Cost Impact: The code change proposal will not increase the cost of construction.

F273-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

3206.6.1.1-F-KLAUSBRUCKNER

F274 – 13

3206.9.3

Proponent: Elley Klausbruckner representing Klausbruckner & Associates Inc (ek@klausbruckner.com)

Revise as follows:

3206.9.3 Dead ends. Dead-end aisles shall ~~be in accordance with Chapter 10~~ not exceed 50 feet (15240 mm).

Reason: There are no dead-end requirements for aisles for storage warehouses in Chapter 10. The only dead end requirements in Chapter 10 apply to corridors [Section 1018.4] and in assembly occupancies.[Section 1028.9.5], as well as in existing occupancies [Section and Table 1104.17.2]. There are no requirements applicable to a warehouse and/or high piled storage area.

Cost Impact: The code change proposal may increase the cost of construction.

F274-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

3206.9.3-F-KLAUSBRUCKNER

F275 – 13

3208.2.1, Chapter 80

Proponent: Jesse J. Beitel, Hughes Associates, Inc, representing United Technologies Corporation
(jbeitel@haifire.com)

Revise as follows:

3208.2.1 Plastic pallets and shelves. Storage on plastic pallets or plastic shelves shall be protected by approved specially engineered fire protection systems.

Exception: Plastic pallets listed and labeled in accordance with UL 2335 or FM 4996 shall be treated as wood pallets for determining required sprinkler protection.

Add new standard to Chapter 80 as follows:

FM

ANSI/FM 4996-13 Approval Standard for Classification of Pallets and Other Material Handling Products as Equivalent to Wood Pallets

Reason: This Code proposal adds an alternative test method for the purpose of determining if a plastic pallet is equivalent to a wood pallet. This test method is used by FM Approvals.

The test method requires that a plastic pallet be subjected to a series of fire tests. Upon successful completion of the required tests, a plastic pallet can be determined to be equivalent to a wood pallet.

The proposed test method, FM 4496 is currently being revised and is undergoing ANSI balloting. It is anticipated that the standard will be completed within the timeframe required by ICC.

Cost Impact: None

Analysis: A review of the standard proposed for inclusion in the code, FM 4996-13, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013.

F275-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

3208.2.1-F-BEITEL

F276 – 13

3208.2.2

Proponent: William Fletcher, P.E., Fletcher Fire Protection Engineering

Revise as follows:

3208.2.2 Racks with solid shelving. Racks with solid shelving having an area greater than ~~32~~ 20 square feet (~~3-1.9~~ m^2), measured between *approved* flue spaces at all four edges of the shelf, shall be in accordance with this section.

Exceptions:

1. Racks with mesh, grated, slatted or similar shelves having uniform openings not more than 6 inches (152 mm) apart, comprised of at least 50 percent of the overall shelf area, and with *approved* flue spaces are allowed to be treated as racks without solid shelves.
2. Racks used for the storage of combustible paper records, with solid shelving, shall be in accordance with NFPA 13.

Reason: This proposal provides consistency with NFPA 13. Section 3.9.3.7.7 notes “shelves within racks with a surface area ≤ 20 sq ft, or 50% open slats is considered an open rack, and thus ESFR ceiling only protection is appropriate. This maximum 20 sq ft shelf rule is the usual standard most consultants follow when determining if the rack shelving can be considered open, and thus appropriate for ESFR protection.

Cost Impact: The change will not increase the cost of construction.

F276-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

3208.2.2-F-FLETCHER

F277 – 13

Table 3208.3

Proponent: William Fletcher, P.E., Fletcher Fire Protection Engineering

Revise as follows:

**TABLE 3208.3
REQUIRED FLUE SPACES FOR RACK STORAGE**

RACK CONFIGURATION	AUTOMATIC SPRINKLER PROTECTION		SPRINKLER AT THE CEILING WITH OR WITHOUT MINIMUM IN-RACK SPRINKLERS			IN-RACK SPRINKLERS AT EVERY TIER	NONSPRINKLERED
			≤ 25 feet		> 25 feet	Any height	Any height
	Storage height		Option 1	Option 2			
Single-row rack	Transverse flue space	Size ^{ba}	3 inches	Not Applicable	3 inches	Not Required	Not Required
		Vertically aligned	Not Required	Not Applicable	Yes	Not Applicable	Not Required
	Longitudinal flue space		Not Required	Not Applicable	Not Required	Not Required	Not Required
Double-row rack	Transverse flue space	Size ^{ba}	6 inches ^a	3 inches	3 inches	Not Required	Not Required
		Vertically aligned	Not Required	Not Required	Yes	Not Applicable	Not Required
	Longitudinal flue space		Not Required	6 inches	6 inches	Not Required	Not Required
Multi-row rack	Transverse flue space	Size ^{ba}	6 inches	Not Applicable	6 inches	Not Required	Not Required
		Vertically aligned	Not Required	Not Applicable	Yes	Not Applicable	Not Required
	Longitudinal flue space		Not Required	Not Applicable	Not Required	Not Required	Not Required

For 1 inch = 25.4 mm, 1 foot = 304.8 mm. SI:

a. ~~Three-inch transverse flue spaces shall be provided at least every 10 feet where ESFR sprinkler protection is provided.~~

b.a. Random variations are allowed, provided that the configuration does not obstruct water penetration.

Reason: I would like to start by noting that I see a lot of people in our industry (consultants, insurance, ahj's) not adhering to the guidelines of open shelving within racks, when using ceiling only, ESFR sprinkler systems. If a fire occurs with ESFR protection, and solid shelves are present within the racks, the fire may not be controlled/suppressed. Large areas of shelving, whether created by pallets, hand stacking of boxes and parts, or even plywood sheets will defeat the key mechanisms needed for suppression of a rack storage fire when ceiling only, ESFR heads are used. The solid shelves will block the heat from rising and quickly fusing the heads, horizontal fire spread occurs, and the water from the heads cannot travel down in to the racks, to achieve suppression. This has been demonstrated by full scale fire testing at FM Global's research lab, and other nationally recognized testing labs as well.

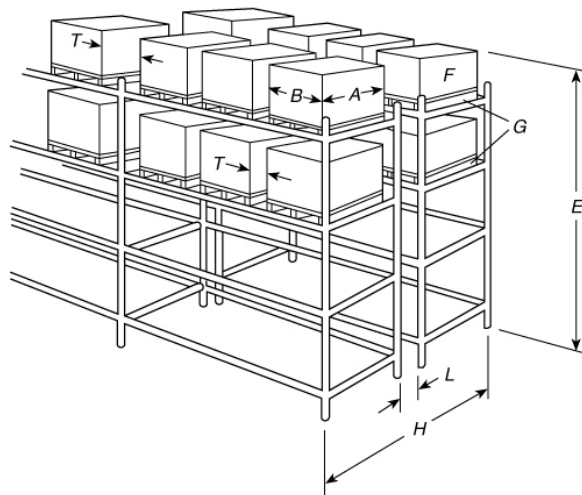
Supporting Information

My concern is with how the 2012, IFC, and 2010, CFC Sec. is written.

The maximum allowable area for shelving within racks to be considered "open" is <32 sq ft. per 3208.2.2.

Table 3208.3 then defines various transverse and longitudinal flue space options, for different rack configurations. For Double Row Racks, Table 3208.3 has Foot note "a" that says: 3 in. transverse flues required every 10 ft. when ESFR used. And, no longitudinal flues are needed.

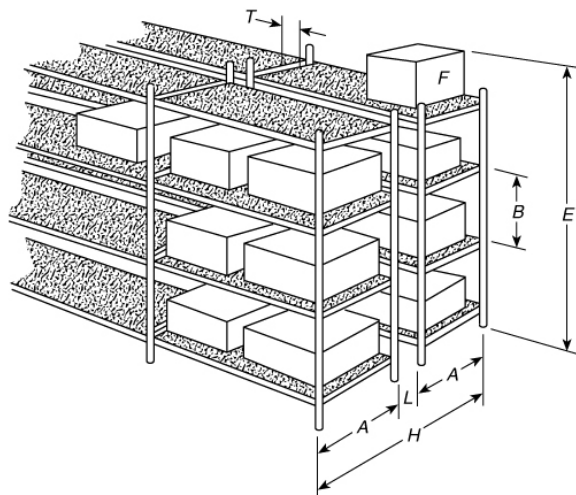
If this code section is followed, a warehouse operator can have a 3 in transverse flue space every 10 ft. For a typical double row rack using 40 x 48 in. pallets, the depth of one side of the double row rack (1/2 H, in Fig A.3.9.3. 7 "b" drawing below from NFPA 13) could be at least 4 ft or more. The total shelf area would then be 10 x 4 = 40 sq. ft. (unless open wire mesh shelving, or equivalent was used). This 40 sq. ft. helve area exceeds 32 sq. ft., and could theoretically be even larger than that.



- | | |
|------------------|---------------------------|
| A Load depth | G Pallet |
| B Load width | H Rack depth |
| E Storage height | L Longitudinal flue space |
| F Commodity | T Transverse flue space |

FIGURE A.3.9.3.7(b)
Double-Row Racks Without Solid or Slatted Shelves.

The racks would then look more like Figure A.3.9.3.7© below.



- | | |
|------------------|---------------------------|
| A Shelf depth | H Rack depth |
| B Shelf height | L Longitudinal flue space |
| E Storage height | T Transverse flue space |
| F Commodity | |

FIGURE A.3.9.3.7(c)
Double-Row Racks with Solid Shelves.

In referring to NFPA 13 (I am using the 2010 Version, which is similar to the 2012 version in this area), Section 3.9.3.7.7 notes "shelves within racks with a surface area ≤ 20 sq ft, or 50% open slats is considered an open rack, and thus ESFR ceiling only protection is appropriate. This maximum 20 sq ft shelf rule is the usual standard most consultants follow when determining if the rack shelving can be considered open, and thus appropriate for ESFR protection. If the 3 in. transverse flue every 10 ft. rule is applied, it is not even close, because as I noted, I can be well above 32 sq ft shelf area allowed by the IFC/CFC.

3.9.3.7.6 Rack Shelf Area.

The area of the horizontal surface of a shelf in a rack defined by perimeter aisle(s) or nominal 6 in. (152 mm) flue spaces on all four sides, or by the placement of loads that block openings that would otherwise serve as the required flue spaces.

3.9.3.7.7 Open Rack.

Racks without shelving or with shelving in racks that are fixed in place with shelves having a solid surface and a shelf area equal to or less than 20 ft² (1.9 m²) or with shelves having a wire mesh, slatted surface, or other material with openings representing at least 50 percent of the shelf area including the horizontal area of rack members and where the flue spaces are maintained.

3.9.3.7.8 Slatted Shelf Rack.

A rack where shelves are fixed in place with a series of narrow individual solid supports used as the shelf material and spaced apart with regular openings.

3.9.3.7.9 Solid Shelf Rack.

A rack where shelves are fixed in place with a solid, slatted, or wire mesh barrier used as the shelf material and having limited openings in the shelf area.

3.9.3.8 Solid Shelving.

Solid shelving is fixed in place, slatted, wire mesh, or other type of shelves located within racks. The area of a solid shelf is defined by perimeter aisle or flue space on all four sides. Solid shelves having an area equal to or less than 20 ft² (1.9 m²) shall be defined as open racks. Shelves of wire mesh, slats, or other materials more than 50 percent open and where the flue spaces are maintained shall be defined as open racks.

I therefore don't believe the Fire Code adequately addresses this topic, and allows somewhat of a loop hole that can allow ESFR protection with solid shelves. And I can tell you, I am seeing this first hand at many large warehouses I visit in my 24 year career.

Cost Impact: This proposal will not increase the cost of construction.

F277-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

3208.3T-F-FLETCHER

F278 – 13

3304.2, 3304.3 (New), 3304.4

Proponent: Marcelo M Hirschler, GBH International (gbhint@aol.com)

Revise as follows:

~~**3304.2 Waste disposal.** Combustible debris shall not be accumulated within buildings. Combustible debris, rubbish and waste material shall be removed from buildings at the end of each shift of work. Combustible debris, rubbish and waste material shall not be disposed of by burning on the site unless approved.~~

3304.2 Combustible debris, rubbish and waste. Combustible debris, rubbish and waste material shall comply with the requirements of Sections 3304.2.1 through 3304.2.4.

3304.2.1 Combustible debris, rubbish and waste material shall not be accumulated within buildings.

3304.2.2 Combustible debris, rubbish and waste material shall be removed from buildings at the end of each shift of work.

3304.2.3 Rubbish containers. Containers with tight-fitting or self-closing lids shall be provided for temporary storage of combustible debris, rubbish and waste material, until the end of each shift of work. The rubbish containers shall be constructed entirely of materials that comply with any one of the following:

1. Noncombustible materials.
2. Materials that meet a peak rate of heat release not exceeding 300 kW/m^2 when tested in accordance with ASTM E 1354 at an incident heat flux of 50 kW/m^2 in the horizontal orientation.

3304.2.4 Spontaneous ignition. Materials susceptible to spontaneous ignition, such as oily rags, shall be stored in a *listed* disposal container.

3304.3 Burning of combustible debris, rubbish and waste. Combustible debris, rubbish and waste material shall not be disposed of by burning on the site unless *approved*.

3304.3 3304.4 Open burning. *Open burning* shall comply with Section 307.

~~**3304.4 Spontaneous ignition.** Materials susceptible to spontaneous ignition, such as oily rags, shall be stored in a *listed* disposal container.~~

Reason: This section needs to be rewritten in a more logical fashion because 3304.2 needs to address what to do with combustible debris, rubbish and waste but not address prohibitions or *what not to do*, which should be covered in another section (burning of the rubbish). The use of the phrase "combustible debris, rubbish and waste material" makes this section consistent with other sections of the IFC.

When dealing with what needs to be done, the proper sequence is: (a) don't accumulate it, (b) remove it at the end of a work shift and (c) (which is missing) put it in appropriate rubbish containers while you are working. Section 3304.4 addresses a special rubbish container for materials susceptible to spontaneous ignition and should also be covered under 3304.2 and not in a separate section.

With regard to burning of combustible waste, this should have its own section, preceding the section on open burning, and should not be covered under what to do with rubbish.

The added requirement for the rubbish containers (other than those for spontaneous ignition materials) tells inspectors that rubbish containers should be provided for temporary storage of combustible rubbish (until the end of the shift of work). Such containers should be constructed of materials that have been shown to be safe by meeting a very severe fire test, just like those required by section 808 for I1, I2 and I3 occupancies. A key requirement is that the lids be tight fitting or self-closing.

Cost Impact: Minimal.

F278-12

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

3304.2 (NEW)-F-HIRSCHLER

F279 – 13

3304.2.1 (New)

Proponent: Marcelo M Hirschler, GBH International (gbhint@aol.com)

Add new text as follows:

3304.2.1 Rubbish containers. Containers with tight-fitting or self-closing lids shall be provided for temporary storage of combustible debris, rubbish and waste material, until the end of each shift of work. The rubbish containers shall be constructed entirely of materials that comply with either of the following:

1. Noncombustible materials.
2. Materials that meet a peak rate of heat release not exceeding 300 kW/m² when tested in accordance with ASTM E 1354 at an incident heat flux of 50 kW/m² in the horizontal orientation.

Reason: Rubbish containers should be provided for temporary storage of combustible rubbish (until the end of the shift of work). Such containers need not be constructed of metal but can be constructed of other noncombustible materials, including materials that have been shown to be safe by meeting a very severe fire test, just like those required by section 808 for I1, I2 and I3 occupancies. A key requirement is that the lids be tight fitting or self closing. Note that this does not address materials susceptible to spontaneous ignition, such as oily rags, covered by 3304.4. The use of the phrase "combustible debris, rubbish and waste" makes this section consistent with other sections of the IFC.

Cost Impact: Minimal

F279-12

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

3304.2.1 (NEW)-F-HIRSCHLER

F280 – 13

3306.2 (New), Chapter 80

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

3306.2 Cleaning with flammable gas. Flammable gases shall not be used to clean or remove debris from piping open to the atmosphere.

3306.2.1 Pipe cleaning and purging. The cleaning and purging of flammable gas piping systems, including cleaning new or existing piping systems, purging piping systems into service, and purging piping systems out of service shall comply with NFPA 56.

Exceptions:

1. Compressed gas piping systems other than fuel gas piping systems where in accordance with Chapter 53.
2. Piping systems regulated by the *International Fuel Gas Code*.
3. Liquefied petroleum gas systems in accordance with Chapter 61.

Add a new referenced standard to Chapter 80 as follows:

NFPA

56-12 *Fire and Explosion Prevention During Cleaning and Purging of Flammable Gas Piping Systems*
3306.2.1

Reason: In the past few years two explosions that killed 10 individuals were attributed to workers using natural gas flowing at high velocities to clean/clear fuel gas piping during the commissioning of fuel gas piping at industrial plants. The flammable gas and debris from the piping were subsequently vented to the atmosphere and ignited by sparks, one of which was suspected to be caused by static electricity. For details on the incidents see the U.S. Chemical Safety Board report at: <http://www.csb.gov/assets/document/KleenUrgentRec.pdf>

The practice of using flammable gases to clean or remove debris from fuel piping that is open to the atmosphere is not currently covered by the International Fire Code. This proposal revises Chapter 33 "Fire Safety During Construction and Demolition" requirements to prohibit this practice in piping systems open to the atmosphere.

The NFPA 56 *Provisional Standard for Fire and Explosion Prevention During Cleaning and Purging of Flammable Gas Piping Systems* provides minimum safety requirements for the cleaning and purging of flammable gas piping systems, including cleaning new or existing piping systems, purging piping systems into service, and purging piping systems out of service. It includes the appropriate managerial and operational requirements necessary to ensure safe outcomes. NFPA 56 compliments the proposal and also does not allow flammable gases to be used for internal cleaning of piping open to the atmosphere.

The intent of the proposal is to address fire and explosion hazards with flammable gas piping that is typically found in electric generating plants and in industrial, institutional, and commercial applications.

It is not the intent of this proposal to cover cleaning or purging of (1) compressed gas piping systems other than fuel gas piping systems that comply with Chapter 53, (2) piping systems regulated by the International Fuel Gas Code, (3) liquefied petroleum gas systems that comply with Chapter 61, or (4) piping systems that are not open to the atmosphere.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

Cost Impact: Approval of this change will increase the cost of flammable gas pipe purging because only inert or simple asphyxiant gases will be allowed.

Analysis: A review of the standard proposed for inclusion in the code, NFPA 56-12, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013.

F280-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

3306.(NEW)-F-ZUBIA-FCAC

F281 – 13

3313.1 (IBC [F] 3311.1, IEBC [F] 1506.1)

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Add new text as follows:

3313.1 (IBC [F] 3311.1, IEBC [F] 1506.1) Where required. In buildings required to have standpipes by Section 905.3.1, not less than one standpipe shall be provided for use during construction. Such standpipes shall be installed prior to construction exceeding ~~when the progress of construction is not more than~~ 40 feet (12 192 mm) in height above the lowest level of fire department vehicle access. Such standpipe shall be provided with fire department hose connections at accessible locations adjacent to usable stairs. Such standpipes shall be extended as construction progresses to within one floor of the highest point of construction having secured decking or flooring.

Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

This code change proposal is intended to clarify the requirement for the timing of the installation of a standpipe during construction. The intent of the existing language is to have the standpipe installed by the time construction reaches 40 feet. However, based on the wording of the section, the standpipe could be required as soon as construction exceeds one story.

The current language states that the standpipe shall be installed at the time when the construction is 40 feet or less. This section has been applied to buildings that are only 15 in height.

The intent seems to be that standpipes are installed when the construction extends beyond the reach of firefighting operations utilizing ground level hose streams and ground ladders.

The proposed revision to this section allows construction up to 40 feet in height, but requires the standpipe to be installed before continuing beyond 40 feet.

Cost Impact: This code change will not increase the cost of construction

F281-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

3313.1-F-ZUBIA-FCAC

F282 – 13

3510 (New), 202, 3504.1.7, 5704.2.7.6, Chapter 80

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Add new text as follows:

SECTION 3510 **HOT WORK ON FLAMMABLE AND COMBUSTIBLE LIQUID STORAGE TANKS**

3510.1 General. Hot work performed on the interior or the exterior of tanks that hold or have held flammable or combustible liquids shall be in accordance with 3510.2.1 through 3510.2.6 and Chapters 4,5,6,7 and 10 of NFPA 326.

3510.2 Prevention. The following steps shall be taken to minimize hazards when hot work must be performed on a flammable or combustible liquid storage container:

1. Use alternative methods to avoid hot work when possible
2. Analyze the hazards prior to performing hot work, identify the potential hazards and the methods of hazard control.
3. Hot work shall conform to the requirements of the code or standard to which the container was originally fabricated.
4. Test the immediate and surrounding work area with a combustible gas detector and provide for a means of continuing monitoring while conducting the hot work.
5. Qualified employees and contractors performing hot work shall use an industry approved hot work permit System to control the work.
6. Personnel shall be properly trained on hot work policies and procedures regarding equipment, safety, hazard controls and job specific requirements.
7. On-site safety supervision shall be present when hot work is in progress to protect the personnel conducting the hot work and provide additional overview of site specific hazards.

SECTION 202 **GENERAL DEFINITIONS**

COMBUSTIBLE GAS DETECTOR. An instrument that samples the local atmosphere and indicates the presence of ignitable vapors or gases within the flammable or explosive range expressed as a volume percent in air.

Revise as follows:

3504.1.7 Precautions in hot work. Hot work shall not be performed on containers or equipment that contains or has contained flammable liquids, gases or solids until the containers and equipment have been thoroughly cleaned, inerted or purged; except that “hot tapping” shall be allowed on tanks and pipe lines when such work is to be conducted by *approved* personnel. Hot work on flammable and combustible liquid storage tanks shall be conducted in accordance with Section 3510.

Revise as follows:

5704.2.7.6 Repair, alteration or reconstruction of tanks and piping. The repair, *alteration* or reconstruction, including ~~welding, cutting and hot tapping~~ of storage tanks and piping that have been placed in service, shall be in accordance with NFPA 30. Hot work, as defined in Section 202, on such tanks shall be conducted in accordance with Section 3510.

Add a new standard to Chapter 80:

NFPA

326- 2010 Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning or Repair,.

Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

There are numerous Hot Work permit and policy guidelines for every industry. There have been numerous incidents documented involving loss of life, injury and property damage occurring when hot work has occurred and industry specific precautions were not followed or personnel did not understand the hazard or risk.

This change will improve the general guidelines in the IFC for safely conducting hot work. The only references to hot work on flammable and combustible tanks are in regards to IFC Chapter 3504.1.7 and Chapter 5706 as it pertains to bulk handling and refineries.

This proposal recognizes that API RP 2009, 2002 edition; Safe Welding and Cutting Practices in Refineries, Gas Plants and Petrochemical Plants, is adopted by reference specific to a particular application within industry. Interestingly API 2009 is a recommended practice and not a standard. I propose NFPA 326 be adopted as a viable standard to provide specific safety procedures for hot work on tanks that fall outside of the scope of IFC Chapter 57.

Additionally, the Chemical Safety Board has published general guidelines applicable to most every situation welding or cutting on flammable, combustible or toxic tanks occur and I have included those steps to consider within a new section in IFC chapter 35 so anyone referencing what to do to be safe has some direction and a significant pointer to the standard applicable for the work to be accomplished.

Cost Impact: This code change will not increase the cost of construction

Analysis: A review of the standard proposed for inclusion in the code, NFPA 326-10, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013.

F282-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

3504.1.7-F-ZUBIA-FCAC

F283 – 13

3603.4

Proponent: Marcelo M Hirschler, GBH International (gbhint@aol.com)

Revise as follows:

3603.4 Rubbish containers. ~~Metal containers with tight-fitting or self-closing lids shall be provided for the temporary storage of combustible trash or rubbish.~~ Containers with tight fitting or self-closing lids shall be provided for temporary storage of combustible debris, rubbish and waste material. The rubbish containers shall be constructed entirely of materials that comply with any one of the following:

1. Noncombustible materials.
2. Materials that meet a peak rate of heat release not exceeding 300 kW/m² when tested in accordance with ASTM E 1354 at an incident heat flux of 50 kW/m² in the horizontal orientation.

Reason: Rubbish containers need not be constructed of metal but can be constructed of other noncombustible materials, including materials that have been shown to be safe by meeting a very severe fire test, just like those required by section 808 for I1, I2 and I3 occupancies. The key requirement that the lids be tight fitting or self closing is retained in the proposal. Note that the requirement covers all type of rubbish and is not intended to address spills of combustible or flammable liquids, covered by 3603.3. The use of the phrase "combustible debris, rubbish and waste material" makes this section consistent with other sections of the IFC.

Cost Impact: This should lower costs by offering more alternatives.

F283-12

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

3603.4-F-HIRSCHLER

F284 – 13

5001.1, Table 5003.1.1(1) [IBC [F] 307.1(1)], Table 5003.1.1(2) [IBC [F] 307.1(2)]; 5701.2

Proponent: Elley Klausbruckner representing Klausbruckner & Associates Inc (ek@klausbruckner.com)

Revise as follows:

5001.1 Scope. Prevention, control and mitigation of dangerous conditions related to storage, dispensing, use and handling of hazardous materials shall be in accordance with this chapter.

This chapter shall apply to all hazardous materials, including those materials regulated elsewhere in this code, except that when specific requirements are provided in other chapters, those specific requirements shall apply in accordance with the applicable chapter. Where a material has multiple hazards, all hazards shall be addressed.

Exceptions:

1. In retail or wholesale sales occupancies, the quantities of medicines, foodstuffs; or consumer ~~or industrial~~ products and cosmetics containing not more than 50 percent by volume of water-miscible liquids and with the remainder of the solutions not being flammable shall not be limited, provided such materials are packaged in individual containers not exceeding 1.3 gallons (5 L).
- 2 through 11 *(No change to current text)*

TABLE 5003.1.1(1) [IBC [F] 307.1(1)] MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING A PHYSICAL HAZARD^{a, j, m, n, p}

(No changes to table)

For SI: 1 cubic foot = 0.02832 m³, 1 pound = 0.454 kg, 1 gallon = 3.785 L.

- a. For use of control areas, see Section 5003.8.3.
- b. The aggregate quantity in use and storage shall not exceed the quantity listed for storage.
- c. The quantities of alcoholic beverages in retail and wholesale sales occupancies shall not be limited providing the liquids are packaged in individual containers not exceeding 1.3 gallons. In retail and wholesale sales occupancies, the quantities of medicines, foodstuffs; or consumer ~~or industrial~~ products, and cosmetics containing not more than 50 percent by volume of water-miscible liquids with the remainder of the solutions not being flammable shall not be limited, provided that such materials are packaged in individual containers not exceeding 1.3 gallons.
- d. Maximum allowable quantities shall be increased 100 percent in buildings equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1. Where Note e also applies, the increase for both notes shall be applied accumulatively.

TABLE 5003.1.1(2) [IBC [F] 307.1(2)] MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIAL POSING A HEALTH HAZARD^{a, b, c, h, i}

(No changes to table)

For SI: 1 cubic foot = 0.02832 m³, 1 pound = 0.454 kg, 1 gallon = 3.785 L.

- a. For use of control areas, see Section 5003.8.3.
- b. In retail and wholesale sales occupancies, the quantities of medicines, foodstuffs; or consumer ~~or industrial~~ products, and cosmetics, containing not more than 50 percent by volume of water-miscible liquids and with the remainder of the solutions not being flammable, shall not be limited, provided that such materials are packaged in individual containers not exceeding 1.3 gallons.
- c through i *(No changes to current text)*

5701.2 Nonapplicability. This chapter shall not apply to liquids as otherwise provided in other laws or regulations or chapters of this code, including:

1. Specific provisions for flammable liquids in motor fuel-dispensing facilities, repair garages, airports and marinas in Chapter 23.
2. Medicines, foodstuffs, cosmetics, and commercial, or institutional and industrial products containing not more than 50 percent by volume of water-miscible liquids and with the remainder of the solution not being flammable, provided that such materials are packaged in individual containers not exceeding 1.3 gallons (5 L).
3. through 10. *(No change to current text.)*

Reason: The term "Industrial products" can apply to anything. A wholesaler of car and truck batteries containing sulfuric acid [e.g. exceeding the MAQs for Toxic and Corrosive liquids] would be exempt by this definition. The original intent of this code section is to exempt materials in smaller containers in occupancies such as supermarkets and pharmacies the small amounts of water-miscible hazardous materials [e.g. household bleach, make up, face toners, etc.] contribute negligible amounts of fuel to a fire.

Cost Impact: The code change proposal will not increase the cost of construction.

F284-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

5003.1.1(1)T-F-KLAUSBRUCKNER

F285 – 13

5001.1, 5004.2.2, 5004.3, 5701.2

Proponent: Brad Emerick, Denver Fire Department representing the Fire Marshal's Association of Colorado (FMAC) and the Colorado Chapter of the ICC (CCICC) (brad.emerick@denvergov.org)

Revise as follows:

5001.1 Scope. Prevention, control and mitigation of dangerous conditions related to storage, dispensing, use and handling of hazardous materials shall be in accordance with this chapter.

This chapter shall apply to all hazardous materials, including those materials regulated elsewhere in this code, except that when specific requirements are provided in other chapters, those specific requirements shall apply in accordance with the applicable chapter. Where a material has multiple hazards, all hazards shall be addressed.

Exceptions:

1 through 9 *(No change to current text)*

~~10. The storage of distilled spirits and wines in wooden barrels and casks.~~

11. *(No change to current text)*

5004.2.2 Secondary containment for hazardous material liquids and solids. Where required by Table 5004.2.2 buildings, rooms or areas used for the storage of hazardous materials liquids or solids shall be provided with secondary containment in accordance with this section when the capacity of an individual vessel or the aggregate capacity of multiple vessels exceeds the following:

1. Liquids: Capacity of an individual vessel exceeds 55 gallons (208 L) or the aggregate capacity of multiple vessels exceeds 1,000 gallons (3785 L); and
2. Solids: Capacity of an individual vessel exceeds 550 pounds (250 kg) or the aggregate capacity of multiple vessels exceeds 10,000 pounds (4540 kg).

Exception: The release of a liquid or solid without secondary containment into a sanitary or storm-water drainage system or onto the ground is allowed when in compliance with federal, state, or local governmental agencies' regulations and permits.

5004.3 Ventilation. Indoor storage areas and storage buildings shall be provided with mechanical exhaust ventilation or natural ventilation where natural ventilation can be shown to be acceptable for the materials stored.

Exception Exceptions:

1. Storage areas for flammable solids complying with Chapter 59.

2. Storage areas for distilled spirits in wooden barrels or casks.

5701.2 Nonapplicability. This chapter shall not apply to liquids as otherwise provided in other laws or regulations or chapters of this code, including:

1 through 9 *(No change to current text)*

~~10. The storage of distilled spirits and wines in wooden barrels and casks.~~

11. The storage of fermented beverages with ethyl alcohol contents of 16% or less.

Reason: There is confusion about the applicability of flammable liquid (Chapter 57) hazardous materials (Chapter 50) provisions to distilled spirits because of the exceptions for distilled spirits and wines stored in wooden barrels and casks in IFC Chapters 50 and 57 (and NFPA 30). The issue arises because of the growing popularity of "boutique" or "craft" distillers locating their operations in urban areas. The proposed language clarifies bulk storage provisions for distilled spirits but does not alter the intent. The proposed language does not affect provisions applicable to use, nor those applicable to liquor storage in retail or wholesale establishments.

First, note distilled spirits are Class 1C and Class 1B flammable liquids. They are primarily comprised of ethyl alcohol (ethanol) and water with concentrations ranging from approximately 19% to 99%. The boiling point of pure ethanol is approximately 178°F so an ethanol mixture with water will boil between 178°F and 212°F. The closed cup flash point for a 19% concentration of ethanol in water is 100°F and for a 58% concentration is 73°F making the mixtures in this range Class 1C flammable liquids (these values are not adjusted for altitude). Ethanol concentrations in water between 58% and 99% are Class 1B flammable liquids.

Second, the Building Code establishes occupancy. If a quantity of a Class 1B or Class 1C flammable liquid exceeding the maximum allowable quantity (MAQ), the room in which it is located is an H3 Occupancy. Please remember this applies to bulk storage (casks, barrels, metal containers, etc. exceeding 1.3 gallon capacities) and not to liquor stores and wholesale distributors for which there are several exceptions.

Third, H occupancies have to be sprinklered. This is the primary provision overlooked because of the confusion noted above. This is not because wood is inherently safer than metal, plastic or glass – it is not. It was probably inserted in the legacy code(s) back when casks were stored in liquid storage warehouses separated by hundreds of feet from one another and urban distilleries weren't contemplated. It was probably held over today because there is not yet an established sprinkler criteria for the storage of Class 1C flammable liquids in wooden barrels and casks. **THIS HOWEVER DOES NOT MEAN THESE ROOMS SHOULD BE EXEMPT FROM SPRINKLERING REQUIREMENTS!** An engineered sprinkler design is required.

Fourth, the applicable code requirements have not been changed. The UBC legacy code excepted distilled spirits stored in wooden barrels and casks from the secondary containment and ventilation requirements normally mandated for flammable liquids. The exception was often misinterpreted even then to extend to the entire range of code provisions. When flammable liquids requirements were brought into the IFC, the exception was moved to the scoping provisions which created the confusion recurring today. The deletion of the exception in Section 5001.1 removes the confusion associated with the applicable requirements. The modifications to Sections 5004.2.2 and 5004.3 reestablish the exceptions to secondary containment and ventilation contained in the legacy code.

The Nonapplicability of Chapter 57 to distilled spirits is retained. The word "wines" is removed from the exception for two reasons:

- a) if the intent to read "distilled wines" then distilled spirits already includes this; and
- b) if the intent is to read "wines and distilled spirits" then wines is included in new item 11 (along with beer).

Cost Impact: This change will not affect the cost of construction.

F285-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

5001.1-F-EMERICK

F286 – 13

5001.1

Proponent: Elley Klausbruckner representing Klausbruckner & Associates Inc (ek@klausbruckner.com)

Revise as follows:

5001.1 Scope. Prevention, control and mitigation of dangerous conditions related to storage, dispensing, use and handling of hazardous materials shall be in accordance with this chapter.

This chapter shall apply to all hazardous materials, including those materials regulated elsewhere in this code, except that when specific requirements are provided in other chapters, those specific requirements shall apply in accordance with the applicable chapter. Where a material has multiple hazards, all hazards shall be addressed.

Exceptions:

1 through 11 *(No change to current text)*

12. Specific provisions for flammable liquids in motor fuel-dispensing facilities, repair garages, airports and marinas in Chapter 23.

Reason: The same exception can be found in Section 5701.2 (Exception 1). The Flammable and Combustible Liquids chapters 57 of the fire code defer to Chapter 23 [Motor Fuel-Dispensing Facilities and Repair Garages] which is very specific and covers the unique use of flammable liquids at motor fuel dispensing facilities, airports and marinas. We believe that it has been the intent to apply Chapter 23 and not Chapters 50 and 57 to these specific operations.

Cost Impact: The code change proposal will not increase the cost of construction.

F286-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

5001.1-F-KLAUSBRUCKNER

F287 – 13

5001.1, 5701.2

Proponent: Elley Klausbruckner representing Klausbruckner & Associates Inc (ek@klausbruckner.com)

Revise as follows:

5001.1 Scope. Prevention, control and mitigation of dangerous conditions related to storage, dispensing, use and handling of hazardous materials shall be in accordance with this chapter.

This chapter shall apply to all hazardous materials, including those materials regulated elsewhere in this code, except that when specific requirements are provided in other chapters, those specific requirements shall apply in accordance with the applicable chapter. Where a material has multiple hazards, all hazards shall be addressed.

Exceptions:

1. through 11. *(No change to current text)*
12. Building and structures occupied for the application of flammable finishes, provided that such buildings or areas comply with the requirements of Chapter 24 of this code and Section 416 of the *International Building Code*.

5701.2 Nonapplicability. This chapter shall not apply to liquids as otherwise provided in other laws or regulations or chapters of this code, including:

1. through 10. *(No change to current text)*
11. Building and structures occupied for the application of flammable finishes, provided that such buildings or areas comply with the requirements of Chapter 24 of this code and Section 416 of the *International Building Code*.

Reason: Per IBC Section 307.1 (Exception 1), an occupancy used for the application of Flammable Finishes cannot be classified as an H Occupancy even if the Maximum Allowable Quantities are exceeded. If the committee believes the intent of IBC is exempt flammable finish operations as long as IBC Section 416 and IFC Chapter 24 are met, then this section helps further clarify the requirements. If the intent of IBC Section 307.1 (Exception 1) is to exempt only the H Occupancy classification [construction, allowable area, egress, etc.], but leave the applicable requirements of IFC Chapters 50 and 57, then this code change proposal should not be approved.

NOTE: Flammable finishes do not just include spray booths, but spray rooms, dipping operations, dual-component coating if applied by brush or roller in quantities exceeding 1 gallon, limited spray spaces, etc. However IBC Section 416 only addresses Spray Rooms and Spray Spaces.

Cost Impact: The code change proposal will decrease the cost of construction.

F287-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

5701.2-F-KLAUSBRUCKNER

F288 – 13

Table 5003.1.1(1) [IBC [F] TABLE 307.1(1)]; IBC [F] 307.5 (IFC 202)

Proponent: Robert J Davidson, Davidson Code Concepts, LLC, representing the Biomass Feedstock Industry Committee on Codes and Standards (BFICOCs) (rjd@davidsoncodeconcepts.com)

Revise as follows:

**TABLE 5003.1.1(1) [IBC [F] TABLE 307.1(1)]
MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING
A PHYSICAL HAZARD^{a, j, m, n, p}**

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	STORAGE ^b			USE-CLOSED SYSTEMS ^b			USE-OPEN SYSTEMS ^b	
			Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas cubic feet at NTP	Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas cubic feet at NTP	Solid pounds (cubic feet)	Liquid gallons (pounds)
Combustible dust	Not Applicable	H-2	See Note q	Not Applicable	Not Applicable	See Note q	Not Applicable	Not Applicable	See Note q	Not Applicable
Combustible fiber ^a	Loose Baled ^o	H-3	(100) (1,000)	Not Applicable	Not Applicable	(100) (1,000)	Not Applicable	Not Applicable	(20) (200)	Not Applicable

(Portions of table not shown remain unchanged)

a. through p. (No change to current text)

q. Where manufactured, generated or used in such a manner that the concentration and conditions create a fire or explosion hazard based on information prepared in accordance with Section 104.7.2 (IBC [F] 414.1.3).

Revise as follows:

IBC [F] 307.5 (IFC 202) High-hazard Group H-3. Buildings and structures containing materials that readily support combustion or that pose a physical hazard shall be classified as Group H-3. Such materials shall include, but not be limited to, the following:

Class I, II or IIIA flammable or combustible liquids that are used or stored in normally closed containers or systems pressurized at 15 pounds per square inch gauge (103.4 kPa) or less

Combustible fibers, other than densely packed baled cotton, where manufactured, generated or used in such a manner that the concentration and conditions create a fire or explosion hazard based on information prepared in accordance with Section 414.1.3

Consumer fireworks, 1.4G (Class C, Common)

Cryogenic fluids, oxidizing

Flammable solids

Organic peroxides, Class II and III

Oxidizers, Class 2

Oxidizers, Class 3, that are used or stored in normally closed containers or systems pressurized at 15 pounds per square inch gauge (103 kPa) or less

Oxidizing gases

Unstable (reactive) materials, Class 2

Water-reactive materials, Class 2

Reason: *"Operations involving combustible fibers are typically associated with salvage, paper milling, recycling, cloth manufacturing, carpet and textile mills and agricultural operations, among others. The primary hazard associated with these operations is the abundance of materials and their ready ignitability. These so-called "Rag Districts," where cloth scrap and clippings are collected and separated for reuse in paper manufacturing, have been associated with catastrophic conflagrations as recently as the 1970s."*

IFC Code Commentary:

The main hazard of combustible fibers is the ignitability of the product with rapid flame spread over exposed material surfaces. There can also be an associated combustible dust hazard depending on how the material is being handled. Currently, Section 5203.5 requires protection against combustible dust hazards by reference to IFC Chapter 22 "Combustible Dust-Producing Operations". The combustible dust hazard can, and in most cases would, present a greater hazard than the fiber ignitability hazard. If a facility complies with IFC Chapter 22 along with referenced standards and the combustible dust hazard is eliminated, "note q" added to Table 5003.1.1(1) / [F] TABLE 307.1(1) in the 2012 edition of the IFC/IBC eliminates the Group H-2 designation for the combustible dust hazard. However, there is no similar provision for the ignitability hazard of the fibers. If the combustible fibers are not manufactured, generated or used in such a manner that the concentration and conditions create a fire or explosion hazard, then there should be a similar provision eliminating the H Group classification for the combustible fibers, a lesser hazard than the combustible dust. In many cases compliance with the reference to IFC Chapter 22 will eliminate the combustible fiber hazard as the combustible dust hazard is controlled.

This proposal adds note q to the entry in the tables for combustible fibers to eliminate the Group H-3 classification where it has been documented that when the fibers are being generated, stored or used, it is not in such a manner that the concentration and conditions create a fire or explosion hazard. The same language is also added to the Combustible fibers subdivision classification at IBC Section [F]307.5 as was done for combustible dust in code change F187-09/10.

The Biomass Feedstock Industry Committee on Codes and Standards (BFICOCS), led by Oak Ridge National Laboratory (ORNL), is an initiative of the Department of Energy Biomass Technologies Office (BTO). As part of the BTO integrated biorefinery efforts, the BFICOCS was assembled to conduct analysis of existing fire and building codes and to prepare proposed code changes designed to facilitate the development of the commercial-scale biomass industry while maintaining a focus on safety. The committee is made up of managers, engineers and code officials from industry, government laboratories, consulting firms, and the American Society of Agricultural and Biological Engineers.

Fire codes related to storage, handling, and preprocessing of biomass are based on industries that operate in a significantly different manner than the growing biomass-based energy industry. Applying current research on biomass properties and knowledge of conventional and emerging storage, handling, and preprocessing technologies, the BFICOCS has identified changes in the IFC that benefit industry and the public.

Cost Impact: The code change proposal will not increase the cost of construction.

F288-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

5003.1.1T-F-DAVIDSON

F289 – 13

Table 5003.1.1(1) [IBC [F] Table 307.1(1)]

Proponent: Glenn A. Dean, Virginia State Fire Marshal's Office (glenn.dean@vdfp.virginia.gov)

Revise as follows:

TABLE 5003.1.1(1) (IBC [F] Table 307.1(1))
MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING
A PHYSICAL HAZARD^{a, j, m, n, p}

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	STORAGE ^b			USE-CLOSED SYSTEMS ^b			USE-OPEN SYSTEMS ^b	
			Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas cubic feet at NTP	Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas cubic feet at NTP	Solid pounds (cubic feet)	Liquid gallons (pounds)
Consumer fireworks	1.4G	H-3	125 d, e, l	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

(Portions of table not shown remain unchanged)

Reason: Based on an October 2007 report entitled "Fire Safety in Consumer Fireworks Storage and Retail Facilities – Hazard Assessment", the NFPA Standards Council began a lengthy discussion on the amount of consumer fireworks that should be effectively permitted in retail establishments and some the built-in safety requirements that should be associated with that amount. To date the effective allowable amount in the NFPA standards has been 125 pounds net with an available increase to 250 pounds if the building is protected throughout with an approved automatic sprinkler system installed in accordance with NFPA 13. This same provision is mirrored in the IFC in all respects for the maximum allowable quantity of consumer fireworks, including the increase for sprinkler protection, and like the IFC, to allow a building to contain more than that, the NFPA standard would require additional construction requirements akin to those for a Group H-3 building.

Beginning with the October 2007 report, the NFPA Standards Council has since called into question the appropriateness and reasoning of an increase based on sprinkler protection in the absence of test data justifying the increase. Because of the lack of test data to determine at what level or quantity of consumer fireworks above 125 pounds net could or should have the benefit of sprinkler protection, the Standards Council has ordered the issuance of a Tentative Interim Amendment (TIA), in process at the time of this submission, eliminating the option of an increase for sprinkler protection until such time as acceptable test data is submitted to justify an increase and to what level of increase it could be. Therefore, due to the TIA, the maximum amount of consumer fireworks in the NFPA standard for retail establishments is limited to 125 pounds net. There will be no provision for increasing the amount due to sprinkler protection. In addition, with the TIA the maximum size of consumer firework storage buildings will be limited to 12,000ft² in area. Full background information may be found at the document information tab at www.nfpa.org/1124.

For the same reasons, until such time as testing is completed, or if ever completed, this change is to delete the reference to footnote "d" that provided a 100% increase to the amount of consumer fireworks allowed if sprinkler protection is provided, when it has been revealed that the original increase was not based on a credible, verifiable series of tests to determine what the appropriate sprinkler design density should be for what may be typical of the quantities of consumer fireworks present in retail establishments and still not become a Group H-3 building.

Cost Impact: Cost of construction may increase.

F289-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

5003.1.1(1)T-F-DEAN

F290 – 13

Table 5003.1.1(1) [IBC [F] Table 307.1(1)], 5003.8.4

Proponent: Patrick A. McLaughlin McLaughlin & Associates, representing the Lonza Group and PPG Industries, Inc.(pmclaugma@aol.com)

Revise as follows:

TABLE 5003.1.1(1) (IBC [F] Table 307.1(1))
MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING
A PHYSICAL HAZARD^{a, j, m, n, p}

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	STORAGE ^b			USE-CLOSED SYSTEMS ^b			USE-OPEN SYSTEMS ^b	
			Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas cubic feet at NTP	Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas cubic feet at NTP	Solid pounds (cubic feet)	Liquid gallons (pounds)
Unstable (reactive)	4	H-1	1 ^{c, g}	(1) ^{c, g}	10 ^{c, g}	0.25 ^g	(0.25) ^g	2 ^{c, g}	0.25 ^g	(0.25) ^g
	3	H-1 or H-2	5 ^{d, e}	(5) ^{d, e}	50 ^{d, e}	1 ^d	(1) ^d	10 ^{d, e}	1 ^d	(1) ^d
	2	H-3	50 ^{d, e}	(50) ^{d, e}	250	50 ^d	(50) ^d	250	10 ^d	(10) ^d
	1	Not Applicable	Not Limited	Not Limited	<u>750</u> ^{d, e} Not Limited	Not Limited	Not Limited	<u>750</u> ^{d, e} Not Limited	Not Limited	Not Limited

(Portions of table not shown remain unchanged.)

a through d (No change to current text)

e. Maximum allowable quantities shall be increased 100 percent when stored in approved storage cabinets, day boxes, gas cabinets, gas rooms, exhausted enclosures, or listed safety cans. Listed safety cans shall be in accordance with Section 5003.9.10. Where Note d also applies, the increase for both notes shall be applied accumulatively.

f through q (No change to current text)

5003.8.4 Gas rooms. Where a gas room is used to increase maximum allowable quantity per control area or provided to comply with the provisions of Chapter 60, the gas room shall be in accordance with Sections 5003.8.4.1 and 5003.8.4.2.

Reason: The 250 cubic feet appears to be a transcription error as it was taken from the Uniform Fire Code which allowed 750 cubic feet. The change will bring the IFC into alignment with NFPA 55, 2010 and 2013 Editions.

Gas rooms are required to be protected by automatic sprinklers, separated based on the occupancy, and have ventilation designed to operate at a negative pressure. These requirements are similar to those that apply to exhausted enclosures which allow the quantity increase. Section 5003.8.4 is modified to insure that the requirements apply if footnote e is used to increase maximum allowable quantities. Accepting this change will bring consistency between the requirements for gas cabinets, exhausted enclosures, and gas rooms with respect to application and MAQ.

Cost Impact: The code change proposal will not increase the cost of construction.

F290-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

5003.1.1(1)T-F-MCLAUGHLIN

F291 – 13

Table 5003.1.1(1) [IBC Table [F] 307.1(1)]

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care (john.williams@doh.wa.gov) and Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee (cbaldassarra@RJAGroup.com)

Revise as follows:

TABLE 5003.1.1(1) [IBC Table [F] 307.1(1)]
MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING
A PHYSICAL HAZARD^{a, j, m, n, p}

(Portions of table not shown remain unchanged)

a. through o. *(No change to current text)*

p. The following shall not be included in determining the maximum allowable quantities:

1. Liquid or gaseous fuel in fuel tanks on vehicles.
2. Liquid or gaseous fuel in fuel tanks on motorized equipment operated in accordance with this code.
3. Gaseous fuels in piping systems and fixed appliances regulated by the *International Fuel Gas Code*.
4. Liquid fuels in piping systems and fixed appliances regulated by the *International Mechanical Code*.
5. In Group I-2, alcohol based hand rubs classified as Class I or II liquids where installed in accordance with Sections 5705.5 and 5705.5.1. The location of the alcohol based hand rub (ABHR) dispensers shall be provided in the construction documents.

q. *(No change to current text)*

Reason: This proposed change will allow a reasonable amount of Alcohol based Hand Rub for infection control and patient life safety located in Group I-2 occupancies in appropriately sized dispensers to be located in control areas and permits the amounts not to be included in determining the maximum allowable quantities. IFC Section 5705.5 addresses the specifics regarding these amounts and locations.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>

This proposal is being co-sponsored by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty-five meetings - all open to the public. In 2012, three of the 25 face-to-face meetings were held. In addition to the CTC meetings, the CTC established Study Groups (SG) of interested parties for each of the areas of study. These SG's are responsible for reviewing the available information and making recommendations to the CTC. All totaled, the SG's held over 70 conference calls in 2012.

Cost Impact: This proposal will not increase the cost of construction.

F291-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

5003.1.1(1)T-F-BALDASSARRA-WILLIAMS-ADHOC-CTC

F292 – 13

Table 5003.1.1(1), Table 5003.1.1(2); IBC [F] Table 307.1(1), [F] Table 307.1(2)

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise IFC Table 5003.1.1(1) as follows:

Editorial Revision: Replace all entries in table which state “Not Applicable” with “N/A”.

Editorial Revision: Replace all entries in table which state “Not Limited” with “NL”.

Editorial Revision: Add the following line at the bottom of the table above the Footnotes:

“N/A = Not Applicable; NL = Not Limited; UD = Unclassified Detonable”

Further revise IFC Table 5003.1.1(1) as follows:

TABLE 5003.1.1(1)
MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING A PHYSICAL HAZARD^{a, j,}
m, n, p

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	STORAGE ^b			USE-CLOSED SYSTEMS ^b			USE-OPEN SYSTEMS ^b	
			Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)
Combustible dust	N/A	H-2	Note q	N/A	N/A	Note q	N/A	N/A	Note q	N/A
Combustible fiber	Loose Baled ^o	H-3	(100) (1,000)	N/A	N/A	(100) (1,000)	N/A	N/A	(20) (200)	N/A
Combustible liquid ^{c,i}	II IIIA IIIB	H-2 or H-3 H-2 or H-3 N/A	N/A	120 ^{d,e} 330 ^{d,e} 13,200 ^{e,f}	N/A	N/A	120 ^d 330 ^d 13,200 ^f	N/A	N/A	30 ^d 80 ^d 3,300 ^f
Consumer fireworks	1.4G	H-3	125 ^{d,e,i}	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cryogenic Flammable	N/A	H-2	N/A	45 ^d	N/A	N/A	45 ^d	N/A	N/A	10 ^d
Consumer fireworks	1.4G	H-3	125 ^{d,e,i}	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cryogenic Inert	N/A	N/A	N/A	N/A	NL	N/A	N/A	NL	N/A	N/A
Cryogenic Oxidizing	N/A	H-3	N/A	45 ^d	N/A	N/A	45 ^d	N/A	N/A	10 ^d
Explosives	Division 1.1	H-1	1 ^{e,g}	(1) ^{e,g}	N/A	0.25 ^g	(0.25) ^g	N/A	0.25 ^g	(0.25) ^g
	Division 1.2	H-1 or H-2	1 ^{e,g}	(1) ^{e,g}	N/A	0.25 ^g	(0.25) ^g	N/A	0.25 ^g	(0.25) ^g
	Division 1.3	H-3	5 ^{e,g}	(5) ^{e,g}	N/A	1 ^g	(1) ^g	N/A	1 ^g	(1) ^g
	Division 1.4	H-3	50 ^{e,g}	(50) ^{e,g}	N/A	50 ^g	(50) ^g	N/A	N/A	N/A
	Division 1.4G	H-3	125 ^{d,e,i}	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Division 1.5	H-1	1 ^{e,g}	(1) ^{e,g}	N/A	0.25 ^g	(0.25) ^g	N/A	0.25 ^g	(0.25) ^g
	Division 1.6	H-1	1 ^{e,g}	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Division 1.6	H-1	1 ^{e,g}	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Flammable gas	Gaseous Liquefied	H-2	N/A	N/A (150) ^{d,e}	1,000 ^{d,e} N/A	N/A	N/A (150) ^{d,e}	1,000 ^{d,e} N/A	N/A	N/A
Flammable liquid ^c	1A 1B and IC	H-2 or H-3	N/A	30 ^{d,e} 120 ^{d,e}	N/A	N/A	30 ^d 120 ^d	N/A	N/A	10 ^d 30 ^d

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	STORAGE ^b			USE-CLOSED SYSTEMS ^b			USE-OPEN SYSTEMS ^b	
			Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)
Flammable liquid, combination (1A, 1B, 1C)	N/A	H-2 or H-3	N/A	120 ^{d, e, h}	N/A	N/A	120 ^{d, h}	N/A	N/A	30 ^{d, h}
Flammable solid	N/A	H-3	125 ^{d, e}	N/A	N/A	125 ^d	N/A	N/A	25 ^d	N/A
Inert gas	Gaseous	N/A	N/A	N/A	NL	N/A	N/A	NL	N/A	N/A
Cryogenic inert	Liquefied	N/A	N/A	N/A	NL	N/A	N/A	NL	N/A	N/A
	N/A	N/A	N/A	N/A	NL	N/A	N/A	NL	N/A	N/A
Organic peroxide	UD	H-1	1 ^{e, g}	(1) ^{e, g}	N/A	0.25 ^g	(0.25) ^g	N/A	0.25 ^g	(0.25) ^g
	I	H-2	5 ^{d, e}	(5) ^{d, e}	N/A	1 ^d	(1) ^d	N/A	1 ^d	(1) ^d
	II	H-3	50 ^{d, e}	(50) ^{d, e}	N/A	50 ^d	(50) ^d	N/A	10 ^d	(10) ^d
	III	H-3	125 ^{d, e}	(125) ^{d, e}	N/A	125 ^d	(125) ^d	N/A	25 ^d	(25) ^d
	IV	N/A	NL	NL	N/A	NL	NL	N/A	NL	NL
	V	N/A	NL	NL	N/A	NL	NL	N/A	NL	NL
Oxidizer	4	H-1	1 ^{e, g}	(1) ^{e, g}	N/A	0.25 ^g	(0.25) ^g	N/A	0.25 ^g	(0.25) ^g
	3 ^k	H-2 or H-3	10 ^{d, e}	(10) ^{d, e}	N/A	2 ^d	(2) ^d	N/A	2 ^d	(2) ^d
	2	H-3	250 ^{d, e}	(250) ^{d, e}	N/A	250 ^d	(250) ^d	N/A	50 ^d	(50) ^d
	1	N/A	4,000 ^{e, f}	(4,000) ^{e, f}	N/A	4,000 ^f	(4,000) ^f	N/A	1,000 ^f	(1,000) ^f
Oxidizing gas	Gaseous	H-3	N/A	N/A	1,500 ^{d, e}	N/A	N/A	1,500 ^{d, e}	N/A	N/A
	Liquefied		N/A	(150) ^{d, e}	N/A	N/A	(150) ^{d, e}	N/A	N/A	N/A
Pyrophoric	N/A	H-2	4 ^{e, g}	(4) ^{e, g}	50 ^{e, g}	1 ^g	(1) ^g	10 ^{e, g}	0	0
Unstable (reactive)	4	H-1	1 ^{e, g}	(1) ^{e, g}	10 ^g	0.25 ^g	(0.25) ^g	2 ^{e, g}	0.25 ^g	(0.25) ^g
	3	H-1 or H-2	5 ^{d, e}	(5) ^{d, e}	50 ^{d, e}	1 ^d	(1) ^d	10 ^{d, e}	1 ^d	(1) ^d
	2	H-3	50 ^{d, e}	(50) ^{d, e}	250 ^{d, e}	50 ^d	(50) ^d	250 ^{d, e}	10 ^d	(10) ^d
	1	N/A	NL	NL	NL	NL	NL	NL	NL	NL
Water reactive	3	H-2	5 ^{d, e}	(5) ^{d, e}	N/A	5 ^d	(5) ^d	N/A	1 ^d	(1) ^d
	2	H-3	50 ^{d, e}	(50) ^{d, e}	N/A	50 ^d	(50) ^d	N/A	10 ^d	(10) ^d
	1	N/A	NL	NL	N/A	NL	NL	N/A	NL	NL

For SI: 1 cubic foot = 0.02832 m³, 1 pound = 0.454 kg, 1 gallon = 3.785 L.

N/A = Not Applicable; NL = Not Limited; UD = Unclassified Detonable

- For use of control areas, see Section 5003.8.3.
- The aggregate quantity in use and storage shall not exceed the quantity listed for storage.
- The quantities of alcoholic beverages in retail and wholesale sales occupancies shall not be limited providing the liquids are packaged in individual containers not exceeding 1.3 gallons. In retail and wholesale sales occupancies, the quantities of medicines, foodstuffs, consumer or industrial products, and cosmetics containing not more than 50 percent by volume of water-miscible liquids with the remainder of the solutions not being flammable shall not be limited, provided that such materials are packaged in individual containers not exceeding 1.3 gallons.
- Maximum allowable quantities shall be increased 100 percent in buildings equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1. Where Note e also applies, the increase for both notes shall be applied accumulatively.
- Maximum allowable quantities shall be increased 100 percent when stored in approved storage cabinets, day boxes, gas cabinets, exhausted enclosures, or in listed safety cans. ~~Listed safety cans shall be~~ in accordance with Section 5003.9.10. Where Note d also applies, the increase for both notes shall be applied accumulatively.
- Quantities shall not be limited in a building equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1.
- Allowed only in buildings equipped throughout with an approved automatic sprinkler system.
- Containing not more than the maximum allowable quantity per control area of Class IA, Class IB or Class IC flammable liquids.
- The maximum allowable quantity shall not apply to fuel oil storage complying with Section 603.3.2.
- Quantities in parenthesis indicate quantity units in parenthesis at the head of each column.
- A maximum quantity of 200 pounds of solid or 20 gallons of liquid Class 3 oxidizers is allowed when such materials are necessary for maintenance purposes, operation or sanitation of equipment when the storage containers and the manner of storage are approved.
- Net weight of pyrotechnic composition of the fireworks. Where the net weight of the pyrotechnic composition of the fireworks is not known, 25 percent of the gross weight of the fireworks including packaging shall be used.
- For gallons of liquids, divide the amount in pounds by 10 in accordance with Section 5003.1.2.
- For storage and display quantities in Group M and storage quantities in Group S occupancies complying with Section 5003.11, see Table 5003.11.1.

- o. Densely-packed baled cotton that complies with the packing requirements of ISO 8115 shall not be included in this material class.
- p. The following shall not be included in determining the maximum allowable quantities:
 - 1. Liquid or gaseous fuel in fuel tanks on vehicles.
 - 2. Liquid or gaseous fuel in fuel tanks on motorized equipment operated in accordance with this code.
 - 3. Gaseous fuels in piping systems and fixed appliances regulated by the *International Fuel Gas Code*.
 - 4. Liquid fuels in piping systems and fixed appliances, regulated by the *International Mechanical Code*.
- q. Where manufactured, generated or used in such a manner that the concentration and conditions create a fire or explosion hazard based on information prepared in accordance with Section 104.7.2.

Revise IFC Table 5003.1.1(2) as follows:

TABLE 5003.1.1(2)
MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIAL POSING A HEALTH HAZARD^{a, b, c, f, h, i}

MATERIAL	STORAGE ^b			USE-CLOSED SYSTEMS ^b			USE-OPEN SYSTEMS ^b	
	Solid pounds ^{d, e}	Liquid gallons (pounds) ^{d, e}	Gas (cubic feet at NTP) ^d	Solid pounds (cubic feet) ^d	Liquid gallons (pounds) ^d	Gas (cubic feet at NTP) ^d	Solid pounds (cubic feet) ^d	Liquid gallons (pounds) ^d
Corrosive	5,000	500	Gaseous 810 ^e Liquefied (150)	5,000	500	Gaseous 810 ^e Liquefied (150)	1,000	100
Highly toxic	10	(10)	Gaseous 20 ^g Liquefied (4) ^g	10	(10)	Gaseous 20 ^g Liquefied (4) ^g	3	(3)
Toxic	500	(500)	Gaseous 810 ^e Liquefied (150) ^e	500	(500)	Gaseous 810 ^e Liquefied (150) ^e	125	(125)

For SI: 1 cubic foot = 0.02832 m³, 1 pound = 0.454 kg, 1 gallon = 3.785 L.

- a. For use of control areas, see Section 5003.8.3.
- b-c. In retail and wholesale sales occupancies, the quantities of medicines, foodstuffs, consumer or industrial products, and cosmetics, containing not more than 50 percent by volume of water-miscible liquids and with the remainder of the solutions not being flammable, shall not be limited, provided that such materials are packaged in individual containers not exceeding 1.3 gallons.
- e-f. For storage and display quantities in Group M and storage quantities in Group S occupancies complying with Section 5003.1.1, see Table 5003.11.1.
- d-b. The aggregate quantity in use and storage shall not exceed the quantity listed for storage.
- e-d. Maximum allowable quantities shall be increased 100 percent in buildings equipped throughout with an *approved automatic sprinkler system* in accordance with Section 903.3.1.1. Where Note f also applies, the increase for both notes shall be applied accumulatively.
- f-e. Maximum allowable quantities shall be increased 100 percent when stored in approved storage cabinets, gas cabinets or exhausted enclosures as specified in the *International Fire Code*. Where Note e also applies, the increase for both notes shall be applied accumulatively.
- g. Allowed only when stored in approved exhausted gas cabinets or exhausted enclosures as specified in the *International Fire Code*.
- h. Quantities in parenthesis indicate quantity units in parenthesis at the head of each column.
- i. For gallons of liquids, divide the amount in pounds by 10 in accordance with Section 5003.1.2.

Revise IBC Table [F] 307.1(1) as follows:

Delete the table and replace with Table 5003.1.1(1) from the IFC.

Revise Footnotes to IBC Table [F] 307.1(1) as follows:

For SI: 1 cubic foot = 0.02832 m³, 1 pound = 0.454 kg, 1 gallon = 3.785 L.

NL = Not Limited; N/A = Not Applicable; UD = Unclassified Detonable

- a. For use of control areas, see Section 414.2.
- b. The aggregate quantity in use and storage shall not exceed the quantity listed for storage.
- c. The quantities of alcoholic beverages in retail and wholesale sales occupancies shall not be limited provided the liquids are packaged in individual containers not exceeding 1.3 gallons. In retail and wholesale sales occupancies, the quantities of medicines, foodstuffs, consumer or industrial products, and cosmetics containing not more than 50 percent by volume of water-miscible liquids with the remainder of the solutions not being flammable, shall not be limited, provided that such materials are packaged in individual containers not exceeding 1.3 gallons.
- d. Maximum allowable quantities shall be increased 100 percent in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1. Where Note e also applies, the increase for both notes shall be applied accumulatively.

- e. Maximum allowable quantities shall be increased 100 percent when stored in *approved* storage cabinets, day boxes, gas cabinets or exhausted enclosures or in *listed* safety cans in accordance with Section 5003.9.10 of the *International Fire Code*. Where Note d also applies, the increase for both notes shall be applied cumulatively.
- f. ~~The permitted quantities~~ Quantities shall not be limited in a building equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.
- g. ~~Permitted~~ Allowed only in buildings equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.
- h. Containing not more than the maximum allowable quantity per *control area* of Class IA, IB or IC flammable liquids.
- i. The maximum allowable quantity shall not apply to fuel oil storage complying with Section 603.3.2 of the *International Fire Code*.
- j. Quantities in parenthesis indicate quantity units in parenthesis at the head of each column.
- k. A maximum quantity of 200 pounds of solid or 20 gallons of liquid Class 3 oxidizers is allowed when such materials are necessary for maintenance purposes, operation or sanitation of equipment. ~~Storage containers and the manner of storage shall be approved when the storage containers and the manner of storage are approved.~~
- l. Net weight of the pyrotechnic composition of the fireworks. Where the net weight of the pyrotechnic composition of the fireworks is not known, 25 percent of the gross weight of the fireworks, including packaging, shall be used.
- M For gallons of liquids, divide the amount in pounds by 10 in accordance with Section 5003.1.2 of the *International Fire Code*.
- n. For storage and display quantities in Group M and storage quantities in Group S occupancies complying with Section 414.2.5, see Tables 414.2.5(1) and 414.2.5(2).
- o. Densely packed baled cotton that complies with the packing requirements of ISO 8115 shall not be included in this material class.
- p. The following shall not be included in determining the maximum allowable quantities:
 - 1. Liquid or gaseous fuel in fuel tanks on vehicles.
 - 2. Liquid or gaseous fuel in fuel tanks on motorized equipment operated in accordance with ~~this code~~ *International Fire Code*.
 - 3. Gaseous fuels in piping systems and fixed appliances regulated by the *International Fuel Gas Code*.
 - 4. Liquid fuels in piping systems and fixed appliances regulated by the *International Mechanical Code*.
- q. Where manufactured, generated or used in such a manner that the concentration and conditions create a fire or explosion hazard based on information prepared in accordance with Section 414.1.3.

Revise IBC Table 307.1(2) as follows:

Delete the table and replace with Table 5003.1.1(2) from the IFC.

Revise Footnotes to IBC Table [F] 307.1(2) as follows:

For SI: 1 cubic foot = 0.02832 m³, 1 pound = 0.454 kg, 1 gallon = 3.785 L.

- a. For use of control areas, see Section 414.2.
- b~~c~~. In retail and wholesale sales occupancies, the quantities of medicines, foodstuffs, consumer or industrial products, and cosmetics, containing not more than 50 percent by volume of water-miscible liquids and with the remainder of the solutions not being flammable, shall not be limited, provided that such materials are packaged in individual containers not exceeding 1.3 gallons.
- e~~f~~. For storage and display quantities in Group M and storage quantities in Group S occupancies complying with Section 414.2.5, see Tables 414.2.5(1) and 414.2.5(2).
- d~~b~~. The aggregate quantity in use and storage shall not exceed the quantity listed for storage.
- e~~d~~. Maximum allowable quantities shall be increased 100 percent in buildings equipped throughout with an *approved automatic sprinkler system* in accordance with Section 903.3.1.1. Where Note f also applies, the increase for both notes shall be applied cumulatively.
- f~~e~~. Maximum allowable quantities shall be increased 100 percent when stored in approved storage cabinets, gas cabinets or exhausted enclosures as specified in the *International Fire Code*. Where Note e also applies, the increase for both notes shall be applied cumulatively.
- g. Allowed only when stored in approved exhausted gas cabinets or exhausted enclosures as specified in the *International Fire Code*.
- h. Quantities in parenthesis indicate quantity units in parenthesis at the head of each column.
- i. For gallons of liquids, divide the amount in pounds by 10 in accordance with Section 5003.1.2 of the *International Fire Code*.

Reason: Correlation between these sets of tables in the IFC and IBC is critical. There is no reason that the tables need to be formatted differently or contain different wording. This proposal does not change any requirements in the codes. It is editorial in nature and is designed to provide uniformity and consistency for the requirements found in the sets of tables.

Items 1 and 2 are editorial and only simplify the table.

Item 3 is needed to correlate with revisions made in Items 1 and 2.

Item 4 alphabetizes the listings in the table and provides consistency in the header of the table. The revisions in the footnotes provide identical wording to the wording in the IBC.

Item 5 restructures the footnotes to provide consistency for both the Health Hazard table and the Physical Hazard table.

Item 6 duplicates the table from the IFC into the IBC.

Item 7 provides identical wording for the footnotes in the IBC as is found in the IFC.

Item 8 duplicates the table from the IFC into the IBC.

Item 9 provides identical wording for the footnotes in the IBC as is found in the IFC.

Cost Impact: The code change proposal will not increase the cost of construction.

F292-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

5003.1.1(1)T-F-ZUBIA-FCAC

F293 – 13

Table 5003.1.1(3)

Proponent: Elley Klausbruckner representing Klausbruckner & Associates Inc (ek@klausbruckner.com)

Revise as follows:

TABLE 5003.1.1(3)
MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING
A PHYSICAL HAZARD IN AN OUTDOOR CONTROL AREA^{a, b, c, d}

MATERIALS	CLASS	STORAGE ^b			USE-CLOSED SYSTEM ^b			USE-OPEN SYSTEM ^b	
		Solid Pounds (cubic feet)	Liquid gallons (pounds) ^d	Gas cubic feet at NTP	Solid Pounds (cubic feet)	Liquid gallons (pounds) ^d	Gas cubic feet at NTP	Solid Pounds (cubic feet)	Liquid gallons (pounds) ^d
Unstable (reactive)	4	2	(2)	20	1	(1)	2	0.25	(0.25)
	3	20	(20)	200	10	(10)	10	1	4 (1)
	2	200	(200)	1,000	100	(100)	250	10	40 (10)
	1	Not	Not	1,500	Not	Not	Not	Not	Not
		Limited	Limited		Limited	Limited	Limited	Limited	Limited

(Portions of the table not shown remain unchanged)

Reason: The amounts throughout the table are based on a conversion of 10 pounds per 1 gallon. Based on this conversion, effectively 10 times the amounts of water reactive 2 and 3 liquids in open system use are allowed than solids in the current table. Adding the parenthesis is to bring consistency in the requirements.

Cost Impact: The code change proposal will not increase the cost of construction.

F293-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

5003.1.1(3)T-F-KLAUSBRUCKNER

F294 – 13

5003.2.1

Proponent: Daniel E. Nichols, P.E., New York State Department of State (dan.nichols@dos.ny.gov)

Revise as follows:

5003.2.1 Design and construction of containers, cylinders and tanks. Containers, cylinders and tanks shall be designed and constructed in accordance with *approved* standards. Containers, cylinders, tanks and other means used for containment of hazardous materials shall be of an *approved* type. Pressure vessels not otherwise regulated by this code shall comply with the ASME *Boiler and Pressure Vessel Code*.

Reason: The addition of the reference to the ASME Boiler and Pressure Vessel Code in the 2012 edition has added confusion to the IFC. A 'pressure vessel' is defined as "A closed vessel designed to operate at pressures above 15 psig (103 kPa)." This is not aligned with the requirements in the previous sentence, which states a "cylinder" (which is a closed vessel that has pressures higher than 40 psig and has a circular cross-section) shall be of an approved type. Nowhere in the code does it state that a cylinder is not a pressure vessel.

The proposal adds language to minimize confusion about applicable sections found in the product-specific hazardous materials chapters, such as 5301.2 for compressed gases and 6101.1 for the use of NFPA for liquefied petroleum gases. It is important to keep the allowance for approved types of containers, cylinders, tanks, and other means, even when it comes to pressurized storage components, since ASME is not the only standard for design. US Department of Transportation regulates pressurized storage components that are transported over public roads (The DOT specification). DOT differs from ASME in construction specifications as well as maintenance and testing. A vast majority of cylinders used to store common materials like propane, medical oxygen, carbon dioxide, helium, and compressed air are in DOT cylinders, not ASME.

This proposal is submitted with the endorsement of the New York State Building Officials Conference, the New York State Fire Marshals and Inspectors Association, and the Association of Fire Districts of New York State.

Cost Impact: This change is a clarification and has no cost impact.

F294-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

5003.2.1-F-NICHOLS

F295 – 13

5003.9, 5003.9.11 (New)

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care
(john.williams@doh.wa.gov)

Revise as follows:

5003.9 General safety precautions. General precautions for the safe storage, handling or care of hazardous materials shall be in accordance with Sections 5003.9.1 through ~~5003.9.10~~ 5003.9.11.

5003.9.11 Emergency showers and eyewash stations. In Group I-2 Condition 2, where the eyes or body of any person are at risk for exposure to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use. The emergency showers and eyewash stations shall be installed in accordance with the International Plumbing Code.

Reason: This proposal addresses KTag K134. The IPC already provides the installation requirements but the requirements are not called up in the IFC. This proposal uses verbiage from OSHA with some minor revisions to remove permissive language. The focus is only on corrosive materials which are defined in the IFC. The scope of this change is limited to Group I-2 condition 2 due to the scoping limitations of the Ad Hoc Healthcare Committee.

Source of verbiage (no copyright issues):

OSHA
1910.151(c)
Where the eyes or body of any person may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use.

For Reference:

International Plumbing Code 2012

SECTION 411 EMERGENCY SHOWERS AND EYEWASH STATIONS

411.1 Approval. Emergency showers and eyewash stations shall conform to ISEA Z358.1.

411.2 Waste connection. Waste connections shall not be required for emergency showers and eyewash stations.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>

Cost impact:

F295-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

5003.9-F-WILLIAMS-ADHOC

F296 – 13

5003.11

Proponent: Richard C. Ramsey, Director of Engineering, Universal Power Group, representing Universal Power Group.

Revise as follows:

5003.11 Group M storage and display and Group S storage. The aggregate quantity of nonflammable solid and nonflammable or noncombustible liquid hazardous materials stored and displayed within a single *control area* of a Group M occupancy, or an outdoor *control area*, or stored in a single *control area* of a Group S occupancy, is allowed to exceed the *maximum allowable quantity per control area* indicated in Section 5003.1 when in accordance with Sections 5003.11.1 through 5003.11.3.10.

Exception: VRLA, lithium-ion, lithium metal polymer or other types of sealed batteries with immobilized electrolyte shall not require storage and display volumetric limitations.

Reason: IFC 2012 physical limitations on stocking (storage) of corrosive material inventory are too restrictive to allow sufficient VRLA battery inventory volume to do normal business at a large battery distribution center. According to IFC 2012, section 608.5 Spill control and neutralization Exception: VRLA, lithium-ion, lithium metal polymer or other types of sealed batteries with immobilized electrolyte shall not require spill control. Spill control is the majority of control for corrosive/hazardous materials. If there is no possibility of spill, why would there be a stocking limit to the amount of inventory warehoused in one location?

Cost Impact: The code change proposal will not increase the cost of construction.

F296-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

5003.11-F-RAMSEY.doc

F297 – 13

Table 5003.11.1 [IBC [F] 414.2.5 (1)]

Proponent: Kirk Mitchell, Kirk Mitchell & Associates, LLL, representing Isocyanurates Industry Ad Hoc Committee (IIAHC) (pkmitchell@bellsouth.net)

Revise as follows:

TABLE 5003.11.1 [IBC [F] 414.2.5 (1)]
MAXIMUM ALLOWABLE QUANTITY PER INDOOR AND OUTDOOR CONTROL AREA IN GROUP M AND S OCCUPANCIES – NONFLAMMABLE SOLIDS, NONFLAMMABLE AND NONCOMBUSTIBLE LIQUIDS

CONDITION		MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA	
Material	Class	Solids pounds	Liquids gallons
A. HEALTH-HAZARD MATERIALS – NONFLAMMABLE AND NONCOMBUSTIBLE SOLIDS AND LIQUIDS			
2. Highly Toxics ^d	Not Applicable	20 ^{b,c}	2 ^{b,c}
3. Toxics ^{b,c,d}	Not Applicable	1,000	100

(Portions of table not shown remain unchanged)

For SI: 1 pounds = 0.454 kg, 1 gallon = 3.785 L, 1 cubic foot = 0.02832 m³

- a. Hazard categories are as specified in Section 5001.2.2
- b. Maximum allowable quantities shall be increased by 100 percent in buildings equipped throughout with an automatic sprinkler in accordance with Section 903.3.1.1. When Note c also applies, the increase for both notes shall be applied accumulatively.
- c. Maximum allowable quantities shall be increased by 100 percent when stored in approved storage cabinets in accordance with Section 5003.8. When Note b also applies, the increase for both notes shall be applied accumulatively.
- d. Toxic or highly toxic solids or liquids displayed in original packaging in Group M or S occupancies and intended for maintenance, operation of equipment, or sanitation when contained in individual packaging not exceeding 100 lb (45.4 kg) shall be limited to an aggregate of 1,200 lb (544.3 kg) or 220 gal (832.8 L). The increases allowed by Notes b and c shall not apply to highly toxic solids and liquids.
- d.e. See Table 5003.8.3.2 for design and number of control areas
- e.f. Maximum allowable quantities for other hazardous material categories shall be in accordance with Section 5003.1.
- f.g. Maximum allowable quantities shall be increased 100 percent in outdoor control areas.
- g.h. Maximum allowable quantities are permitted to be increased to 2,250 pounds when individual packages are in the original sealed containers from the manufacturer or packager and not exceed 10 pounds each.
- h.i. Maximum allowable quantities are permitted to be increased to 4,500 pounds when individual packages are in the original sealed containers from the manufacturer or packager and not exceed 10 pounds each.
- i.j. Quantities are unlimited where protected by an automatic sprinkler system.
- j.k. Quantities are unlimited in an outdoor control area.

Reason: The proposed change provides for a practical degree of storage flexibility for combinations of health hazard materials when intended for the designated use as ascribed. Additionally, the footnoted language is consistent with the updated revised footnoted material found in NFPA 400 Hazardous Materials Code (2013 Edition)

Cost Impact: No anticipated or projected cost impact with this proposal.

F297-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

5003.11.1T-F-MITCHELL

F298 – 13

IFC: 5004.7; IBC [F] 414.5.3

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

IFC 5004.7 Standby or emergency power. Where mechanical ventilation, treatment systems, temperature control, alarm, detection or other electrically operated systems are required, such systems shall be provided with an emergency or standby power system in accordance with NFPA 70 and Section 604.

Exceptions:

1. Emergency or standby power are not required for the following:
 - ~~4.~~ 1.1. Mechanical ventilation for storage of Class IB and Class IC flammable and combustible liquids in closed containers not exceeding ~~64/2~~ 6.5 gallons (25 L) capacity.
 - ~~2.~~ 1.2. Storage areas for Class 1 and 2 oxidizers.
 - ~~3.~~ 1.3. Storage areas for Class II, III, IV and V organic peroxides.
 - ~~4.~~ 1.4. Storage areas for asphyxiant, irritant and radioactive gases.
- ~~5.~~ For storage areas for highly toxic or toxic materials, see Sections 6004.2.2.8 and 6004.3.4.2.
- ~~6.~~ Standby power for mechanical ventilation, treatment systems and temperature control systems shall not be required where an approved fail-safe engineered system is installed.

For storage and use areas for highly toxic or toxic materials, see Sections 6004.2.2.8 and 6004.3.4.2.

IBC [F] 414.5.3 Emergency or standby power. Where mechanical ventilation, treatment systems, temperature control, alarm, detection or other electrically operated systems are required by the International Fire Code or this code, such systems shall be provided with an emergency or standby power system in accordance with Chapter 27.

Exceptions:

1. Emergency or standby power are not required for the following ~~storage areas~~:
 - 1.1. Mechanical ventilation for storage of Class IB and Class IC flammable and combustible liquids in closed containers not exceeding 6.5 gallons (25 L) capacity.
 - 1.2. Storage areas for Class 1 and 2 oxidizers.
 - 1.3. Storage areas for Class II, III, IV and V organic peroxides.
 - 1.4. Storage, use and handling areas for asphyxiant, irritant and radioactive gases.
 - ~~1.5. For storage, use and handling areas for highly toxic or toxic materials, see Sections 6004.2.2.8 and 6004.3.4.2 of the International Fire Code.~~
2. Standby power for mechanical ventilation, treatment systems and temperature control systems shall not be required where an approved fail-safe engineered system is installed.

For storage and use areas for highly toxic or toxic materials, see Sections 6004.2.2.8 and 6004.3.4.2 of the International Fire Code.

Reason: This proposal is intended to correlate the IBC requirements with the requirements in the IFC. Section 414.5.3 in the IBC should be the same as Section 5004.7 in the IFC. However, there are slight differences. This proposal will correct those differences and provide consistency between the codes.

The revisions in IFC Section 5004.7 and IBC Section 414.5.3 are based on the following:

1. Item 1 is duplicated from the IBC and placed into the IFC. The item is revised so that it is not limited to storage. This is consistent with the following text in Item 1.4 which currently addresses use and handling areas.

2. The items are renumbered as subsections consistent with the IBC format.
3. Item 1.4 is relocated as a second paragraph in the section. This provision is not an exception, it does not eliminate emergency or standby power, but rather it adds additional criteria. This is further confirmed by IFC Section 604.2.11 which states "Emergency power shall be provided for occupancies with highly toxic or toxic materials in accordance with Sections 6004.2.2.8 and 6004.3.4.2."

These two sections are then consistent and correlate with the other requirements found in the IFC and IBC. There is no change in requirements.

Cost Impact: The code change proposal will not increase the cost of construction.

F298-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

5004.7-F-ZUBIA-FCAC

F299 – 13

5104.1, 5104.1.1 (New), 202 (IBC [F] 202)

Proponent: Patrick A. McLaughlin McLaughlin & Associates, representing the Consumer Specialty Products Association (pmclaugma@aol.com)

Revise as follows:

5104.1 General. The inside storage of Level 2 and 3 aerosol products shall comply with Sections 5104.2 through 5104.7 and NFPA 30B. Level 1 aerosol products and those aerosol products covered by Section 5104.1.1 shall be considered equivalent to a Class III commodity and shall comply with the requirements for palletized or rack storage in NFPA 13.

5104.1.1 Aerosol products in plastic containers larger than 118 ml (4 fl. oz.) shall be considered to be equivalent to Class III commodities, as defined in NFPA 13, *Standard for the Installation of Sprinkler Systems*, where any of the following conditions are met:

1. Base product has no fire point when tested in accordance with ASTM D 92, *Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester*, and nonflammable propellant.
2. Base product has no sustained combustion as tested in accordance with "Method of Testing for Sustained Combustibility", Title 49 Code of Federal Regulations, Part 173, Appendix H, and nonflammable propellant.
3. Base product contains up to 20% by volume (15.8% by weight) of ethanol and/or isopropyl alcohol in an aqueous mix, and nonflammable propellant.
4. Base product contains 4% by weight or less of an emulsified flammable liquefied gas propellant within an aqueous base. The propellant shall remain emulsified for the life of the product. Where such propellant is not permanently emulsified then the propellant shall be nonflammable.

SECTION 202 (IBC [F] 202) GENERAL DEFINITIONS

AEROSOL CONTAINER. A metal can, or a glass or plastic bottle designed to dispense an aerosol. Metal cans or plastic containers shall be limited to a maximum size of 33.8 fluid ounces (1000 ml). Glass ~~or plastic~~ bottles shall be limited to a maximum size of 4 fluid ounces (118 ml).

Reason: A significant amount of new research has been completed on aerosol products in plastic containers that clearly defines a "low hazard" version of the product that can be stored in general purpose warehouses without significantly increasing the fire hazard. The following discussion provides an overview of the work that was done and the conclusions from the effort.

1) Aerosol Products in Plastic Containers – Propellant: Nonflammable; Base: Liquid Content that Does not Support Combustion

The fire hazard created by aerosol products in metal containers is driven by their propellant and the liquid content. An aerosol product that contains a nonflammable propellant and a liquid content that does not support combustion would have a Chemical Heat of Combustion of 0 kJ/g and be classified as a Level 1 aerosol product. Level 1 aerosols are protected using the same protection criteria needed for Class III commodities provided by NFPA 13.

The fire hazard of an aerosol product in a plastic container cannot be directly compared to aerosol products in metal containers. However, using commodity classification information for plastic containers filled with liquids that do not burn supports proposing a protection level for equivalent aerosol products. In this case, the content of the aerosol would not contribute to a fire. Only the primary (plastic container) and secondary (carton) packaging would contribute. If the aerosol was not pressurized, it would directly compare to products listed in NFPA 13 Annex A and FM Global Property Loss Prevention Data Sheet 8-1 as shown below.

NFPA 13 Annex A

Table A.5.6.3

Milk in Plastic – Class I

Bottles, Jars / Filled noncombustible liquids / Plastic, PET – Class I

FM Global Property Loss Prevention Data Sheet 8-1

2.2.2.2 Examples of Class I Commodities

4. Other – Noncombustible liquids in 5 gal (19 l) or smaller plastic containers

Both standards treat a plastic container filled with a liquid that does not burn as a Class I commodity. The addition of a nonflammable propellant to a plastic container will not change the burning properties of the commodity (it may result in a violent rupture with no change in burning rates or severity). The above discussion would point to classifying the aerosol products in plastic containers charged with a nonflammable propellant and liquid that does not burn as a Class I commodity. However, in an effort to provide consistency in the protection of aerosols, the protection proposal targets using the same protection currently recommended for Level 1 aerosols.

2) Aerosol Products in Plastic Containers – Propellant: Nonflammable; Base: Liquid Content Consists of up to 20% Ethanol or Isopropyl Alcohol in Aqueous Solution

An aerosol product in a plastic container that contains a liquid that burns will create a fire hazard at least as severe as the same liquid in an unpressurized plastic container. The fire hazard may increase because the container is pressurized and will definitely increase if it is pressurized with a flammable propellant. As the fire hazard of the aerosol's content increases, the fire hazard of the actual aerosol will increase as well. If on the other hand, the aerosol product in a plastic container was charged with liquid components that can easily be protected in an unpressurized plastic container, similar to the discussion under item 1, there is a good chance that the aerosol products in plastic containers can be protected with a similar level of protection. The only question might be the impact of adding nonflammable propellant.

FM Global has developed protection criteria for several alcohol water mixtures in plastic bottles. The alcohols used in the testing are ethanol and isopropyl alcohol. The mixtures ranged from 100% alcohol (approximate) down to 20% by volume alcohol/80% by volume water. The 20% alcohol/80% water mixture in a plastic bottle in cartons was tested in a full-scale array with the overview of the test presented in Table 1. This alcohol/water mixture does have a definable fire point; however, it produces unstable burning.

Table 1. FM Global Test Summary

Fire Test Summary – Diluted Alcohol Test Series		
Test Number		5
Test Date		1-19-99
Test Parameters	Commodity	20% isopropyl alcohol / 80% water in a 1 pint [470 ml] plastic container in cartons
	Storage Arrangement	Rack
	Storage Height (ft) [m]	Nominal 20 [6.1]
	No. Tiers	4
	Ceiling Height (ft) [m]	30 [9.1]
	Aisle Width (ft) [m]	8 [2.4]
	Sprinkler Type (K factor gpm/psi ^{0.5} [L/min/bar ^{0.5}], Temperature Rating)	K 5.6 [81]/ 286°F [140°C] / Standard Response
	Sprinkler Spacing (ft x ft) [m x m]	10 x 10 [3.0 x 3.0]
Test Results	Discharge Density (gpm/ft ²) [mm/min]	0.30 [12]
	First Sprinkler Operated (min:sec)	21:56
	Total Sprinklers Operated	2
	Peak Gas Temperature (°F) [°C]	585°F [307]
	Peak Steel Temperature (°F) [°C]	189°F [87.2]
Test Concluded (min:sec)		30:00

Based on the results of this test, FM Global has recommended protecting 20%_{vcl} alcohol/80%_{vcl} water mixtures in plastic bottles with the same protection recommended for liquids that do not burn in plastic containers, i.e., Class I commodity. A final question is does pressurizing a plastic container filled with a 20%_{vcl} alcohol/80%_{vcl} water mixture with nonflammable propellant change the burning properties of the product.

Since the propellant will not burn, the only real opportunity to change the burning behavior would be to cause the alcohol/water mixture to burn more severely (e.g., maybe produce fireballs when the mixture is ejected from the container under pressure). To evaluate this potential, a small-scale test series was contracted with Underwriters Laboratories to investigate the impact of pressurizing aerosol products in plastic containers, filled with a 20%_{vol} alcohol/80%_{vol} water mixture, with nonflammable propellants. A summary of 5 tests that were run is provided in Table 2. Two filling methods were investigated, direct fill (liquid and propellant in same space) and bag-on-valve (liquid in one compartment, propellant in outer compartment). UL reported the number of container failures. The overall fire behavior was provided through direct observation. The tests looked at two cases of six containers arranged with a 6 in. (15 cm) flue between them and a point igniter in the flue space. The cases were in a small pan.

Table 2 UL Testing Summary

Test #	Description	Fill Type	Test Results
1	15% ethanol and 85% water	Direct Fill	12 containers ruptured but burned in place No fire balls during rupture No pool fire Bottom of boxes unburned after 6 min
2	15% ethanol and 85% water	Bag on Valve	12 containers ruptured with some ejected away from case 50% of one carton unburned after 4 min No fire balls during rupture No pool fire
3	20% ethanol and 80% water	Direct Fill	12 containers ruptured but burned in place No fire balls during rupture No pool fire Bottom of boxes unburned after 5 min
4	20% ethanol and 80% water Unpressurized Containers	Direct Fill	12 containers ruptured but burned in place No fire balls during rupture No pool fire Bottom of boxes unburned after 10 min
5	20% ethanol and 80% water	Bag on Valve	5 containers ruptured Fire extinguished by rupturing containers

None of the tests produced a pool fire or fireball. In all five tests, portions of the aerosol products in plastic containers and cardboard cases remained unburned. Based on these tests, it appears that the fire properties of alcohol/water mixture remained unchanged when pressurized and that using Class III commodity protection will provide fully adequate protection for the aerosol products in plastic containers.

3) Aerosol Products in Plastic Containers – Propellant: 4% by Weight Nonflammable Propellant or Flammable Propellant that is Emulsified in Liquid Base; Base: Aqueous Base with no Fire Point.

An emulsion, in an aerosol product, would be a mixture of two or more liquids in which one is present as droplets, of microscopic or ultramicroscopic size, distributed throughout the other. Emulsions are formed from the component liquids either spontaneously or, more often, by mechanical means, such as agitation, provided that the liquids that are mixed have no (or a very limited) mutual solubility. Emulsions are stabilized by agents that form films at the surface of the droplets (e.g., soap molecules) or that impart to them a mechanical stability (e.g., colloidal carbon or bentonite). Colloidal distributions or suspension of one or more liquid(s) with another will have a shelf life that varies with the efficiency of the recipe used.

A Level 1 aerosol (metal can) was defined by the fire performance of shave cream. This product had limited amounts of flammable liquefied gas propellant to eject the mixture and to cause foaming of the mixture. In a fire, the hydrocarbon propellant would be ejected and burn, but the large quantities of foam mix and water tended to produce a very limited fire severity. A similar product was evaluated when placed in a plastic aerosol container.

The product consisted of several liquid components that do not support combustion mixed with water and a maximum of 4% by weight flammable liquefied gas propellant. The liquefied gas was held within the liquid mixture as an emulsion. The gas would eject the liquid product and cause the liquid mixture to foam. Since the liquid components do not burn, the main concern centers around the flammable liquefied gas propellant. The evaluation used small, intermediate, and full-scale fire testing to evaluate the fire hazard created by this product. All of the testing was completed at Underwriters Laboratories.

The intermediate and large-scale testing are summarized in Table 3. The large-scale test used the 12-Pallet Aerosol Classification Test protocol. This methodology only applies to metal aerosol products but, lacking any test data, it was considered a good starting point. The 12 pallet load palletized array operated 4 sprinklers in 10 seconds at around a minute and a half after ignition. The fire was quickly knocked down. The test was run for 32 minutes. The liquid product was released during the test and did not contribute. The flammable liquefied gas did create brief flare-ups of the fire when released and continued to create small fireballs throughout the test. The high sprinkler discharge density (0.79 gpm/ft²) (32 mm/min) easily extinguished the majority of the array and limited the fire spread to the ignition flue located in the center of the array. The fire test seemed to demonstrate that the limited amount of flammable liquefied gas in the product would not produce a severe fire; however, the high water density does not permit easy comparison to a Class III commodity fire.

An intermediate-scale test was run under the calorimeter at UL to evaluate the effect of a significantly lower water density (0.25 gpm/ft²) (10 mm/min) on this product. The product was placed in a double row rack with a storage height of 15 ft (4.6 m). Four open sprinklers were located 10 ft (3 m) above the top of the array and arranged to deliver a 0.25 gpm/ft² (10 mm/min). The sprinklers were activated at approximately one minute after ignition. The test was terminated at 4 minutes since the fire was extinguished. The percent damage was not provided in the UL report; however the pictures indicate that the fire was again confined to the ignition flue.

NFPA 13 requires a 0.25 gpm/ft² (10 mm/min) to protect 15 ft (4.6 m) high double row rack storage of Class III commodity in a 25 ft (7.6 m) high building using low temperature ceiling sprinklers [NFPA 13, Table 16.2.1.3.2, Figure 16.2.1.3.2(c) curves E & F, Figure 16.2.1.3.4.1]. The intermediate-scale test indicates that this same protection level easily controlled/extinguished a fire involving the foam shave cream in a plastic aerosol container.

Table 3 UL Test Summary

Shave Cream Intermediate and Large-Scale Fire Test Summaries			
Test Number		1 (Intermediate-Scale)	1 (Large-Scale)
Report Date		12/31/09	10/26/09
Test Parameters	Commodity	Shave Foam in 11 oz (330 ml) Plastic Aerosol	Shave Foam in 11 oz (330 ml) Plastic Aerosol
	Storage Arrangement (pallet loads)	Rack Array under Calorimeter 2 x 2 x 3 high	Palletized Array 2 x 2 x 3 high
	Storage Height (ft) [m]	15 [4.6]	14 [4.3]
	No. Tiers	3	3
	Ceiling Height (ft) [m]	Sprinklers at 25 [7.6] above floor	25 [7.6]
	Aisle Width (ft)	None	None
	Sprinkler Type (K factor gpm/psi ^{0.5} [L/min/bar ^{0.5}], Temperature Rating)	K = 8.0 [120] / Open	11.2 [161] / 155°F [68°C]
	Sprinkler Spacing (ft x ft) [m x m]	10 x 10 [3 x 3]	10 x 10 [3 x 3]
	Discharge Density (gpm/ft ²) [mm/min]	0.25 [10]	0.79 [32]
Test Results	First Sprinkler Operated (min:sec)	1:07 water on	1:23
	Total Sprinklers Operated	4	4
	Peak Gas Temperature (°F) [°C]	3000 kW peak heat release rate	1242 [672]
	Peak Steel Temperature (°F) [°C]	None recorded	165 [74]
	Test Concluded (min:sec)	4:00	32:00

In addition to the intermediate and large-scale fire test, a number of small-scale tests were also done to provide a visual documentation on how a plastic aerosol container with a shave foam type product behaves when exposed to fire without sprinkler protection. These tests consisted of placing two cases of six containers on each side of a standard igniter. The containers were contained in a cardboard box. A shave cream and a hair mousse were tested. A general description of the test results is provided in Table 4. Test 9 used a product that was very similar to what was tested in the intermediate and large-scale testing. It was a shave cream product that had a small percentage of a flammable liquefied gas that was in a stable emulsion with a multi-component liquid mixture. The liquid mixture did not support combustion. The product in Test 10 had a higher weight percent flammable liquefied gas that did not form a stable emulsion in the bottle. A liquefied gas layer formed in the container. It was not clear what the liquid mixture was made up of. In both products, the flammable liquefied gas was used to eject the liquid mixture out of the container and cause the liquid product to create foam.

In Test 9, all but two of the containers failed. The shave foam covered the cases, containers and pan after the test. The product burned weakly and extinguished the igniter used in the test. The product used in Test 10 did appear to burn more vigorously. Container failure produced momentary fireballs. While this limited-scale test cannot predict the behavior of a product in a full-scale arrangement, it did demonstrate that there were differences between the shave cream and the hair mousse, and that the hair mousse produced a more vigorous fire.

Table 4 UL Testing Summary

Test #	Description	Fill Type	Test Results
9	Shave Cream Emulsion (4% by weight hydrocarbon propellant – the emulsion was stable, no propellant layer was noticeable in container)	Direct Fill	Initially flames are about 3 to 4 ft (0.9 to 1.2 m) high. First container ruptures at :50 seconds. Multiple container ruptures follow. The igniter is extinguished by a container rupture at approximately 1:15. The fire goes out at approximately 6 minutes. The two cases are covered in foam shave cream and two containers did not fail. There was no pool fire. The ruptures did not produce noticeable fireballs or increased burning.
10	Mousse and conditioner (6% by weight hydrocarbon propellant – the emulsion was not stable and a propellant layer formed in container)	Direct Fill	Initially flames are about 3 to 4 ft (0.9 to 1.2 m) high. First container ruptures at :48 seconds. Multiple container ruptures follow. The flames increase in intensity with the container ruptures. Eventually all of the containers are breached. A small pool of burning liquid formed but went out quickly. An increase in burning was noticeable with each container failure.

The results of the intermediate-scale testing, the full-scale testing, and the small-scale testing, indicate that an aerosol product in a plastic container filled with a liquid mixture that does not support combustion and no more than 4% by weight flammable liquefied gas in a stable emulsion with the liquid mixture can be protected using criteria recommended for a Class III commodity.

The aerosol container definition was also modified to reflect the current definition in NFPA 30B 2011, edition, that is referenced by the IFC.

Cost Impact: The code change proposal will not increase the cost of construction.

F299-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

5104.1-F-MCLAUGHLIN

F300 – 13

5203.7 (New), 5204.1

Proponent: Robert J Davidson, Davidson Code Concepts, LLC, representing the Biomass Feedstock Industry Committee on Codes and Standards (BFICOCS) (rjd@davidsoncodeconcepts.com)

Revise as follows:

5203.7 Sources of ignition. Sources of ignition shall comply with Sections 5203.7.1 through 5203.7.2.

5003.7.1 Smoking. Smoking shall be prohibited and “No Smoking” signs provided as follows:

1. In rooms or areas where materials are stored or dispensed or used in open systems .
2. Within 25 feet (7620 mm) of outdoor storage or open use areas.
3. Facilities or areas within facilities that have been designated as totally “no smoking” shall have “No Smoking” signs placed at all entrances to the facility or area. Designated areas within such facilities where smoking is permitted either permanently or temporarily, shall be identified with signs designating that smoking is permitted in these areas only.

Signs required by this section shall be in English as a primary language or in symbols allowed by this code and shall comply with Section 310.

5203.7.2 Open flames. Open flames and high-temperature devices shall not be used in a manner which creates a hazardous condition and shall be listed for use with the materials stored or used.

5204.1 General. Loose combustible fibers, not in suitable bales or packages and ~~whether housed or stored outdoors~~ in the open, shall ~~not be stored within 100 feet (30 480 mm) any structure, except as indicated in this chapter~~ comply with Section 2808 of this code. Occupancies involving the indoor storage of loose combustible fibers in amounts exceeding the maximum allowable quantity per control area as set forth in Section 5003.1 shall comply with Sections 5204.2 through 5204.6.

Reason: This proposal is part of a package of proposals concerning Chapter 52 Combustible Fibers. An issue identified in review of the current code language and structure is that though Chapter 52 Combustible Fibers is located in the "Hazardous Materials" portion of the code, combustibles fibers are not defined as a hazardous material.

5001.2 Material classification. Hazardous materials are those chemicals or substances defined as such in this code. Definitions of hazardous materials shall apply to all hazardous materials, including those materials regulated elsewhere in this code.

5001.2.1 Mixtures. Mixtures shall be classified in accordance with hazards of the mixture as a whole. Mixtures of hazardous materials shall be classified in accordance with nationally recognized reference standards; by an approved qualified organization, individual, or Material Safety Data Sheet (MSDS); or by other approved methods.

5001.2.2 Hazard categories. Hazardous materials shall be classified according to hazard categories. The categories include materials regulated by this chapter and materials regulated elsewhere in this code.

5001.2.2.1 Physical hazards. The material categories listed in this section are classified as physical hazards. A material with a primary classification as a physical hazard can also pose a health hazard.

- 1. Explosives and blasting agents.*
- 2. Combustible liquids.*
- 3. Flammable solids, liquids and gases.*
- 4. Organic peroxide solids or liquids.*
- 5. Oxidizer, solids or liquids.*
- 6. Oxidizing gases.*
- 7. Pyrophoric solids, liquids or gases.*
- 8. Unstable (reactive) solids, liquids or gases.*
- 9. Water-reactive materials solids or liquids.*
- 10. Cryogenic fluids.*

5001.2.2.2 Health hazards. The material categories listed in this section are classified as health hazards. A material with a primary classification as a health hazard can also pose a physical hazard.

1. *Highly toxic and toxic materials.*
2. *Corrosive materials.*

Combustible fibers do not fit into those parameters. A review of the definition of hazardous materials found within the code also documents that the materials regulated by Chapter 52 are not hazardous materials.

[F] HAZARDOUS MATERIALS. *Those chemicals or substances that are physical hazards or health hazards as classified in Section 307 and the International Fire Code, whether the materials are in usable or waste condition.*

[F] HEALTH HAZARD. *A classification of a chemical for which there is statistically significant evidence that acute or chronic health effects are capable of occurring in exposed persons. The term "health hazard" includes chemicals that are toxic or highly toxic, and corrosive.*

[F] PHYSICAL HAZARD. *A chemical for which there is evidence that it is a combustible liquid, cryogenic fluid, explosive, flammable (solid, liquid or gas), organic peroxide (solid or liquid), oxidizer (solid or liquid), oxidizing gas, pyrophoric (solid, liquid or gas), unstable (reactive) material (solid, liquid or gas) or water- reactive material (solid or liquid).*

Since the scoping of Chapter 50, including the sections within Chapter 50, are for the regulation of hazardous materials, even basic requirements found within Chapter 50 such as control of ignition hazards would not apply to the activities regulated by Chapter 52.

CHAPTER 50 HAZARDOUS MATERIALS—GENERAL PROVISIONS

SECTION 5001 GENERAL

5001.1 Scope. *Prevention, control and mitigation of dangerous conditions related to storage, dispensing, use and handling of hazardous materials shall be in accordance with this chapter.*

This chapter shall apply to all hazardous materials, including those materials regulated elsewhere in this code, except that when specific requirements are provided in other chapters, those specific requirements shall apply in accordance with the applicable chapter. Where a material has multiple hazards, all hazards shall be addressed.

SECTION 5003 GENERAL REQUIREMENTS

5003.1 Scope. *The storage, use and handling of all hazardous materials shall be in accordance with this section.*

This proposal addresses this issue by adding a Section 5203.7 "Sources of ignition" by extracting requirements from current Section 5003.7 "Sources of ignition" that would be appropriate for combustible fibers. In reality, there isn't any other section of Chapter 50 that provides for the regulation of combustible fibers.

In addition, this proposal is building upon a separate proposal to recognize the ability to control the hazards of combustible fibers just as the code provides for recognition of the control of combustible dust by modifying the language found in Section 5204.1.

Section 5204.1 is proposed to be modified to point to Section 2808 "STORAGE AND PROCESSING OF WOOD CHIPS, HOGGED MATERIAL, FINES, COMPOST AND RAW PRODUCT ASSOCIATED WITH YARD WASTE AND RECYCLING FACILITIES" of the fire code as the appropriate standard for the exterior storage of combustible fibers. The materials and hazards presented are similar.

Section 5204.1 is further modified to indicate that the more restrictive indoor storage of combustible fibers regulated by Sections 5204.2 through 5204.6 is for those facilities that have amounts exceeding the maximum allowable quantity per control area as set forth in Section 5003.1. If the hazards are controlled eliminating the application of IFC Table 5003.1.1/IBC [F]307.1.1(1) and Sections 307.4 and 307.5 of the IBC, the increased protection levels are not necessary.

The Biomass Feedstock Industry Committee on Codes and Standards (BFICOCS), led by Oak Ridge National Laboratory (ORNL), is an initiative of the Department of Energy Biomass Technologies Office (BTO). As part of the BTO integrated biorefinery efforts, the BFICOCS was assembled to conduct analysis of existing fire and building codes and to prepare proposed code changes designed to facilitate the development of the commercial-scale biomass industry while maintaining a focus on safety. The committee is made up of managers, engineers and code officials from industry, government laboratories, consulting firms, and the American Society of Agricultural and Biological Engineers.

Fire codes related to storage, handling, and preprocessing of biomass are based on industries that operate in a significantly different manner than the growing biomass-based energy industry. Applying current research on biomass properties and knowledge of conventional and emerging storage, handling, and preprocessing technologies, the BFICOCS has identified changes in the IFC that benefit industry and the public.

Cost Impact: The code change proposal will not increase the cost of construction.

F300-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

5203.7 (NEW)-F-DAVIDSON

F301 – 13

Chapter 52; Chapter 37 (New)

Proponent: Robert J Davidson, Davidson Code Concepts, LLC, representing the Biomass Feedstock Industry Committee on Codes and Standards (BFICOCS) (rjd@davidsoncodeconcepts.com)

Revise as follows:

CHAPTER ~~52~~ 37 **COMBUSTIBLE FIBERS**

Reason: .Currently Chapter 52 regulating Combustible Fibers is located in a portion of the International Fire Code that applies to hazardous materials and the activities involving the handling, storage or use of hazardous materials.

Part V—Hazardous Materials

CHAPTER 50 **HAZARDOUS MATERIALS—GENERAL PROVISIONS**

SECTION 5001 **GENERAL**

5001.1 Scope. *Prevention, control and mitigation of dangerous conditions related to storage, dispensing, use and handling of hazardous materials shall be in accordance with this chapter.*

This chapter shall apply to all hazardous materials, including those materials regulated elsewhere in this code, except that when specific requirements are provided in other chapters, those specific requirements shall apply in accordance with the applicable chapter. Where a material has multiple hazards, all hazards shall be addressed.

5001.2 Material classification. *Hazardous materials are those chemicals or substances defined as such in this code. Definitions of hazardous materials shall apply to all hazardous materials, including those materials regulated elsewhere in this code.*

5001.2.1 Mixtures. *Mixtures shall be classified in accordance with hazards of the mixture as a whole. Mixtures of hazardous materials shall be classified in accordance with nationally recognized reference standards; by an approved qualified organization, individual, or Material Safety Data Sheet (MSDS); or by other approved methods.*

5001.2.2 Hazard categories. *Hazardous materials shall be classified according to hazard categories. The categories include materials regulated by this chapter and materials regulated elsewhere in this code.*

5001.2.2.1 Physical hazards. *The material categories listed in this section are classified as physical hazards. A material with a primary classification as a physical hazard can also pose a health hazard.*

1. Explosives and blasting agents.
2. Combustible liquids.
3. Flammable solids, liquids and gases.
4. Organic peroxide solids or liquids.
5. Oxidizer, solids or liquids.
6. Oxidizing gases.
7. Pyrophoric solids, liquids or gases.
8. Unstable (reactive) solids, liquids or gases.
9. Water-reactive materials solids or liquids.
10. Cryogenic fluids.

5001.2.2.2 Health hazards. *The material categories listed in this section are classified as health hazards. A material with a primary classification as a health hazard can also pose a physical hazard.*

1. Highly toxic and toxic materials.
2. Corrosive materials.

Combustible fibers do not fit into those parameters. A review of the definition of hazardous materials found within the code documents that the materials regulated by Chapter 52 are not by definition hazardous materials.

[F] HAZARDOUS MATERIALS. *Those chemicals or substances that are physical hazards or health hazards as classified in Section 307 and the International Fire Code, whether the materials are in usable or waste condition.*

[F] HEALTH HAZARD. A classification of a chemical for which there is statistically significant evidence that acute or chronic health effects are capable of occurring in exposed persons. The term "health hazard" includes chemicals that are toxic or highly toxic, and corrosive.

[F] PHYSICAL HAZARD. A chemical for which there is evidence that it is a combustible liquid, cryogenic fluid, explosive, flammable (solid, liquid or gas), organic peroxide (solid or liquid), oxidizer (solid or liquid), oxidizing gas, pyrophoric (solid, liquid or gas), unstable (reactive) material (solid, liquid or gas) or water- reactive material (solid or liquid).

Because the scoping of Chapter 50 is for the regulation of hazardous materials, the requirements of Chapter 50 would not apply to the materials or activities regulated by Chapter 52 Combustible Fibers.

SECTION 5003 GENERAL REQUIREMENTS

5003.1 Scope. The storage, use and handling of all hazardous materials shall be in accordance with this section.

SECTION 5004 STORAGE

5004.1 Scope. Storage of hazardous materials in amounts exceeding the maximum allowable quantity per control area as set forth in Section 5003.1 shall be in accordance with Sections 5001, 5003 and 5004. Storage of hazardous materials in amounts not exceeding the maximum allowable quantity per control area as set forth in Section 5003.1 shall be in accordance with Sections 5001 and 5003. Retail and wholesale storage and display of nonflammable solid and nonflammable and noncombustible liquid hazardous materials in Group M occupancies and Group S storage shall be in accordance with Section 5003.11.

SECTION 5005 USE, DISPENSING AND HANDLING

5005.1 General. Use, dispensing and handling of hazardous materials in amounts exceeding the maximum allowable quantity per control area set forth in Section 5003.1 shall be in accordance with Sections 5001, 5003 and 5005. Use, dispensing and handling of hazardous materials in amounts not exceeding the maximum allowable quantity per control area set forth in Section 5003.1 shall be in accordance with Sections 5001 and 5003.

IFC Code Commentary for Chapter 52 Combustible Fibers:

"The operations involving combustible fibers are typically associated with salvage, paper milling, recycling, cloth manufacturing, carpet and textile mills and agricultural operations, among others. The primary hazard associated with these operations is the abundance of materials and their ready ignitability. The greatest hazard presented would be a dust explosion hazard and in that case Section 5203.5 requires an approved dust-collecting and exhaust system be installed and compliance with Chapter 22 "Combustible Dust-Producing Operations".

It appears that the Chapter for Combustible Fibers ended up in the hazardous materials portion of the International Fire Code simply because the presence of more than a threshold amount of fibers could result in a Group H classification. In comparison, a combustible dust hazard, which could also result in a Group H classification, has the requirements for controlling the hazard located in Chapter 22 in the Special Occupancies and Operations portion of the code.

This proposal does not make any technical changes and simply suggests taking the existing Combustible Fiber requirements and move them to the Special Occupancies and Operations portion of the code book as a more appropriate location. This is additionally supported by the fact that the combustible fiber activities are linked to Chapter 22 Combustible Dusts by Section 5203.5. The Biomass Feedstock Industry Committee on Codes and Standards (BFICOCS), led by Oak Ridge National Laboratory (ORNL), is an initiative of the Department of Energy Biomass Technologies Office (BTO). As part of the BTO integrated biorefinery efforts, the BFICOCS was assembled to conduct analysis of existing fire and building codes and to prepare proposed code changes designed to facilitate the development of the commercial-scale biomass industry while maintaining a focus on safety. The committee is made up of managers, engineers and code officials from industry, government laboratories, consulting firms, and the American Society of Agricultural and Biological Engineers.

Fire codes related to storage, handling, and preprocessing of biomass are based on industries that operate in a significantly different manner than the growing biomass-based energy industry. Applying current research on biomass properties and knowledge of conventional and emerging storage, handling, and preprocessing technologies, the BFICOCS has identified changes in the IFC that benefit industry and the public.

Cost Impact: The code change proposal will not increase the cost of construction.

F301-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

CHAPTER 52-F-DAVIDSON

F302 – 13

5301.1, Chapter 80

Proponent: Robert Boyd, Boyd Hydrogen, LLC, representing self (Bob@BoydH2.com)

Revise as follows:

5301.1 Scope. Storage, use and handling of compressed gases in compressed gas containers, cylinders, tanks and systems shall comply with this chapter, including those gases regulated elsewhere in this code. Partially full compressed gas containers, cylinders or tanks containing residual gases shall be considered as full for the purposes of the controls required.

Exceptions:

1. Gases used as refrigerants in refrigeration systems (see Section 606).
2. Compressed natural gas (CNG) for use as a vehicular fuel shall comply with Chapter 23, NFPA 52 and the *International Fuel Gas Code*.
3. Compressed hydrogen (CH₂) for use as a vehicular fuel shall comply with Chapter 23, NFPA 2 and the *International Fuel Gas Code*.

Add new standard to Chapter 80 as follows:

NFPA

2-11 Hydrogen Technologies Code 5301.1

Reason: The fueling, use, and operation of hydrogen powered fuel cell vehicles is functionally equivalent to the fueling, use, and operation of CNG powered vehicles.

The California Fuel Cell Partnership's 2012 update on FCV deployment plans provides details on the expectation and goal of government agencies including the Department of Energy, California EPA, California Energy Commission and South Coast Air Quality Management District to have an established fleet of at least 50,000 hydrogen powered fuel cell hybrid electric vehicles deployed from 7 automakers* and operating in California sometime between 2015 and 2018.

A link to "A California Road Map: The Commercialization of Hydrogen Fuel Cell Vehicles"

Is shown below:

[http://cafcp.org/sites/files/A%20California%20Road%20Map%20June%202012%20\(CaFCP%20technical%20version\)_1.pdf](http://cafcp.org/sites/files/A%20California%20Road%20Map%20June%202012%20(CaFCP%20technical%20version)_1.pdf)

Without this proposed change and additional exception to 5301.1, local AHJ's might be confused and believe that hydrogen powered vehicles should comply with chapter 53

*7 automakers with stated plans to deploy hydrogen powered fuel cell electric vehicles: GM, Honda, Toyota, Nissan, Kai, Hyundai, VW/Audi/Porsche.

Cost Impact: None

Analysis: A review of the standard proposed for inclusion in the code, NFPA 2-11, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013.

F302-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

5301.1-F-BOYD

F303 – 13

5301.1, 5305.7

Proponent: Robert J Davidson, Davidson Code Concepts, LLC, representing the National Renewable Energy Laboratory (NREL) (rjd@davidsoncodeconcepts.com)

Revise as follows:

5301.1 Scope. Storage, use and handling of compressed gases in compressed gas containers, cylinders, tanks and systems shall comply with this chapter, including those gases regulated elsewhere in this code. Partially full compressed gas containers, cylinders or tanks containing residual gases shall be considered as full for the purposes of the controls required.

Exceptions:

1. Gases used as refrigerants in refrigeration systems (see Section 606).
2. Compressed natural gas (CNG) for use as a vehicular fuel shall comply with Chapter 23, NFPA 52 and the International Fuel Gas Code.
3. Compressed hydrogen (CH₂) for use as a vehicular fuel shall comply with Chapters 23 and 58 of this code, the *International Fuel Gas Code* and NFPA 2.

5305.7 Transfer. Transfer of gases between containers, cylinders and tanks shall be performed by qualified personnel using equipment and operating procedures in accordance with CGA P-1.

Exception: The f Fueling of vehicles with compressed natural gas (CNG) or compressed hydrogen gas, that is being conducted in accordance with Chapter 23.

Add new referenced standard to Chapter 80 as follows:

NFPA

2-11 Hydrogen Technologies Code

Reason: These two items are a proposed as a correlation cleanup. In retrospect this cleanup should have been added back in 2003 editions when hydrogen motor fueling was added to Chapter 23.

The added Section 5301.1, Exception 3 mirrors the language for CNG found at Exception 2 with a point to Chapter 23, Chapter 58 and an additional pointer to NFPA 2 to coordinate this proposal with previous proposals in this grouping submitted on behalf of NREL.

With the modification of the exception at Section 5305.7, in addition to adding fueling of vehicles with compressed hydrogen gas, the proposal makes it clear that the exception is due to compliance with Chapter 23 provisions, it is not a unrestricted exception.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, NFPA 2-11, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013.

F303-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

5301.1-F-DAVIDSON

F304 – 13

5301.1, 5303.6.2

Proponent: Patrick A. McLaughlin McLaughlin & Associates, representing the Compressed Gas Association (pmclaugma@aol.com)

Revise as follows:

5301.1 Scope. Storage, use and handling of *compressed gases* in *compressed gas* containers, cylinders, tanks and systems shall comply with this chapter and NFPA 55, including those gases regulated elsewhere in this code. Partially full *compressed gas* containers, cylinders or tanks containing residual gases shall be considered as full for the purposes of the controls required.

Exceptions:

1. Gases used as refrigerants in refrigeration systems (see Section 606).
2. Compressed natural gas (CNG) for use as a vehicular fuel shall comply with Chapter 23, NFPA 52 and the International Fuel Gas Code.

Cutting and welding gases shall also comply with Chapter 35.

Cryogenic fluids shall comply with Chapter 55. Liquefied natural gas for use as a vehicular fuel shall also comply with NFPA 52 and NFPA 59A.

Compressed gases classified as hazardous materials shall also comply with Chapter 50 for general requirements and chapters addressing specific hazards, including Chapters 58 (Flammable Gases), 60 (Highly Toxic and Toxic Materials), 63 (Oxidizers, Oxidizing Gases and Oxidizing Cryogenic Fluids) and 64 (Pyrophoric Materials).

LP-gas shall also comply with Chapter 61 and the International Fuel Gas Code.

5303.6.2 Caps and plugs. *Compressed gas* containers, cylinders and tanks designed for valve protection caps or other protective devices shall have the caps or devices in place. ~~attached~~. When valve outlet caps or plugs are provided for valve outlet protection they shall be in place.

Exception: *Compressed gas* containers, cylinders or tanks in use, being serviced or being filled.

Reason:

- 5301.1: Flammable gases and flammable and oxidizing cryogenic fluids are currently also required to comply with NFPA 55. It seems reasonable that all compressed gases comply with NFPA 55, as it is the source of many of the IFC provisions. Because of the three year adoption cycle, and the adoption processes of the two entities being out of sync, the IFC may be up to five or more years out of date. This change will also help keep the IFC updated to current technology. For example, NFPA 55 is the source document for the fundamental requirements for compressed hydrogen gas (GH2), or liquefied hydrogen gas (LH2) system installations. It serves as a source for the fundamental controls used by NFPA 2, *Hydrogen Technologies Code*, 2011 Edition, which contains requirements for vehicular fueling.
- 5306.6.2: The code change clarifies that when provided, both the protective devices and valve caps must be in place. It also aligns with NFPA 55 requirements.

Cost Impact: The code change proposal will not increase the cost of construction.

F304-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

5301.1-F-MCLAUGHLIN

F305 – 13

5305.7

Proponent: Robert Boyd, Boyd Hydrogen, LLC, representing self (Bob@BoydH2.com)

Revise as follows:

5305.7 Transfer. Transfer of gases between containers, cylinders and tanks shall be performed by qualified personnel using equipment and operating procedures in accordance with CGA P-1

Exception: Fueling of vehicles with compressed natural gas (CNG) or compressed hydrogen.

Reason: fueling of hydrogen powered fuel cell vehicles is functionally equivalent to fueling CNG powered cars used by normal licensed private vehicle operators.

The training and expertise required for consumer training of operators of CNG and compressed hydrogen vehicles are quite similar and quite different from what is specified in CGA P-1.

All Compressed Hydrogen or CNG dispensers are required by NFPA-2 (H2) and NFPA-52 (CNG) to have a pressure sensor and automatic shut off valve and the dispenser must conduct an integrity check of the dispenser hose, the vehicle fueling system and the integrity of the nozzle / reprisal connection. The dispenser must perform the integrity check at the beginning of fueling and then at least once during the fueling process. If the dispenser senses any leaks it must terminate the fueling process.

The California Fuel Cell Partnership's 2012 update on FCV deployment plans \ the expectation of government agencies including the Department of Energy, California EPA, California Energy Commission and South Coast Air Quality Management District clearly defines the goals to have an established fleet of at least 50,000 hydrogen powered fuel cell hybrid electric vehicles deployed from 7 automakers* and operating in California sometime between 2015 and 2018.

Without this change local AHJ's might be confused and believe that qualified personnel using equipment and operating procedures in accordance with CGA P-1 are required to fill vehicles that are fueled with compressed hydrogen.

*7 automakers with stated plans to deploy hydrogen powered fuel cell electric vehicles: GM, Honda, Toyota, Nissan, Kai, Hyundai, VW/Audi/Porsche.

A link to "A California Road Map: The Commercialization of Hydrogen Fuel Cell Vehicles"

Is shown below:

[http://cafcp.org/sites/files/A%20California%20Road%20Map%20June%202012%20\(CaFCP%20technical%20version\)_1.pdf](http://cafcp.org/sites/files/A%20California%20Road%20Map%20June%202012%20(CaFCP%20technical%20version)_1.pdf)

Cost Impact: None

F305-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

5305.7-F-BOYD

F306 – 13

5306, 5306.1, 5306.4

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care (john.williams@doh.wa.gov) and Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee (cbaldassarra@RJAGroup.com)

Revise as follows:

SECTION 5306 MEDICAL GASES SYSTEMS

5306.1 General. ~~Compressed~~ Medical gases at healthcare related hospitals and similar facilities intended for patient care, inhalation or sedation including, but not limited to, analgesia systems for dentistry, podiatry, veterinary and similar uses shall comply with Sections 5306.2 through 5306.4 in addition to other requirements of this chapter.

5306.4 Transfilling. Transfilling areas and operations including, but not limited to, ventilation and separation, shall comply with NFPA 99.

(Renumber remaining section.)

Reason: This proposal addresses CMS KTag 143. This KTag is concerned with the transferring or what is often termed transfilling of oxygen in a gaseous or liquid form within hospitals and other medical facilities. The current provisions in the IFC are actually fairly consistent with NFPA 99 and the requirements of the KTags in this respect. The only major differences found were that the IFC requirements do not specifically address transfilling and the type of floor surface allowed. Transfilling is the transfer of oxygen to smaller portable containers from larger storage containers. This can occur in liquid or gaseous state. Currently the provisions only relate to storage. This has been revised by the proposal. The reference to NFPA will provide restrictions on the floor used to concrete or ceramic due to the noncombustible nature of the floors.

This proposal addresses two other issues as follows:

Title 5306. This was changed to delete the term “systems” since transfilling and storage of oxygen is not necessarily part of a system. This will be a more general title which is more applicable to all of Section 5306.

Section 5306.1. The terms hospitals and similar facilities were deleted in favor of a more all encompassing set of terms “Healthcare related facilities.” The current language seems to give priority to hospitals and can be somewhat unclear that it would also apply to ambulatory care facilities and nursing homes.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>

This proposal is being co-sponsored by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as “areas of study”. Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.”

Cost impact: The code change proposal should not increase the cost of construction because compliance is already required by facility licensure requirements.

F306-13

Public Hearing: Committee:
Assembly:

AS
ASF

AM
AMF

D
DF

5306.1-F-BALDASSARRA-WILLIAMS-ADHOC

F307 – 13

5306.2

Proponent: Masoud Sabounchi, Advanced Consulting Engineers Inc., representing self
(masoud@acecode.com)

Revise as follows:

5306.2 Interior supply location. Medical gases shall be stored in areas dedicated to the storage of such gases without other storage or uses. Where containers of medical gases in quantities greater than the permit amount are located inside buildings, they shall be in a 1-hour exterior room, a 1-hour interior room or a gas cabinet in accordance with Section 5306.2.1, 5306.2.2 or 5306.2.3, respectively. Rooms or areas where medical gases are stored or used in quantities exceeding the *maximum allowable quantity per control area* as set forth in Section 5003.1 shall be in accordance with the *International Building Code* for high-hazard Group H occupancies.

Exceptions:

1. In Group I-2 and ambulatory health care occupancies, areas containing medical gas cabinets or medical gas rooms constructed in accordance with Sections 5306.2.1, 5306.2.2 or 5306.2.3, where quantity of the stored oxidizing gases exceeds the maximum allowable quantities shall not be considered Group H.
2. In Group I-2 and ambulatory health care occupancies, oxygen cylinders that are in use shall comply with applicable provisions of NFPA 99.

Reason: This proposal reverts the provisions of 2012 IFC Section 5306.2 to that of 2006 IFC Section 3006.2.1 regarding storage and use of the medical gases in health care occupancies without declaration of the storage/use rooms/areas as hazardous occupancy where quantity of oxidizing gases exceed the maximum allowable quantities (MAQs). This proposal does not change the existing requirements where flammable medical gases are used or stored.

IFC Section 5306 requires 1-hour fire resistance rated interior or exterior medical gas rooms where quantity of medical gases exceeds the permit amount. Per IFC Table 105.6.8 permit amounts of oxidizing gases is 504 cubic feet.

In a 10 story hospital, number of control areas and quantity of oxidizing gases per control area varies based on location of the control areas. Per IBC Table 414.2.2 floors (above grade plane) 4, 5 and 6 may have two control areas and limit quantity of hazardous materials to 12.5% of the MAQs. Quantity of oxidizing gases in each control area on floors 4, 5, and 6 would be limited to 1500×2 (due to sprinkler protection) $\times 12.5/100=375$ cubic feet unless these rooms are considered H-3 Occupancy. This quantity is less than the 504 cubic feet which is the permit quantity. It is not clear if the 504 cubic feet permit limit or the limit of 375 cubic feet would govern the occupancy designation of the medical gas rooms.

If the 375 cubic feet limit is the MAQ, the control area has to be declared an H-3 occupancy. As such, IBC would require 2-hour fire resistance rated separation to enclose the medical gas storage rooms in hospitals and IBC Section 415.5 would require these H-3 occupancy medical gas storage rooms to have 25% of the wall area as exterior walls. Most health care occupancies have oxygen cylinders for patient use-if quantity of in use oxidizing gases exceed 375 cubic feet on floors 4, 5 and 6, the occupancy group of these health care floors would have to be H-3 which clearly is not the intent of the code.

On floors 7 and up quantity of oxidizing gases would be limited to 5% of MAQs or 150 cubic feet without declaration of an H-3 occupancy for the floor or reduction of the in use oxygen to less than 150 cubic feet and introduction of H-3 occupancy rooms for storage of oxidizing gases. This quantity is extremely limiting considering a large hospital floor area. On floor levels above the 9th, only one control area with total quantity of 150 cubic feet oxidizing gases is permitted which mandates creation of H-3 occupancy rooms and would limit total quantity of "in use" oxygen cylinders to 150 cubic feet in the remainder of the floor. Reference to NFPA 99 regarding "in use" quantities noted in exception number two would coordinate IFC provisions with NFPA 99.

Cost Impact: This change will not affect the cost of construction.

F307-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

5306.2-F-SABOUNCHI

F308 – 13

5306.2.1

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care (john.williams@doh.wa.gov) and Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee (cbaldassarra@RJAGroup.com)

Revise as follows:

5306.2.1 One-hour exterior rooms. A 1- hour exterior room shall be a room or enclosure separated from the remainder of the building by fire barriers constructed in accordance with Section 707 of the *International Building Code* or horizontal assemblies constructed in accordance with Section 711 of the *International Building Code*, or both, with a fire- resistance rating of not less than 1- hour. Openings between the room or enclosure and interior spaces shall be self-closing smoke- and draft-control assemblies having a fire protection rating of not less than 1hour. Rooms shall have at least one exterior wall that is provided with at least two non-closable louvered vents. Each vent shall have a minimum free opening area of 24 square inches (155 cm²) for each 1,000 cubic feet (28 m³) at normal temperature and pressure (NTP) of gas stored in the room and shall not be less than ~~36 72~~ square inches (~~0.023 m²~~ 465 cm²) in aggregate free opening area. One vent shall be within 6 inches (152 mm) of the floor and one shall be within 6 inches (152 mm) of the ceiling. Rooms shall be provided with at least one automatic sprinkler to provide container cooling in case of fire.

Reason: The purpose of this proposal is to update Section 5306.2.1 on Medical Gas Systems to clarify and address the differences with the language in NFPA 99-2012, Section 9.3.7.5.2 with which hospitals are required to comply.

This proposed revision requires the vents to be of the non-closable type which is not currently required in the IFC, and to be of a larger size. It further defines the louver opening as “aggregate free opening” as required which is not currently specified in the IFC.

NFPA 99 is the more restrictive and sets the design of the louver to be specifically fixed where the IFC language may result is a “closable” louver which is not the intent of this code section. It also provides clarification on the sizing of the louver as it relates to the amount of gas being stored in the room where the IFC currently does not.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>

This proposal is being co-sponsored by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as “areas of study”. Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public. In 2012, three of the 25 face-to face meetings were held. In addition to the CTC meetings, the CTC established Study Groups (SG) of interested parties for each of the areas of study. These SG’s are responsible for reviewing the available information and making recommendations to the CTC. All totaled, the SG’s held over 70 conference calls in 2012.

Cost impact: The code change proposal should not increase the cost of construction because compliance is already required by facility licensure requirements.

F308-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

5306.2.1-F-BALDASSARRA-WILLIAMS-ADHOC-CTC

F309– 13

5306.4

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care
(john.williams@doh.wa.gov)

Revise as follows:

5306.4 Medical gas systems. Medical gas systems including, but not limited to, distribution piping, supply manifolds, connections, pressure regulators and relief devices and valves, shall be installed in accordance with NFPA 99 and the general provisions of this chapter. Existing medical gas systems shall be maintained in accordance with the maintenance, inspection and testing provisions of NFPA 99 for medical gas systems.

Reason: This proposal clarifies that once medical gas systems are installed in accordance with NFPA 99 that the new construction requirements of NFPA 99 are not intended to be retroactively enforced. Instead the intention is that the systems be maintained in accordance with the maintenance provisions of NFPA 99. This addresses CMS K-Tag K78.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>

Cost impact: The code change proposal should not increase the cost of construction because compliance with the standard is already required by facility licensure requirements.

F309-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

5306.4-F-WILLIAMS-ADHOC

F310 – 13

5307 (New), 908.7 (New), 105.6.4 (New), Table 105.6.8

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Add new text as follows:

SECTION 5307 **CARBON DIOXIDE (CO₂) SYSTEMS USED IN BEVERAGE DISPENSING APPLICATIONS**

5307.1 General. Carbon dioxide systems with 100 or more pounds of carbon dioxide used in beverage dispensing applications shall comply with Sections 5307.2 through 5307.5.2.

5307.2 Permits. Permits shall be required as set forth in Section 105.6.

5307.3 Equipment. The storage, use, and handling of liquid carbon dioxide shall be in accordance with Chapter 53 and the applicable requirements of NFPA 55, Chapter 13.

5307.4 Protection from damage. Carbon dioxide systems shall be installed so the storage tanks, cylinders, piping and fittings are protected from damage by occupants or equipment during normal facility operations.

5307.5 Required protection. Where carbon dioxide storage tanks, cylinders, piping and equipment are located indoors, rooms or areas containing carbon dioxide storage tanks, cylinders, piping and fittings and other areas where a leak of carbon dioxide can collect shall be provided with either ventilation in accordance with Section 5307.5.1 or an emergency alarm system in accordance with Section 5307.5.2.

5307.5.1 Ventilation. Mechanical ventilation shall be in accordance with the *International Mechanical Code* and shall comply with all of the following:

1. Mechanical ventilation in the room or area shall be at a rate of not less than 1 cubic foot per minute per square foot [0.00508 m³/(s • m²)].
2. Exhaust shall be taken from a point within 12 inches (305 mm) of the floor.
3. The ventilation system shall be designed to operate at a negative pressure in relation to the surrounding area.

5307.5.2 Emergency alarm system. An emergency alarm system shall comply with all of the following:

1. Continuous gas detection shall be provided to monitor areas where carbon dioxide can accumulate.
2. The threshold for activation of an alarm shall not exceed 5,000 parts per million (9,000 mg/m³).
3. Activation of the emergency alarm system shall initiate a local alarm at an approved location.

908.7 Carbon dioxide (CO₂) systems. Emergency alarm systems in accordance with Section 5307.5.2 shall be provided where required for compliance with Section 5307.5.

105.6.4 Carbon dioxide systems used in beverage dispensing applications. An operational permit is required for carbon dioxide systems used in beverage dispensing applications with more than 100 pounds of carbon dioxide.

(Renumber subsequent sections.)

Revise as follows:

**TABLE 105.6.8
PERMIT AMOUNTS FOR COMPRESSED GASES**

TYPE OF GAS	AMOUNT (cubic feet at NTP)
Inert and simple asphyxiant ^a	6,000

(Portions of table not shown remain unchanged)

For SI: 1 cubic foot = 0.02832 m³.

a. For carbon dioxide used in beverage dispensing applications, see Section 105.6.4.

Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at:
<http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

This proposal is intended to address fatal CO₂ poisoning incidents in restaurants where CO₂ leaked from large storage tanks and displaced oxygen in these areas. Two such incidents can be found at:

http://articles.orlandosentinel.com/2005-02-12/news/0502120303_1_carbon-dioxide-central-florida-sanford

<http://savannahnow.com/news/2011-09-14/carbon-dioxide-blamed-pooler-mcdonalds-death>

Individual requirements are proposed based on the following:

105.6.4 and Table 105.6.8 – Operational permits are required for CO₂ systems used in the beverage dispensing applications covered by new Section 5307.

5307.1 – The intent of the proposal is to address locations where CO₂ is used in conjunction with carbonators to produce carbonated beverages. A minimum trigger of 100 lbs. was selected for these requirements because it was felt that systems with lesser amounts of CO₂ do not pose as great a risk of asphyxiation as is present with large quantities of the gas.

5307.2 – Provides a reference to permit requirements that is consistent with other such references in the code.

5307.3 - Components in a compressed gas system are already required to comply with Chapter 53 which will cover items such as pressure vessel and piping requirements, among others. An additional reference to NFPA 55, Chapter 13 brings in additional requirements that relate specifically to these installations.

5307.4 - This section includes basic requirements that are intended to protect CO₂ storage tanks, cylinders, piping and fittings are protected from damage by occupants or equipment during normal facility operations. This will decrease the chance of damage that may cause leaks, which is especially important in the facilities in which gas detection systems are not provided.

5307.5 – This section requires buildings in which the CO₂ systems are installed to be provided with either ventilation that complies with Section 5307.5.1 or an emergency alarm system that complies with Section 5307.5.2. It does not require that both ventilation and gas detection be required.

The hazard associated with these systems is that the heavier than air CO₂ may accumulate and displace oxygen, creating an asphyxiation hazard. Leaks are most likely from fittings and connections, but could also be from plastic or other runs of piping.

5307.5.2 – When the emergency alarm system option is selected, it shall include a continuous gas detection system with CO₂ detectors of adequate number and spacing to cover the protected area. The trigger level of 5000 ppm CO₂ is the OSHA Permissible Exposure Limit (PEL).

Cost Impact: This proposal will add to the cost of construction.

F310-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

5307 (NEW)-F-ZUBIA-FCAC

F311 – 13

5501.1, 5503.1.3.1, 5503.2.6, Table 5504.3.1.1

Proponent: Patrick A. McLaughlin McLaughlin & Associates, representing the Compressed Gas Association (pmclaugma@aol.com)

Revise as follows:

5501.1 Scope. Storage, use and handling of *cryogenic fluids* shall comply with this chapter and NFPA 55. *Cryogenic fluids* classified as hazardous materials shall also comply with the general requirements of Chapter 50 for general requirements. Partially full containers containing residual *cryogenic fluids* shall be considered as full for the purposes of the controls required.

Exceptions:

1. Fluids used as refrigerants in refrigeration systems (see Section 606).
2. Liquefied natural gas (LNG), which shall comply with NFPA 59A.

Oxidizing *cryogenic fluids*, including oxygen, shall comply with ~~NFPA 55~~ and Chapter 63, as applicable.

Flammable *cryogenic fluids*, including hydrogen, methane and carbon monoxide, shall comply with ~~NFPA 55~~ and Chapters 23 and 58, as applicable.

Inert *cryogenic fluids*, including argon, helium and nitrogen, shall comply with ANSI/CGA P-18.

5503.1.3.1 Temperature effects. When container foundations or supports are subject to exposure to temperatures below -130°F (-90°C) ~~-450°F (-404°C)~~, the foundations or supports shall be constructed of materials to withstand the low-temperature effects of *cryogenic fluid* spillage.

5503.2.6 Shutoffs between pressure relief devices and containers. Shutoff valves shall not be installed between pressure relief devices and containers.

Exceptions:

1. A shutoff valve is allowed on containers equipped with multiple pressure-relief device installations where the arrangement of the valves provides the full required flow through the minimum number of required relief devices at all times.
2. A locking type shutoff valve, is allowed to be used upstream of the pressure relief device for service-related work performed by the supplier when in accordance with the requirements of the ASME Boiler and Pressure Vessel Code.

**TABLE 5504.3.1.1
SEPARATION OF STATIONARY CONTAINERS FROM
EXPOSURE HAZARDS**

EXPOSURES	MINIMUM DISTANCE (feet)
Building exits	10

(Portions of table not shown remain unchanged)

Reason:

5501.1: The proposal requires compliance to NFPA 55 for all cryogenic fluids and provides the correct title for the already reference P-18. Without the expanded NFPA 55 reference, the scope is inconsistent. It currently requires compliance with NFPA 55 oxidizing and flammable cryogenic fluids. If it is appropriate for these materials it is appropriate for all cryogenic fluids.

- 5503.1.3.1:** A cryogenic fluid is defined as having a boiling point lower than -130 F by the IFC, DOT, OSHA, and internationally. The requirements should apply at that temperature otherwise the foundation or supports of those cryogenic fluids within the range not covered are at risk. . Also, the change brings the IFC into alignment with NFPA 55.
- 5503.2.6:** The proposal brings the IFC into alignment with NFPA 55. The ASME Boiler and Pressure Vessel code allows the use of a locking valve on the upstream side of a pressure relief device in instances where it is impractical to install multiple pressure relief devices and valves, or where having the multiple valves creates more potential safety hazards during maintenance work on the devices. The BPV code has detailed requirements for working on relief devices with the use of upstream valves, including the requirement to lock the valve open when not working on the valve and the requirement to lower pressure vessel pressure before maintenance. The BPV code also requires that personnel monitor vessel pressure during maintenance and have access to an alternate valve other than a pressure relief valve to relieve unexpected pressure rises during maintenance activities. Petrochemical plants and industrial gas plant personnel have used the procedures successfully for many years, as evidenced by the continued allowance of the procedure in the BPV code.

Table

- 5504.3.1.1:** The proposal correlates this Table with IFC Table 5504.3.1.2.1, Separation of Portable Containers from Exposure Hazards and NFPA 55.

Cost Impact: The code change proposal will not increase the cost of construction.

F311-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

5501.1-F-MCLAUGHLIN

F312 – 13

5601.3

Proponents: Glenn A. Dean, Virginia State Fire Marshal's Office (glenn.dean@vdfp.virginia.gov); Adolf Zubia, Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

5601.3 Prohibited explosives. Permits shall not be issued or renewed for possession, manufacture, storage, handling, sale or use of the following materials and such materials currently in storage or use shall be disposed of in an *approved* manner.

1. Liquid nitroglycerin.
2. Dynamite containing more than 60-percent liquid *explosive* ingredient.
3. Dynamite having an unsatisfactory absorbent or one that permits leakage of a liquid *explosive* ingredient under any conditions liable to exist during storage.
4. Nitrocellulose in a dry and uncompressed condition in a quantity greater than 10 pounds (4.54 kg) of net weight in one package.
5. Fulminate of mercury in a dry condition and fulminate of all other metals in any condition except as a component of manufactured articles not hereinafter forbidden.
6. *Explosive* compositions that ignite spontaneously or undergo marked decomposition, rendering the products of their use more hazardous, when subjected for 48 consecutive hours or less to a temperature of 167°F (75°C).
7. New *explosive materials* until *approved* by DOTn, except that permits are allowed to be issued to educational, governmental or industrial laboratories for instructional or research purposes.
8. *Explosive materials* ~~condemned~~ forbidden for transport by DOTn.
9. *Explosive materials* containing an ammonium salt and a chlorate.
10. *Explosives* not packed or marked as required by DOTn 49 CFR Parts 100–185.

Exception: Gelatin dynamite.

Reason - DEAN: The U.S. Department of Transportation (DOTn) does not “condemn” materials. It never has. What DOTn does do, when appropriate, is list explosive products as “forbidden” by any mode of transport. This change is simply to reflect that reality by deleting the antiquated language that has for decades wrongly existed in the model codes, and replace it with specific, enforceable language.

A complete list of materials forbidden to transport by DOTn is available at <http://www.phmsa.dot.gov>.

Reason - ZUBIA: While it does prohibit transporting certain materials on the public highways, the Federal Department of Transportation (DOTn) does not condemn explosives.

Example: Triacetone Triperoxide (TATP)

These materials are already banned or prohibited from transportation by DOT. The DOT prohibition is not affected by the deletion of this outdated language.

Cost Impact: The code change proposal will not increase the cost of construction.

F312-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

5601.3-F-DEAN-ZUBIA-FCAC

F313 – 13

5601.1.3

Proponent: Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee
(cbaldassarra@RJAGroup.com)

Revise as follows:

5601.1.3 Fireworks. The possession, manufacture, storage, sale, handling and use of fireworks are prohibited.

Exceptions:

1. Storage and handling of fireworks as allowed in Section 5604.
2. Manufacture, assembly and testing of fireworks as allowed in Section 5605.
3. The use of fireworks for fireworks displays as allowed in Section 5608.
4. The possession, storage, sale, handling and use of specific types of Division 1.4G fireworks where allowed by applicable laws, ordinances and regulations, provided such fireworks comply with NFPA 1124, CPSC 16 CFR Parts 1500 and 1507, and DOTn 49 CFR Parts 100 – 185, for consumer fireworks.

Reason: Consumer fireworks present an unusually high risk to the public. This is reflected in the general provision of this paragraph – a prohibition of such facilities – although certain exceptions are allowed. Incidents have been documented in a report prepared for the NFPA Fire Protection Research Foundation by Schirmer Engineering Corporation, *Fire Safety in Consumer Fireworks Storage and Retail Facilities – Hazard Assessment, October, 2007*, available from The Research Foundation. The report further identified concerns about the lack of technical documentation for various design criteria, including the lack of a basis for appropriate automatic sprinkler protection design criteria for such facilities.

The current provision in Exception 4 is inadequate to assure that a reasonable level of safety will be provided. Reference to NFPA will provide additional important criteria related to construction, allowable area, egress and protection which is not identified in CPSC 16 CFR, Parts 1500 and 1507, or DOTn 49 CFR, Parts 100 – 185. NFPA has recently undertaken a major review of the consumer fireworks provisions in NFPA 1124 to assure that the provisions are technically sound and provide a reasonable level of safety for this hazard.

Cost Impact: This proposal may have a negative impact on the construction of large consumer fireworks facilities. The exact impact cannot be quantified. Nevertheless, the industry will have options to safely operate its businesses.

F313-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

5601.1.3-F-BALDASSARRA

F314 – 13

5704.2.5

Proponent: Elley Klausbruckner representing Klausbruckner & Associates Inc (ek@klausbruckner.com)

Revise as follows:

5704.2.5 Explosion control. Explosion control shall be provided in accordance with Section 911 for indoor tanks.

Reason: This section is under 5704.2 which is applicable to indoor and outdoor tanks. Explosion control is typically applied for indoor storage and/or use. Explosion control using mechanical ventilation as deflagration prevention or using barricaded construction, is not applicable to outdoor tank storage.

Cost Impact: The code change proposal will not increase the cost of construction.

F314-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

5704.2.5-F-KLAUSBRUCKNER

F315 – 13

5704.2.7.1, 5704.2.11, 5704.2.11.1

Proponent: Bob Eugene, representing UL LLC (Robert.Eugene@ul.com)

Revise as follows:

5704.2.7.1 Materials used in tank construction. The materials used in tank construction shall be in accordance with NFPA 30. The materials of construction for tanks and their appurtenances shall be compatible with the liquids to be stored.

5704.2.11 Underground tanks. Underground storage of flammable and *combustible liquids* in tanks shall comply with Section 5704.2 and Sections 5704.2.11.1 through 5704.2.11.4.2 ~~5704.2.11.5.2~~.

~~**5704.2.11.1 Contents.** Underground tanks shall not contain petroleum products containing mixtures of a nonpetroleum nature, such as ethanol or methanol blends, without evidence of compatibility.~~

(Renumber subsequent sections)

Reason: Combustible and flammable liquid tanks are being used to store an ever increasing number of liquids, including gasoline/ethanol blends and diesel/biodiesels blends. A sentence was added to the general tank storage section requiring the tank materials to be compatible with the stored liquids. This is consistent with NFPA 30, Section 21.4.1.1. With this requirement in place for all tanks, it is no longer necessary to include a similar compatibility requirement for underground tanks in Section 5704.2.11.1.

Cost Impact: None

F315-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

5704.2.7.1-F-EUGENE

F316 – 13

5704.2.7.3.6

Proponent: Lynne M. Kilpatrick, Sunnyvale Department of Public Safety, representing California Fire Chiefs Association (lkilpatrick@sunnyvale.ca.gov)

Delete without substitution:

~~5704.2.7.3.6 Tank venting for tanks and pressure vessels storing Class IB and Class IC liquids.~~

~~Tanks and pressure vessels storing Class IB or Class IC liquids shall be equipped with venting devices which shall be normally closed except when venting under pressure or vacuum conditions, or with listed flame arresters. The vents shall be installed and maintained in accordance with Section 21.4.3 of NFPA 30 or API 2000.~~

Reason: Revisions to Section 5704.2.7.3.2 that were approved during the last code cycle fully address the requirements for venting tanks containing Class IB and IC flammable liquids currently found in Section 5704.2.7.3.6, making this Section redundant.

Cost Impact: The code change proposal will not increase the cost of construction.

F316-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

5704.2.7.3.6-F-KILPATRICK

F317 – 13

5704.2.9.7.3

Proponent: Lynne M. Kilpatrick, Sunnyvale Department of Public Safety, representing California Fire Chiefs Association (lkilpatrick@sunnyvale.ca.gov)

Delete without substitution:

~~5704.2.9.7.3 Flame arresters.~~ ~~Approved flame arresters or pressure breather valves shall be installed in normal vents.~~

Reason: As written, this code section requires that a flame arrester or pressure-vacuum (PV) vent be installed in the normal vent of all protected aboveground tanks (UL 2085) containing flammable or combustible liquids. Because the primary function of a flame arrester is to prevent the unrestricted propagation of flame through flammable gas or vapor mixtures, there is no technical reason to require a flame arrester on tanks containing combustible liquids. Other national standards (i.e. NFPA 30: 21.4.3.9) require the venting devices or flame arresters only on tanks containing Class I flammable liquids. Even the provisions found in Section 5704.2.7.3.2 of this code addressing other tanks whose design and construction provide less protection and control than a protected aboveground tank, only require tanks to be equipped with such venting devices when the tank contains a Class I liquid. Consider the following example of this inconsistency: A diesel generator with an integral UL142 (steel aboveground) tank is not required to be equipped with a flame arrester on the normal vent, but the same diesel generator with an integral UL 2085 tank is required to have a flame arrester.

Approving this code change proposal deletes the special requirement for all protected aboveground tanks to be equipped with a venting device or flame arrester regardless of the tank contents and relies on Section 5704.2.7.3.2 to drive the conditions under which the device is needed. This is consistent with the current code requirement for tanks other than protected aboveground tanks and other national standards and maintains a requirement for all tanks to be equipped with a tank venting device or flame arrester when there is a sound technical reason to provide one.

Cost Impact: The code change proposal will not increase the cost of construction.

F317-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

5704.2.9.7.3-F-KILPATRICK

F318 – 13

5704.3.3.2

Proponent: Elley Klausbruckner representing Klausbruckner & Associates Inc (ek@klausbruckner.com)

Revise as follows:

5704.3.3.2 Incompatible materials. Materials that will react with water or other liquids to produce a hazard shall not be stored in the same room with flammable and *combustible liquids* except where stored in accordance with Section 5003.9.8.

Reason: The code section, as it is currently written, provides conflicting information. Materials that will react with water or other liquids to produce a hazard are allowed in the same room as flammable and combustible liquids when restricted by container size isolated from each other by methods listed in 5003.9.8 (1) through (4) . Therefore the language stating "shall not be stored in the same room" is in conflict with "in accordance with Section 5003.9.8."

We believe the intent is to isolate the two materials to avoid a reaction. The language as it is can be problematic in places such as lab facilities where a storage area using hazardous materials cabinets are used to store small vials of materials.

Cost Impact: The code change proposal will not increase the cost of construction.

F318-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

5704.3.3.2-F-KLAUSBRUCKNER

F319 – 13

Table 5704.3.6.3(7), Table 5704.3.7.5.1, 5704.3.8.5

Proponent: Elley Klausbruckner representing Klausbruckner & Associates Inc (ek@klausbruckner.com)

Revise as follows:

TABLE 5704.3.6.3(7)

AUTOMATIC AFFF WATER PROTECTION REQUIREMENTS FOR RACK STORAGE OF LIQUIDS IN METAL CONTAINERS GREATER THAN 5-GALLON CAPACITY^{a, b}

(No changes to table)

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 square foot = 0.0929 m², 1 pound per square inch = 6.895 kPa, 1 gallon = 3.785 L, 1 gallon per minute = 3.785 L/m, 1 gallon per minute per square foot = 40.75 L/min/m².

- a. System shall be a closed-head wet system with *approved* devices for proportioning aqueous film-forming foam.
- b. Except as modified herein, in-rack sprinklers shall be installed in accordance with NFPA 13.
- c. The height of storage shall not exceed 25 feet.
- d. Hose stream demand includes 1½-inch inside hose connections ~~hand hose~~, when required.

TABLE 5704.3.7.5.1

AUTOMATIC AFFF-WATER PROTECTION REQUIREMENTS FOR SOLID-PILE AND PALLETIZED STORAGE OF LIQUIDS IN METAL CONTAINERS OF 5-GALLON CAPACITY OR LESS^{a, b}

(No changes to table)

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 square foot = 0.0929 m², 1 gallon per minute = 3.785 L/m, 1 gallon per minute per square foot = 40.75 L/min/m², °C. = [(°F)-32]/1.8.

- a. System shall be a closed-head wet system with approved devices for proportioning aqueous film-forming foam.
- b. Maximum ceiling height of 30 feet.
- c. Hose stream demand includes 1½-inch inside hose connections ~~hand hose~~, when required.

5704.3.8.5 Warehouse hose lines. In liquid storage warehouses, either 1½-inch (38 mm) lined or 1-inch (25 mm) hard rubber ~~hand~~ hose lines shall be provided in sufficient number to reach all liquid storage areas and shall be in accordance with Section 903 or Section 905.

Reason: The term “hand hose” is only used in Chapter 57, while the remainder of the IFC uses the term “hose connections.”

Cost Impact: The code change proposal will not increase the cost of construction.

F319-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

5704.6.3T-F-KLAUSBRUCKNER

F320 – 13

5705.5, 5705.5.1

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care (john.williams@doh.wa.gov) and Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee (cbaldassarra@RJAGroup.com)

Revise as follows:

5705.5 Alcohol-based hand rubs classified as Class I or II liquids. The use of wall-mounted dispensers containing alcohol-based hand rubs classified as Class I or II liquids shall be in accordance with all of the following:

1. The maximum capacity of each dispenser shall be 68 ounces (2 L).
2. The minimum separation between dispensers shall be 48 inches (1219 mm).
3. The dispensers shall not be installed ~~directly adjacent to, directly above, or below, or closer than 1 inch to~~ an electrical receptacle, switch, appliance, device or other ignition source. The wall space between the dispenser and the floor or intervening counter top shall be free remain clear and unobstructed of electrical receptacles, switches, appliances, devices, or other ignition sources.
4. Dispensers shall be mounted so that the bottom of the dispenser is a minimum of 42 inches (1067 mm) and a maximum of 48 inches (1219 mm) above the finished floor.
5. Dispensers shall not release their contents except when the dispenser is manually activated. Facilities shall be permitted to install and use automatically activated “touch free” alcohol-based hand-rub dispensing devices with the following requirements:
 - 5.1. The facility or persons responsible for the dispensers shall test the dispensers each time a new refill is installed in accordance with the manufacturer’s care and use instructions.
 - 5.2. Dispensers shall be designed and must operate in a manner that ensures accidental or malicious activations of the dispensing device are minimized. At a minimum, all devices subject to or used in accordance with this section shall have the following safety features:
 - 5.2.1. Any activations of the dispenser shall only occur when an object is placed within 4 inches (98 mm) of the sensing device.
 - 5.2.2. The dispenser shall not dispense more than the amount required for hand hygiene consistent with label instructions as regulated by the United States Food and Drug Administration (USFDA).
 - 5.2.3. An object placed within the activation zone and left in place will cause only one activation.
6. Storage and use of alcohol-based hand rubs shall be in accordance with the applicable provisions of Sections 5704 and 5705.
7. Dispensers installed in occupancies with carpeted floors shall only be allowed in smoke compartments or fire areas equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2.

5705.5.1 Corridor installations. In addition to the provisions of Section 5705.5, W where wall-mounted dispensers containing alcohol-based hand rubs are installed in corridors or rooms and areas open to the corridor, they shall be in accordance with all of the following:

1. Level 2 and 3 aerosol containers shall not be allowed in corridors.
2. The maximum capacity of each Class I or II liquid dispenser shall be 41 ounces (1.21 L) and the maximum capacity of each Level 1 aerosol dispenser shall be 18 ounces (0.51 kg).
3. The maximum quantity allowed in a corridor within a control area shall be 10 gallons (37.85 L) of Class I or II liquids or 1135 ounces (32.2 kg) of Level 1 aerosols, or a combination of Class I or II liquids and Level 1 aerosols not to exceed, in total, the equivalent of 10 gallons (37.85 L) or 1,135 ounces (32.2 kg) such that the sum of the ratios of the liquid and aerosol quantities divided by the allowable quantity of liquids and aerosols, respectively, shall not exceed one.

4. The minimum corridor width shall be 72 inches (1829 mm).
5. Projections into a corridor shall be in accordance with Section 1003.3.3.

Reason: Because ABHR dispensers are often installed above fixed casework countertops, Section 5705.5(3) is being revised to address the practical issue of clearances from the dispenser to ignition sources associated with the countertop installation. Establishing the minimum clearance requirements provides clarity to the fire code official and to designers and facility administrators.

As part of an institution's infection control protocol, many places where ABHR dispensers are installed in healthcare facilities are areas that are open to the corridor as permitted by Section 407 of the *International Building Code*. As such, Section 5705.5.1 is being revised to include such areas.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>

This proposal is being co-sponsored by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/cc/ctc/index.html>. Since its inception in April, 2005, the CTC has held 25 meetings – all open to the public. In 2012, three of the 25 face-to face meetings were held. In addition to the CTC meetings, the CTC established Study Groups (SG) of interested parties for each of the areas of study. These SG's are responsible for reviewing the available information and making recommendations to the CTC. All totaled, the SG's held over 70 conference calls in 2012.

Cost impact: This proposal will not increase the cost of construction.

F320-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

5705.5-F-BALDASSARRA-WILLIAMS-ADHOC-CTC

F321 – 13

5706.5.1.5

Proponent: Elley Klausbruckner representing Klausbruckner & Associates Inc (ek@klausbruckner.com)

Revise as follows:

5706.5.1.5 Spill control and secondary containment. Areas where transfer operations are located shall be provided with spill control and secondary containment in accordance with Section 5703.4. The spill control and secondary containment system in bulk plants, bulk terminals, and refineries shall have a design capacity capable of containing the capacity of the largest tank compartment located in the area where transfer operations are conducted. Containment of the rainfall volume specified in Section 5004.2.2.6 is not required.

Reason: The requirements of spill control above is under 5706, "Special Operation." These requirements are mostly intended for large flammable/combustible liquids bulk tanks, plants and terminals. However since Bulk Transfer is defined as:

***BULK TRANSFER.** The loading or unloading of flammable or combustible liquids from or between tank vehicles, tank cars or storage tanks.*

Since most flammable/combustible liquids storage tanks will need refilling, the requirements of 5706.5.1.5 [as it is written] apply to ALL flammable/combustible liquids storage tanks, not just in bulk terminals and plants. In other words, the design of secondary containment having a design capacity capable of containing the capacity of the largest tank **compartment** would be applied to the largest tank vehicle or tank car compartment filling or fuelling regular tanks on site. This section was clearly intended bulk plants, terminals and refineries.

For example if a single double walled tank for a generator is proposed, Section 5706.5.1.5, as it exists, would still require that a spill control and secondary containment be designed and installed. The containment would have to be designed to contain the largest tank compartment [which can be a tank car, tank vehicle, etc.]. There is no method of verifying what tank vehicle or tank car [i.e. largest compartment on that tank] will be refilling the on-site diesel generator tank. This was clearly intended for bulk plants, bulk terminals and refineries, not for single tanks used on site.

Please also note that overfill protection is required for tanks that do not fall under "Special Operations" in sections 5704.2.7.5.8, 5704.2.8.18, 5704.2.9.5.1, 5704.2.9.7.6, 5704.2.11.4. These overfill protection requirements address the hazards associated with possibly overfilling tanks.

Cost Impact: The code change proposal will not increase the cost of construction.

F321-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

5706.5.1.5-F-KLAUSBRUCKNER

F322 – 13

5706.8 (New), 5706.1

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

5706.8 Liquid Biofuels. Production, processing and storing of liquid biofuels shall comply with all applicable requirements in this chapter. Biofuel dispensing operations shall be in accordance with Chapter 23.

(Renumber subsequent sections)

5706.1 General. This section shall cover the provisions for special operations which include, but are not limited to, storage, use, dispensing, mixing or handling of flammable and *combustible liquids*. The following special operations shall be in accordance with Sections 5701, 5703, 5704 and 5705, except as provided in Section 5706.

1. Storage and dispensing of flammable and *combustible liquids* on farms and sites.
2. Well drilling and operating.
3. Bulk plants or terminals.
4. Bulk transfer and process transfer operations utilizing tank vehicles and tank cars.
5. Tank vehicles and tank vehicle operation.
6. Refineries.
7. Liquid biofuels.
- ~~7~~8. Vapor recovery and vapor-processing systems.

Reason: A growing number of citizens are obtaining used cooking grease and other combustible liquids, to then distill into biodiesel and other liquid biofuels. This proposal provides clear cut requirements for code officials to use to prevent this processing operation from being conducted unless in conformance with the code.

Cost Impact: The code change will not increase the cost of construction.

F322-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

5706.8 (NEW)-F-ZUBIA-FCAC

F323 – 13

5801.1, Chapter 80

Proponent: Robert J Davidson, Davidson Code Concepts, LLC, representing the National Renewable Energy Laboratory (NREL) (rjd@davidsoncodeconcepts.com)

Revise as follows:

5801.1 Scope. The storage and use of flammable gases and flammable cryogenic fluids shall be in accordance with this chapter and NFPA 55. Compressed gases shall also comply with Chapter 53 and cryogenic fluids shall also comply with Chapter 55. Flammable cryogenic fluids shall comply with Section 5806. Hydrogen motor fuel-dispensing stations and repair garages and their associated above-ground hydrogen storage systems shall also be designed , ~~and~~ constructed and maintained in accordance with Chapter 23 and NFPA 2.

Exceptions:

1. Gases used as refrigerants in refrigeration systems (see Section 606).
2. Liquefied petroleum gases and natural gases regulated by Chapter 61.
3. Fuel-gas systems and appliances regulated under the International Fuel Gas Code other than gaseous hydrogen systems and appliances.
4. Pyrophoric gases in accordance with Chapter 64.

Add new standard to Chapter 80 as follows:

NFPA

2-11 Hydrogen Technologies Code 5801.1

Reason: This minor modification to Section 5801.1 clarifies that hydrogen motor fuel dispensing stations and repair garages must be maintained in accordance with Chapter 23 in addition to being design and constructed in accordance with that chapter. Additionally, a reference is added to NFPA 2 to coordinate with previous proposals in this series of changes submitted on behalf of NREL.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, NFPA 2-11, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013.

F323-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

5801.1-F-DAVIDSON

F324 – 13

5803.1.1

Proponent: Robert J Davidson, Davidson Code Concepts, LLC, representing the National Renewable Energy Laboratory (NREL) (rjd@davidsoncodeconcepts.com)

Revise as follows:

5803.1.1 Special limitations for indoor storage and use. Flammable gases shall not be stored or used in Group A, E, I or R occupancies or in offices in Group B occupancies.

Exceptions:

1. Cylinders of nonliquefied compressed gases not exceeding a capacity of 250 cubic feet (7.08 m³) or liquefied gases not exceeding a capacity of 40 pounds (18 kg) each at normal temperature and pressure (NTP) used for maintenance purposes, patient care or operation of equipment.
2. Food service operations in accordance with Section 6103.2.1.7.
3. Hydrogen gas systems located in a hydrogen cutoff room constructed in accordance with Section 421 of the *International Building Code*.

Reason: Starting with the 2003 edition of the I-Codes there were provisions for the use of a "hydrogen cutoff room" as an incidental use for the storage and use of hydrogen. The purpose was to provide rules for the indoor application of new hydrogen fuel technology.

Though language was added to Chapter 23 pointing to the hydrogen cutoff room provisions for indoor fueling operations, no pointer was provided for other uses of the new technology such as the use of hydrogen fuel cells with hydrogen gas cylinders as a fuel supply for clean energy backup power systems.

The use of the hydrogen fuel cell backup power supplies is not Group specific and though Exception 1 currently permits the hydrogen for operation of equipment, the amount permitted, 250 cubic feet, is insufficient for the backup power application.

The new pointer to the use of the hydrogen cutoff room will provide for the safe use of this technology in the Groups currently restricted by Section 5803.1.1 by allowing the application of the hydrogen cutoff rooms which have increased protective measures. The limiting factor would be the MAQ for flammable gas currently specified by the code.

Cost Impact: The code change proposal will not increase the cost of construction.

F324-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

5803.1.1-F-DAVIDSON

F325 – 13

6003.1.4.1

Proponent: Elley Klausbruckner representing Klausbruckner & Associates Inc (ek@klausbruckner.com)

Revise as follows:

6003.1.4.1 Floors. In addition to the requirements set forth in Section 5004.12, floors of storage areas where highly toxic and toxic liquids are stored shall be of liquid-tight construction.

Reason: Liquid tight flooring for storage of highly toxic and toxic solids is illogical. We believe the code section was intended for storage of liquids only.

Cost Impact: The proposal will not increase the cost of construction.

F325-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

6003.1.4.1-F-KLAUSBRUCKNER

F326 – 13

6003.1.5.2, 6003.1.5.3

Proponent: Elley Klausbruckner representing Klausbruckner & Associates Inc (ek@klausbruckner.com)

Revise as follows:

6003.1.5.2 Exhaust ventilation for open systems. Mechanical exhaust ventilation shall be provided for highly toxic and toxic liquids used in *open systems* in accordance with Section 5005.2.1.1.

Exception: Liquids ~~or solids~~ that do not generate highly toxic or toxic fumes, mists or vapors.

6003.1.5.3 Exhaust ventilation for closed systems. Mechanical exhaust ventilation shall be provided for highly toxic and toxic liquids used in *closed systems* in accordance with Section 5005.2.2.1.

Exception: Liquids ~~or solids~~ that do not generate highly toxic or toxic fumes, mists or vapors.

Reason: Editorial Change. The charging statement is specific to highly toxic and toxic liquids. However the exception mentions solids.

Cost Impact: The proposal will not increase the cost of construction.

F326-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

6003.1.5.2-F-KLAUSBRUCKNER

F327 – 13

Table 6104.3

Proponent: Bruce Swiecicki representing National Propane Gas Association (bswiecicki@npga.org)

Revise as follows:

**TABLE 6104.3
LOCATION OF LP-GAS CONTAINERS**

LP-GAS CONTAINER CAPACITY (water gallons)	MINIMUM SEPARATION BETWEEN LP-GAS CONTAINERS AND BUILDINGS, PUBLIC WAYS OR LOT LINES OF ADJOINING PROPERTY THAT CAN BE BUILT UPON		MINIMUM SEPARATION BETWEEN LP-GAS CONTAINERS ^{b, c} (feet)
	Mounded or underground LP-gas containers ^a (feet)	Above-ground LP-gas containers ^b (feet)	

(Portions of table not shown remain unchanged)

Reason: The definition in the International Fire Code of “public way” is:

“A street, alley or other parcel of land open to the outside air leading to a street, that has been deeded, dedicated or otherwise permanently appropriated to the public for public use and which has a clear width and height of not less than 10 feet.”

The Commentary to the IFC elaborates by saying:

“The Public way marks the termination of the exit discharge portion of the means of egress system. It is the final destination for occupants, and is presumed to be safe from the emergency occurring in the structure or that it will directly connect to other routes so that occupants can move a distance away from the danger.”

Based on the history of the term “public way,” the chief concern is being able to egress the occupants of a building in a manner that allows them to have access to a safe space outside the building. The presumption is that an emergency has occurred inside the building and the occupants must egress the building safely.

The restriction on the placement of a propane container with respect to a public way is not consistent with the purpose for establishing a public way because the threat to the occupants does not come from the propane container. The container is required to be located a specific distance from the building based on its size and therefore, the container will not be threatened by a fire event that occurs within the building. It has been shown that the distances required by Table 6104.3 are sufficient to maintain the safety of the container even if the building is on fire. Therefore, there is no threat to the occupants from the propane container as they egress the building. In addition, the potential concern of vehicular impact to the propane container is already addressed in Section 312 of the IFC.

Chapter 61 refers to NFPA 58 as a standard that “fills in the gaps” that may not be addressed in Chapter 61. In this case, NFPA 58 has a restriction (Table 6.5.3) on the location of product transfers with respect to public ways and places of public assembly. Transfers of propane into or out of the container are prohibited within 10 feet of a public way and within 50 feet of outdoor places of public assembly. Therefore, the threat to the general public during product transfer operations is addressed by NFPA 58.

The limitation in the IFC on the placement of containers with respect to public ways creates a conflict between Section 6104.3 with Table 6104.3 in the IFC and Section 6.3.1 with Table 6.3.1 in NFPA 58. This conflict has led to differing interpretations by various authorities having jurisdiction and we propose to delete the term “public ways” to resolve the conflict.

In summary, elimination of the term “public way” will not compromise the safety of the occupants of the building and will resolve a conflict between the IFC and NFPA 58.

Cost Impact: This proposal will not increase the cost of construction.

F327-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

6104.3-F-SWIECICKI

F328 – 13

Table 6104.3

Proponent: Bruce Swiecicki representing National Propane Gas Association (bswiecicki@npga.org)

Revise as follows:

**TABLE 6104.3
LOCATION OF LP-GAS CONTAINERS**

LP-GAS CONTAINER CAPACITY (water gallons)	MINIMUM SEPARATION BETWEEN LP-GAS CONTAINERS AND BUILDINGS, PUBLIC WAYS OR LOT LINES OF ADJOINING PROPERTY THAT CAN BE BUILT UPON		MINIMUM SEPARATION BETWEEN LP-GAS CONTAINERS ^{b, c} (feet)
	Mounded or underground LP-gas containers ^a (feet)	Above-ground LP-gas containers ^b (feet)	
Less than 125 ^{c, d}	10	5 e	None
501 to 2,000	10	25 e, f	3

(Portions of table not shown remain unchanged)

a through d (No changes to current text)

e. The following shall apply to above-ground containers installed alongside buildings:

1. LP-gas containers of less than a 125-gallon water capacity are allowed next to the building they serve and with no separation from a property line when in compliance with Items 2, 3 and 4.
2. Department of Transportation (DOTn) specification LP-gas containers shall be located and installed so that the discharge from the container pressure relief device is at least 3 feet horizontally from building openings below the level of such discharge and shall not be beneath buildings unless the space is well ventilated to the outside and is not enclosed for more than 50 percent of its perimeter. The discharge from LP-gas container pressure relief devices shall be located not less than 5 feet from exterior sources of ignition, openings into direct-vent (sealed combustion system) appliances or mechanical ventilation air intakes.
3. ASME LP-gas containers of less than a 125-gallon water capacity shall be located and installed such that the discharge from pressure relief devices shall not terminate in or beneath buildings and shall be located at least 5 feet horizontally from building openings below the level of such discharge and not less than 5 feet from exterior sources of ignition, openings into direct vent (sealed combustion system) appliances, or mechanical ventilation air intakes.
4. The filling connection and the vent from liquid-level gauges on either DOTn or ASME LP-gas containers filled at the point of installation shall not be less than 10 feet from exterior sources of ignition, openings into direct vent (sealed combustion system) appliances or mechanical ventilation air intakes.

f. *(No changes to current text)*

Reason: This proposal will bring the IFC into closer correlation with NFPA 58 regarding the installation of small containers next to buildings. There is no technical basis for permitting the installation of a small container next to a building and still mandating a separation distance from a lot line, as Note e to Table 6104.3 may currently be interpreted to require. ICC staff previously responded to a request for interpretation and agrees that an installation in which a small container is located next to a building does not constitute a violation if the property line is within 5 feet of the container.

The other change would strike the reference to Note e in the cell for 501-2000 gallon above-ground containers. Since Note e is only applicable to containers less than 125 gallons, there is no need to reference it in that cell.

Cost Impact: This proposal will not increase the cost of construction.

F328-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

6104.3T #1-F-SWIECICKI

F329 – 13

6105.2

Proponent: Bruce Swiecicki representing National Propane Gas Association. (bswiecicki@npga.org)

Revise as follows:

6105.2 Release to the atmosphere. LP-gas shall not be released to the atmosphere, except in accordance with Section 7.3 of NFPA 58. ~~through an approved liquid level gauge or other approved device.~~

Reason: Currently, the IFC permits LP-gas to be released to the atmosphere only while the container is being filled, through the fixed maximum liquid level gauge. However, there are many other situations that require the release of LP-gas under controlled conditions. Referencing Section 7.3 of NFPA 58 will accomplish the intent of this proposal by recognizing all the different circumstances that necessitate the release of gas to the atmosphere, including the following:

- The release of gas when the filling hose is disconnected from the filler valve on the container.
- The release of gas necessary to make cylinders and other containers safe prior to being serviced.
- The release of gas that may be necessary in order to properly purge a container of air to make it safe for filling.

These are a few of the common occurrences in the propane industry that necessitate the release of LP-gas to the atmosphere.

Cost Impact: This proposal will not increase the cost of construction.

F329-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

6105.2-F-SWIECICKI

F330 – 13

6106.2

Proponent: Bruce Swiecicki representing National Propane Gas Association (bswiecicki@npga.org)

Revise as follows:

6106.2 Overfilling. LP-gas containers shall not be filled or maintained with LP-gas in excess of either the volume determined using the fixed maximum liquid-level gauge ~~installed by the manufacturer~~ installed in accordance with the manufacturer's specifications and in accordance with Section 5.7.5 of NFPA 58, or the weight determined by the required percentage of the water capacity marked on the container. Portable LP-gas containers shall not be refilled unless equipped with an overfilling prevention device (OPD) where required by Section 5.7.3 of NFPA 58.

Reason: This paragraph requires usage of manufacturer installed liquid level gauge to fill a container. It is common practice in the industry to field repair and replace valves and gauges on both ASME tanks and DOT cylinders as needed.

The liquid level gauge is generally an integral part of the service valve which is used to turn the tank on and off. Service valves have rubber or plastic o-rings that can start to leak over time. When a service valve becomes faulty, a new valve is installed with a liquid level gauge tube of exactly the same length. In addition, OPD systems on DOT cylinders may also require periodic replacement. The propane industry has procedures and training to successfully perform these replacements and repair.

The current code text eliminates the ability to service and repair propane containers in the field. The proposed rewrite would correct this and acknowledge that the service and repair of propane containers in the field does take place. NFPA 5.7.5 "Liquid Level Gauging Device" covers the requirements for proper installation and the use of liquid level gauges.

Cost Impact: This proposal will not increase the cost of construction.

F330-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

6106.2-F-SWIECICKI

F331 – 13

6107.4, 6109.13

Proponent: Jeffrey M. Shapiro, International Institute of Ammonia Refrigeration
(jeff.shapiro@intlcodeconsultants.com)

Revise as follows:

6107.4 Protecting containers from vehicles. Where exposed to vehicular damage due to proximity to alleys, driveways or parking areas, LP-gas containers, regulators and piping shall be protected in accordance with NFPA 58, Section 342.

6109.13 Protection of containers. LP-gas containers shall be stored within a suitable enclosure or otherwise protected against tampering. Vehicular protection shall be provided as required by Section 6107.4, the fire code official.

Reason: Sections 6107.4 and 6109.13 both require vehicle impact protection for LP-gas containers, but the requirements are not consistent between the two sections. Furthermore, Section 6109.13 provides no guidance on when protection is necessary or what type of protection should be provided. The proposed revisions correlate the two sections and provide a reference to NFPA 58 for design requirements that are specific to LP-gas equipment. Because NFPA 58 is specific to LP-gas and it contains requirements for vehicle impact protection, as well as annex guidance on how to accomplish such protection, it makes sense for Chapter 61 to reference NFPA 58 for this topic, as it does for various other LP gas topics, to avoid conflicts between the code and the reference standard.

Cost Impact: The code change proposal will not increase the cost of construction.

F331-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

6107.4-F-SHAPIO

F332 – 13

6110.1, 6110.2

Proponent: Bruce Swiecicki representing National Propane Gas Association (bswiecicki@npga.org)

Revise as follows:

6110.1 ~~Temporarily out of service~~ Containers disconnected from service at consumer sites. LP-gas containers ~~disconnected from service whose use has been temporarily discontinued at consumer sites~~ shall comply with all of the following:

- ~~1. Be disconnected from appliance piping.~~
- ~~21. Have The~~ LP-gas container outlets, except pressure relief valves, shall be closed or and plugged or capped.
- ~~32. Be The container shall be~~ positioned with the pressure relief valve in direct communication with the LP-gas container vapor space.

6110.2 ~~Permanently out of service~~ Retrieval of disconnected containers. ~~LP-gas containers to be placed permanently out of service shall be removed from the site.~~ LP-gas containers that have been disconnected from service shall be retrieved by the owner.

Reason: As currently worded, the text in Section 6110 is confusing and difficult to implement. A reading of the 2012 Commentary indicates that the concern is over LP-gas containers that have been disconnected from service due to a customer's request, usually because the customer wants to switch suppliers. The text proposed above will clarify in concise terms what needs to be done in order to avoid the release of gas from a container that has been disconnected from service. The proposal accomplishes the following:

- The changed titles clarify the intent of these sections.
- The deletion of current #1 occurs because the first sentence of the paragraph establishes that the container has already been disconnected from the piping system.
- Changing "outlets" to "appurtenances" is more accurate since not every valve on a container is an "outlet." Container appurtenances are defined in NFPA 58 as "devices installed in container openings for safety, control or operating purposes."
- It is necessary not only to close the valve, but also to plug or cap it.

Current 6110.2 was reworded slightly to establish the responsibility lies with the container owner by recognizing that although the majority of propane tanks are owned by the propane marketer, some are owned by the property owner and therefore the marketer has no control over them.

Cost Impact: This proposal will not increase the cost of construction.

F332-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

6110.1-F-SWIECICKI

F333 – 13

6111.2, 6111.2.1, 6111.2.2

Proponent: Bruce Swiecicki representing National Propane Gas Association (bswiecicki@npga.org)

Revise as follows:

6111.2 Unattended parking. The unattended parking of LP-Gas cargo tank vehicles not in service shall be in accordance with ~~Sections 6111.2.1 and 6111.2.2~~ one of the following:

1. Vehicles shall be parked within a LP-Gas Bulk Plant.
2. Vehicles shall be parked off of public streets, highways, public avenues or public alleys.
3. Vehicles shall be parked at other *approved* locations not less than 50 feet (15. 240 m) from buildings, other than those *approved* for the storage or servicing of such vehicles.

~~**6111.2.1 Near residential, educational and institutional occupancies and other high-risk areas.** LP-gas tank vehicles shall not be left unattended at any time on residential streets or within 500 foot (152 m) of a residential area, apartment or hotel complex, educational facility, hospital or care facility. Tank vehicles shall not be left unattended at any other place that would, in the opinion of the *fire code official*, pose an extreme life hazard.~~

~~**6111.2.2 Durations exceeding 1 hour.** LP-gas tank vehicles parked at any one point for longer than 1 hour shall be located as follows:~~

- ~~1. Off public streets, highways, public avenues or public alleys.~~
- ~~2. Inside of a bulk plant.~~
- ~~3. At other *approved* locations not less than 50 feet (15-240 mm) from buildings other than those *approved* for the storage or servicing of such vehicles.~~

Reason: LP-gas tank vehicles are more commonly referred to as “cargo tank vehicles” and they are under the jurisdiction of the U.S. Department of Transportation, Title 49 of the Code of Federal Regulations. The transportation of hazardous materials (propane is classified as a flammable gas, Division 2.1) is regulated by the Hazardous Materials Regulations (Parts 171-185) and the Federal Motor Carrier Safety Regulations (Parts 350-399).

The current text in 6111.2 addresses “unattended” parking, in which the operator of the vehicle is not present and able to react to an emergency situation by either driving the vehicle or controlling the flow of product into or out of the cargo tank. A vehicle that is parked for the purpose of transferring product into or out of the cargo tank would not be considered to be “unattended” because paragraph 177.834 (i) requires the operator to be in attendance during the product transfer operation. Therefore, the requirements in 6111.2 would not be applicable whenever the cargo tank vehicle was being loaded or unloaded.

The requirements in 6111.2.1 address unattended parking with respect to certain occupancies and other locations that are termed “high-risk” areas. This paragraph is not needed in the code because it imposes requirements that are unwarranted and contradictory as compliance with 6111.2.1 and 6111.2.2 is muddled, i.e., it is not uncommon for LP-gas bulk plants to be located within 500 feet of the occupancies and locations that are mentioned in 6111.2.1. Therefore, the parking of cargo tank vehicles *even within the confines of the bulk plant could constitute a violation*.

Furthermore, the requirements from 49 CFR Part 397.7(b) makes no mention of the occupancies or locations described in 6111.2.1:

§ 397.7 Parking

(b) A motor vehicle which contains hazardous materials other than Division 1.1, 1.2, or 1.3 materials must not be parked on or within five feet of the traveled portion of public street or highway except for brief periods when the necessities of operation require the vehicle to be parked and make it impracticable to park the vehicle in any other place.

The requirements in current paragraph 6111.2.2 are reasonable and do not impose an undue burden on operators of LP-gas cargo tank vehicles. Those requirements are more consistent (but not identical) with those in paragraph 9.7.2 of NFPA 58. Therefore, this wording is retained in 6111.2.

The 50-foot separation distance has been shown to be a valid separation distance to protect the cargo tank from exposure to nearby fires. The 50-foot separation is required for stationary containers greater than 2,000 gallons water capacity and has been justified by numerical modeling of steel containers exposed to fire. The research paper, (*Journal of Hazardous Materials*, April 2006) analyzed steel propane containers of the sizes referred to in Table 6104.3 that were exposed to a severe petroleum pool fire 100 feet in diameter. The modeling indicated that the temperatures of the container walls were well below the temperature at which steel begins to yield. Since all LPG cargo tank motor vehicles are less than 30,000 gallons water capacity, the fifty foot separation distance is justified.

Cost Impact: This proposal will not increase the cost of construction.

F333-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

6111.2-F-SWIECICKI

F334 – 13

6303.1.1.2, 6303.2, 6304.1, 6304.2.1

Proponent: Patrick A. McLaughlin McLaughlin & Associates, representing the Lonza Group and PPG Industries, Inc.(pmclaugma@aol.com)

Revise as follows:

6303.1.1.2 Class 3 liquid and solid oxidizers. A maximum of 200 pounds (91 kg) of solid or 20 gallons (76 L) of liquid Class 3 oxidizer is allowed in ~~Group I occupancies storage and use~~ when such materials are necessary for maintenance purposes or operation of equipment. The oxidizers shall be stored in *approved* containers and in an *approved* manner.

~~**6303.2 Quantities exceeding the maximum allowable quantity per control area.** The storage and use of oxidizing materials in amounts exceeding the *maximum allowable quantity per control area* indicated in Section 5003.1 shall be in accordance with Chapter 50 and this chapter.~~

6303.2 Class 1 oxidizer storage configuration. The storage configuration of Class I liquid and solid oxidizers shall be as set forth in Table 6303.2

~~**6304.2.1 Distance from storage to exposures for liquid and solid oxidizers.** Outdoor storage areas for liquid and solid oxidizers shall be located in accordance with Table 6304.1.2.~~

6304.1 Indoor storage. Indoor storage of oxidizing materials in amounts exceeding the *maximum allowable quantity per control area* indicated in Table 5003.1.1(1) shall be in accordance with Sections 5001, 5003 and 5004 and this chapter.

~~**6304.1.1 Detached storage.** Storage of liquid and solid oxidizers shall be in detached buildings when required by Section 5003.8.2.~~

~~**6304.1.2 Distance from detached storage buildings to exposures.** In addition to the requirements of the *International Building Code*, detached storage buildings shall be located in accordance with Table 6304.1.2.~~

~~TABLE 6304.1.2 OXIDIZER LIQUIDS AND SOLIDS-DISTANCE FORM DETACHED BUILDINGS AND OUTDOOR STORAGE AREAS TO EXPOSURES~~

~~**6304.1.3 6304.1.1 Explosion control.** Indoor storage rooms, areas and buildings containing Class 4 liquid or solid oxidizers shall be provided with explosion control in accordance with Section 911.~~

~~**6304.1.4 6304.1.2 Automatic sprinkler system.** The *automatic sprinkler system* for oxidizer storage shall be designed in accordance with NFPA 430 400.~~

~~**6304.1.5 6304.1.3 Liquid-tight floor.** In addition to Section 5004.12, floors of storage areas for liquid and solid oxidizers shall be of liquid-tight construction.~~

~~**6304.1.6 6304.1.4 Smoke detection.** An *approved* supervised smoke detection system in accordance with Section 907 shall be installed in liquid and solid oxidizer storage areas. Activation of the smoke detection system shall sound a local alarm.~~

Exception: Detached storage buildings protected by an *approved* automatic fire-extinguishing system.

~~6304.1.7~~ 6304.1.5 Storage conditions. The maximum quantity of oxidizers per building in ~~detached~~ storage buildings shall not exceed those quantities set forth in Tables 6304.1.7 ~~5(1)~~ through 6304.1.7 ~~5(4 3)~~. The storage configuration for liquid and solid oxidizers shall be as set forth in Tables 6304.1.7 ~~5(1)~~ through 6304.1.7 ~~5(4 3)~~. Class 2 oxidizers shall not be stored in *basements* except when such storage is in stationary tanks. Class 3 and 4 oxidizers in amounts exceeding the *maximum allowable quantity per control area* set forth in Section 5003.1 shall be stored on the ground floor only.

~~6304.1.8~~ 6304.1.6 Separation of Class 4 oxidizers from other materials. In addition to the requirements in Section 5003.9.8, Class 4 oxidizer liquids and solids shall be separated from other hazardous materials by not less than a 1- hour *fire barrier* or stored in hazardous materials storage cabinets. ~~Detached storage buildings for Class 4 oxidizer liquids and solids shall be located a minimum of 50 feet (15 240 mm) from other hazardous materials storage.~~

~~6304.1.9~~ 6304.1.7 Contamination. Liquid and solid oxidizers shall not be stored on or against combustible surfaces. Liquid and solid oxidizers shall be stored in a manner to prevent contamination.

~~6304.1.4~~ 6304.1.8 Detached storage. Storage of liquid and solid oxidizers shall be in detached buildings when required by Section 5003.8.2. *(moved from Section 6304.1.1)*

6304.1.8.1 Separation Distance. Detached storage buildings for Class 4 oxidizer liquids and solids shall be located a minimum of 50 feet (15 240 mm) from other hazardous materials storage.

Table ~~6304.1.7(1)~~ 6303.2
STORAGE OF CLASS 1 OXIDIZER LIQUIDS AND SOLIDS IN COMBUSTIBLE CONTAINERS^a

STORAGE CONFIGURATION	LIMITS (feet)
Piles	
Maximum length	No Limit
Maximum width	50 <u>24 (7.3 m)</u>
Maximum height	20 (6.1 m)
Maximum distance to aisle	<u>12 (3.7 m)</u>
Minimum distance to next pile ^b	3 <u>4 (1.2 m)</u>
Minimum distance to walls ^c	2 (0.6 m)
Maximum quantity per pile	No Limit <u>200 tons (181 met ton)</u>
Maximum quantity per building	No Limit

a. Storage in noncombustible containers or in bulk in detached storage buildings is not limited as to quantity or arrangement.

b. The minimum aisle width shall be equal to the pile height, but not less than 4 (1.2m) ft. and not greater than 8 (2.4m) ft.

c. There shall be no minimum distance from the pile to a wall for amounts less than 9000 lb. (4082 kg).

Table 6304.1.7 (2) 6304.1.5(1)
STORAGE OF CLASS 2 OXIDIZER LIQUIDS AND SOLIDS ^{d a, b}

STORAGE CONFIGURATION	<u>Segregated storage</u> <u>Control Area Storage</u>	LIMITS <u>Cutoff storage rooms^e</u> <u>Group H Occupancy Storage</u>	<u>Detached building</u> <u>Storage</u>
Piles Maximum width Maximum height <u>Maximum distance to aisle</u> Minimum distance to next pile Minimum distance to walls	16 feet (4.9 m) 40 feet <u>Note a</u> <u>8 feet (2.4 m)</u> Note d <u>b</u> 2 feet (0.6 m)	25 feet (7.6 m) 42 feet <u>Note a</u> <u>12 feet (3.7)</u> Note d <u>b</u> 2 feet ^c (0.6 m)	25 feet (7.6 m) 42 feet <u>Note a</u> <u>12 feet (3.7)</u> Note d <u>b</u> 2 feet ^c (0.6 m)
Maximum quantity per pile	20 tons <u>MAQ</u>	50 <u>100</u> tons (91 met ton)	200 tons (181 met tons)
Maximum quantity per building	200 tons <u>MAQ</u>	500 <u>2000</u> tons (907 met tons)	No Limit

For SI: 1 foot = 304.8 mm, 1 ton = 0.907185 metric ton.

- a. ~~Storage in noncombustible containers is not limited as to quantity or arrangement, except that piles shall be at least 2 feet from walls in sprinklered buildings and 4 feet from walls in nonsprinklered buildings.~~
- b. ~~Quantity limits shall be reduced by 50 percent in buildings or portions of buildings used for retail sales.~~
- c. ~~Cutoff storage rooms shall be separated from the remainder of the building by 2-hour fire barriers.~~
- d a. Maximum storage height in non sprinklered buildings is limited to 6 ft. (1.8 m). In sprinklered buildings see NFPA 400 for storage heights based on ceiling sprinkler protection.
- b. ~~The minimum aisle width shall be equal to the pile height, but not less than 4 ft. (1.2m) and not greater than 8 ft. (2.4m). Aisle width shall not be less than the pile height.~~
- c. ~~For Protection Level and Detached Storage under 4500 lb (2041 kg), there shall be no minimum separation distance between the pile and any wall.~~

Table 6304.1.7(3) 6304.1.5(2)
STORAGE OF CLASS 3 OXIDIZER LIQUIDS AND SOLIDS ^a

STORAGE CONFIGURATION	<u>Segregated storage</u> <u>Control Area Storage</u>	LIMITS <u>Cutoff storage rooms^e</u> <u>Group H Occupancy Storage</u>	<u>Detached building</u> <u>Storage</u>
Piles Maximum width Maximum height <u>Maximum distance to aisle</u> Minimum distance to next pile Minimum distance to walls	12 feet 8 feet <u>Note a</u> <u>8 feet (2.4 m)</u> Note d <u>b</u> 4 feet	16 feet 40 feet <u>Note a</u> <u>10 feet (3 m)</u> Note d <u>b</u> 4 feet ^c	20 feet 40 feet <u>Note a</u> <u>10 feet (3 m)</u> Note d <u>b</u> 4 feet ^c
Maximum quantity per pile	20 tons <u>NA</u>	30 tons	150 100 tons
Maximum quantity per building	400 tons <u>MAQ</u>	500 <u>1200</u> tons	No Limit

For SI: 1 foot = 304.8 mm, 1 ton = 0.907185 metric ton.

- a. ~~Storage in noncombustible containers is not limited as to quantity or arrangement, except that piles shall be at least 2 feet from walls in sprinklered buildings and 4 feet from walls in nonsprinklered buildings.~~
- b. ~~Quantity limits shall be reduced by 50 percent in buildings or portions of buildings used for retail sales.~~
- c. ~~Cutoff storage rooms shall be separated from the remainder of the building by 2-hour fire barriers.~~
- a. Maximum storage height in non sprinklered buildings is limited to 6 feet. In sprinklered buildings see NFPA 400 for storage heights based on ceiling sprinkler protection.

- d b. The minimum aisle width shall be equal to the pile height, but not less than 4 (1.2m) ft. and not greater than 8 (2.4m) ft. Aisle width shall not be less than the pile height.
- c. For Protection Level and Detached Storage under 2300 lb (1043 kg), there shall be no minimum separation distance between the pile and any wall.

Table ~~6304.1.7(4)~~ 6304.1.5(3)
STORAGE OF CLASS 4 OXIDIZER LIQUIDS AND SOLIDS

(Portions of table not shown remain unchanged)

Add new standard to Chapter 80 as follows:

NFPA

400-10 Hazardous Materials Code

Reason: The Chapter 63 provisions on liquid and solid oxidizers were originally extracted from NFPA 430. As a result, Chapter 63 contains terminology that does not exist in the IFC, and creates conflicts and confusion. Furthermore, NFPA developed a new standard on hazardous materials, NFPA 400, using the UFC as the base and NFPA 430 requirements were moved into it, and updated to incorporate the terminology of the IFC relating to hazardous material, and, subsequently, NFPA 430 was withdrawn. However, the IFC was not updated to reflect the new NFPA requirements, nor the current IFC hazardous material requirements. This code change updates Chapter 63 so that it now parallels the terminology of the hazardous materials provisions in the IFC.

6303.1.1.2 - This section, as written, could lead the user to believe that 200 pounds are not allowed in other occupancies because they are not mentioned. However IFC Table 5003.1.1(1) footnote k allows 200 pounds for these purposes in all occupancies. The result of the change would be to provide clarity. Group I occupancies would not be impacted as the section would continue to apply to them.

6303.2 - Class 1 oxidizer storage configuration limits are currently referenced in Section 6304.1.7 which only applies to oxidizers in excess of the maximum allowable quantity. Since there is no maximum allowable quantity for sprinklered Class 1 oxidizers, the reference is added here and the tables renumbered. The current Section is deleted because it is redundant.

6304.1.2 - This section which applies to detached oxidizer storage distances, conflicts with IBC Sections 415.5.1.2 and 415.5.1.3 so it is deleted. Also, the Class 4 oxidizer distances were extracted from NFPA 430 where they apply only to distances of tanks from buildings and not liquid and solid oxidizer from exposures as the current table indicates.

6304.1.4 - The reference to NFPA 430 is changed to NFPA 400 because NFPA 430 no longer exists. The automatic fire sprinkler requirements for oxidizer storage have been moved to Chapter 15 of NFPA 400. The Standard is available to read at: <http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=400>.

6304.1 - The material is reorganized by moving the detached building requirement to the end for clarity. Also, 6304.1.2 which applies to detached oxidizer storage conflicts with IBC Sections 415.5.1.2 and 415.5.1.3. The Class 4 oxidizer distances, which are deleted, were from NFPA 430 where they applied only to distances of tanks from buildings and not liquid and solid oxidizer from exposures as the current table indicates. Lastly, the newly renumbered Section 6304.1.5 is amended to clarify that it applies to all storage of liquid and solid oxidizers, not just detached building storage.

Tables 6304.1.7(1), 6304.1.7(2) and 6304.1.7(3) These tables were amended in NFPA 400 to make them consistent with the International Fire Code terminology, to replace "segregated storage" with "control area storage" and "cutoff storage rooms" with "protection level storage". The quantity allowances were also modified to reflect those found in the IFC for those storage areas. Finally, the Tables were renumbered to reflect the relocation of the Class 1 Table to the general requirements section and the relocation of the charging paragraph.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, NFPA 400-10, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013.

F334-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

6303.1.1.2-F-MCLAUGHLIN

F335 – 13

6303.1.1.2

Proponent: Kirk Mitchell, Kirk Mitchell & Associates, LLL, representing Isocyanurates Industry Ad Hoc Committee (IIAHC) (pkmitchell@bellsouth.net)

Revise as follows:

6303.1.1.2 Class 3 liquid and solid oxidizers. A maximum of 200 pounds (91 kg) of solid or 20 gallons (76 L) of liquid Class 3 oxidizers is allowed in Group A,B, E, I and R occupancies when such materials are necessary for maintenance purposes or operation of equipment. The oxidizers shall be stored in *approved* containers and in an *approved* manner.

Reason: The current language contained in 2012 IFC infers that the storage allowance is extended to Group I (Institutional) group settings. What about the other settings (e.g., Group A – Assembly, Group B – Business, etc.? These other assemblies have the same potential “*maintenance*” and/or “*operational*” needs as the Group I occupancies.

Cost Impact: No anticipated or projected cost impact with this proposal.

F335-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

6303.1.1.2-F-MITCHELL

F336 – 13

6304.1.4, Chapter 80

Proponent: Kirk Mitchell, Kirk Mitchell & Associates, LLL, representing Isocyanurates Industry Ad Hoc Committee (IIAHC) (pkmitchell@bellsouth.net)

Revise as follows:

6304.1.4 Automatic Sprinkler System. The automatic sprinkler system shall be designed in accordance with NFPA 430 400.

Add new standard to Chapter 80 as follows:

NFPA

400-13 Hazardous Materials Code

Reason: Correlation with correct NFPA code. NFPA 430 has been discontinued and its content incorporated into NFPA 400 Hazardous Materials Code.

Cost impact: None given

Analysis: A review of the standard proposed for inclusion in the code, NFAP 400-13, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013.

F336-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

6304.1.4 #1-F-MITCHELL

F337 – 13

Appendix C101, C102, C103, C104, C105

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

APPENDIX C FIRE HYDRANT LOCATIONS AND DISTRIBUTION

The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.

SECTION C101 GENERAL

C101.1 Scope. In addition to the requirements of Section 507.5.1 of the *International Fire Code*, fire hydrants shall be provided in accordance with this appendix for the protection of buildings, or portions of buildings, hereafter constructed or moved into the jurisdiction.

~~C102~~ ~~LOCATION~~

~~**C102.1 Location.** Fire hydrants shall be provided along required fire apparatus access roads and adjacent public streets.~~

~~C102 C103~~ ~~NUMBER OF FIRE HYDRANTS~~

~~**C102.1 C103.1 Minimum number of fire hydrants for a building available.** The minimum number of fire hydrants available to a building shall not be less than the minimum specified that listed in Table C102.1 C105.1.~~

~~The number of fire hydrants available to a complex or subdivision shall not be less than that determined by spacing requirements listed in Table C105.1 when applied to fire apparatus access roads and perimeter public streets from which fire operations could be conducted~~

SECTION C104 CONSIDERATION OF EXISTING FIRE HYDRANTS

~~**C104.1 Existing fire hydrants.** Existing fire hydrants on public streets are allowed to be considered as available. Existing fire hydrants on adjacent properties shall not be considered available unless fire apparatus access roads extend between properties and easements are established to prevent obstruction of such roads.~~

SECTION ~~C103~~ C105 FIRE HYDRANT SPACING DISTRIBUTION OF FIRE HYDRANTS

C103.1 C105.1 Hydrant spacing. Fire apparatus access roads and public streets providing required access to buildings in accordance with Section 503 of the *International Fire Code* shall be provided with one or more fire hydrants, as determined by Section C102.1. Where more than one fire hydrant is required, the distance between required fire hydrants shall be in accordance with Sections C103.2 and C103.3

C103.2 Average spacing. The average spacing between fire hydrants shall ~~be in accordance with not~~ exceed that listed in Table C102.1 C105.1.

Exception: ~~The fire chief is authorized to accept a deficiency of up to 10 percent~~ The average spacing shall be permitted to be increased by 10 percent where existing fire hydrants provide all or a portion of the required number of fire hydrants service.

C103.3 Maximum spacing. ~~Regardless of the average spacing, fire hydrants shall be located such that all points on streets and access roads adjacent to a building are within the distances listed in Table C105.1 and the minimum number of hydrants are provided. The maximum spacing between fire hydrants shall be in accordance with Table C102.1.~~

**TABLE C102.1 C105.1
REQUIRED NUMBER AND SPACING DISTRIBUTION OF FIRE HYDRANTS**

FIRE-FLOW REQUIREMENT (gpm)	MINIMUM NUMBER OF HYDRANTS	AVERAGE SPACING BETWEEN HYDRANTS ^{a,b,c,f,g}	MAXIMUM DISTANCE FROM ANY POINT ON STREET OR ROAD FRONTAGE TO A HYDRANT ^{d,f,g}
1,750 or less	1	500	250
2,000-2,250	2	450	225
2,500	3	450	225
3,000	3	400	225
3,500-4,000	4	350	210
4,500-5,000	5	300	180
5,500	6	300	180
6,000	6	250	150
6,500-7,000	7	250	150
7,500 or more	8 or more ^e	200	120

For SI: 1 foot = 304.8 mm, 1 gallon per minute = 3.785 L/m.

- a. Reduce by 100 feet for dead-end streets or roads.
- b. Where streets are provided with median dividers which cannot be crossed by fire fighters pulling hose lines, or where arterial streets are provided with four or more traffic lanes and have a traffic count of more than 30,000 vehicles per day, hydrant spacing shall average 500 feet on each side of the street and be arranged on an alternating basis ~~up to a fire-flow requirement of 7,000 gallons per minute and 400 feet for higher fire-flow requirements.~~
- c. Where new water mains are extended along streets where hydrants are not needed for protection of structures or similar fire problems, fire hydrants shall be provided at spacing not to exceed 1,000 feet to provide for transportation hazards.
- d. Reduce by 50 feet for dead-end streets or roads.
- e. One hydrant for each 1,000 gallons per minute or fraction thereof.
- f. A 50 percent spacing increase shall be permitted where the building is equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1 of the *International Fire Code*.
- g. A 25 percent spacing increase shall be permitted where the building is equipped throughout with an approved automatic sprinkler system in accordance with Sections 903.3.1.2 or 903.3.1.3 of the *International Fire Code* or Section P2904 of the *International Residential Code*.

SECTION C104 CONSIDERATION OF EXISTING FIRE HYDRANTS

C104.1 Existing fire hydrants. Existing fire hydrants on public streets are allowed to be considered as available ~~to meet the requirements of Sections C102 and C103. Existing fire hydrants on adjacent properties shall not be considered available unless are allowed to be considered as available to meet the requirements of Sections C102 and C103 provided that a fire apparatus access roads extends between properties and that an and easements are is established to prevent obstruction of such roads.~~

Reason: This code change proposal:

1. Clarifies how the requirements of 507.5.1 are to be utilized with Appendix C when Appendix C is adopted by the jurisdiction. Previously, it was not clear how these two sections were to be integrated when Appendix C was adopted.
2. States the buildings moved into the jurisdiction are also under the scope of this appendix. These buildings should be treated like new buildings when they are relocated.

3. The location language, in the current C102.1, is now addressed in the revised C102.1 by addressing the minimum number of hydrants for a building. The location spacing language has been provide in the new C103.1. The proposed C102.1 and title has been revised for better clarity as to the intent and the minimum number of hydrant that are available to a building.
4. The "complex" and "subdivision" paragraph has been deleted as basing the spacing on individual building fire flow covers every building in a complex or subdivision. There is no need for additional "complex or subdivision" text which can't be applied without an identifiable fire flow.
5. C103.1 has been revised for better clarity and application by the user. Poor code language, such as "regardless of the average spacing" has been replaced with clearer code text.
6. Table C102.1 has three modifications to the footnotes. First, the 7,000 GPM threshold for arranging hydrants on an alternating basis does not appear to have any basis in application and creates confusion as to its true intent so it has been deleted. Second, a modifier for a 50% increase in hydrant spacing is proposed for building protected by a fire sprinkler system installed in accordance with NFPA 13. Lastly, a modifier for a 25% increase in hydrant spacing is proposed for those buildings protected by a fire sprinkler system installed in accordance with NFPA 13D, 13R or P2904. This spacing increase is justified due to the documented success of fire sprinklers systems in extinguishing and controlling fires.
7. The existing hydrant section was relocated for better flow of the appendix and additional text was provided to clarify how it should be applied.

Cost Impact: The code change proposal will not increase the cost of construction.

F337-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

C101.1-F-ZUBIA-FCAC

F338 – 13

Appendix C Table C105.1

Proponent: Anthony C. Apfelbeck, City of Altamonte Springs Building/Fire Safety Division, representing self (ACApfelbeck@Altamonte.org)

Revise as follows:

**TABLE C105.1
NUMBER AND DISTRIBUTION OF FIRE HYDRANTS**

FIRE-FLOW REQUIREMENT (gpm)	MINIMUM NUMBER OF HYDRANTS	AVERAGE SPACING BETWEEN HYDRANTS^{a,b,c}	MAXIMUM DISTANCE FROM ANY POINT ON STREET OR ROAD FRONTAGE TO A HYDRANT^d
1,750 1,250 or less	1	500	250
2,000 1,500-2,250	2	450	225
2,500	3	450	225
3,000	3	400	225
3,500-4,000	4	350	210
4,500-5,000	5	300	180
5,500	6	300	180
6,000	6	250	150
6,500-7,000	7	250	150
7,500 or more	8 or more ^e	200	120

For SI: 1 foot = 304.8 mm, 1 gallon per minute = 3.785 L/m.

- Reduce by 100 feet for dead-end streets or roads.
- Where streets are provided with median dividers which cannot be crossed by fire fighters pulling hose lines, or where arterial streets are provided with four or more traffic lanes and have a traffic count of more than 30,000 vehicles per day, hydrant spacing shall average 500 feet on each side of the street and be arranged on an alternating basis.
- Where new water mains are extended along streets where hydrants are not needed for protection of structures or similar fire problems, fire hydrants shall be provided at spacing not to exceed 1,000 feet to provide for transportation hazards.
- Reduce by 50 feet for dead-end streets or roads.
- One hydrant for each 1,000 gallons per minute or fraction thereof.

Reason: This proposal changes the fire-flow threshold within the table which, in turn, changes the minimum number of hydrants and spacing for the modified threshold numbers. As an example a building with a required fire flow of 1,750 GPM would only require a single fire hydrant under the current provisions of Table C105.1. Under this proposal, that same building would require two fire hydrants.

The reasons for this change are:

- ISO only recognizes a maximum of 1,000 GPM of flow per fire hydrant in the Fire Suppression Rating Schedule as specified in Section 614. The current table could result in a grading deficiency of 750 gallons per minute if the full 1,750 is provided from a single hydrant for a protected property.
- There are practical fire flow delivery problems when the entire 1,750 GPM is provide from a single hydrant. Typically, a single fire apparatus is supplied from a single hydrant. Fire departments are not normally set up to operate in a dual pumping operation from a single fire hydrant. Two hydrants providing the 1,750 GPM would provide improved spacing, access and flexibility for responding units.
- A single hydrant providing 1,750 GPM does not provide a backup in case the hydrant is out of service due to maintenance, obstructions or cold weather conditions.

Cost Impact: This code change proposal will increase the cost of construction.

F338-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

C105.1T-F-APFELBECK

F339 – 13

Appendix D103.5

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

D103.5 Fire apparatus access road gates. Gates securing the fire apparatus access roads shall comply with all of the following criteria:

- ~~1. The minimum gate width shall be 20 feet (6096 mm). Where a single gate is provided, the gate width shall be not less than 20 feet (6096 mm). Where a fire apparatus road consists of a divided roadway the gate width shall be not less than 12 feet (3658 mm).~~
2. Gates shall be of the swinging or sliding type.
3. Construction of gates shall be of materials that allow manual operation by one person.
4. Gate components shall be maintained in an operative condition at all times and replaced or repaired when defective.
5. Electric gates shall be equipped with a means of opening the gate by fire department personnel for emergency access. Emergency opening devices shall be approved by the fire code official.
- ~~6. Manual opening gates shall not be locked with a padlock or chain and padlock unless they are capable of being opened by means of forcible entry tools or when a key box containing the key(s) to the lock is installed at the gate location.~~
- ~~76. Methods of locking device specifications~~ shall be submitted for approval by the fire code official.
- ~~87.~~ Electric gate operators, where provided, shall be listed in accordance with UL 325.
- ~~98.~~ Gates intended for automatic operation shall be designed, constructed and installed to comply with the requirements of ASTM F 2200.

Reason: This proposal is designed to clarify and simplify the list of criteria for security gates.

Item 1 is revised to address the reality that many locations are now splitting the roadway with a guard station or island which holds the gate operating mechanism. When the roadway is split, a gate that is 20' wide is not necessary on each side. Item 1 is reworded to specify that when there is a single gate, the gate width must be 20', but in the situation of a split roadway, a 12' wide gate in each direction is adequate.

The requirements in Item 6 are easily covered in the revision to Item 7. Item 6 currently lists specific methods of locking access gates. Item 6 then becomes unnecessary so it is proposed to be deleted.

The reality is that there are many other methods available which can be utilized to lock a gate. Whatever the method of locking, the need is to have the method approved. This will now be covered in the new Item 6.

Cost Impact: The code change proposal will not increase the cost of construction.

F339-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

D103.5-F-ZUBIA-FCAC

F340 – 13

Appendix B105.1, Table B105(1) (New), B105.2, Table B105(2) (New), Table B105.1

Proponent: Adolf Zubia, Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

B105.1 One- and two-family dwellings, congregate living facilities of Groups R-3 and R-4 and townhouses. The minimum fire-flow and flow duration requirements for one- and two-family dwellings, congregate living facilities of Group R-3 and R-4 and townhouses having a fire-flow calculation area that does not exceed 3,600 square feet (344.5 m²) shall be 1,000 gallons per minute (3785.4 L/min) for 1 hour. Fire-flow and flow duration for dwellings having a fire-flow calculation area in excess of 3,600 square feet (344.5 m²) shall not be less than that specified in Table B105.1. shall be as specified in Tables B105(1) and B105(3).

Exception: A reduction in required fire-flow of 50 percent, as approved, is allowed when the building is equipped with an approved automatic sprinkler system.

TABLE B105(1)
REQUIRED FIRE-FLOW FOR ONE- AND TWO-FAMILY DWELLINGS, CONGREGATE LIVING FACILITIES OF GROUP R-3 AND R-4 AND TOWNHOUSES,

<u>FIRE-FLOW CALCUATION AREA (square feet)</u>	<u>AUTOMATIC SPRINKLER SYSTEM (Design Standard)</u>	<u>MINIMUM FIRE-FLOW (gallons per minute)</u>	<u>FLOW DURATION (hours)</u>
0-3,600	No automatic sprinkler system	1,000	1
3,601-greater	No automatic sprinkler system	Value in Table B105(3)	Duration in Table B105(3) at the required fire-flow rate
0-3,600	Section 903.3.1.3 of the <i>International Fire Code</i> . or Section P2904 of the <i>International Residential Code</i>	500	0.5
3,601-greater	Section 903.3.1.3 of the <i>International Fire Code</i> . or Section P2904 of the <i>International Residential Code</i>	½ value in Table B105(3)	1

B105.2 Buildings other than one- and two-family dwellings, congregate living facilities of Group R-3 and R-4 and Townhouses. The minimum fire-flow and flow duration for buildings other than one- and two-family dwellings, congregate living facilities of Group R-3 and R-4 and Townhouses shall be as specified in Tables B105.1 B105(2) and B105(3).

Exception: A reduction in required fire-flow of up to 75 percent, as approved, is allowed when the building is provided with an approved automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2. The resulting fire-flow shall not be less than 1,500 gallons per minute (5678 L/min) for the prescribed duration as specified in Table B105.1.

TABLE B105(2)
REQUIRED FIRE-FLOW FOR BUILDINGS OTHER THAN ONE- AND TWO-FAMILY DWELLINGS,
CONGREGATE LIVING FACILITIES OF GROUP R-3 AND R-4 AND TOWNHOUSES,

<u>AUTOMATIC SPRINKLER SYSTEM(Design Standard)</u>	<u>MINIMUM FIRE-FLOW (gallons per minute)</u>	<u>FLOW DURATION (hours)</u>
No automatic sprinkler system	Value in Table B105.3	Duration in Table B105(3)
Section 903.3.1.1 of the <i>International Fire Code</i> .	25% of the value in Table B105(3) ^a	Duration in Table B105(3) at the reduced flow rate
Section 903.3.1.2 of the <i>International Fire Code</i> .	25% of the value in Table B105(3) ^b	Duration in Table B105(3) at the reduced flow rate

a. The reduced fire-flow shall not be less than 1,000 gallons per minute (5678 L/min)

b. The reduced fire-flow shall not be less than 1,500 gallons per minute (3785 L/min)

B105.3 Water supply for buildings equipped with an automatic sprinkler system. For buildings equipped with an approved *automatic sprinkler system*, the water supply shall be capable of providing the greater of:

1. The automatic sprinkler system demand, including hose stream allowance.
2. The required fire-flow.

TABLE B105.1 B105(3)
MINIMUM REQUIRED FIRE FLOW AND FLOW DURATION FOR BUILDINGS
REFERENCE TABLE FOR TABLES B105(1) AND B102(2)

(Portions of table not shown remain unchanged)

Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

1. Clarifies that "Townhouses" R-3 and R-4 congregate living facilities are to be treated as one-and-two family dwellings with respect to developing needed fire flow in accordance with appendix B.
2. Relocates the fire flow modifiers from the paragraph to a table format in B105(1) and B105(2) for easier readability and application by the user.
3. Recognizes the provisions of P2904 in the IRC as equivalent to NFPA 13D when determining needed fire flow.
4. Provides a reduction in the required duration of fire flow for fully sprinklered one-and two-family dwellings less than 3,600 square feet as a reasonable incentive for the installation of a fire sprinkler system. Experience with fire sprinklers shows that a vast majority of fires in one and two family dwellings will be controlled or extinguished by the fire sprinkler system. This duration modifier also provides an achievable fire flow in rural applications where the development of a 1 hour duration is unrealistic.
5. Provides reduction to 1,000 GPM, rather than 1,500 GPM, for buildings other than one-and two-family dwellings and townhomes protected in accordance with NFPA 13 sprinkler systems. Currently, the appendix treats both NFPA 13R and NFPA 13 systems similarly permitting a reduction in fire flow to 1,500 GPM. An NFPA 13 system provides a significantly greater level of protection via the system design area, water supply and protection of concealed combustible spaces. Due to this level of protection, there should be a reduced minimum fire flow for buildings protected in accordance with NFPA 13 systems as opposed to NFPA 13R systems.
6. The current language provides no guidance to the Fire Chief as to criteria upon which to base approval of the required fire flow reduction for sprinkler protected buildings. The change simply allows the reduction by the elimination of the exceptions and codifying the credits in the tables.
7. This code change proposal clarifies in B105.3 that a fire sprinkler demand should not be added to the manual fire flow demand in developing the needed fire flow. The greater of the sprinkler demand or the demand developed in accordance with Appendix B will be the required fire flow.
8. IFC Section 903.3.1.3 was revised last cycle to include Group R-3 and R-4 congregate residences as well as townhouses. Fair Housing by law requires group homes to be considered the same as single family.

Cost Impact: This code change will not increase the cost of construction

F340-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

B105.1-F-ZUBIA-FCAC

F341 – 13

Appendix D106.3 (New)

Proponent: Anthony C. Apfelbeck, City of Altamonte Springs Building/Fire Safety Division, representing self (ACApfelbeck@Altamonte.org)

Add new text as follows:

D106.3 Remoteness. Where two fire apparatus access roads are required, they shall be placed a distance apart equal to not less than one half of the length of the maximum overall diagonal dimension of the property or area to be served, measured in a straight line between accesses.

Reason: Currently, Section D106, Multiple-Family Residential Developments, does not require fire apparatus access roads to be remote when more than one access road is required. D104, Commercial and Industrial Developments, and D107, One- or Two-Family Residential Developments already contain a “remoteness” provision.

This code change proposal duplicates the language from D104.3 into a new 106.3 placing new “Remoteness” language within the Section D106 that is directly relevant to Multiple-Family Residential Developments.

Cost Impact: This code change will increase the cost of construction.

F341-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

D106.3-F-APFELBECK

F342 – 13

Appendix D107.1, D107.2 (New)

Proponent: Anthony C. Apfelbeck, City of Altamonte Springs Building/Fire Safety Division, representing self (ACApfelbeck@Altamonte.org)

Revise as follows:

D107.1 One- or two-family dwelling residential developments. Developments of one- or two-family dwellings where the number of dwelling units exceeds 30 shall be provided with separate and approved fire apparatus access roads, ~~and shall meet the requirements of Section D104.3.~~

Exceptions:

1. Where there are more than 30 dwelling units on a single public or private fire apparatus access road and all dwelling units are equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1., 903.3.1.2 or 903.3.1.3.3, access from two directions shall not be required.
2. The number of dwelling units on a single fire apparatus access road shall not be increased unless fire apparatus access roads will connect with future development, as determined by the fire code official.

D107.2 Remoteness. Where two fire apparatus access roads are required, they shall be placed a distance apart equal to not less than one half of the length of the maximum overall diagonal dimension of the property or area to be served, measured in a straight line between accesses.

Reason: This proposal is an editorial change that is intended to clarify the remoteness reference in D107.1. This proposal does not modify the technical aspect of the code.

The current Section D107.1 refers the user to Section D104.3 which is titled "Commercial and Industrial Developments." Referring to Section D104.3 places the user in a section that is not germane to one-and two family dwelling and has to potential to create confusion to the fire code official and the code user.

This code change proposal duplicates the language from D104.3 into a new 107.2 placing new "Remoteness" language within the Section D107 that is directly relevant to one-and two-family dwellings. This code change does not modify any technical aspect of the current code remoteness requirement for one-and two-family dwellings.

Cost Impact: This code change will not increase the cost of construction.

F342-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

D107.1-F-APFELBECK

F343 – 13

Appendix E102.1.7.1

Proponent: Kirk Mitchell, Kirk Mitchell & Associates, LLL, representing Isocyanurates Industry Ad Hoc Committee (IIAHC) (pkmitchell@bellsouth.net)

Revise as follows:

E102.1.7.1 Examples of liquid and solid oxidizers according to hazard.

Class 4: ammonium perchlorate (particle size greater than 15 microns), ammonium permanganate, guanidine nitrate, hydrogen peroxide solutions more than 91 percent by weight, perchloric acid solutions more than 72.5 percent by weight, potassium superoxide, tetranitromethane.

Class 3: ammonium dichromate, calcium hypochlorite (over 50 percent by weight), chloric acid (10 percent maximum concentration), hydrogen peroxide solutions (greater than 52 percent up to 91 percent), mono-(trichloro)-tetra-(monopotassium di-chloro)-penta-s-triazinetriene, nitric acid, (fuming - more than 86 percent concentration), perchloric acid solutions (60 percent to 72 percent by weight), potassium bromate, potassium chlorate, potassium dichloro-s-triazinetriene (potassium dichloro-isocyanurate), potassium perchlorate (99 percent), potassium permanganate (greater than 97.5 percent), sodium bromate, sodium chlorate, sodium chlorite (over 40 percent by weight) and sodium dichloro-s-triazinetriene anhydrous (sodium dichloro-isocyanurate anhydrous).

Class 2: barium bromate, barium chlorate, barium hypochlorite, barium perchlorate, barium permanganate, 1-bromo-3-chloro-5, 5-dimethylhydantoin, calcium chlorate, calcium chlorite, calcium hypochlorite (50 percent or less by weight), calcium perchlorate, calcium permanganate, calcium peroxide (75 percent), chromium trioxide (chromic acid), copper chlorate, halane (1, 3-di-chloro-5, 5-dimethylhydantoin), hydrogen peroxide (greater than 27.5 percent up to 52 percent), lead perchlorate, lithium chlorate, lithium hypochlorite (more than 39 percent available chlorine), lithium perchlorate, magnesium bromate, magnesium chlorate, magnesium perchlorate, mercurous chlorate, nitric acid (more than 40 percent but less than 86 percent), perchloric acid solutions (more than 50 percent but less than 60 percent), ~~potassium perchlorate, potassium permanganate~~, potassium peroxide, potassium superoxide, silver peroxide, sodium chlorite (40 percent or less by weight), sodium perchlorate, sodium perchlorate monohydrate, sodium permanganate, sodium peroxide, sodium persulfate (99 percent), strontium chlorate, strontium perchlorate, thallium chlorate, ~~trichloro-s-triazinetriene (trichloroisocyanuric acid)~~, urea hydrogen peroxide, zinc bromate, zinc chlorate and zinc permanganate.

Class 1: all inorganic nitrates (unless otherwise classified), all inorganic nitrites (unless otherwise classified), ammonium persulfate, barium peroxide, ~~calcium peroxide~~, hydrogen peroxide solutions (greater than 8 percent up to 27.5 percent), lead dioxide, lithium hypochlorite (39 percent or less available chlorine), lithium peroxide, magnesium peroxide, manganese dioxide, nitric acid (40 percent concentration or less), perchloric acid solutions (less than 50 percent by weight), potassium dichromate, potassium monopersulfate (45 percent KHSO₅ or 90 percent triple salt), potassium percarbonate, potassium persulfate, sodium carbonate peroxide, sodium dichloro-s-triazinetriene dihydrate, sodium dichromate, sodium perborate (anhydrous), sodium perborate monohydrate, sodium perborate tetra-hydrate, sodium percarbonate, ~~sodium persulfate~~, strontium peroxide, trichloro-s-triazinetriene (trichloroisocyanuric acid) and zinc peroxide.

Reason: This proposal suggests moving Trichloro-s-triazinetriene (trichloroisocyanuric acid) from a Class 2 oxidizer to a Class 1 oxidizer. Trichloro-s-triazinetriene (trichloroisocyanuric acid) is a Class 1 oxidizer (See NFPA 400 – Hazardous Materials Code 2013 Edition – Section G.3.2 Class 1 Oxidizers.)

NFPA reclassified trichloro-s-triazinetriene (trichloroisocyanuric acid) as a Class 1 Oxidizer in the 1995 edition of NFPA 430 based on extensive test data supplied by a consortium of chlorinated isocyanurate manufacturers and reported out in large scale burn tests conducted at Safety Engineering Laboratories, Inc. Since then, trichloro-s-triazinetriene (trichloroisocyanuric acid) has been one of very few oxidizers which are listed in different classes by the IFC compared to NFPA 430/400.

Additionally, recent work by Elizabeth Buc provided supplementary experimental burn rate data on trichloro-s-triazinetriene (trichloroisocyanuric acid). This work confirmed that trichloro-s-triazinetriene (trichloroisocyanuric acid) is appropriately classified as a Class 1 Oxidizer. Reference: E. Buc, Oxidizer Classification Research Project: Tests and Criteria, Fire and Materials Research Laboratory, LLC, November 2, 2009.

(See attached electronic PDF titled *FMRL_Oxidizer_Classification_Research_Project_Report*)

This proposal also suggests making changes to typical oxidizers based on test results and criteria from Table G.1.2(a) – NFPA Oxidizer Class Tests and Criteria of NFPA 400 Hazardous Materials Code (2013 Edition) and Section G.2.2 Class 1 Oxidizer through G.2.4 Class 3 Oxidizer and Table 5.2.1.13.3(a) Maximum Allowable Quantity (MAQ) per Indoor and Outdoor Control Area for Selected Hazard Categories in Merchantile, Storage and Industrial Occupancies.

Cost Impact: The portion of this proposal reclassifying trichloro-s-triazinetriene (trichloroisocyanuric acid) may result in reduced cost of construction and protection of referenced material due to its proper oxidization classification in appendix.

With the exception of the inclusion of 'anhydrous' following sodium dichloro-s-triazinetriene, the other proposed changes to Appendix E Section E102.1.7.1 Examples of Liquid and Solid Oxidizers According to Hazard may result in an increase in the cost of construction and/or protection as the other identified changes represents a categorical increase in the oxidizer classification ranking based on the newly adopted oxidizer testing and classification scheme.

F343-13

Public Hearing: Committee: AS
Assembly: ASF

AM
AMF

D
DF

E102.1.7.1 #1-F-MITCHELL

F344 – 13

Appendix K (New)

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care
(john.williams@doh.wa.gov)

Revise as follows:

APPENDIX K

CONSTRUCTION REQUIREMENTS FOR EXISTING AMBULATORY CARE FACILITIES

The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.

K101.1 Scope. The provisions of this chapter shall apply to existing buildings containing ambulatory care facilities in addition to the requirements of Chapter 11. Where the provisions of this chapter conflict with either the construction requirements within Chapter 11 or the construction requirements that applied at the time of construction, the most restrictive provision shall apply.

K101.2 Intent. The intent of this appendix is to provide a minimum degree of fire and life safety to persons occupying and existing buildings containing ambulatory care facilities where such building do not comply with the minimum requirements of the *International Building Code*.

SECTION K102

FIRE SAFETY REQUIREMENTS FOR EXISTING AMBULATORY CARE FACILITIES

K102.1 Separation. Ambulatory care facilities where the potential for four or more care recipients are to be incapable of self-preservation at any time, whether rendered incapable by staff or staff accepted responsibility for a care recipient already incapable, shall be separated from adjacent spaces, corridors or tenants with a fire partition installed in accordance with Section 708 of the *International Building Code*.

K102.2 Smoke compartments. Where the aggregate area of one or more ambulatory care facilities is greater than 10,000 square feet (929 m²) on one story, the story shall be provided with a smoke barrier to subdivide the story into no fewer than two smoke compartments. The area of any one such smoke compartment shall be not greater than 22,500 square feet (2092 m²). The travel distance from any point in a smoke compartment to a smoke barrier door shall be not greater than 200 feet (60 960 mm). The smoke barrier shall be installed in accordance with Section 709 of the *International Building Code* with the exception that smoke barriers shall be continuous from outside wall to an outside wall, a floor to a floor, or from a smoke barrier to a smoke barrier or a combination thereof.

K102.2.1 Refuge area. Not less than 30 net square feet (2.8 m²) for each nonambulatory care recipient shall be provided within the aggregate area of corridors, care recipient rooms, treatment rooms, lounge or dining areas and other low-hazard areas within each smoke compartment. Each occupant of an ambulatory care facility shall be provided with access to a refuge area without passing through or utilizing adjacent tenant spaces.

K102.2.2 Independent egress. A means of egress shall be provided from each smoke compartment created by smoke barriers without having to return through the smoke compartment from which means of egress originated.

K102.3 Ambulatory care automatic sprinkler system. An automatic sprinkler system shall be provided throughout the entire floor containing an ambulatory care facility in Type II-B, III-B and V-B construction where either of the following conditions exist at any time:

1. Four or more care recipients are incapable of self preservation, whether rendered incapable by staff of staff has accepted responsibility for care recipients already incapable.
2. One or more care recipients that are incapable of self preservation are located at other than the level of exit discharge serving such a facility.

In buildings where ambulatory care is provided on levels other than the level of exit discharge, an automatic sprinkler system shall be installed throughout the entire floor where such care is provided and all floors below, and all floors between the level of ambulatory care and the nearest level of exit discharge, including the level of exit discharge.

K102.4 Ambulatory care automatic fire alarm system. Fire areas containing ambulatory care facilities shall be provided with an electronically supervised automatic smoke detection system installed within the ambulatory care facility and in public use areas outside of tenant spaces, including public corridors and elevator lobbies.

Exception: Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 of the *International Fire Code*, provided the occupant notification appliances will activate throughout the notification zones upon sprinkler waterflow.

SECTION K103 **INCIDENTAL USES IN EXISTING AMBULATORY CARE FACILITIES**

K103.1 General. Incidental uses associated with and located within existing ambulatory care facilities required to be separated by Section 422 in the *International Building Code*, and that generally pose a greater level of risk to such occupancies shall comply with the provisions of Sections K103.2 through K103.4.2.1. Incidental uses in ambulatory care facilities required to be separated by Section 422 in the *International Building Code* are limited to those listed in Table K103.1.

K103.2 Occupancy classification. Incidental uses shall not be individually classified in accordance with Section 302.1 of the *International Building Code*. Incidental uses shall be included in the building occupancies within which they are located.

K103.3 Area limitations. Incidental uses shall not occupy more than 10 percent of the building area of the story in which they are located.

K103.4 Separation and protection. The incidental uses listed in Table K103.1 shall be separated from the remainder of the building or equipped with an automatic sprinkler system, or both, in accordance with the provisions of that table.

K103.4.1 Separation. Where Table K103.1 specifies a fire-resistance-rated separation, the incidental uses shall be separated from the remainder of the building in accordance with Section 509.4.1 of the *International Building Code*.

K103.4.2 Protection. Where Table K103.1 permits an automatic sprinkler system without a fire-resistance-rated separation, the incidental uses shall be separated from the remainder of the building by construction capable of resisting the passage of smoke in accordance with Section 509.4.2 of the *International Building Code*.

K103.4.2.1 Protection limitation. Except as otherwise specified in Table K103.1 for certain incidental uses, where an automatic sprinkler system is provided in accordance with Table K103.1, only the space occupied by the incidental use need be equipped with such a system.

TABLE K103.1
INCIDENTAL USES IN EXISTING AMBULATORY CARE FACILITIES

<u>ROOM OR AREA</u>	<u>SEPARATION AND/OR PROTECTION</u>
<u>Furnace room where any piece of equipment is over 400,000 Btu per hour input.</u>	<u>1 hour or provide automatic sprinkler system</u>
<u>Rooms with boilers where the largest piece of equipment is over 15 psi and 10 horsepower</u>	<u>1 hour or provide automatic sprinkler system</u>
<u>Refrigerant machinery room</u>	<u>1 hour or provide automatic sprinkler system</u>
<u>Hydrogen cutoff rooms, not classified as Group H</u>	<u>1 hour in ambulatory care facilities</u>
<u>Incinerator rooms</u>	<u>2 hours and provide automatic sprinkler system</u>
<u>Laboratories not classified as Group H</u>	<u>1 hour or provide automatic sprinkler system</u>
<u>Laundry rooms over 100 square feet</u>	<u>1 hour or provide automatic sprinkler system</u>
<u>Waste and linen collection rooms with containers with total volume of 10 cubic feet or greater.</u>	<u>1 hour or provide automatic sprinkler system</u>
<u>Storage rooms greater than 100 square feet</u>	<u>1 hour or provide automatic sprinkler system</u>
<u>Stationary storage battery systems having a liquid electrolyte capacity of more than 50 gallons for flooded lead-acid, nickel cadmium or VRLA, or more than 1,000 pounds for lithium-ion and lithium metal polymer used for facility standby power, emergency power or uninterruptable power supplies</u>	<u>1 hour in ambulatory care facilities</u>

For SI: 1 square foot = 0.0929 m², 1 pound per square inch (psi) = 6.9 kPa, 1 British thermal unit (Btu) per hour = 0.293 watts, 1 horsepower = 746 watts, 1 gallon = 3.785 L.

SECTION K104 **MEANS OF EGRESS REQUIREMENTS FOR EXISTING AMBULATORY CARE FACILITIES**

K104.1 Size of doors. The minimum width of each door opening shall be sufficient for the *occupant load* thereof and shall provide a clear width of not less than 28 inches (711 mm). Where this section requires a minimum clear width of 28 inches (711 mm) and a door opening includes two door leaves without a mullion, one leaf shall provide a clear opening width of 28 inches (711 mm). In ambulatory care facilities, doors serving as means of egress from patient treatment rooms shall provide a clear width of not less than 32 inches (813 mm). The maximum width of a swinging door leaf shall be 48 inches (1219 mm) nominal. The height of doors openings shall not be less than 80 inches (2032 mm).

Exceptions:

1. Door openings to storage closets less than 10 square feet (0.93 m²) in area shall not be limited by the minimum width.
2. Width of door leaves in revolving doors that comply with Section 1008.1.4.1 shall not be limited.
3. Exit access doors serving a room not larger than 70 square feet (6.5 m²) shall be not less than 24 inches (610 mm) in door width.
4. Door closers and door stops shall be permitted to be 78 inches (1980 mm) minimum above the door.

K104.2 Corridor and Aisle width. Corridor width shall be as determined in Section 1005.1 of the *International Fire Code* and this section. The minimum width of corridors and aisles that serve gurney traffic in areas where patients receive care that causes them to be incapable of self preservation shall be not less than 72 inches (1829mm).

K104.3 Existing elevators. Existing elevators, escalators, dumbwaiters and moving walks shall comply with the requirements of Sections K104. 3.1 and K104.3.2.

K104.3.1 Elevators, escalators, dumbwaiters and moving walks. Existing elevators, escalators, dumbwaiters and moving walks in ambulatory care facilities required to be separated by Section 422 shall comply with ASME A17.3.

K104.3.2 Elevator emergency operation. Existing elevators with a travel distance of 25 feet (7620 mm) or more above or below the main floor or other level of a building and intended to serve the needs of emergency personnel for fire-fighting or rescue purposes shall be provided with emergency operation in accordance with ASME A17.3.

SECTION J 105 REFERENCED STANDARDS

ICC IBC-15 International Building CodeK101.2, K102.1, K102.2, K103.1, K103.2, K103.3.1, K104.1, K104.2

ICC IFC-15 International Fire Code.....K102.4, K104.2

ASME A17.3-08.....K104.3.1, K104.3.2

Reason: This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April, 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>

The intent of this section is to provide jurisdictions an option for assessing a minimum fire and life safety requirements for buildings containing ambulatory care facilities. While this appendix is written with the intent to apply retroactive minimum standards, we recognize that the ambulatory care requirements are relatively recent additions to the code. For that reason, these requirements are presented as an appendix, so that the adopting authority can exercise judgment in the adoption and application of this section.

This is an especially important option for federal authorities having jurisdiction, who have long standing minimum fire and life safety standards for ambulatory care facilities. Those federal standards were applied to new and existing construction long before the creation of the ambulatory care use that currently in the International Building Code. Therefore, we have a situation where some (but not all) ambulatory care facilities were built very specific defend-in-place features. This subset of facilities was those that were certified by the federal government as "ambulatory surgical facilities." Many other medical facilities that would be classified today as ambulatory care were not required to have defend in place features, such a smoke compartmentation. The federal AHJs highly value these defend-in-place concepts and need retroactive standard. This appendix would be that standard.

This appendix would also be useful for those local and state jurisdictions that are specifically focused in ensuring the safety for existing ambulatory care. If a surgery center was constructed as recently as 2009, there would have been no defend in place features required by the ICC family of codes. Post adoption of the 2009 IBC, there would have been. This appendix could be used to assess post 2009 surgery centers and free standing emergency departments. It could also be used to bring those earlier facilities into compliance with the current standards at the discretion of the adopting jurisdiction.

The technical requirements are based on the current IBC language, as well as several concepts approved in the 2012 Group A changes. The significant difference is a relaxation of the sprinkler requirement for existing facilities. This appendix would only require retroactive sprinklering of unprotected construction, which is consistent with the overall concept of the current federal requirements.

Cost impact: The code change proposal should not increase the cost of construction because compliance is already required by facility licensure requirements.

F344-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

APPENDIX X (NEW)-F-WILLIAMS-ADHOC

F345 – 13

Appendix K (new)

Proponent: Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee
(cbaldassarra@rjagroup.com)

Add new text as follows:

Appendix K **Employee Qualifications**

The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.

SECTION K101 **FIRE INSPECTOR** **AND FIRE PLAN EXAMINER QUALIFICATIONS**

K101.1. Fire inspector and fire plan examiner. The fire code official shall appoint or hire such number of officers, fire inspectors, fire plan examiners, assistants and other employees as shall be authorized by the jurisdiction. A person shall not be appointed or hired as a fire inspector or fire plans examiner who has less than five years' experience as a contractor, engineer, architect, a member of the fire service, or a member of a fire prevention organization. Any combination of education and experience that would confer equivalent knowledge and ability shall be deemed to satisfy this requirement. Fire inspectors and fire plan examiners shall be certified through a recognized certification program for such position.

Reason: This proposed change is a result of the CTC's investigation of the area of study entitled "NIST Charleston Sofa Store Fire Recommendations". The scope of the activity is noted as:

Review the NIST and other investigative reports on the fire that occurred on the evening of June 18, 2007 in the Sofa Super Store in Charleston, South Carolina to identify issues that can be addressed by the International Codes.

In connection with their investigation, NIST analyzed the fire ground, consulted with other experts, and performed computer simulations of fire growth alternatives. Based on these analyses, NIST concluded that the following sequence of events is likely to have occurred. A fire began in packing material and discarded furniture outside an enclosed loading dock area. The fire spread to the loading dock, then into both the retail showroom and warehouse spaces. During the early stages of the fire in the two latter locations, the fire spread was slowed by the limited supply of fresh air. This under-ventilation led to generation of a large mass of pyrolyzed and only partially oxidized effluent. The smoke and combustible gases flowed into the interstitial space below the roof and above the suspended ceiling of the main retail showroom. As this space filled with unburned fuel, the hot smoke also seeped through the suspended ceiling into the main showroom and formed a hot smoke layer below the suspended ceiling. Up to this time, the extent of fire spread into the interstitial space was not visible to fire fighters in the store. If the fire spread had been visible to the fire fighters in the store, it would have provided a direct indication of a fire hazard in the showroom. Meanwhile, the fire at the back of the main showroom and the gas mixture below the suspended ceiling were both still fuel rich. When the front windows were broken out or vented, the inflow of additional air allowed the heat release rate of the fire to intensify rapidly and added air to the layer of unburned fuel below the suspended ceiling enabling the ignition of the unburned fuel/air mixture. The fire swept from the rear to the front of the main showroom extremely quickly, and then into the west and east showrooms. Nine fire fighters were killed in the Sofa Super Store fire. NIST developed eleven recommendations to help mitigate such future losses.

Recommendation 3 of the NIST report reads as follows:

"Qualified Fire Inspectors and Building Plan Examiners: NIST recommends that all state and local jurisdictions ensure that fire inspectors and building plan examiners are professionally qualified to a national standard such as NFPA 1031 Standard for Professional Qualifications for Fire Inspector and Plan Examiner. Professional qualification may be demonstrated through a nationally accepted certification examination, such as the Fire Plan Examiner; Fire Inspector I and II, and Certified Fire Marshal."

Following a review of recommendation 3 of the NIST report a new Appendix K is proposed. This proposal is similar in scope and intent to Section A101.3 of Appendix A of the International Building Code where suggested qualifications for building official, chief inspector, inspector and plan examiner are established.

The purpose of this proposal is to provide optional criteria for qualifications of employees who enforce the Fire Code through inspections and plan examinations. A jurisdiction that wants to make this appendix a mandatory part of the code would need to

specifically list this appendix in its adoption ordinance. In recognition of the fact that some jurisdictions are mandated by applicable state law to employ only persons licensed by the state to perform certain duties, the proposal was drafted as an Appendix.

This proposal would not require fire inspectors or fire plan examiners to have had previous experience in Fire Code enforcement, but would merely require that they possess experience in a related job category. It is not our intent to prohibit a plan review and inspection staff from hiring and training entry level employees. The training of entry level shall be supervised by trained and certified personnel.

This proposal is submitted by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty-five meetings - all open to the public. In 2012, three of the 25 face-to face meetings were held. In addition to the CTC meetings, the CTC established Study Groups (SG) of interested parties for each of the areas of study. These SG's are responsible for reviewing the available information and making recommendations to the CTC. All totaled, the SG's held over 70 conference calls in 2012.

Cost Impact: This code change proposal will not increase the cost of construction.

F345- 13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

APPENDIX K (NEW)-F-BALDASSARRA-CTC

F346 – 13

Appendix K (New), 508.1.5

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Add new text as follows:

APPENDIX K **REQUIREMENTS FOR FIREFIGHTER AIR REPLENISHMENT SYSTEMS**

The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.

SECTION K101 **GENERAL**

K101.1 Scope. Firefighter air replenishment systems (FARS) shall be provided in accordance with this appendix. The adopting ordinance shall specify building characteristics or special hazards that establish thresholds triggering a requirement for the installation of a FARS. The requirement shall be based upon the fire department's capability of replenishing firefighter breathing air during sustained emergency operations. Considerations shall include:

1. Building characteristics, such as number of stories above or below grade plane, floor area, type of construction, and fire-resistance of the *primary structural frame* to allow sustained firefighting operations based on a rating of not less than 2-hours.
2. Special hazards, other than buildings, that require unique accommodations to allow the fire department to replenish firefighter breathing air.
3. Fire department staffing level.
4. Availability of a fire department breathing air replenishment vehicle.

SECTION K102 **DEFINITIONS**

K102.1 Definitions. For the purpose of this appendix, certain terms are defined as follows:

FIREFIGHTER AIR REPLENISHMENT SYSTEM (FARS). A permanently installed arrangement of piping, valves, fittings and equipment to facilitate the replenishment of breathing air in self contained breathing apparatus (SCBA) for firefighters engaged in emergency operations.

SECTION K103 **PERMITS**

K103.1 Permits. Permits shall be required to install and maintain a FARS. Permits shall be in accordance with Sections 103.2 and 103.3.

K103.2 Construction permit. A construction permit is required for installation of or modification to a FARS. The construction permit application shall include documentation of an acceptance and testing plan as specified in Section K105.

K103.3 Operational permit. An operational permit is required to maintain a FARS

SECTION K104
DESIGN AND INSTALLATION

K104.1 Design and installation. A FARS shall be designed and installed in accordance with Sections K104.2 through K104.15.

K104.2 Standards. Firefighter air replenishment systems shall be in accordance with Sections K104.2.1 and K104.2.2.

K104.2.1 Pressurized system components. Pressurized system components shall be designed and installed in accordance with ASME B31.3.

K104.2.2 Air quality. The system shall be designed to convey breathing air complying with NFPA 1989.

K104.3 Design and operating pressure. The minimum design pressure shall be 110 percent of the fire department's normal SCBA fill pressure. The system design pressure shall be marked in an approved manner at the supply connections, and adjacent to pressure gauges on any fixed air supply components. Pressure shall be maintained in the system within five percent of the design pressure.

K104.4 Cylinder refill rate. The FARS shall be capable of refilling breathing air cylinders of a size and pressure used by the fire department at a rate of not less than two empty cylinders in two minutes.

K104.5 Breathing air supply. Where a fire department mobile air unit is available, the FARS shall be supplied by an external mobile air connection in accordance with Section K104.13. Where a fire department mobile air unit is not available, a stored pressure air supply shall be provided in accordance with Section K104.4.1. A stored pressure air supply shall be permitted to be added to a system supplied by an external mobile air connection provided that a means to bypass the stored pressure air supply is located at the external mobile air connection.

K104.5.1. Stored pressure air supply. A stored pressure air supply shall be designed based on NFPA 1901, Chapter 24, except that provisions applicable only to mobile apparatus or not applicable to system design shall not apply. A stored pressure air supply shall be capable of refilling a minimum of fifty empty breathing air cylinders of a size and pressure used by the fire department

K104.5.2. Retrofit of external mobile air connection. A FARS not initially provided with an external mobile air connection due to the lack of a mobile air unit shall be retrofitted with an external mobile air connection if a mobile air unit becomes available. Where an external mobile air connection is provided, a means to bypass the stored pressure air supply shall be located at the external mobile air connection. The retrofit shall be completed not more than 12 months after notification by the fire code official.

K104.6 Isolation valves. System isolation valves that are accessible to the fire department shall be installed on the system riser to allow piping beyond any air cylinder refill panel to be blocked.

K104.7 Pressure relief valve. Pressure relief valves shall be installed at each point of supply and at the top or end of every riser. The relief valve shall meet the requirements of the CGA S-1.3 and shall not be field adjustable. Pressure relief valves shall discharge in a manner that does not endanger personnel who may be in the area. Valves, plugs or caps shall not be installed in the discharge of a pressure relief valve. Where discharge piping is used the end shall not be threaded.

K104.8 Materials and equipment. Pressurized system components shall be listed or approved for their intended use and rated for the maximum allowable design pressure in the system. Piping and fittings shall be stainless steel.

K104.9 Welded connections. Piping connections that are concealed shall be welded.

K104.10 Protection of piping. System piping shall be protected from physical damage in an approved manner.

K104.11 Compatibility. Fittings and connections intended to be used by the fire department shall be compatible with the fire department's equipment.

K104.12 Security. Connections to a FARS shall be safeguarded from unauthorized access in an approved manner.

K104.13 Fill stations. Firefighter air replenishment fill stations shall comply with Section K104.12.1 through K104.12.3.

K104.13.1 Location. Fill stations for refilling breathing air cylinders shall be located as follows:

1. Fill stations shall be provided at the fifth floor above and below the ground level floor and every third floor level thereafter.
2. On floor levels requiring fill stations, one fill station shall be provided adjacent to a required exit stair at a location designated by the Fire Code Official. In buildings required to have three or more exit stairs, additional fill stations shall be provided at a ratio of one fill station for every three stairways.

K104.13.2 Design Fill stations for breathing air cylinders shall be designed to meet the following requirements:

1. Pressure control, A pressure gauge and pressure-regulating devices and controls shall be provided to allow the operator to control the fill pressure and fill rate on each cylinder fill hose.
2. Valves controlling cylinder fill hoses shall be slow operating valves
3. A separate flow restriction device shall be provided on each fill hose.
4. A method shall be provided to bleed each cylinder fill hose.
5. The fill station shall be designed to provide a containment area that 1) fully encloses any cylinder being filled and flexible cylinder fill hoses, and 2) directs the energy from a failure away from personnel. Fill stations shall be designed to prohibit filling of cylinders that are not enclosed within the containment area.

Exception: Where required or approved by the Fire Chief, fill stations providing for the direct refilling of the firefighters' breathing air cylinders using Rapid Intervention Crew/Company Universal Air Connection (RIC/UAC) fittings shall be used in lieu of cylinder fill stations that utilize containment areas.

K104.13.3 Cylinder refill rate. Fill stations shall be capable of simultaneously filling two or more empty breathing air cylinders equivalent to those used by the fire department to their design pressure within two (2) minutes.

K104.14 External mobile air connection. An external mobile air connection shall be provided for fire department mobile air apparatus where required by Section K104.4 to supply the system with breathing air.

K104.14.1 Location. The location of the external mobile air connection shall be accessible to mobile air apparatus and approved by the fire chief.

K104.14.2 Protection from vehicles. A means of vehicle impact protection in accordance with Section 312 shall be provided to protect mobile air connections that are subject to vehicular impact.

K104.14.3 Clear space around connections. A working space of not less than 36 inches (762 mm) in width, 36 inches (914 mm) in depth and 78 inches (1981 mm) in height shall be provided and maintained in front of and to the sides of external mobile air connections.

K104.15 Air monitoring system. An approved air monitoring system shall be provided. The system shall automatically monitor air quality, moisture and pressure on a continual basis. The air monitoring system shall be equipped with a minimum of two content analyzers capable of detecting carbon monoxide, carbon dioxide, nitrogen, oxygen, moisture and hydrocarbons.

K104.15.1 Alarm conditions. The air monitoring system shall transmit a supervisory signal when any of the following levels are detected:

1. Carbon monoxide exceeds 5 ppm
2. Carbon dioxide exceeds 1,000 ppm
3. An oxygen level below 19.5 percent or above 23.5 percent
4. A nitrogen level below 75 percent or above 81 percent
5. Hydrocarbon (condensed) content exceeds 5 milligrams per cubic meter of air
6. The moisture concentration exceeds 24 ppm by volume
7. The pressure falls below 90% of the maintenance pressure specified in Section K104.2

K104.15.2 Alarm supervision, monitoring and notification. The air monitoring system shall be electrically supervised and monitored by an approved supervising station, or when approved, shall initiate audible and visual supervisory signals at a constantly attended location.

K104.15.3 Air quality status display. Air quality status shall be visually displayed at the external mobile air connection required by K104.13.

SECTION K105 **ACCEPTANCE TESTS**

K105.1 Acceptance tests. Upon completion of the installation, a FARS shall be acceptance tested to verify compliance with equipment manufacturers' instructions and design documents. Oversight of the acceptance tests shall be provided by a registered design professional. Acceptance testing shall include the following:

1. A pneumatic test in accordance with ASME B31.3 of the complete system at a minimum test pressure of 110 percent of the system design pressure using oil free dry air, nitrogen or argon shall be conducted.. Test pressure shall be maintained for a minimum of 24 hours. During this test, all fittings, joints and system components shall be inspected for leaks. Any defects in the system or leaks detected shall be documented and repaired.
2. A cylinder filling performance test shall be conducted to verify compliance with the required breathing air cylinder refill rate from the exterior mobile air connection and, where provided, a stored air pressure supply system.
3. The air quality monitoring system shall be tested to verify that: 1) Visual indicators required by Section K104.14.1 function properly, and 2) Supervisory signals are transmitted as required by Section K104.14.2 for each sensor based on a sensor function test.
4. Connections intended for fire department use shall be confirmed as compatible with the fire department's mobile air unit, SCBA cylinders and, where provided, RIC/UAC connections.
5. Air samples shall be taken from not less than two fill stations and submitted to an approved gas analysis laboratory to verify compliance with NFPA 1989. The FARS shall not be placed into service until a written report verifying compliance with NFPA 1989 has been provided to the code official.

SECTION K106 **INSPECTION, TESTING AND MAINTENANCE**

K106.1 Periodic inspection, testing, and maintenance. A FARS shall be continuously maintained in an operative condition and shall be inspected at least annually. At least quarterly, an air sample shall be taken from the system and tested to verify compliance with NFPA 1989. The laboratory test results shall be maintained onsite and readily available for review by the fire code official.

SECTION K107
REFERENCED STANDARDS

ASME B31.3, 2012,	Process Piping K104.2.1, K105.1
CGA S-1.3-2008	Pressure Relief Device Standards – Part 3 Stationary Storage Containers for Compressed Gases K104.7
NFPA 1901-09	Standard for Automotive Fire Apparatus K104.5.1,
NFPA 1989-13	Breathing Air Quality for Fire Emergency Services Respiratory Protection K104.2.2, K105.1, K106.1

Revise as follows:

508.1.5 Required features. The *fire command center* shall comply with NFPA 72 and shall contain the following features:

- 1 through 11. *(No change to current text)*
12. Schematic building plans indicating the typical floor plan and detailing the building core, *means of egress, fire protection systems, firefighter air replenishment system, fire-fighting equipment and fire department access, and the location of fire walls, fire barriers, fire partitions, smoke barriers and smoke partitions.*
13. through 18. *(No change to current text)*

Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

Breathing air is critical for firefighting operations. Historically, fire departments have supplied air bottles by means of a "bottle brigade", whereby firefighters manually transport air bottles up stairways. This is usually accomplished by stationing a firefighter on alternating floors, and each firefighter carries two to four bottles at a time up two floors, passes them to the next firefighter, then goes down two flights of stairs and receives more air bottles from the firefighter stationed below. This process is extraordinarily firefighter intensive, and takes firefighters away from their primary mission of rescue and firefighting. Even when fires are insignificant or controlled by sprinklers, copious amounts of smoke and other combustion byproducts require the use of self contained breathing apparatus (SCBA) for extended periods of time to conduct search, rescue, suppression, and overhaul. These extended missions require a large number of air bottles to be transported to support the operation. Transporting bottles is not the highest and best use of highly trained firefighters – it is a costly solution to a serious problem that can be addressed by installing firefighter breathing air replenishment systems.

Technology exists at this point in time to address the issue using in-building air supply systems. Firefighter Breathing Air Systems were introduced in the late 1980's. These systems are now required in a number of communities throughout the United States, and several hundred systems have been installed and are now operational. The system has been called a "standpipe for air", which is an accurate description. The system consists of stainless steel, high pressure piping that is supplied by on site air storage, fire department air supply units, or both; a few systems have breathing air compressors installed. Air filling stations are then strategically located throughout the building, using either quick fill connections or rupture containment fill stations complying with NFPA 1901. These systems allow firefighters to refill breathing air cylinders inside the fire building, negating the required "bottle brigade", and making more firefighters available for search, rescue, and fire suppression operations.

While not every jurisdiction will necessarily embrace this technology, there is a need to standardize the installation criteria in jurisdictions that determine the systems are needed. It is now being recognized as a basic principle of fire protection that once a community has identified an unacceptable risk that risk mitigation must occur to reduce that risk to a level that allows the fire department to be both efficient and effective in coping with it. Thus, an adoptable appendix to provide guidance to these jurisdictions is appropriate and needed in the International Fire Code. More and more jurisdictions are considering requiring these systems, and guidance from the International Fire Code is needed.

Cost Impact: This code change will add to the cost of construction

Analysis: A review of the standards proposed for inclusion in the code, NFPA 1901-09 and NFPA 1989-08, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013. ASME B31.3-

04 and CGA S1.3 (2005) are currently referenced in the IFC. Updates in year editions will be accomplished by an administrative standards update code change to be heard by the ADM Code Development Committee.

F346-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

APPENDIX K (NEW) #1-F-ZUBIA-FCAC

F347 – 13

Appendix K (New)

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Add new text as follows:

APPENDIX K

HIGH-RISE BUILDINGS - RETROACTIVE AUTOMATIC SPRINKLER REQUIREMENT

SECTION K101

SCOPE

K101.1 Scope. An automatic sprinkler system shall be installed in all existing high-rise buildings in accordance with the installation requirements and compliance schedule of this appendix.

SECTION K102

WHERE REQUIRED

K102.1 High-Rise Buildings. An automatic sprinkler system installed in accordance with Section 903.3.1.1 of the International Fire Code shall be provided throughout existing high-rise buildings.

Exceptions:

1. Airport traffic control towers.
2. Open parking structures.
3. Group U Occupancies.
4. Occupancies in Group F-2.

SECTION K103

COMPLIANCE

K103.1 Compliance Schedule. Building owners shall file a compliance schedule with the fire code official no later than 365 days after the first effective date of this code. The compliance schedule shall not exceed 12 years for an automatic sprinkler system retrofit.

SECTION K104

REFERENCED STANDARDS

ICC IFC-15 International Fire CodeK102.1

Reason: This proposal provides model code text for adoption by jurisdictions that choose to require existing high-rise buildings to be retrofitted with fire sprinklers. It is recognized that not all jurisdictions may choose to or have legal authority to enact a retroactive construction requirement of this nature, so the proposal has been suggested for inclusion in the IFC as an adoptable appendix.

Modern fire and building codes require complete automatic fire sprinkler protection and a variety of other safety features in new high-rise construction. Many older high-rise buildings lack automatic fire sprinkler protection and other basic fire protection features necessary to protect the occupants, emergency responders, and the structure itself. Without complete automatic fire sprinkler protection, fire departments cannot provide the level of protection that high-rise buildings demand.

Existing high-rise buildings that are not protected with fire sprinklers represent a significant hazard to the occupants and firefighters. Additionally, High-Rise fires can significantly impact a communities' infrastructure and the economic viability.

Between 2003 and 2006, there was an average of 13,400 reported structure fires in high-rise buildings annually. These incidents resulted in 62 civilian deaths, 490 civilian injuries, and \$179 million in direct property damage per year. Furthermore, from 1977 to 2009, 25 firefighters died from non-stress related cardiac death during fire suppression operations in high-rise buildings. By their very nature, high-rise fires present unique firefighting challenges that are extremely difficult for firefighters to mitigate without the presence of fire sprinkler systems. Some of these challenges include:

High-rise structure fires require significantly more resources, such as personnel and equipment, to extinguish than do fires in other types of occupancies. This further strains the responding fire department and firefighters.

Due to their height, smoke movement in high-rise structures is very different from that of other structures. Temperature gradients result in varying pressures throughout the structure, which can allow for the rapid, uncontrolled movement of smoke and flame (known as the "stack effect"). By design, exits from high-rise structures are limited. In an emergency, the movement of people out of a building is particularly difficult. A prime example of this hazard is the One Meridian Plaza fire. This fire occurred on the 22nd floor of the 38-story Meridian Bank Building and was reported to the Philadelphia Fire Department on February 23, 1991 at approximately 2040 hours and burned for more than 19 hours. The fire caused three firefighter fatalities and injuries to 24 firefighters. The 12-alarms brought 51 engine companies, 15 ladder companies, 11 specialized units, and over 300 firefighters to the scene. It was the largest high-rise office building fire in modern American history, completely consuming eight floors of the building, and was only controlled only when it reached a floor that was protected by automatic sprinklers. In 1999 the building was torn down amidst a storm of litigation. The HVAC and other utilities in some high-rises service multiple levels and can facilitate the spread of smoke and flame through a building.

Due to the height of the building, response times for the fire department to reach the actual fire itself are extended, contributing to larger fire growth thereby attributing to extensive smoke spread throughout the building.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

Cost Impact: This change will increase the cost of operating an existing High-Rise building.

F347-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

APPENDIX K (NEW) #2-F-ZUBIA-FCAC

F348 – 13

907.2.6.2 (IBC [F] 907.2.6.2); IBC [F] 407.8

Proponent: John Williams, CBO, Chair, ICC Ad Hoc Committee on Health Care (john.williams@doh.wa.gov) and Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee (cbaldassarra@RJAGroup.com)

Revise as follows:

907.2.6.2 (IBC [F] 907.2.6.2) Group I-2. An automatic smoke detection system shall be installed in corridors in Group I-2 Condition 1 ~~nursing homes, long term care facilities, detoxification facilities~~ and spaces permitted to be open to the corridors by Section 407.2. The system shall be activated in accordance with Section 907.4. Group I-2 Condition 2 Hospitals shall be equipped with an automatic smoke detection system as required in Section 407.

Exceptions:

1. Corridor smoke detection is not required in smoke compartments that contain sleeping units where such units are provided with smoke detectors that comply with UL 268. Such detectors shall provide a visual display on the corridor side of each sleeping unit and shall provide an audible and visual alarm at the care provider's station attending each unit.
2. Corridor smoke detection is not required in smoke compartments that contain sleeping units where sleeping unit doors are equipped with automatic door-closing devices with integral smoke detectors on the unit sides installed in accordance with their listing, provided that the integral detectors perform the required alerting function.

IBC [F] 407.8 Automatic fire smoke detection. An automatic smoke detection system shall be installed in corridors in Group I-2 Condition 1 ~~nursing homes, long term care facilities, detoxification facilities~~ and spaces permitted to be open to the corridors by Section 407.2 ~~shall be equipped with an automatic fire detection system.~~ The system shall be activated in accordance with Section 907.4. Group I-2 Condition 2 Hospitals shall be equipped with an automatic smoke detection system as required in Section 407.2 and 407.4.3.

Exceptions:

1. ~~Corridor smoke detection is not required where sleeping rooms in smoke compartments that contain sleeping units where such units are provided with smoke detectors that comply with UL 268. Such detectors shall provide a visual display on the corridor side of each sleeping room and unit and shall provide an audible and visual alarm at the care provider's station attending each unit.~~
2. ~~Corridor smoke detection is not required where sleeping room in smoke compartments that contain sleeping units where sleeping unit doors are equipped with automatic door-closing devices with integral smoke detectors on the unit sides installed in accordance with their listing, provided that the integral detectors perform the required alerting function.~~

Reason: The proposed language in IBC 407.8 and IBC/IFC 907.2.6.2 coordinates with the proposed language automatic smoke detection system requirements in IBC 407.4.3 submitted by the Adhoc Health Care committee during Group A hearings. The intent is also to make the language consistent between the two sections.

This proposal is submitted by the ICC Ad Hoc Committee for Healthcare (AHC). The AHC was established by the ICC Board of Directors to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. The AHC is composed of building code officials, fire code officials, hospital facility engineers, and state healthcare enforcement representatives. The goals of the committee are to ensure that the ICC family of codes appropriately addresses the fire and life safety concerns of a highly specialized and rapidly evolving healthcare delivery system. This process is part of a joint effort between ICC and the American Society for Healthcare Engineering, a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. Since its inception in April 2011, the AHC has held 8 open meetings and over 150 workgroup calls which included members of the AHC as well as any interested party to discuss and debate the proposed changes. All meeting materials and reports are posted on the AHC website at: <http://www.iccsafe.org/cs/AHC/Pages/default.aspx>.

This proposal is being co-sponsored by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

Cost Impact: None

F348-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

407.8-F-BALDASSARRA-WILLIAMS-ADHOC

F349 – 13

3203.4

Proponent: Darren Meyers, P.E., International Energy Conservation Consultants, LLC, representing the Biomass Feedstock Industry Committee on Codes and Standards (dmeyers@ieccode.com)

Revise as follows:

3203.4 Class III commodities. Class III commodities are commodities of wood, paper, natural fiber cloth, or Group C plastics or products thereof, with or without pallets. Products are allowed to contain limited amounts of Group A or B plastics, such as metal bicycles with plastic handles, pedals, seats and tires. Group A plastics shall be limited in accordance with Section 3203.7.4. Examples of Class III commodities include, but are not limited to, the following:

- Aerosol, Level 1 (see Chapter 28)
- Biomass briquettes, bagged, totes and static piles
- Biomass pellets, bagged, totes and static piles
- Charcoal
- Combustible fiberboard
- Cork, baled
- Corn cobs, static piles
- Corn stover, baled and chopped
- Feed, bagged
- Fertilizers, bagged
- Firewood
- Food in plastic containers
- Forest residue, round wood or chipped (branches, bark, cross-cut ends, edgings and treetops)
- Furniture: wood, natural fiber, upholstered, non-plastic, wood or metal with plastic-padded and covered armrests
- Glycol in combustible containers not exceeding 25 percent
- Lubricating or hydraulic fluid in metal cans
- Lumber
- Mattresses, excluding foam rubber and foam plastics
- Noncombustible liquids in plastic containers having a capacity of more than 5 gallons (19 L)
- Paints, oil base, in metal cans
- Paper, waste, baled
- Paper and pulp, horizontal storage, or vertical storage that is banded or protected with *approved* wrap
- Paper in cardboard boxes
- Peanut hulls, bagged, totes and static piles
- Pillows, excluding foam rubber and foam plastics
- Plastic-coated paper food containers
- Plywood
- Rags, baled
- Recovered construction wood
- Rice hulls, bagged, totes and static piles
- Rugs, without foam backing
- Seasonal grasses, baled and chopped
- Straw, baled
- Sugar, bagged
- Wood, baled
- Wood chips, bagged, totes and static piles
- Woody biomass, round wood or chipped (vase-shaped stubby bushes, bamboo, willows; branches, bark and stem wood)
- Wood doors, frames and cabinets
- Wood pellets, bagged, totes and static piles

Yarns of natural fiber and viscose

Reason: The additions clarify that certain “crop-residue” as solid, biomass feedstock as biofuel are appropriately identified as Class III commodities.

The Biomass Feedstock Industry Committee on Codes and Standards (BFICOCs), led by Oak Ridge National Laboratory (ORNL), is an initiative of the Department of Energy Biomass Technologies Office (BTO). As part of the BTO integrated biorefinery efforts, the BFICOCs was assembled to conduct analysis of existing fire and building codes and to prepare proposed code changes designed to facilitate the development of the commercial-scale biomass industry while maintaining a focus on safety. The committee is made up of managers, engineers and code officials from industry, government laboratories, consulting firms, and the American Society of Agricultural and Biological Engineers (ASABE).

Fire codes related to storage, handling, and pre-processing of biomass are based on industries that operate in a significantly different manner than the growing biomass-based energy industry. Applying current research on biomass properties and knowledge of conventional and emerging storage, handling, and pre-processing technologies, the BFICOCs has identified changes in the IFC that benefit both industry and the public.

Cost Impact: The code change proposal will not increase the cost of construction.

F349-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

3203.4-F-MEYERS

F350 – 13

2801.1, 2802.1, 2804.1, 2808.1, 2808.2, 2809.1, 2809.2, 202

Proponent: Darren Meyers, P.E., International Energy Conservation Consultants, LLC, representing the Biomass Feedstock Industry Committee on Codes and Standards (dmeyers@ieccode.com)

Revise as follows:

CHAPTER 28 LUMBER YARDS, AGRO-INDUSTRIAL, SOLID BIOMASS AND WOODWORKING FACILITIES

SECTION 2801 GENERAL

2801.1 Scope. The storage, manufacturing and processing of solid biomass feedstock, timber, lumber, plywood, veneers and agro-industrial byproducts shall be in accordance with this chapter.

SECTION 2802 DEFINITIONS

2802.1 Definitions. The following terms are defined in Chapter 2:

AGRO-INDUSTRIAL.
BIOMASS.
STATIC PILES.
SOLID BIOFUEL.
SOLID BIOMASS FEEDSTOCK.

SECTION 2804 FIRE PROTECTION

2804.1 General. Fire protection in timber and lumber production mills, ~~and~~ plywood and veneer mills, and agro-industrial facilities shall comply with Sections 2804.2 through 2804.4.

SECTION 2808 STORAGE AND PROCESSING OF WOOD CHIPS, HOGGED MATERIAL, FINES, COMPOST, SOLID BIOMASS FEEDSTOCK, AND RAW PRODUCT ASSOCIATED WITH YARD WASTE, AGRO-INDUSTRIAL AND RECYCLING FACILITIES

2808.1 General. The storage and processing of wood chips, hogged materials, fines, compost, solid biomass feedstock and raw product produced from yard waste, debris, agro-industrial and recycling facilities shall comply with Sections 2808.2 through 2808.10.

2808.2 Storage site. Storage sites shall be level and on solid ground, elevated soil lifts or other all-weather surface. Sites shall be thoroughly cleaned before transferring wood products to the site.

SECTION 2809 EXTERIOR STORAGE OF FINISHED LUMBER AND SOLID BIOFUEL PRODUCTS

2809.1 General. Exterior storage of finished lumber and solid biofuel products shall comply with Sections 2809.1 through 2809.5.

2809.2 Size of piles. Exterior ~~lumber~~ storage shall be arranged to form stable piles with a maximum height of 20 feet (6096 mm). Piles shall not exceed 150,000 cubic feet (4248 m³) in volume.

2809.3 Fire apparatus access roads. Fire apparatus access roads in accordance with Section 503 shall be located so that a maximum grid system unit of 50 feet by 150 feet (15 240 mm by 45 720 mm) is established.

2809.4 Security. Permanent ~~lumber~~ storage areas shall be surrounded with an *approved* fence. Fences shall be a minimum of 6 feet (1829 mm) in height.

Exceptions:

1. Lumber piles inside of buildings and production mills for lumber, plywood and veneer.
2. Solid biofuel piles inside of buildings and agro-industrial processing facilities for solid biomass feedstock.

2809.5 Fire protection. An *approved* hydrant and hose system or portable fire-extinguishing equipment suitable for the fire hazard involved shall be provided for open storage yards. Hydrant and hose systems shall be installed in accordance with NFPA 24. Portable fire extinguishers complying with Section 906 shall be located so that the travel distance to the nearest unit does not exceed 75 feet (22 860 mm).

SECTION 202 GENERAL DEFINITIONS

AGRO-INDUSTRIAL. Technologies, methods and associated machinery used in transforming raw agricultural products into intermediate or consumable products.

BIOMASS. Plant or animal-based material of biological origin, including but not limited to materials originating from arboriculture, agriculture, aquaculture, horticulture and forestry, excluding material embedded in geological formations or transformed into fossil.

STATIC PILES. Piles in which processed wood product or solid, biomass feedstock is mounded and is not being turned or moved.

SOLID BIOFUEL. Densified biomass made with or without additives in the form of cubiform, polyhedral, polyhydric or cylindrical units, produced by compressing milled biomass.

SOLID BIOMASS FEEDSTOCK. The basic materials, including agricultural residues, including but not limited to corn cobs, corn stover, rice hulls, and peanut hulls; herbaceous crops, including but not limited to warm- and cool-seasonal grasses; forest residue, including but not limited to branches, bark, cross-cut ends, edgings and treetops; short-rotation woody crops, including but not limited to vase-shaped stubby bushes, bamboo, willows with five to ten-year rotations and their branches, bark and stem wood; agricultural waste, including but not limited to garden or park waste, grass or flower cuttings and hedge trimmings; and dried manure; from which biofuel is comprised, manufactured or made.

Reason: The proposed language facilitates fire control and reduces exposures to and from facilities storing and processing “crop-residue” as solid biomass feedstock for biofuel production.

The Biomass Feedstock Industry Committee on Codes and Standards (BFICOCS), led by Oak Ridge National Laboratory (ORNL), is an initiative of the Department of Energy Biomass Technologies Office (BTO). As part of the BTO integrated biorefinery efforts, the BFICOCS was assembled to conduct analysis of existing fire and building codes and to prepare proposed code changes designed to facilitate the development of the commercial-scale biomass industry while maintaining a focus on safety. The committee is made up of managers, engineers and code officials from industry, government laboratories, consulting firms, and the American Society of Agricultural and Biological Engineers (ASABE).

Fire codes related to storage, handling, and pre-processing of biomass are based on industries that operate in a significantly different manner than the growing biomass-based energy industry. Applying current research on biomass properties and knowledge of conventional and emerging storage, handling, and pre-processing technologies, the BFICOCS has identified changes in the IFC that benefit both industry and the public.

Cost Impact: The code change proposal will not increase the cost of construction.

F350-13

Public Hearing: Committee:
Assembly:

AS
ASF

AM
AMF

D
DF

2801.1-F-MEYERS

FG1– 13

IFGC [F] 413.2.3, IFGC [F] 413.3, IFGC [F] 413.4

Proponent: James Ranfone, American Gas Association (jranfone@aga.org)

Revise as follows:

IFGC [F] 413.2.3 General. Residential fueling *appliances* shall be *listed*. ~~The capacity of a residential fueling appliance shall not exceed 5 standard cubic feet per minute (0.14 standard cubic meter/min) of natural gas.~~

IFGC [F] 413.3 Location of dispensing operations and equipment. Compression, storage and dispensing *equipment* shall be located above ground ~~outside outdoors~~.

Exceptions:

1. Compression, storage or dispensing *equipment* is allowed in buildings of noncombustible construction, as set forth in the *International Building Code*, that are unenclosed for three-quarters or more of the perimeter.
2. Compression, storage and dispensing *equipment* is allowed to be located indoors or in vaults in accordance with the *International Fire Code*.
3. Residential fueling *appliances* and *equipment* in accordance with Section 413.4, ~~shall be allowed to be installed indoors in accordance and the equipment manufacturer's instructions and Section 413.4.3.~~

IFGC [F] 413.4 Residential fueling appliance installation. Residential fueling *appliances* shall be installed in accordance with Sections 413.4.1 through 413.4.3.

IFGC [F] 413.4.2 Outdoor installation. Residential fueling *appliances* located outdoors shall be listed for outdoor installation and installed in accordance with the *appliance* manufacturer's instructions. Residential fueling *appliances* located outdoors shall be installed on a firm, noncombustible base.

IFGC [F] 413.4.3 Indoor installation. Residential fueling *appliances* located indoors shall be listed for indoor installation and installed in accordance with the *appliance* manufacturer's instructions. ~~Where located indoors,~~ Residential fueling *appliances* shall be vented to the outdoors. A gas detector set to operate at one-fifth of the lower limit of flammability of natural gas shall be installed in the room or space containing the *appliance*. The detector shall be located within 6 inches (152 mm) of the highest point in the room or space. The detector shall stop the operation of the *appliance* and activate an audible or visual alarm.

Reason: Residential fueling of natural gas vehicles represents a nationally-important opportunity to increase adoption of natural gas passenger cars and other light duty vehicles. Natural gas promises to be a major contributor toward reducing U. S. dependence upon foreign oil and petroleum products and making use of abundant, low cost U. S. natural gas supplies, the development of which is adding significantly to the recovery of U. S. economy.

However, the current text in IFGC Section 413.2.3 is inconsistent with modern approaches and gas flow rates being proposed for vehicle residential fueling by arbitrarily restricting residential fueling appliances to a gas flow rate of 5 standard cubic feet (of natural gas) per minute (scfm). Current research and technology development programs are targeting delivering natural gas at higher flow rates, especially at the initiation of the fueling cycle, to achieve practical vehicle refueling rates. A wide variety of technologies and commercial interests are focused on approaches for which the 5 scfm flow rate limitation would represent a technology barrier.

The current 5 scfm flow rate limitation in Section 413.2.3 raises a number of issues, including whether it is a reasonable, meaningful, or enforceable limit:

- The 5 scfm flow rate limit, if inferred as a potential leakage limit to an indoor garage or other space, is provided without a release time duration or profile, which would be required to determine how such a leak would present flammability hazards. As such, a 5 scfm limitation appears arbitrary and incomplete.
- Detailed fault tree analysis, failure modes and effects analysis, and computational fluid dynamics analysis of residential fueling appliance releases conducted by TIAx in 2004 showed that leak rates from various release scenarios and median residential garage air tightnesses and ventilation rates should be below 1 scfm to maintain steady state gas-in-air concentrations below

combustible levels. The TIAX analysis suggests that a 5 scfm flow rate, when inferred as a potential leak rate, may be unsafe with respect combustion hazards in residential garages from releases from the vehicle fueling appliance and dispenser hose, as well as from the onboard vehicle fuel system.

- The 5 scfm flow limit may not be enforceable by code authorities, particularly if the listing standard (which is undefined by the current code language) does not readily provide a code official with gas flow information.
- Review of ICC records suggests that according to the 2006 ICC Code Commentary the 5 scfm limit as well as other technical provisions of Section 413 were adopted for consistency with National Fire Protection Association (NFPA) Standard 52 and based on flow rates for residential fueling appliances available at that time. NFPA Standard 52 records show that the flow rate was adopted in the 1988 standard cycle, but no specific technical justification for the flow rate limitation was provided.

Since requirements in Section 413.2.3 apply to the residential refueling appliance and specifically require it to be listed, leakage prevention and mitigation is most properly addressed in the listing standard. The proponent of this code change and a vast array of other organizations have convened a Technical Advisory Group (TAG) to draft a national consensus standard under the American National Standards Institute (ANSI) processes of CGA Group, an ANSI- recognized standards development organization (SDO) for natural gas vehicle standards. Completion of the standard is expected between 18 and 24 months from the submission date of this proposal.

The ANSI standard development activity is directly addressing the requirement in Section 413.2.3 for the residential fueling appliance to be listed and is addressing prevention and mitigation of leak hazards consistent with the 2004 TIAX analysis for critical leaks relevant to indoor refueling operations. In doing so, the ANSI standard is addressing the intent of the 5 scfm gas flow limitation but is based on preventing and mitigation releases must more conservatively than the current flow limitation approach. Leak mitigation is being included in the standard through a variety of performance-based automatic and redundant means and verified in standards-based methods of test in the design certification process. Since the ANSI process is open and invites public review, the adequacy and appropriateness of the listing requirements and methods of test a open to public input from all stakeholders and expertise. Therefore, the basis for leak prevention and mitigation will be likewise open to public review and comment.

Changes proposed to Section 413.4 address the lack of differentiation of residential fueling appliances designed for outdoor and indoor installation. The new language directs the authority having jurisdiction to the specific listing for outdoor or indoor installation and associated listing requirements for those environments, including leak prevention and hazard mitigation, environmental conditions, and other requirements for germane to the installation location. The proposed language is consistent with current direction in development of the ANSI standard, which makes this differentiation and applies relevant requirements to the appliance design certification.

Cost Impact: None.

FG1-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

[F] 413.2.3-FG-RANFONE

G1 – 13

IBC [F] 307.1

Proponent: Maureen Traxler, City of Seattle, WA representing Washington Association of Building Officials (Maureen.Traxler@seattle.gov)

Revise as follows:

IBC [F] 307.1 High-hazard Group H. High-hazard Group H occupancy includes, among others, the use of a building or structure, or a portion thereof, that involves the manufacturing, processing, generation or storage of materials that constitute a physical or health hazard in quantities in excess of those allowed in *control areas* complying with Section 414, based on the maximum allowable quantity limits for *control areas* set forth in Tables 307.1(1) and 307.1(2). Hazardous occupancies are classified in Groups H-1, H-2, H-3, H-4 and H-5 and shall be in accordance with this section, the requirements of Section 415 and the *International Fire Code*. Hazardous materials stored, or used on top of roofs or canopies shall be classified as outdoor storage or use and shall comply with the *International Fire Code*.

Exceptions: The following shall not be classified as Group H, but shall be classified as the occupancy that they most nearly resemble.

1. Buildings and structures occupied for the application of flammable finishes, provided that such buildings or areas conform to the requirements of Section 416 and the *International Fire Code*.
2. Wholesale and retail sales and storage of flammable and combustible liquids in mercantile occupancies conforming to the *International Fire Code*.
3. Closed piping system containing flammable or combustible liquids or gases utilized for the operation of machinery or equipment.
4. Cleaning establishments that utilize combustible liquid solvents having a flash point of 140°F (60°C) or higher in closed systems employing equipment *listed* by an *approved* testing agency, provided that this occupancy is separated from all other areas of the building by 1-hour *fire barriers* constructed in accordance with Section 707 or 1-hour *horizontal assemblies* constructed in accordance with Section 711, or both.
5. Cleaning establishments that utilize a liquid solvent having a flash point at or above 200°F (93°C).
6. Liquor stores and distributors without bulk storage.
7. The storage of distilled spirits and wines in wooden barrels and casks
- ~~78.~~ Refrigeration systems.
- ~~89.~~ The storage or utilization of materials for agricultural purposes on the premises.
- ~~910.~~ Stationary batteries utilized for facility emergency power, uninterruptable power supply or telecommunication facilities, provided that the batteries are provided with safety venting caps and *ventilation* is provided in accordance with the *International Mechanical Code*.
- ~~4011~~ Corrosives shall not include personal or household products in their original packaging used in retail display or commonly used building materials.
- ~~4412.~~ Buildings and structures occupied for aerosol storage shall be classified as Group S-1, provided that such buildings conform to the requirements of the *International Fire Code*.
- ~~4213.~~ Display and storage of nonflammable solid and nonflammable or noncombustible liquid hazardous materials in quantities not exceeding the maximum allowable quantity per *control area* in Group M or S occupancies complying with Section 414.2.5.
- ~~4314.~~ The storage of black powder, smokeless propellant and small arms primers in Groups M and R-3 and special industrial explosive devices in Groups B, F, M and S, provided such storage conforms to the quantity limits and requirements prescribed in the *International Fire Code*.

Reason: IFC Section 5001.1 has an exception providing that "The storage of distilled spirits and wines in wooden barrels and casks" is not required to comply with the chapter's general requirements for hazardous materials. IFC Section 5701.2 states that

Chapter 57's provisions for flammable and combustible liquids do not apply to "The storage of distilled spirits and wines in wooden barrels and casks". Similarly, Chapter 9 of NFPA 30-2012 Flammable and Combustible Liquids Code, exempts the storage of distilled spirits and wines in wooden barrels or casks from the general requirements for storage of liquids in containers. However, the Building Code classifies that same storage as an H-3 occupancy. It is inconsistent for the Building Code to classify an occupancy as a hazardous occupancy due to the presence of this type of storage if none of the mitigation measures are required by the Fire Code. The IFC exempts storage of spirits in wooden containers from all the IBC provisions that would otherwise apply. For example, IBC Section 415.4 requires sprinklers for all Group H occupancies—IFC Section 5004.5 requires sprinklers in indoor storage, but storage of spirits in wooden containers is not required to comply because it is exempt from Chapter 50. Adding this exception to the list of exceptions in IBC section 307.1 will eliminate this inconsistency between the codes and will eliminate unnecessary confusion about how to classify such uses and apply the IBC provisions.

Cost Impact: The code change will not increase the cost of construction.

G1-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

[F] 307.1 #1-G-TRAXLER

G2 – 13

IBC [F] 307.1

Proponent: William E. Koffel, P.E., Koffel Associates, Inc., representing American Pyrotechnics Association (APA) (wkoffel@koffel.com)

Revise as follows:

IBC [F] 307.1 High-hazard Group H. High-hazard Group H occupancy includes, among others, the use of a building or structure, or a portion thereof, that involves the manufacturing, processing, generation or storage of materials that constitute a physical or health hazard in quantities in excess of those allowed in *control areas* complying with Section 414, based on the maximum allowable quantity limits for *control areas* set forth in Tables 307.1(1) and 307.1(2). Hazardous occupancies are classified in Groups H-1, H-2, H-3, H-4 and H-5 and shall be in accordance with this section, the requirements of Section 415 and the *International Fire Code*. Hazardous materials stored, or used on top of roofs or canopies shall be classified as outdoor storage or use and shall comply with the *International Fire Code*.

Exceptions: The following shall not be classified as Group H, but shall be classified as the occupancy that they most nearly resemble.

1 through 13 (*No change to current text*)

14. Retail sales of consumer fireworks in Group M occupancies in accordance with the requirements of Section 5601.1.3 of the *International Fire Code* and NFPA 1124.

Reason: Chapter 7 of NFPA 1124 provides requirements for both new and existing facilities in which consumer fireworks are sold. The intent is to reduce the risk to that comparable to occupants within other mercantile occupancies. Some of the requirements include:

- Limitations on the use of aerial devices
- Automatic sprinkler protection when in excess of 3000 sq ft for new, 7500 sq ft for existing
- Fire alarm system
- Separation distances
- 75 ft travel distance with no dead ends and in most instances a requirement for three exits
- Increased egress capacity factor
- Minimum four foot aisles
- Flame breaks
- Fuse covers
- Maximum shelf height
- Limitations on the proximity the consumer fireworks may be to an exit

Full scale fire tests have demonstrated the effectiveness of the fuse cover requirement to greatly decrease the likelihood of ignition and the growth of a fire, should one occur.

Cost Impact: None since it provides another compliance alternative

G2-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

[F] 307.1-G-KOFFEL

G3 – 13

IBC [F] 307.1; IBC [F] 307.1.1 (New)

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee
(bajnaic@chesterfield.gov)

Revise as follows:

IBC [F] 307.1 High-hazard Group H. High-hazard Group H occupancy includes, among others, the use of a building or structure, or a portion thereof, that involves the manufacturing, processing, generation or storage of materials that constitute a physical or health hazard in quantities in excess of those allowed in control areas complying with Section 414, based on the maximum allowable quantity limits for control areas set forth in Tables 307.1(1) and 307.1(2). Hazardous occupancies are classified in Groups H-1, H-2, H-3, H-4 and H-5 and shall be in accordance with this section, the requirements of Section 415 and the International Fire Code. Hazardous materials stored, or used on top of roofs or canopies shall be classified as outdoor storage or use and shall comply with the International Fire Code.

Exceptions: The following **IBC [F] 307.1.1 Uses other than Group H.** The storage, use or handling of hazardous materials as described in one or more of the following items shall not cause the occupancy to be classified as Group H, but shall be classified as the occupancy that they most nearly resemble:

1. Buildings and structures occupied for the application of flammable finishes, provided that such buildings or areas conform to the requirements of Section 416 and the International Fire Code.
2. Wholesale and retail sales and storage of flammable and combustible liquids in mercantile occupancies conforming to the International Fire Code.
3. Closed piping system containing flammable or combustible liquids or gases utilized for the operation of machinery or equipment.
4. Cleaning establishments that utilize combustible liquid solvents having a flash point of 140°F (60°C) or higher in closed systems employing equipment listed by an approved testing agency, provided that this occupancy is separated from all other areas of the building by 1-hour fire barriers constructed in accordance with Section 707 or 1-hour horizontal assemblies constructed in accordance with Section 711, or both.
5. Cleaning establishments that utilize a liquid solvent having a flash point at or above 200°F (93°C).
6. Liquor stores and distributors without bulk storage.
7. Refrigeration systems.
8. The storage or utilization of materials for agricultural purposes on the premises.
9. Stationary batteries utilized for facility emergency power, uninterruptable power supply or telecommunication facilities, provided that the batteries are provided with safety venting caps and ventilation is provided in accordance with the *International Mechanical Code*.
10. Corrosive ~~s shall not include~~ personal or household products in their original packaging used in retail display, ~~or~~
11. Commonly used corrosive building materials.
- ~~11.~~ 12. Buildings and structures occupied for aerosol storage shall be classified as Group S-1, provided that such buildings conform to the requirements of the *International Fire Code*.
- ~~12-13.~~ 13. Display and storage of nonflammable solid and nonflammable or noncombustible liquid hazardous materials in quantities not exceeding the maximum allowable quantity per control area in Group M or S occupancies complying with Section 414.2.5.
- ~~13-14.~~ 14. The storage of black powder, smokeless propellant and small arms primers in Groups M and R-3 and special industrial explosive devices in Groups B, F, M and S, provided such storage conforms to the quantity limits and requirements prescribed in the *International Fire Code*.

[F] 307.1.1 307.1.2 Hazardous materials. Hazardous materials in any quantity shall conform to the requirements of this code, including Section 414, and the *International Fire Code*.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

This proposal takes a long "exception list" and turns the language into a positive statement list of hazardous material activities that would not be classified as a High Hazard Group occupancy.

Cost Impact: This proposal will not increase the cost of construction.

G3-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

[F] 307.1-G-BAJNAI-BCAC

G4 – 13

IBC [F] 403.3.2 (IFC 914.3.1.2)

Proponent: Jeffrey M. Shapiro, International Institute of Ammonia Refrigeration
(jeff.shapiro@intlcodeconsultants.com)

Revise as follows:

IBC [F] 403.3.2 (IFC 914.3.1.2) Water supply to required fire pumps. In buildings that are more than 420 feet (128 m) in building height, required fire pumps shall be supplied by connections to no fewer than two water mains located in different streets. Separate supply piping shall be provided between each connection to the water main and the pumps. Each connection and the supply piping between the connection and the pumps shall be sized to supply the flow and pressure required for the pumps to operate.

Exception: Two connections to the same main shall be permitted provided the main is valved such that an interruption can be isolated so that the water supply will continue without interruption through no fewer than one of the connections.

Reason: The text in this section originated with Proposal G46-07/08. That proposal was accepted based on a public comment that had a reason statement that began with "*The purpose of this public comment is to increase the reliability of fire sprinkler systems in very tall buildings, those that exceed 420 feet in height, by requiring a minimum of two risers for each sprinkler zone and pumps to be supplied by a minimum of two connections to the municipal distribution system.*" Although Section 403.3.1, which was also created by the same public comment included the 420 foot threshold, the threshold was clearly overlooked in the text of 403.3.2. The text as written technically applies to any high-rise building, which comes at very significant cost, yet there is no documented justification as a basis for applying the code in that manner. The proposed revision resolves the apparent oversight in the current code text.

Cost Impact: The code change proposal will not increase the cost of construction.

G4-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

[F] 403.3.2-G-SHAPIRO

G5 – 13

IBC [F] 414.3

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee
(bajnaic@chesterfield.gov)

Revise as follows:

IBC [F] 414.3 Ventilation. Rooms, areas or spaces of Group H in which explosive, corrosive, combustible, flammable or highly toxic dusts, mists, fumes, vapors or gases are or may be emitted due to the processing, use, handling or storage of materials shall be mechanically ventilated as where required by this code, the *International Fire Code* or and the *International Mechanical Code*.

~~Ducts conveying explosives or flammable vapors, fumes or dusts shall extend directly to the exterior of the building without entering other spaces. Exhaust ducts shall not extend into or through ducts and plenums.~~

Exception: ~~Ducts conveying vapor or fumes having flammable constituents less than 25 percent of their lower flammable limit (LFL) are permitted to pass through other spaces.~~

Emissions generated at workstations shall be confined to the area in which they are generated as specified in the International Fire Code and the International Mechanical Code.

~~The location of supply and exhaust openings shall be in accordance with the *International Mechanical Code*. Exhaust air contaminated by *highly toxic* material shall be treated in accordance with the *International Fire Code*.~~

~~A manual shutoff control for ventilation equipment required by this section shall be provided outside the room adjacent to the principal access door to the room. The switch shall be of the break-glass type and shall be labeled: VENTILATION SYSTEM EMERGENCY SHUTOFF.~~

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

This proposal clarifies that ventilation may be required when hazardous materials are handled regardless of whether the activity is located in a H Group. The proposal also eliminates language that is covered by the IMC for the design and installation of the exhaust systems.

Note that this section does not trigger the installation of the exhaust systems, it refers to the IBC, IFC and IMC for those triggers such as: IBC [F] 415.8.2.7, IBC [F] 415.10.1.6, IBC [F] 415.10.5.8, IMC 502.1, IMC 502.2 – IMC 502.17, IFC 2105.2.3, IFC 2106.3.3, IFC 5003.8.4.2, IFC 5003.8.5.2, and IFC 5004.3 as a few examples.

Cost Impact: This proposal will not increase the cost of construction.

G5-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

[F] 414.3-G-BAJNAI-BCAC

G6 – 13

IBC [F] 414.5, IBC [F] 414.6, IBC [F] 414.7

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Revise as follows:

IBC [F] ~~414.5~~ 415.6 Inside storage, dispensing and use. The inside storage, dispensing and use of hazardous materials shall be in accordance with Sections ~~414.5.1~~ 415.6.1 through ~~414.5.4~~ 415.6.3 of this code and the *International Fire Code*.

IBC [F] ~~414.5.1~~ 415.6.1 Explosion control. (No change to current text)

IBC [F] Table ~~414.5.1~~ 415.6.1 Explosion Control Requirements (No change to current text)

IBC [F] 414.5.2 Monitor control equipment. (No change to current text)

IBC [F] ~~414.5.3~~ 415.6.2 Emergency or standby power. (No change to current text)

IBC [F] ~~414.5.4~~ 415.6.3 Spill control, drainage and containment. Rooms, buildings or areas occupied for the storage or use of solid and liquid hazardous materials shall be provided with a means to control spillage and to contain or drain off spillage and fire protection water discharged in the storage area where required in the *International Fire Code*. The methods of spill control shall be in accordance with the *International Fire Code*.

IBC [F] 414.6 Outdoor storage, dispensing and use. (No change to current text)

IBC [F] 414.6.1 Weather protection. (No change to current text)

IBC [F] 414.6.1.1 Walls. (No change to current text)

IBC [F] 414.6.1.2 Separation distance. (No change to current text)

IBC [F] 414.6.1.3 Noncombustible construction. (No change to current text)

IBC [F] ~~414.7~~ 415.7 Emergency alarms. (No change to current text)

IBC [F] ~~414.7.1~~ 415.7.1 Storage. (No change to current text)

IBC [F] ~~414.7.2~~ 415.7.2 Dispensing, use and handling. (No change to current text)

IBC [F] ~~414.7.3~~ 415.7.3 Supervision. (No change to current text)

(Renumber subsequent sections)

Reason: The above sections apply only to Group H occupancies. Section 414 contains requirements which apply to all hazardous materials. Section 415 contains the requirements which apply to Group H occupancies, where the MAQ has been exceeded.

Even the text in these sections state that they only apply to Group H occupancies. For example, Section 414.5.1 starts off by saying;

"Explosion control shall be provided in accordance with the International Fire Code as required by Table 414.5.1 **where quantities of hazardous materials specified in that table exceed the maximum allowable quantities in Table 307.1(1)**..."

Therefore, all of these sections are relocated into Section 415. The only two changes in text occur in Section 415.6 and 415.6.3. Section 415.6 contains an editorial revision so that it references the correct relocated sections. Section 415.6.3 is revised to include the term 'use' in addition to 'storage'. This section addresses spill control and secondary containment. Spill control is required in

areas of 'use'. Secondary containment is required in areas of 'storage' and 'use'. Therefore, including the term 'use' just correlates this section with the rest of the code.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

Cost Impact: This code change will not increase the cost of construction

G6-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

[F] 414.5-G-ZUBIA-FCAC

G7 – 13

IBC [F] 414.5.2

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azubiamia@yahoo.com)

Delete without substitution:

~~IBC [F] 414.5.2 Monitor control equipment.~~ ~~Monitor control equipment shall be provided where required by the International Fire Code.~~

(Renumber subsequent sections)

Reason: Section 414.5.2 refers to regulations in the IFC for application to “monitor control equipment”. The term “monitor control equipment” is not used in the IFC as suggested by this reference to the IFC.

This IBC section is referring to a term that is not utilized, therefore, this section is proposed to be deleted. The term is not used and do not relate to building construction requirements.

Process control equipment is already addressed in the IFC and the provisions in the IFC cover these items. The proposal eliminates the confusion which occurs when the user refers to the IFC and finds nothing specified for ‘monitor control equipment’. Deleting this section does not eliminate any of the requirements.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

Cost Impact: This code change will not increase the cost of construction

G7-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

[F] 414.5.2-G-ZUBIA-FCAC

G8 – 13

IBC [F] 414.7, [F] 414.7.1, [F] 414.7.2, [F] 414.7.3

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee
(bajnaic@chesterfield.gov)

Revise as follows:

IBC [F] 414.7 ~~415.5~~ Emergency alarms. Emergency alarms for the detection and notification of an emergency condition in Group H occupancies shall be provided as set forth herein.

IBC [F] ~~414.7.1~~ 415.5.1 Storage. An approved manual emergency alarm system shall be provided in buildings, rooms or areas used for storage of hazardous materials. Emergency alarm-initiating devices shall be installed outside of each interior exit or exit access door of storage buildings, rooms or areas. Activation of an emergency alarm-initiating device shall sound a local alarm to alert occupants of an emergency situation involving hazardous materials.

IBC [F] ~~414.7.2~~ 415.5.2 Dispensing, use and handling. Where hazardous materials having a hazard ranking of 3 or 4 in accordance with NFPA 704 are transported through corridors, interior exit stairways or ramps, or exit passageways there shall be an emergency telephone system, a local manual alarm station or an approved alarm-initiating device at not more than 150-foot (45 720 mm) intervals and at each exit and exit access doorway throughout the transport route. The signal shall be relayed to an approved central, proprietary or remote station service or constantly attended on-site location and shall initiate a local audible alarm.

IBC [F] ~~414.7.3~~ 415.5.3 Supervision. Emergency alarm systems shall be supervised by an approved central, proprietary or remote station service or shall initiate an audible and visual signal at a constantly attended on-site location.

(Renumber subsequent sections)

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

The scope of Section 414 applies to all buildings and structures where hazardous materials are present.

[F] 414.1 General. *The provisions of Sections 414.1 through 414.7 shall apply to buildings and structures occupied for the manufacturing, processing, dispensing, use or storage of hazardous materials.*

However, current Section 414.5 only applies to Group H occupancies. For clarification the section is proposed to be relocated to Section 415 which is the portion of the IBC that applies to H Group occupancies.

Cost Impact: This proposal will not increase the cost of construction.

G8-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

[F] 414.7-G-BAJNAI-BCAC

G9 –13

IBC [F] 415.6

Proponent: Homer Maiel, PE, CBO, Town of Atherton (CA), representing ICC Tri-Chapter (Peninsula, East Bay, Monterey Bay)

Revise as follows:

IBC [F] 415.6 Special provisions for Group H-1 occupancies. Group H-1 occupancies shall be in ~~buildings used for no other purpose, shall not exceed one story in height and be without basements, crawl spaces or other under floor spaces.~~ detached buildings. Roofs shall be of lightweight construction with suitable thermal insulation to prevent sensitive material from reaching its decomposition temperature. Group H-1 occupancies containing materials that are in themselves both physical and health hazards in quantities exceeding the maximum allowable quantities per *control area* in Table 307.1(2) shall comply with requirements for both Group H-1 and H-4 occupancies.

Reason: This is only an editorial change. The entire stricken out portion is the definition for “detached buildings”. Hence replacing it with “detached buildings”

Cost Impact: This code change will not increase the cost of construction.

G9-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

[F] 415.6-G-MAIEL.doc

G10 – 11

IBC [F] 415.7.1

Proponent: Homer Maiel, PE, CBO, Town of Atherton (CA), representing ICC Tri-Chapter (Peninsula, East Bay, Monterey Bay)

Delete without substitution as follows:

~~**IBC [F] 415.7.1 Detached buildings.** Detached buildings shall not exceed one story in height and shall be without basements, crawl spaces or other under-floor spaces.~~

Reason: Since this section is already covered in Chapter 2 as a definition, there is no need to be repeated here.

Cost Impact: This code change will not increase the cost of construction.

G10-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

[F] 415.7-G-MAIEL.doc

G11 – 13

IBC [F] 415.7.5

Proponent: Tony Crimi, A.C. Consulting Solutions Inc, representing North American Insulation Manufacturers Association (NAIMA) (tcrimi@sympatico.ca)

Add new text as follows:

IBC [F] 415.7.5. Noncombustible Roof Insulation. Roof insulation for Group H-2, H-3 or H-4 occupancies shall comply with the requirements for Class NC (noncombustible core) in accordance with the requirements of FM 4470.

(Renumber subsequent sections.)

Reason: This proposal introduces a new type class of non-combustible roof insulation products which are specifically evaluated for a higher level of resistance to ignition based upon testing and conformance with the current edition of FM 4470 Approval Standard for Single-Ply, Polymer-Modified Bitumen Sheet, Built-Up Roof (BUR) and Liquid Applied Roof Assemblies. It does not preclude the use of other roof insulation materials. This proposal does not preclude the use of other roof insulation materials. It merely recognizes that in order for a roof insulation to be considered non-combustible, it needs to comply with the new FM 4470 standard.

There is a long history of losses connected with fires in roofing materials and roof coverings. According to NFPA statistics, an average of 4,200 fires starting with exterior roof coverings, surfaces or finishes made of sawn wood occurred per year during the five year period from 1994 through 1998. These fires caused an average of five civilian deaths, 23 civilian injuries and an estimated \$7.0 million in direct property damage per year. During this time period, these fires accounted for 0.7% of the 567,100 total reported structure fires, 0.1% of the 3,744 civilian structure fire deaths, 0.1% of the 21,293 civilian structure fire injuries, and 1.1% of the \$7.2 billion in direct property damage. These totals exclude from the analysis fires where the roof covering was recorded as composed of hardboard, plywood, fiberboard or wood pulp, as these products are considered more likely to refer to decking or framing, rather than to shingles and covering. Also excluded are fires where the roof covering was recorded as growing wood, felled but unsawn wood, wood shavings, or unclassified or unknown-type wood. More importantly, this analysis excludes fires that begin with some other fuel but grow and spread primarily through secondary involvement of wooden roof coverings. Such fires cannot be identified in existing national databases.¹

The roof insulation is one of the most vulnerable parts of a building. Group H buildings are designed to address hazards beyond the other occupancies to provide minimum regulations intended to mitigate the risk to life and structures.

¹ Marty Ahrens, NFPA Report, Wood Shingle or Wood Shake Roof Fires, Statistical Analysis, July 2001

Cost Impact: This proposal will not increase the cost of construction.

Analysis: FM 4470 (1992) is currently referenced in the IBC. Updates in the year edition will be accomplished by an administrative standards update code change to be heard by the ADM Code Development Committee.

G11-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

[F] 415.7.5-(NEW)-G-CRIMI

G12 – 13

IBC [F] 415.10.3.2, IBC [F] 415.10.5.8

Proponent: Patrick A. McLaughlin McLaughlin & Associates, representing the Semiconductor Industry Association (pmclaugma@aol.com)

Revise as follows:

IBC [F] 415.10.3.2 Mechanical ventilation. *Service corridors* shall be mechanically ventilated as required by Section 415.10.1.6 or at not less than six air changes per hour, ~~whichever is greater.~~

IBC [F] 415.10.5.8 Ventilation. Mechanical exhaust *ventilation* shall be provided in liquid storage rooms, HPM rooms and gas rooms at the rate of not less than 1 cubic foot per minute per square foot (0.044 L/s/m²) of floor area or six air changes per hour, ~~whichever is greater, for categories of material.~~

Exhaust *ventilation* for gas rooms shall be designed to operate at a negative pressure in relation to the surrounding areas and direct the exhaust *ventilation* to an exhaust system.

Reason: The six air changes per hour was developed assuming a maximum ceiling height of 10 feet. Currently some of the rooms have ceiling height in excess of 25 feet. There is no justification for the air movement that is required to reach the 6 air changes per hour. The NPFA handbook ventilation discussion states "NFPA 30 allows the use of the traditional approach of 1 cfm of ventilation per square foot (0.3 m3/min/m2) of floor area. This is based on an old, but very effective, rule of thumb: areas where liquids are used should be ventilated at a rate of six air changes per hour. However, most industrial facilities are high-ceilinged; six air changes per hour involve exhausting a great volume of air, with a correspondingly large energy loss in winter. Because most vapors are generated and tend to remain at or near floor level, it is reasonable to assume an arbitrary ceiling height of 10 ft (3 m). With each square foot of floor area translating to 10 ft³, six air changes per hour equals 60 ft³ per hour, or 1 cfm for that one square foot of floor area". As the semiconductor industry moves to future technologies, the ceiling heights of HPM rooms are in some cases over 25', which would require massive amounts of make-up air and result in a large energy loss due to cooling and heating of the space. This proposed change would then align the IFC and IBC provisions with NFPA 30, while still maintaining requirements for adequate makeup air into HPM rooms.

Cost Impact: The code change proposal will not increase the cost of construction.

G12-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

[F] 415.10.5.8-G-MCLAUGHLIN

G13 – 13

IBC [F] 415.10.6.4

Proponent: Robert J Davidson, Davidson Code Concepts, LLC, representing self (BFICOCS)
(rjd@davidsoncodeconcepts.com)

Revise as follows:

IBC [F] 415.10.6.4 Installations in corridors and above other occupancies. The installation of HPM piping and tubing within the space defined by the walls of corridors and the floor or roof above, or in concealed spaces above other occupancies, shall be in accordance with Sections 415.10.6.1 through 415.10.6.3 and the following conditions:

1. through 3. *(No change to current text.)*
4. HPM supply piping and tubing and nonmetallic waste lines shall be separated from the corridor and from occupancies other than Group H-5 by fire barriers or by an approved piping protective system that have a fire-resistance rating of not less than 1 hour Where gypsum wallboard is used, joints on the piping side of the enclosure are not required to be taped, ~~provided the joints occur over framing members.~~ Access openings into the enclosure shall be protected by approved fire protection-rated assemblies.
5. *(No change to current text.)*

Exception: Transverse crossings of the corridors by supply piping that is enclosed within a ferrous pipe or tube for the width of the corridor need not comply with Items 1 through 5.

Reason: The purpose of this proposal is to allow for additional methods of fire-resistance protection for supply piping and tubing. Depending on the configuration and installation details, a fire-resistance wrap material can provide the required fire-resistance rating.

An additional change is to eliminate the wording ", provided the joints occur over framing members" which addresses the elimination of taping joints on the supply piping side of the fire-resistance protection. The IBC Commentary states:
The elimination of the taping of the wallboard joints on the piping side of a rated assembly is in recognition of actual installation difficulties and the reduced likelihood of a fire on the interior of the wall cavity. To eliminate the taping of joints, however, the joints must occur over framing members.

If the elimination is related to the practical difficulty of taping on the inside of the barrier and the reduces likelihood of a fire on the interior of the cavity, in other words the protection is for an exposure fire, then elimination of the interior taping is not reliant on the joints being over framing members.

Cost Impact: The code change proposal will reduce the cost of construction.

G13-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

[F] 415.10.6.4-G-DAVIDSON

G14 – 13

IBC [F] 421, Table 509.1, 202; IFC 5808 (New); 5802.1, 202

Proponent: Robert J Davidson, Davidson Code Concepts, LLC, representing National Renewable Energy Laboratory (NREL) (rjd@davidsoncodeconcepts.com)

Revise as follows:

IBC SECTION 421 HYDROGEN CUTOFF GAS ROOMS

[F] 421.1 **General.** Where required by the International Fire Code, hydrogen ~~cutoff~~ gas rooms shall be designed and constructed in accordance with Sections 421.1 through 421.8.

[F] 421.2 **Definitions.** The following terms are defined in Chapter 2:

GASEOUS HYDROGEN SYSTEM.

HYDROGEN CUTOFF GAS ROOM.

[F] 421.3 **Location.** Hydrogen ~~cutoff~~ gas rooms shall not be located below grade.

[F] 421.4 **Design and construction.** Hydrogen ~~cutoff~~ gas rooms ~~not classified as Group H shall be classified with respect to occupancy in accordance with Section 302.1 and separated from other areas of the building in accordance with Section 509.1 by not less than 1-hour fire barriers constructed in accordance with Section 707 or horizontal assemblies constructed in accordance with Section 711, or both; or as required by Section 508.2, 508.3 or 508.4, as applicable~~.

[F] 421.4.1 ~~**Opening protectives Pressure control.** Doors within the fire barriers, including doors to corridors, shall be self-closing in accordance with Section 716. Interior door openings shall be electronically interlocked to prevent operation of the hydrogen system when doors are opened or ajar or the room shall be provided with a mechanical exhaust ventilation system designed in accordance with Section 421.4.1.1.~~ Hydrogen gas rooms shall be provided with a ventilation system designed to maintain the room at a negative pressure in relation to surrounding rooms and spaces.

[F] 421.4.1.1 ~~**Ventilation alternative.** Where an exhaust system is used in lieu of the interlock system required by Section 421.4.1, exhaust ventilation systems shall operate continuously and shall be designed to operate at a negative pressure in relation to the surrounding area. The average velocity of ventilation at the face of the door opening with the door in the fully open position shall not be less than 60 feet per minute (0.3048 m/s) and not less than 45 feet per minute (0.2287 m/s) at any point in the door opening.~~

[F] 421.4.2 **Windows.** Operable windows in interior walls shall not be permitted. Fixed windows shall be permitted where in accordance with Section 716.

[F] 421.5 **Exhaust Ventilation.** ~~Cutoff~~ Gas rooms shall be provided with mechanical exhaust ventilation in accordance with the applicable provisions for repair garages in Chapter 5 of Section 502.16.1 of the *International Mechanical Code*.

[F] 421.6 **Gas detection system.** Hydrogen ~~cutoff~~ gas rooms shall be provided with an approved flammable gas detection system in accordance with Sections 421.6.1 through ~~421.6.3~~ 421.6.4.

[F] 421.6.1 **System design.** The flammable gas detection system shall be listed for use with hydrogen and any other flammable gases used in the room. The gas detection system shall be designed to activate when the level of flammable gas exceeds 25 percent of the lower flammability limit (LFL) for the gas or mixtures present at their anticipated temperature and pressure.

[F] 421.6.2 Gas detection system components. Gas detection system control units shall be listed and labeled in accordance with UL 864 or UL 2017. Gas detectors shall be listed and labeled in accordance with UL 2075 for use with the gases and vapors being detected.

[F] 421.6.3 421.6.2 Operation. Activation of the gas detection system shall result in all of the following:

1. Initiation of distinct audible and visual alarm signals both inside and outside of the ~~cutoff~~ gas room.
2. Activation of the mechanical exhaust ventilation system.

[F] 421.6.4 421.6.3 Failure of the gas detection system. Failure of the gas detection system shall result in activation of the mechanical exhaust ventilation system, cessation of hydrogen generation and the sounding of a trouble signal in an approved location.

[F] 421.7 Explosion control. Explosion control shall be provided in accordance with Chapter 9 of the ~~International Fire Code~~ where required by Section [F] 414.5.1. Mechanical ventilation and gas detection systems shall be connected to a standby power system in accordance with Chapter 27.

**IBC TABLE 509.1
INCIDENTAL USES**

ROOM OR AREA	SEPARATION AND/OR PROTECTION
Hydrogen cutoff <u>gas</u> rooms, not classified as Group H	1 hour in Group B, F, M, S and U occupancies; 2 hours in Group A, E, I and R occupancies.

(Portions of table not shown remain unchanged)

**IBC SECTION 202
DEFINITIONS**

[F] HYDROGEN CUTOFF GAS ROOM. A room or space that is intended exclusively to house a gaseous hydrogen system.

Add new IFC text as follows:

**SECTION 5808
HYDROGEN GAS ROOMS**

5808.1 General. Where required by the International Fire Code, hydrogen gas rooms shall be designed and constructed in accordance with Sections 5808.1 through 5808.7 and the *International Building Code*.

5808.2 Location. Hydrogen gas rooms shall not be located below grade.

5808.3 Design and construction. Hydrogen gas rooms not exceeding the maximum allowable quantities in Table 5003.1.1(1) shall be separated from other areas of the building in accordance with Section 509.1 of the *International Building Code*.

5808.3.1 Pressure control. Hydrogen gas rooms shall be provided with a ventilation system designed to maintain the room at a negative pressure in relation to surrounding rooms and spaces.

5808.3.2 Windows. Operable windows in interior walls shall not be permitted. Fixed windows shall be permitted where in accordance with Section 716 of the *International Building Code*.

5808.4 Exhaust Ventilation. Gas rooms shall be provided with mechanical exhaust ventilation in accordance with the applicable provisions of Section 502.16.1 of the *International Mechanical Code*.

5808.5 Gas detection system. Hydrogen gas rooms shall be provided with an approved flammable gas detection system in accordance with Sections 5808.5.1 through 5808.5.4.

5808.5.1 System design. The flammable gas detection system shall be listed for use with hydrogen and any other flammable gases used in the room. The gas detection system shall be designed to activate when the level of flammable gas exceeds 25 percent of the lower flammability limit (LFL) for the gas or mixtures present at their anticipated temperature and pressure.

5808.5.2 Gas detection system components. Gas detection system control units shall be listed and labeled in accordance with UL 864 or UL 2017. Gas detectors shall be listed and labeled in accordance with UL 2075 for use with the gases and vapors being detected.

5808.5.3 Operation. Activation of the gas detection system shall result in all of the following:

1. Initiation of distinct audible and visual alarm signals both inside and outside of the gas room.
2. Activation of the mechanical exhaust ventilation system.

5808.5.4 Failure of the gas detection system. Failure of the gas detection system shall result in activation of the mechanical exhaust ventilation system, cessation of hydrogen generation and the sounding of a trouble signal in an approved location.

5808.6 Explosion control. Explosion control shall be provided where required by Section 911.

5808.7 Standby power. Mechanical ventilation and gas detection systems shall be connected to a standby power system in accordance with Chapter 6.

Add new IFC definition as follows:

IFC SECTION 202 DEFINITIONS

GASEOUS HYDROGEN SYSTEM. An assembly of piping, devices and apparatus designed to generate, store, contain, distribute or transport a nontoxic, gaseous hydrogen containing mixture having at least 95-percent hydrogen gas by volume and not more than 1-percent oxygen by volume. Gaseous hydrogen systems consist of items such as *compressed gas* containers, reactors and appurtenances, including pressure regulators, pressure relief devices, manifolds, pumps, compressors and interconnecting piping and tubing and controls.

HYDROGEN GAS ROOM. A room or space that is intended exclusively to house a *gaseous hydrogen system*.

Revise as follows:

5802.1 Definitions. The following terms are defined in Chapter 2:

FLAMMABLE GAS.

FLAMMABLE LIQUEFIED GAS.

GASEOUS HYDROGEN SYSTEM.

HYDROGEN GAS ROOM.

METAL HYDRIDE.

METAL HYDRIDE STORAGE SYSTEM.

Reason:

IBC Changes: The purpose of this submittal is cleanup of language, correlation with NFPA 2 "Hydrogen Technologies Code", and correlation with other portions of the IBC. NFPA 2 has been formed to provide a source document for the storage, use and handling

of hydrogen and much work has gone into refining terms and requirements. For consistency the concepts and terms within the IFC, the IBC and NFPA should correlate for effective and efficient application of hydrogen technologies.

From the 2011 edition of NFPA 2:

Origin and Development of NFPA 2

"With the increased interest in hydrogen being used as a fuel source, the National Fire Protection Association was petitioned to develop an all-encompassing document that establishes the necessary requirements for hydrogen technologies. In 2006, the Technical Committee on Hydrogen Technology was formed and tasked to develop a document that addresses all aspects of hydrogen storage, use, and handling, that draws from existing NFPA codes and standards, and that identifies and fills technical gaps for a complete functional set of requirements for code users and enforcers. This document is also structured so that it works seamlessly with building and fire codes."

The term "Hydrogen Cutoff Room" is proposed to be changed to "Hydrogen Gas Room" which is the phrase used by NFPA 2 for consistency. The change would be reflected in the definition, titles and technical language found within the code.

Section [F]421.4 is modified to improved correlation of this section with Section 509 Incidental Uses. Hydrogen cutoff rooms not classified as a Group H are in Table 509 as an Incidental use. The specifications for separation are covered by 509.4.1. The "hydrogen cutoff room" was not intended to be an H Group, so the language referring to Group separated or non-separated uses is not necessary. That language will apply if a Group H classification is determined to apply. The change provides a cleaner, easier to understand application of these requirements

Section [F] 421.4.1 is modified to be consistent with the newer requirements found within NFPA 2 for hydrogen gas rooms.

Section [F]421.5 is modified to clarify that it is an "exhaust" ventilation system that is required and a pointer to the specific section in the IMC has been added instead of the generic Chapter 5 reference for clarity.

A new Section [F] 421.6.2 has been added to provide standards for the required gas detection system. This language and the referenced standards already exists in the IFC,IBC and IMC for when gas detection systems are required to be installed.

Section [F]421.6.2, Item 2 and Section [F]421.6.3 are proposed to be modified by adding the word "exhaust" to add clarity that it is a "mechanical exhaust system" that is be required.

Section [F]421.7 has been modified to point to the explosion control requirements located within Chapter 4 of the IBC, they are a match for the requirements of the IFC.

IFC Changes: This is duplication of language that is currently in the building code. Because most of the requirements for hydrogen are in the Fire Code, there is a tendency to only use the IFC along with the IFGC and IMC for detailed requirements. The existence of the allowance for use of a hydrogen gas room is not always recognized. By copying the existing language to this new section in the fire code officials will not only provide for increase awareness on the application of hydrogen gas rooms, but will also highlight the systems that must be maintained.

The only modifications made were to fit the language to application out of this code as compared to the IBC as has been done with similar language duplication on other topics.

Cost Impact: The code change proposal will not increase the cost of construction.

G14-13

Public Hearing: Committee:
Assembly:

AS
ASF

AM
AMF

D
DF

[F] 421-G-DAVIDSON WITH 5808-F-DAVIDSON-COMBINED

G15 – 13

IBC [F] 425 (New), [F] 415.8.1

Proponent: Robert J Davidson, Davidson Code Concepts, LLC, representing the Biomass Feedstock Industry Committee on Codes and Standards (BFICOCS) (rjd@davidsoncodeconcepts.com)

Revise as follows:

IBC SECTION [F] 425 **COMBUSTIBLE DUSTS, GRAIN PROCESSING AND STORAGE**

[F] ~~415.8.1~~ 425.1 Combustible dusts, grain processing and storage. The provisions of Sections ~~415.8.1.1~~ ~~425.1.1~~ through ~~415.8.1.6~~ ~~425.1.6~~ shall apply to buildings in which materials that produce combustible dusts are stored or handled. Buildings that store or handle combustible dusts shall comply with the applicable provisions of NFPA 61, NFPA 85, NFPA 120, NFPA 484, NFPA 654, NFPA 655 and NFPA 664, and the International Fire Code.

[F] ~~415.8.1.1~~ 425.1.1 Type of construction and height exceptions. Buildings shall be constructed in compliance with the height and area limitations of Table 503 ~~for Group H-2~~; except that where erected of Type I or II construction, the heights and areas of grain elevators and similar structures shall be unlimited, and where of Type IV construction, the maximum building height shall be 65 feet (19 812 mm) and except further that, in isolated areas, the maximum building height of Type IV structures shall be increased to 85 feet (25 908 mm).

[F] ~~415.8.1.2~~ 425.1.2 Grinding rooms. Every room or space occupied for grinding or other operations that produce combustible dusts ~~in such a manner that the room or space is classified as a Group H-2 occupancy~~ shall be enclosed with fire barriers constructed in accordance with Section 707 or horizontal assemblies constructed in accordance with Section 711, or both. The fire-resistance rating of the enclosure shall be not less than 2 hours where the area is not more than 3,000 square feet (279 m²), and not less than 4 hours where the area is greater than 3,000 square feet (279 m²).

[F] ~~415.8.1.3~~ 425.1.3 Conveyors. *(No change to current text)*

[F] ~~415.8.1.4~~ 425.1.4 Explosion control. *(No change to current text)*

[F] ~~415.8.1.5~~ 425.1.5 Grain elevators. *(No change to current text)*

[F] ~~415.8.1.6~~ 425.1.6 Coal pockets. *(No change to current text)*

Reason: The IBC requirements for *Combustible dusts, grain processing and storage* are located in a section of the IBC that only applies to activities that have been designated as High Hazard Groups involving hazardous materials, yet, starting with the 2012 edition IFC Table 5003.1.1(1) / IBC Table 307.1(1) provides for an exception to the High Hazard Group designation if the combustible dust hazard is controlled, in that event the requirements would not apply when some of them should apply, including the height and area exceptions, regardless of the Group classification.

[F] 415.1 Scope.

*The provisions of Sections 415.1 through 415.10 shall apply to the **storage and use of hazardous materials** in excess of the maximum allowable quantities per control area listed in Section 307.1. Buildings and structures with an occupancy in Group H shall also comply with the applicable provisions of Section 414 and the International Fire Code.*

Further, combustible dusts and fibers are not "hazardous materials" as defined by the IFC/IBC and should not be merged in with hazardous material requirements regardless of Group classification.

[F] HAZARDOUS MATERIALS. *Those chemicals or substances that are physical hazards or health hazards as classified in Section 307 and the International Fire Code, whether the materials are in usable or waste condition.*

[F] HEALTH HAZARD. *A classification of a chemical for which there is statistically significant evidence that acute or chronic health effects are capable of occurring in exposed persons. The term "health hazard" includes chemicals that are toxic or highly toxic, and corrosive.*

[F] PHYSICAL HAZARD. *A chemical for which there is evidence that it is a combustible liquid, cryogenic fluid, explosive, flammable (solid, liquid or gas), organic peroxide (solid or liquid), oxidizer*

Based upon the scoping of Section [F]415.1 and the definitions for hazardous materials, the current location for [F]415.8.1 is a mismatch. Though the presence of combustible dusts can cause a high hazard group classification, the material involved is not necessarily a "hazardous material" by definition.

From a practical standpoint, this proposal is a follow up coordination with the code change F187-09/10 which added "combustible dusts" to IFC Table 5003.1.1(1) / IBC Table 307.1(1) along with Note q that provides for elimination of the Group H-2 classification where the hazards are controlled. Prior to that code change the existence of a combustible dust caused an H-2 classification and section [F] 415.8.1 would have applied, (though a designer/facility operator could still question the hazardous materials scoping of Section 415.1 mentioned above).

Some of the provisions found in existing IBC Sections [F]415.8.1 through [F]415.8.1.6 need to be applied regardless of the H Group classification and in most cases it will be compliance with these sections that assists the occupancy to avoid the H Group classification.

This proposal moves the requirements for Combustible dusts, grain processing and storage to a new Section [F]425 to eliminate the H Group scoping limitation and makes minor modifications necessitated by the relocation.

Sections [F]415.8.1.1, proposed as [F]425.1.1, has been modified to eliminate the reference to the H-2 Group, the section provides for a height exception for these occupancies which should apply regardless of the Group classification. Another way to express this is to point out that if the height increase was warranted for an H-2 Group classification, it is clearly warranted for an S, F or U Group classification.

[F]415.8.1.2, proposed as [F]425.1.2, is modified to clarify that those construction requirements are for occupancies that are classified as Group H, which is the hazard classification they are based upon in the current code language. If the hazard is controlled providing for elimination of the Group H designation, then the increased construction requirements are not necessary. The remaining sections are not modified as they should apply in all cases as appropriate.

The Biomass Feedstock Industry Committee on Codes and Standards (BFICOCs), led by Oak Ridge National Laboratory (ORNL), is an initiative of the Department of Energy Biomass Technologies Office (BTO). As part of the BTO integrated biorefinery efforts, the BFICOCs was assembled to conduct analysis of existing fire and building codes and to prepare proposed code changes designed to facilitate the development of the commercial-scale biomass industry while maintaining a focus on safety. The committee is made up of managers, engineers and code officials from industry, government laboratories, consulting firms, and the American Society of Agricultural and Biological Engineers.

Fire codes related to storage, handling, and preprocessing of biomass are based on industries that operate in a significantly different manner than the growing biomass-based energy industry. Applying current research on biomass properties and knowledge of conventional and emerging storage, handling, and preprocessing technologies, the BFICOCs has identified changes in the IFC that benefit industry and the public.

Cost Impact: The code change proposal will not increase the cost of construction.

G15-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

[F] 425 (NEW)-G-DAVIDSON

G16 – 13

IBC [F] 501.2

Proponent: Tim Swanson, City of Greeley, representing Colorado Chapter of the International Code Council

Revise as follows:

IBC [F] 501.2 Address identification. New and existing buildings shall be provided with *approved* address numbers or letters. Each character shall be ~~not less than 4 inches (102 mm) in height and not less than 0.5 inch (12.7 mm) in width. a minimum of 4 inches (101.6 mm) high with a minimum stroke width of 0.5 inch (12.7 mm).~~ They shall be installed on a contrasting background and be plainly visible from the street or road fronting the property. When required by the fire code official, address numbers shall be provided in additional *approved* locations to facilitate emergency response. Where access is by means of a private road and the building address cannot be viewed from the *public way*, a monument, pole or other *approved* sign or means shall be used to identify the structure. Address numbers shall be maintained.

Reason: The language in the current IBC would literally allow the entire character to be as narrow as ½" wide. I know that is not the intent, but that is what the current language it would allow. The intent of requiring a visible, recognizable character is better stated with the language that was in the 2006 IBC and is currently in the 2012 IFC, and the 2012 IRC.

Cost Impact: None

Analysis: Current IFC Section 505.1, IPMC Section 304.3 and IRC R319.1 contain the proposed phraseology.

G16-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

[F]501.2-G-SWANSON

G17 – 13

IBC [F] 2702.2.10, [F] 2702.2.11, [F] 2702.2.12

Proponent: Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (azumiamia@yahoo.com)

Revise as follows:

IBC [F] 2702.2.10 Hazardous materials. Emergency or standby power shall be provided in occupancies with hazardous materials ~~in accordance with Section 414.5.3 where required by the *International Fire Code*.~~

IBC [F] 2702.2.11 Highly toxic and toxic materials. Emergency power shall be provided for occupancies with highly toxic or toxic materials ~~in accordance with the *International Fire Code*.~~

IBC [F] 2702.2.12 Organic peroxides. Standby power shall be provided for occupancies with organic peroxides ~~in accordance with the *International Fire Code*.~~

(Renumber subsequent sections)

Reason: This proposal is intended to simplify the IBC requirements and correlate the IBC with the requirements in the IFC. This proposal does not change any requirements, it only reformats them.

Section 2702.2.10 currently references back to 414.5.3. Section 414.5.3 states that "...systems shall be provided with an emergency or standby power system in accordance with Chapter 27." So the reality is that both sections reference each other. To solve this confusion, IBC 414.5.3 is retained to reference Chapter 27, and 2702.2.10 is revised to reference the IFC.

Sections 2702.11 and 2702.12 are deleted since they are covered under the definition of 'hazardous materials' addressed in Section 2702.10 and the revision to 2702.10 covers their reference to the IFC.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

Cost Impact: This code change will not increase the cost of construction

G17-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

[F] 2702.2.10-G-ZUBIA-FCAC

M1-13

IMC [F] Table 1103.1

Proponent: Debra Kennoy, Arkema Inc., representing self (debra.kennoy@arkema.com)

Revise as follows:

**IMC [F] TABLE 1103.1
REFRIGERANT CLASSIFICATION, AMOUNT AND OEL**

REFRIGERANT	FORMULA	CHEMICAL NAME OF BLEND	REFRIGERANT CLASSIFICATION	DEGREES OF HAZARD ^a	[M] AMOUNT OF REFRIGERANT PER OCCUPIED SPACE			
					Pounds per 1,000 cubic feet	ppm	g/m ³	OEL ^e
R-32	CH ₂ F ₂	difluoromethane (methylene fluoride)	A2	<u>1-4-0</u>	4.8	36,000	77	1,000
R-141b	CH ₃ CCl ₂ F	1,1-dichloro-1-fluoroethane	—	<u>2-1-0</u>	0.78	2,600	12	500
R-142b	CH ₃ CClF ₂	1-chloro-1,1-difluoroethane	A2	<u>2-4-0</u>	5.1	20,000	83	1,000
R-427A	zeotrope	R-32/125/143a/134a (15.0/25.0/10.0/50.0)	A1	<u>2-1-0</u>	18	76,000	280	1,000

(Portions of table not shown remain unchanged)

Reason: Several refrigerants including R-32, R-141b, R-142b, and R-427A are missing the Degrees of Hazard information in ANSI/ASHRAE Standard 34, Designation and Safety Classification of Refrigerants. The information for these refrigerants is provided in the modification to Table 1103.1 as shown above.

Cost Impact: The code change proposal will not increase the cost of construction.

M1-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

[F] 1103.1T-M-KENNOY

P1– 13

IPC [F] 1202.1; IPC Chapter 14

Proponent: Jonathan Humble (Chairman), representing ICC Reference Standards Committee and Sharon Myers, RA, MPE, CBO. State of Ohio, representing Division of Industrial Compliance, Bureau of Building Code Compliance (SHARON.MYERS@COM.STATE.OH.US)

Revise as follows:

IPC [F] 1202.1 Nonflammable medical gases. Nonflammable medical gas systems, inhalation anesthetic systems and vacuum piping systems shall be designed and installed in accordance with NFPA 99C.

Exceptions:

1. This section shall not apply to portable systems or cylinder storage.
2. Vacuum system exhaust terminations shall comply with the *International Mechanical Code*.

Revise IPC Chapter 14 as follows:

NFPA	National Fire Protection Association 1 Batterymarch Park Quincy, MA 02169-7471	
Standard reference number	Title	Referenced in code section number
NFPA 99C-05	Gas and Vacuum Systems	1202.1
<u>NFPA 99-2012</u>	<u>Health Care Facilities Code</u>	

Reason (Humble): NFPA has also announced that starting 2012 NFPA 99C will no longer be a stand-alone document, which makes this proposal necessary in order to be consistent with the updating of the NFPA referenced standards. NFPA 99C represented an "extract reprint" of NFPA 99, specifically from Chapter 5 of NFPA 99.

As a result, the proposal before you is recommending that the above changes be accepted to reflect the current state of the reference standards.

Further information about this change can be found on the www.nfpa.org web page or at <http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=99&cookie%5Ftest=1> to view a copy of the read-only NFPA 99.

Reason (Myers): NFPA 99C has been incorporated into NFPA 99 and the reference is no longer valid. This proposal simply revises the reference to NFPA 99 and the edition to 2012 to be consistent with other references to NFPA 99 throughout the I-Codes.

Cost Impact: The code change proposal will not increase the cost of construction.

P1-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

[F] 1202.1-P-HUMBLE

2013 PROPOSED CHANGES TO THE INTERNATIONAL PROPERTY MAINTENANCE CODE

INTERNATIONAL PROPERTY MAINTENANCE CODE COMMITTEE

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TENTATIVE ORDER OF DISCUSSION 2013 PROPOSED CHANGES TO THE INTERNATIONAL PROPERTY MAINTENANCE CODE

The following is the tentative order in which the proposed changes to the code will be discussed at the public hearings. Proposed changes which impact the same subject have been grouped to permit consideration in consecutive changes.

Proposed change numbers that are indented are those which are being heard out of numerical order. Indentation **does not** necessarily indicate that one change is related to another. Proposed changes may be grouped for purposes of discussion at the hearing at the discretion of the chair. Note that some IPMC code change proposals may not be included on this list, as they are being heard by other committees. Please consult the Cross Index of Proposed Changes.

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PM2-13
PM3-13
PM4-13
PM5-13
PM6-13
PM7-13
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PM9-13
 ADM36-13, Part II
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PM11-13
PM12-13
PM16-13
PM17-13
PM18-13

PM1 – 13

202 (New)

Proponent: Wayne R. Jewell, CBO, Green Oak Charter Township, representing self
(wayne.jewell@twp.green-oak.mi.us)

Add new definition as follows:

SECTION 202 DEFINITIONS

COST OF SUCH DEMOLITION OR EMERGENCY REPAIRS. The costs shall include the actual costs of the demolition or repair of the structure less all revenues obtained if salvage was conducted prior to demolition or repair. Costs shall also include, but not be limited to, all expenses incurred or necessitated related to demolition or emergency repairs, such as asbestos survey and abatement if necessary; costs of inspectors, testing agencies or experts retained relative to the demolition or emergency repairs; costs of testing; surveys for other materials that are controlled or regulated from being dumped in a land-fill; title searches; mailing(s); postings; recording; and all attorney fees expended for recovering of the cost of emergency repairs or to obtain or enforce an order of demolition made by a *code official*, the governing body or board of appeals.

Reason: This provides a definition that summarizes the existing language of the code text in Sections 106.3, 105.5 and 110.3. All of these sections make reference to the jurisdiction's ability to recover costs. This provides a descriptive definition as to what those "costs" are to include. Without a definition that brings the scope of these three sections together there is a lack of uniform enforcement as to what are the actual costs of actions taken by a jurisdiction. This provides a basis of what is to be considered when preparing an invoice of expenses paid by the jurisdiction to protect the public due to the lack of action by an owner of property after receiving a proper notice(s) or order(s) from a code official, governing body or board of appeals.

Cost Impact: The code change proposal will properly place the cost of actions taken by a jurisdiction to provide for the safety and welfare of the public upon the property owner.

PM1-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

202-COST OF SUCH DEMOLITION OR EMERGENCY REPAIRS-PM-JEWELL.DOC

PM2 – 13

202 (New)

Proponent: Jim Edelson, New Buildings Institute (jedelson@comcast.net); Ric Cochrane, National Trust for Historic Preservation; David Collins, The Preview Group representing The American Institute of Architects

Add new definition as follows:

SECTION 202 DEFINITIONS

HISTORIC BUILDING. Any building or structure that is one or more of the following:

1. Listed, or certified as eligible for listing by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, in the National Register of Historic Places
2. Designated as historic under an applicable state or local law; or
3. Certified as a contributing resource within a National Register listed or locally designated historic district.

Reason: There is no definition for Historic Buildings in the IPMC, even though the term is used in many places. The current language for Historic Buildings in the IECC-Commercial, the IECC-Residential and the IEBC is confusing and does not clearly describe how buildings and districts are listed or determined to be eligible to be listed as historic.

This proposal adds a consistent definition to the IPMC, while solving two problems with the Historic Buildings definitions in the IECC and the IEBC. First, it remedies the confusion caused by the sheer complexity of the defining language by converting the running list of qualifications into a clearly delineated numbered list. Second, the proposal gives the language clarity and specificity as to how a building is officially determined to be eligible for the various lists of historic buildings. In accordance with the Code of Federal Regulations, Title 36, Chapter I, Part 63, determinations of eligibility for listing in the National Register of Historic Places are made by State Historic Preservation Offices in coordination with the Keeper of the National Register of Historic Places. This is an official process conducted in accordance with federal standards. This proposal aligns the code language with the language of this official process and removes any ambiguity as to who can make determinations of eligibility.

This proposal is one of four proposals in Cycle B to create this consistency for Historic Buildings across the I-codes. The other three proposals are being made to the IECC-Residential, the IECC-Commercial and the IEBC.

Cost Impact: There is no cost impact to this proposal.

Analysis: EB1-13 and CE7, CE8 and CE9-13 also propose a similar definition for Historic Building for the IEBC and IECC, respectively.

PM2-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

202-HISTORIC BUILDING-PM-COCHRANE-COLLINS-EDELSON

PM3 – 13

202

Proponent: Rebecca Morley, representing National Center for Healthy Housing

Revise as follows:

SECTION 202 DEFINITIONS

INFESTATION. The presence, within or contiguous to, a structure or premises of: insects including cockroaches, fleas, and bedbugs; pest rodents including rats and mice; vermin; or other pests. Visible pest residue or debris constitutes an infestation unless there is clear evidence that the pest is no longer present.

Reason: The current definition of infestation would appear to exclude rodents other than rats. However, rodents carry disease and, in the case of mice, may trigger an asthma attack. The proposal applies the term to all rodents.

Cockroaches, fleas and bedbugs are public health problems; the proposal specifies these insects to make clear that they are included.

The proposal clarifies that visible evidence of pest residues is a sufficient basis for action by a code official. The code official does not have to see a live pest. Many of the pests of most concern are nocturnal and their residue is the only evidence available during daylight.

Cost Impact: The proposal will not increase the cost of maintenance since this is a definition not a requirement.

PM3-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

202-INFESTATION-PM-MORLEY

PM4 – 13

202 (New)

Proponent: Rebecca Morley, representing National Center for Healthy Housing

Add new definition as follows:

SECTION 202 DEFINITIONS

SANITARY. A condition that is clean and free of *infestation*; rodent residues such as droppings, urine, gnaw marks, grease marks, or nest debris; insect residues such as droppings, debris, or body parts; human or animal waste; mold; wastewater; sewage; rotting material; and accumulation of rubbish or garbage.

Reason: Although used extensively in the code, “sanitary” currently lacks a definition. Therefore the varying contexts in which it appears give the word different connotations. As a result, the term is ambiguous allowing for differing interpretations. The ambiguity means that the code official's interpretation is open to challenge. As a result, code officials may be reluctant to cite for unsanitary conditions absent other violations such as active infestation.

Pest residues that remain after pest elimination may carry infectious diseases and allergens that cause allergies, cause asthma or trigger an asthma attack. Accumulations of rubbish or garbage can provide harborage and a food source for rodents or insects and become the source of disease.

The definition of sanitary addresses those situations commonly understood to spread or support disease. It includes the term infestation to make clear that an infestation is never sanitary.

Cost Impact: This code change proposal will not increase the cost of construction.

PM4-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

202-SANITARY (NEW)-PM-MORLEY

PM5 – 13

304.1.1

Proponent: Andy Williams, Metal Construction Association (afwilliams@metalconstruction.org)

Revise as follows:

304.1.1 Unsafe conditions. The following conditions shall be determined as unsafe and shall be repaired or replaced to comply with the *International Building Code* or the *International Existing Building Code* as required for existing buildings:

1 through 7 (*No change to current text*)

8. Roofing or roofing components that have defects that reduce the roof covering fire classification, or admit rain, roof surfaces with inadequate drainage, or any portion of the roof framing that is not in good repair with signs of *deterioration*, fatigue or without proper anchorage and incapable of supporting all nominal loads and resisting all load effects;

9 through 13 (*No change to current text*)

Exceptions:

1. When substantiated otherwise by an *approved* method.
2. Demolition of unsafe conditions shall be permitted when *approved* by the *code official*.

Reason: An unsafe condition can occur when the roof covering does not maintain the fire classification mandated by the IBC or the IEBC. Failure to maintain this level of performance may allow the spread fire from roof to roof. This unsafe condition is not presently listed in the IPMC. By listing this as an unsafe condition, the Code Official will have language in the IPMC to insure that a roof covering fire classification is maintained.

Cost Impact: The code change proposal will not increase the cost of construction.

PM5-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

304.1.1.1-PM-WILLIAMS.DOC

PM6 – 13

304.2.1 (New), 305.3.1 (New), Chapter 8

Proponent: Rebecca Morley, representing National Center for Healthy Housing

Add new text as follows:

304.2.1 Disturbance of existing painted surfaces. In any Group E, I-4, R-2, R-3, R-4 occupancies completed prior to 1978, where repairs disturb painted surfaces, the work shall comply with the information distribution, certification and work practice requirements of 40 CFR 745 for renovations.

Exception: Where documentation is provided from an approved test in accordance with 40 CFR 745.82(a)(1) or (2) that proves that the disturbed paint contains lead levels below specified levels, the work is not required to comply with this section.

305.3.1 Disturbance of existing painted surfaces. In any Group E, I-4, R-2, R-3, R-4 occupancies completed prior to 1978, where repairs disturb painted surfaces, the work shall comply with the information distribution, certification and work practice requirements of 40 CFR 745 for renovations.

Exception: Where documentation is provided from an approved test in accordance with 40 CFR 745.82(a)(1) or (2) that proves that the disturbed paint contains lead levels below specified levels, the work is not required to comply with this section.

Add new standard to Chapter 8 as follows:

EPA U.S. Environmental Protection Agency

40 CFR 745– July 1, 2012 Lead-Based Paint Poisoning Prevention in Certain Residential Structures

Reason: The purpose of this proposed code language for the surfaces of the structure is to incorporate measures that reflect current knowledge about working with paint that may contain lead-based paint and thereby prevent lead poisoning. The code already requires repair of paint in poor condition. This new subsection would further require compliance with federal regulations to promote the safe repair of deteriorated paint that is likely to contain lead. These regulations have been in effect since April 2010. This change would only affect structures likely to contain lead-based paint.

Multiple studies have demonstrated that lead dust, which is caused by deteriorated lead-based paint and some methods of paint repair, is the major source of lead exposure for young children. The dangers associated with exposure to lead based paint hazards are well-known: lead is associated with a range of serious health effects on children, including detrimental effects on cognitive and behavioral development with serious personal and social consequences that may persist throughout their lifetime. More than 36 million pre-1978 US housing units contain lead-based paint.

Sections 304.2 and 305.3 fail to specifically require, on older structures that are likely to contain lead-based paint, the use of precautionary practices in order to prevent the dispersal of lead before, during, and after the repair work, in the course of complying with the code requirement to repair peeling, flaking and chipping paint. The proposal improves the current Code by adding to each section a health-protective requirement to perform the repair safely around lead-based paint, a subject currently acknowledged in the Commentary but not in the Code. The addition of the proposed new language will protect children from lead poisoning by specifying the use of federally – or state - approved lead safe work practices in making the required repairs. The lead-safe work practices are required by EPA effective April 22, 2010, for most renovation, repair and painting work in all pre-1978 homes. The federal renovation rule and this proposal are based on a rebuttable presumption of lead's presence, which allows the property owner to demonstrate that lead is not present to be exempt from the requirements. The proposed new language includes these exceptions: structures built after lead was banned from paint used in residential structures (1977 US; earlier in some US cities; 1909 France, Belgium, Austria), and structures where the deteriorated paint has been documented to not contain lead (such as by a lead-based paint inspection or risk assessment, by the use of a test kit by a certified renovator, or through completion of another government-approved test method or ANSI standard).

The EPA 40 CFR 745 standard is available at <http://www.gpo.gov/fdsys/pkg/CFR-2012-title40-vol32/xml/CFR-2012-title40-vol32-part745.xml>.

Cost Impact: This change will not increase the cost of maintenance since these federal and state requirements are already in place.

Staff analysis: A review of the standard proposed for inclusion in the code, EPA 40 CFR 745 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

PM_-13

Public Hearing: Committee: AS AM D

Assembly:

ASF

AMF

DF

304.2.1 (NEW)-PM-MORLEY

PM7 – 13

304.7.1, 304.7.1 (New), 304.7.2 (New)

Proponent: Andy Williams, Metal Construction Association (afwilliams@metalconstruction.org)

Revise as follows:

304.7 Roofs and drainage. Roof drainage and fire classification shall comply with Sections 304.7.1 and 304.7.1 respectively.

304.7.1 Roof drainage. The roof and flashing shall be sound, tight and not have defects that admit rain. Roof drainage shall be adequate to prevent dampness or *deterioration* in the walls or interior portion of the structure. Roof drains, gutters and downspouts shall be maintained in good repair and free from obstructions. Roof water shall not be discharged in a manner that creates a public nuisance.

304.7.2 Fire classification. The roof covering fire classification shall not be reduced due to repairs from the fire classification required when installed. The roof covering fire classification for a recovering shall comply with the fire classification in the *International Building Code*.

Reason: The proposal to 304.7 to identify that an unsafe condition exists when the roof covering has defects that reduce its fire classification is not adequate unless there is direction on how to address the unsafe condition. Section 304.7.2 is to clarify that the roof covering is required to comply with the fire classification mandated by the IBC. For repairs to a roof covering, the repair must maintain the roof covering fire classification required by the IBC when the roof covering was initially installed. For a recovering, the roof covering must have the fire classification required by the IBC adopted at the time of the recovering.

Cost Impact: The code change proposal will not increase the cost of construction.

PM7-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

304.7-PM-WILLIAMS.DOC

PM8 – 13

304.20 (New)

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee
(BajnaiC@chesterfield.gov)

Add new text as follows:

304.20 Prohibitions in open parking garages. Partial or complete closing of required openings in exterior walls by tarpaulins or any other means shall be prohibited in open parking structures.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

This language is currently required by section 406.5.11 of the International Building Code and should also be appropriately placed in the Property Maintenance Code.

Cost Impact: This proposal does not increase the cost of construction.

PM8-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

304.20 (NEW)-PM-BAJNAI-BCAC.DOC

PM9 – 13

305.3

Proponent: Rebecca Morley, representing National Center for Healthy Housing

Revise as follows:

305.3 Interior surfaces. All interior surfaces, including windows and doors, shall be maintained in good, clean and sanitary condition. Peeling, chipping, flaking or abraded paint shall be repaired, removed or covered. Cracked or loose plaster, decayed wood and other defective surface conditions shall be corrected. Surfaces such as but not limited to wood, textiles, paint, cellulose insulation, and paper, including paper-faced gypsum board, shall have no signs of chronic or persistent excessive moisture. Material discolored or deteriorated by mold or mildew shall be cleaned, dried and repaired and the underlying cause shall be corrected. If the material has decayed or failed beyond repair, it shall be removed and replaced and the and the underlying cause shall be corrected.

Exception: Porous materials that do not contain organic material, such as clean unpainted bricks and concrete.

Reason: Mold typically grows in buildings affected by water damage. According to the Institute of Medicine of the National Academies' *Damp Indoor Spaces and Health* (2004), mold and damp indoor environments are associated with asthma symptoms in sensitized persons, coughing, wheezing, and upper respiratory tract symptoms. See www.nap.edu/books/0309091934/html/

In December 2007, the National Center for Healthy Housing (NCHH) and the U.S. Centers for Disease Control and Prevention (CDC) convened an Expert Panel consistent with National Institute of Health guidelines to assess the effectiveness of various interventions to make homes healthier and safer. NCHH and CDC published the report of the experts in January 2009. See www.nchh.org/LinkClick.aspx?fileticket=2lvaEDNBldU%3d&tabid=229 for the full report.

The Expert Panel reviewed five peer-reviewed research studies on the issue of mold and allergens and concluded that "when implemented together, eliminating moisture intrusion and leaks and removal of moldy items were found to be effective in reducing asthma triggers and reducing exposures." Other provisions of the IPMC address eliminating moisture intrusion. But no provisions require action on building materials with chronic moisture issues including those materials that have failed beyond repair.

This proposal implements the Expert Panel's recommendation while providing flexibility in response to actual conditions – repair for reparable material, replacement for failed material. To ensure the health of the building's occupants, mitigation of moisture problems must be a part of the code.

Cost Impact: This code change proposal will increase the cost of maintenance.

PM9-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

305.3-PM-MORLEY

PM10 – 13

202, 306.1, 306.1.2 New

Proponent: Meg Waltner, representing National Resource Defense Council, Andrew Burr, representing Institute for Market Transformation and Eric Makela, representing Britt Makela Group, Inc.

Add new definition as follows:

SECTION 202 DEFINITIONS

RETRO-COMMISSIONING. A systematic process for optimizing the energy efficiency of existing base building systems through the identification and correction of deficiencies in such systems, including but not limited to repairs of defects, cleaning, adjustments of valves, sensors, controls or programmed settings, and/or changes in operational practices.

Revise as follows:

SECTION 306 COMPONENT SERVICEABILITY

306.1 General. The components of a structure and equipment therein shall be maintained in good repair and operation, structurally sound and in a sanitary condition.

306.1.1 Unsafe conditions. (no change to current text)

306.1.2 Retro-commissioning. Retro-commissioning shall be performed on the base building systems for buildings 25,000 ft² or greater starting 5 years after issuance of the certificate of occupancy and continuing every 5 years for the life of the building. The building owner shall provide evidence that *retro-commissioning* has been performed and the evidence shall document that sufficient analysis, corrections and testing have been done so indicating that the base building systems meet items 1 through 4 below.

Exception: Retro-commissioning is not required for *let for occupancy* spaces of buildings.

1. Operating protocols, calibration, and sequencing for HVAC and service water heating systems:
 - 1.1. HVAC temperature and humidity set points and setbacks are appropriate and operating schedules reflect major space occupancy patterns and the current facility requirements;
 - 1.2. HVAC sensors are properly calibrated;
 - 1.3. HVAC controls are functioning and control sequences are appropriate for the current facility requirements;
 - 1.4. Loads are distributed equally across equipment when appropriate, such as for fans, boilers and pumps that operate in parallel;
 - 1.5. Ventilation rates are appropriate for the current facility requirements;
 - 1.6. System automatic reset functions are functioning appropriately, if applicable;
 - 1.7. Adjustments have been made to compensate for oversized or undersized equipment so that it is functioning as efficiently as possible;
 - 1.8. Simultaneous heating and cooling does not occur unless intended;
 - 1.9. HVAC system economizer controls are properly functioning, if applicable;
 - 1.10. The HVAC distribution systems, both air and water side, are balanced;
 - 1.11. Domestic hot water systems have been checked to ensure proper temperature settings.
 - 1.12. Water pumps are functioning as designed;

- 1.13. System water leaks have been identified and repaired;
- 1.14. HVAC equipment, such as vents, ducts, coils, valves and soot bins, is clean;
- 1.15. Filters are clean and protocols are in place to replace, as appropriate.
- 2. Operating protocols, calibration, and sequencing for lighting systems:
 - 2.1. Light levels are appropriate to the task;
 - 2.2. Lighting sensors and controls are functioning properly according to occupancy, schedule, and/or available daylight, where applicable;
- 3. Cleaning and repair:
 - 3.1. Motors, fans, and pumps, including components such as belts, pulleys, and bearings, are in good operating condition;
 - 3.2. Steam traps have been replaced as required to maintain efficient operation, if applicable;
 - 3.3. Manual overrides on existing equipment have been remediated;
 - 3.4. Boilers have been tuned for optimal efficiency, if applicable;
 - 3.5. Exposed hot and chilled water and steam pipes three (3) inches or greater in diameter with associated control valves are insulated in accordance with the International Energy Conservation Code;
 - 3.6. In all easily accessible locations, sealants and weather stripping are installed where appropriate and are in good condition.
- 4. Documentation:
 - 4.1. Permits for all HVAC, electrical and plumbing equipment are in order;
 - 4.2. Operational and maintenance record keeping procedures, such as log books and computer maintenance records, have been implemented;
 - 4.3. The operations and maintenance manuals, if such manuals are still available from the manufacturer, the maintenance contracts, and the most recent retro-commissioning report is on site and accessible.

Reason: A critical aspect of building maintenance is ensuring that the energy systems of a building are maintained in a state of good repair and are functioning efficiently. It has been found that, over time, due to system breakdowns and uncoordinated repairs and renovations, building energy systems drift out of proper performance -- sometimes quite dramatically. Sensors and controls can be reset so that building systems are running 24/7 rather than only when necessary, repairs can be made that solve an immediate problem but result in heating and cooling systems running simultaneously, etc. The result of these problems is a poorly performing building that can waste considerable energy while often being uncomfortable or even unhealthy.

For other equipment, such as automobiles, a regular tune-up to ensure safe and efficient operation is considered standard practice. This is becoming standard in buildings, also, through retro-commissioning. Retro-commissioning (RCx) is a process that has been developed in recent decades to ensure that building energy systems are essentially tuned up -- that they are running efficiently and that they are in a state of good repair. Retro-commissioning takes a careful look at the systems that are in place, analyzes how they could be repaired to run more efficiently, and then performs those repairs.

Several U.S. cities recently adopted RCx requirements for large buildings. In 2009, New York City passed an ordinance, Local Law 87, that requires nonresidential and multifamily housing properties over 50,000 square feet to perform RCx once every 10 years. In 2011, San Francisco passed an ordinance requiring energy audits or RCx once every 5 years.

Cost Impact: In 2009, Lawrence Berkeley National Laboratory published a study of building commissioning costs and benefits, looking at 643 buildings with a cumulative square footage of 100 million square feet. RCx was found to cost an average of \$0.30 per square foot. The RCx resulted in a 16% whole-building median energy savings with an average payback of 1.1 years.

PM10-13

Public Hearing: Committee:	AS	AM	D
Assembly:	ASF	AMF	DF

306.1-PM-BURR-MAKELA-WALTNER.DOC

PM11 – 13

307.1

Proponent: Roy Fyffe, Building Official, representing City of Burnet, TX (rfyffe@cityofburnet.com)

Revise as follows:

307.1 General. Every exterior and interior flight of stairs having more than four risers shall have a handrail on one side of the stair and every open portion of a stair, landing, balcony, porch, deck, ramp or other walking surface which is more than 30 inches (762mm) above the floor or grade below shall have *guards*. Handrails shall not be less than ~~30-34~~ inches (~~762mm-864 mm~~) in height or more than ~~42~~ 38 inches (~~1067~~ 965mm) in height measured vertically above the nosing of the tread or above the finished floor of the landing or walking surfaces. *Guards* shall not be less than ~~30~~ 36 inches (~~762~~ 914 mm) in height above the floor of the landing, balcony, porch, deck, or ramp or other walking surface.

Exception: *Guards* shall not be required where exempted by the adopted building code.

Reason: The revised text will provide for continuity and clarity between both IPMC and IRC codes, thus lessening any confusion for building and property maintenance inspectors.

Cost Impact: The code change proposal will not increase the cost of construction.

PM11-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

307.1-PM-FYFFE

PM12 – 13

310 (New)

Proponent: Jim Edelson, New Buildings Institute (jedelson@comcast.net)

Add new text as follows:

SECTION 310 **ENERGY REQUIREMENTS**

310.1 General. Nonresidential *buildings* shall be maintained and operated to achieve a source energy use intensity, sEUI, less than or equal to the value from Table 310.1 based on the *building* type and climate zone of the *building* and calculated in accordance with Section 310.2. Where a *building* has multiple use types from Table 310.1, the maximum allowable energy use shall be based on the total gross floor area of each use type in relation to the total gross floor area of all use types within the *building*.

TABLE 310.1^a
SOURCE ENERGY USE INTENSITY (sEUI) TARGETS

Climate Zone^a	1A	2A	2B	3A	3B	3B	3C	4A	4B	4C	5A	5B	6A	6B	7	8
Use Types	sEUI Target (kBtu/sf/yr)															
Administrative/professional office	<u>202</u>	<u>208</u>	<u>201</u>	<u>197</u>	<u>163</u>	<u>182</u>	<u>179</u>	<u>218</u>	<u>188</u>	<u>199</u>	<u>234</u>	<u>202</u>	<u>259</u>	<u>230</u>	<u>272</u>	<u>368</u>
Bank/other financial	<u>347</u>	<u>358</u>	<u>346</u>	<u>339</u>	<u>280</u>	<u>314</u>	<u>307</u>	<u>375</u>	<u>323</u>	<u>342</u>	<u>403</u>	<u>348</u>	<u>445</u>	<u>395</u>	<u>468</u>	<u>633</u>
Government office	<u>246</u>	<u>254</u>	<u>246</u>	<u>241</u>	<u>199</u>	<u>223</u>	<u>218</u>	<u>266</u>	<u>230</u>	<u>243</u>	<u>286</u>	<u>247</u>	<u>316</u>	<u>281</u>	<u>332</u>	<u>449</u>
Medical office (non-diagnostic)	<u>157</u>	<u>162</u>	<u>157</u>	<u>153</u>	<u>127</u>	<u>142</u>	<u>139</u>	<u>170</u>	<u>146</u>	<u>155</u>	<u>182</u>	<u>157</u>	<u>201</u>	<u>179</u>	<u>212</u>	<u>286</u>
Mixed-use office	<u>248</u>	<u>256</u>	<u>248</u>	<u>243</u>	<u>200</u>	<u>225</u>	<u>220</u>	<u>269</u>	<u>232</u>	<u>245</u>	<u>289</u>	<u>249</u>	<u>319</u>	<u>283</u>	<u>335</u>	<u>453</u>
Other office	<u>209</u>	<u>216</u>	<u>209</u>	<u>205</u>	<u>169</u>	<u>189</u>	<u>185</u>	<u>226</u>	<u>195</u>	<u>207</u>	<u>243</u>	<u>210</u>	<u>269</u>	<u>238</u>	<u>283</u>	<u>382</u>
Laboratory	<u>870</u>	<u>861</u>	<u>834</u>	<u>856</u>	<u>719</u>	<u>806</u>	<u>778</u>	<u>946</u>	<u>847</u>	<u>874</u>	<u>102</u> <u>1</u>	<u>914</u>	<u>113</u> <u>2</u>	<u>103</u> <u>1</u>	<u>121</u> <u>6</u>	<u>161</u> <u>4</u>
Distribution/ shipping center	<u>151</u>	<u>97</u>	<u>100</u>	<u>95</u>	<u>74</u>	<u>92</u>	<u>79</u>	<u>107</u>	<u>100</u>	<u>94</u>	<u>125</u>	<u>117</u>	<u>149</u>	<u>137</u>	<u>171</u>	<u>268</u>
Non-refrigerated warehouse	<u>128</u>	<u>82</u>	<u>85</u>	<u>80</u>	<u>63</u>	<u>78</u>	<u>67</u>	<u>91</u>	<u>85</u>	<u>80</u>	<u>106</u>	<u>99</u>	<u>127</u>	<u>116</u>	<u>145</u>	<u>227</u>
Convenience store	<u>911</u>	<u>967</u>	<u>917</u>	<u>983</u>	<u>882</u>	<u>914</u>	<u>961</u>	<u>106</u> <u>1</u>	<u>972</u>	<u>104</u> <u>3</u>	<u>112</u> <u>4</u>	<u>103</u> <u>7</u>	<u>120</u> <u>1</u>	<u>113</u> <u>9</u>	<u>128</u> <u>6</u>	<u>153</u> <u>9</u>
Convenience store with gas station	<u>798</u>	<u>848</u>	<u>804</u>	<u>862</u>	<u>773</u>	<u>801</u>	<u>842</u>	<u>930</u>	<u>852</u>	<u>914</u>	<u>985</u>	<u>909</u>	<u>105</u> <u>3</u>	<u>998</u>	<u>112</u> <u>7</u>	<u>134</u> <u>9</u>
Grocery store/food market	<u>585</u>	<u>621</u>	<u>589</u>	<u>631</u>	<u>566</u>	<u>587</u>	<u>617</u>	<u>681</u>	<u>624</u>	<u>670</u>	<u>722</u>	<u>666</u>	<u>771</u>	<u>731</u>	<u>826</u>	<u>988</u>
Other food sales	<u>264</u>	<u>280</u>	<u>266</u>	<u>285</u>	<u>256</u>	<u>265</u>	<u>278</u>	<u>307</u>	<u>282</u>	<u>302</u>	<u>326</u>	<u>300</u>	<u>348</u>	<u>330</u>	<u>373</u>	<u>446</u>
Fire station/police station	<u>176</u>	<u>174</u>	<u>168</u>	<u>173</u>	<u>145</u>	<u>163</u>	<u>157</u>	<u>191</u>	<u>171</u>	<u>176</u>	<u>206</u>	<u>184</u>	<u>228</u>	<u>208</u>	<u>245</u>	<u>326</u>
Other public order and safety	<u>454</u>	<u>450</u>	<u>436</u>	<u>447</u>	<u>375</u>	<u>421</u>	<u>406</u>	<u>494</u>	<u>442</u>	<u>456</u>	<u>533</u>	<u>477</u>	<u>591</u>	<u>539</u>	<u>635</u>	<u>843</u>
Medical office (diagnostic)	<u>196</u>	<u>196</u>	<u>195</u>	<u>192</u>	<u>179</u>	<u>194</u>	<u>169</u>	<u>195</u>	<u>192</u>	<u>174</u>	<u>190</u>	<u>190</u>	<u>197</u>	<u>193</u>	<u>196</u>	<u>227</u>
Clinic/other outpatient health	<u>270</u>	<u>269</u>	<u>268</u>	<u>264</u>	<u>245</u>	<u>267</u>	<u>232</u>	<u>268</u>	<u>264</u>	<u>239</u>	<u>262</u>	<u>261</u>	<u>271</u>	<u>266</u>	<u>269</u>	<u>312</u>
Refrigerated warehouse	<u>601</u>	<u>595</u>	<u>577</u>	<u>591</u>	<u>497</u>	<u>557</u>	<u>538</u>	<u>654</u>	<u>585</u>	<u>604</u>	<u>706</u>	<u>632</u>	<u>782</u>	<u>713</u>	<u>840</u>	<u>111</u> <u>5</u>
Religious worship	<u>99</u>	<u>98</u>	<u>95</u>	<u>97</u>	<u>82</u>	<u>91</u>	<u>88</u>	<u>107</u>	<u>96</u>	<u>99</u>	<u>116</u>	<u>104</u>	<u>128</u>	<u>117</u>	<u>138</u>	<u>183</u>
Entertainment/ culture	<u>229</u>	<u>227</u>	<u>220</u>	<u>225</u>	<u>189</u>	<u>212</u>	<u>205</u>	<u>249</u>	<u>223</u>	<u>230</u>	<u>269</u>	<u>241</u>	<u>298</u>	<u>272</u>	<u>320</u>	<u>425</u>
Library	<u>335</u>	<u>332</u>	<u>321</u>	<u>329</u>	<u>277</u>	<u>310</u>	<u>300</u>	<u>364</u>	<u>326</u>	<u>336</u>	<u>393</u>	<u>352</u>	<u>436</u>	<u>397</u>	<u>468</u>	<u>621</u>
Recreation	<u>157</u>	<u>156</u>	<u>151</u>	<u>155</u>	<u>130</u>	<u>146</u>	<u>141</u>	<u>171</u>	<u>153</u>	<u>158</u>	<u>185</u>	<u>165</u>	<u>205</u>	<u>186</u>	<u>220</u>	<u>292</u>
Social/meeting	<u>121</u>	<u>120</u>	<u>116</u>	<u>119</u>	<u>100</u>	<u>112</u>	<u>108</u>	<u>132</u>	<u>118</u>	<u>121</u>	<u>142</u>	<u>127</u>	<u>157</u>	<u>143</u>	<u>169</u>	<u>224</u>
Other public assembly	<u>149</u>	<u>147</u>	<u>143</u>	<u>146</u>	<u>123</u>	<u>138</u>	<u>133</u>	<u>162</u>	<u>145</u>	<u>149</u>	<u>175</u>	<u>156</u>	<u>194</u>	<u>176</u>	<u>208</u>	<u>276</u>
College/ university	<u>325</u>	<u>332</u>	<u>320</u>	<u>332</u>	<u>241</u>	<u>309</u>	<u>287</u>	<u>395</u>	<u>333</u>	<u>353</u>	<u>438</u>	<u>371</u>	<u>517</u>	<u>445</u>	<u>564</u>	<u>816</u>
Elementary/ middle school	<u>177</u>	<u>176</u>	<u>170</u>	<u>170</u>	<u>141</u>	<u>162</u>	<u>157</u>	<u>189</u>	<u>168</u>	<u>167</u>	<u>202</u>	<u>179</u>	<u>231</u>	<u>204</u>	<u>244</u>	<u>348</u>

Climate Zone ^a	1A	2A	2B	3A	3B	3B	3C	4A	4B	4C	5A	5B	6A	6B	7	8
Use Types	sEUI Target (kBtu/sf/yr)															
High school	166	170	163	170	123	158	147	202	170	180	224	189	264	228	288	417
Preschool/ daycare	209	207	201	200	167	191	186	223	198	197	239	211	272	240	288	411
Other classroom education	126	129	124	128	93	120	111	153	129	137	170	143	200	172	218	316
Fast food	181 7	186 4	182 7	190 5	168 5	183 7	178 1	206 9	192 5	195 5	223 2	205 1	242 3	225 1	259 9	322 3
Restaurant/ cafeteria	763	799	772	830	706	788	783	921	843	882	994	907	107 7	100 4	116 4	144 0
Other food service	716	749	724	778	662	739	734	864	791	827	933	851	101 0	941	109 2	135 1
Hospital/ inpatient health	561	568	534	548	530	523	547	572	492	536	572	503	590	530	600	716
Nursing home/assisted living	309	306	296	304	255	286	276	336	301	310	363	325	402	366	432	573
Dormitory/ fraternity/ sorority	175	176	171	173	142	164	148	192	170	173	215	188	247	219	269	345
Hotel	214	234	217	251	227	229	244	276	259	270	300	283	325	313	353	425
Motel or inn	231	231	225	230	201	220	209	245	228	226	260	240	283	260	300	366
Other lodging	229	229	224	228	200	218	207	243	226	224	259	239	281	259	298	364
Vehicle dealership/ showroom	281	282	270	277	199	250	223	323	274	294	367	310	420	375	468	655
Retail store	194	195	187	191	138	173	154	223	189	203	253	214	290	259	323	453
Other retail	392	393	378	386	278	350	312	452	383	410	512	433	587	524	653	915
Post office/postal center	164	162	157	161	135	152	147	178	160	165	192	172	213	194	229	304
Repair shop	124	123	119	122	103	115	111	135	121	125	146	131	162	147	174	231
Vehicle service/repair shop	148	147	142	146	123	137	133	161	144	149	174	156	193	176	207	275
Vehicle storage/ maintenance	112	111	107	110	93	104	100	122	109	112	131	118	146	133	157	208
Other service	315	312	302	310	260	292	282	343	307	317	370	331	410	374	441	585
Strip shopping mall	282	294	287	314	224	289	267	375	321	349	427	364	498	449	559	788
Enclosed mall	279	292	285	312	222	287	265	372	318	346	423	361	494	445	555	781

a. Climate zones as determined in accordance with Section C301 of the International Energy Conservation Code.

310.2 Calculation of energy use. The sEUI shall be based on 12 continuous months of energy use data for the whole *building*. The annual sEUI for electric energy shall be calculated by converting energy use at the *building* to kBtu's and multiplying by the conversion factor in Table 310.2.1 based on the geographical location of the *building*. The annual sEUI for fossil fuels shall be calculated by converting energy use at the *building* to kBtu's and multiplying by the conversion factors in Table 310.2.2. The annual sEUI for district cooling shall be calculated by converting energy use at the *building* to kBtu's, multiplying by 0.33, and then multiplying by the conversion factor in Table 310.2.1 based on the geographical location of the *building*. The annual sEUI for district heating shall be calculated by converting energy use at the *building* to kBtu's and multiplying by 1.35 for hot water and 1.45 for steam. The annual sEUI for all other energy sources shall be calculated by converting energy use at the *building* to kBtu's and multiplying by 1.1.

TABLE 310.2.1^a
ELECTRICITY GENERATION ENERGY CONVERSION FACTORS BY eGRID SUB REGION^a

eGRID 2007 Sub-region Acronym	eGRID 2007 Sub-region Name	Energy Conversion Factor
AKGD	ASCC Alaska Grid	2.97
AKMS	ASCC Miscellaneous	1.76
ERCT	ERCOT All	2.93
FRCC	FRCC All	2.97
HIMS	HICC Miscellaneous	3.82
HIOA	HICC Oahu	3.14
MORE	MRO East	3.40
MROW	MRO West	3.41
NYLI	NPCC Long Island	3.20
NEWE	NPCC New England	3.01
NYCW	NPCC NYC/Westchester	3.32
NYUP	NPCC Upstate NY	2.51
RFCE	RFC East	3.15
RFCM	RFC Michigan	3.05
RFCW	RFC West	3.14
SRMW	SERC Midwest	3.24
SRMV	SERC Mississippi Valley	3.00
SRSO	SERC South	3.08
SRTV	SERC Tennessee Valley	3.11
SRVC	SERC Virginia/Carolina	3.13
SPNO	SPP North	3.53
SPSO	SPP South	3.05
CAMX	WECC California	2.61
NWPP	WECC Northwest	2.26
RMPA	WECC Rockies	3.18
AZNM	WECC Southwest	2.95

a. Sources: EPA eGrid 2007 version 1.1, 2005 data; EPA eGrid regional gross grid loss factors; EIA Table 8.4a (Sum tables 8.4 band 8.4c) and Table 8.2c (Breakout of Table 8.2b), 2005 data.

TABLE 310.2.2
U.S. AVERAGE BUILDING FUELS ENERGY CONVERSION FACTORS BY FUEL TYPE

Fuel Type	Energy Conversion Factor
Natural Gas	1.09
Fuel Oil	1.13
LPG	1.12

Reason: According to the Urban Land Institute, New Construction and Major Renovations account for only 1-2% of the building stock in a typical year. For the larger population of existing buildings, building codes' primary means of improving energy efficiency are through alterations. However, as current codes are formulated, the scope of that impact is generally limited to the scope of the alteration. Code requirements generally apply only to the alterations and not to the energy efficiency of the whole building. This highlights the inability of a jurisdiction's energy code to improve the energy efficiency of its whole building stock.

Bearing in mind the dangers of unintended consequences, it is wise to carefully target any new code requirements for existing buildings, and so this proposal is built on two principles:

- Many existing buildings perform quite well, so requirements should focus only on very poorly performing buildings rather than indiscriminately covering all buildings.
- As this represents new territory in building codes, requirements should be built upon existing code mechanisms, code language and code requirements as much as possible.

The International Property Maintenance Code provides a natural and logical home for this kind of code requirement. The IPMC is already scoped around the fundamental concept of establishing a minimum standard for the condition of a building. Energy performance falls directly within this scope. The IPMC already has the administrative mechanisms needed to set this minimum standard for energy performance. Section 104 gives the code official authority to inspect and require reports. Section 106 provides means for dealing with violations. This proposal, therefore, only sets a minimum threshold for energy performance. This leverages the existing procedures and remedies already built into the IPMC, and avoids the need to create new code enforcement mechanisms.

The performance threshold values in the table are based on the 2003 Commercial Building Energy Consumption Survey (the same dataset that serves as the basis for commercial building Energy Star Scores and the targets for existing buildings in ASHRAE Standard 100). Based on either the table of values or an Energy Star Score threshold of 26, the requirements will only kick in for a building that would have fallen in the worst performing quartile of the building stock in that building survey. This represents the worst 25% of the buildings around a decade ago, effectively making these requirements only apply to buildings that can be reasonably considered "energy hogs." CBECS is a nationwide survey conducted by the Energy Information Administration, so climate zone diversity for the table was created using the same, nationally vetted process used to create the performance targets for existing buildings proposed for ASHRAE Standard 100.

The target EUIs in the proposal are presented in source kBtu units because the only EUI metric in an I-Code, the 2012 IgCC, uses the same source kBtu metric. The calculation language and conversion factors for source energy are also taken directly from the IgCC, but the language has been slightly altered for greater clarity.

Current energy codes have a limited means of impacting the energy performance of the vast majority of buildings in the entire building stock. This proposed addition to the IPMC will address the significant energy efficiency opportunities in existing buildings, and do it in a way that simply expands upon current code mechanisms.

Cost Impact: There is no cost impact to this proposal.

Analysis: EB51-13 also proposes similar requirements for the IEBC.

PM12-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

310.2 (NEW)-PM-EDELSON

PM13 – 13

[F] 702.4 (IFC 1030.7)

THIS CHANGE WILL BE HEARD BY THE IFC COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee
(BajnaiC@chesterfield.gov)

Revise as follows:

[F] 702.4 (IFC 1030.7) Emergency escape and rescue openings. Required emergency escape and rescue openings shall be maintained in accordance with the code in effect at the time of construction, and the following. Required emergency escape and rescue openings shall be operational from the inside of the room without the use of keys or tools. Bars, grilles, grates or similar devices are permitted to be placed over emergency escape and rescue openings provided the minimum net clear opening size complies with the code that was in effect at the time of construction and such devices shall be releasable or removable from the inside without the use of a key, tool or force greater than that which is required for normal operation of the escape and rescue opening. Where new bars, grilles, grates or similar devices, are installed in existing buildings where none presently exist, smoke alarms shall be installed in accordance with Section 907.2.11 of the *International Building Code*.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

This code proposal is attempting to clarify the requirements for existing openings that have previously approved bars, grilles, grates and similar devices on them, vs. existing or new openings that will be installing such devices on them.

The existing IBC Code Section 1029.4 states:

1029.4 Operational constraints. Emergency escape and rescue openings shall be operational from the inside of the room without the use of keys or tools. Bars, grilles, grates or similar devices are permitted to be placed over emergency escape and rescue openings provided the minimum net clear opening size complies with Section 1029.2 and such devices shall be releasable or removable from the inside without the use of a key, tool or force greater than that which is required for normal operation of the escape and rescue opening. Where such bars, grilles, grates or similar devices are installed in existing buildings, smoke alarms shall be installed in accordance with Section 907.2.11 regardless of the valuation of the alteration.

Existing IPMC Section 702.4's last sentence was revised to clearly state that it is only applicable to existing openings that have previously approved bars, grilles, grates and similar devices on them.

The new proposed last sentence in this code proposal is attempting to correlate the requirement of IBC Section 1029.4 with the IPMC Section 702.4. If a new opening is provided, or an existing opening is going to be provided, with bars, grilles, grates and similar devices, then the smoke alarm requirements of IBC Section 907.2.11 are applicable to the affected residential unit. If previously approved bars, grilles, grates and similar devices are only being repaired or replaced on an existing opening then the smoke alarm requirement of IBC Section 907.2.11 would still not be applicable.

The title and first sentence were revised to indicate "rescue" openings to be consistent with other I-code language.

Cost Impact: This proposal will not increase the cost of construction.

PM13-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

[F] 702.4-PM-BAJNAI-BCAC.DOC

PM14 – 13

[F] 704.1.2 (New)

THIS CHANGE WILL BE HEARD BY THE IFC COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee
(BajnaiC@chesterfield.gov)

Add text as follows:

[F] 704.1 General. All systems, devices and equipment to detect a fire, actuate an alarm, or suppress or control a fire or any combination thereof shall be maintained in an operable condition at all times in accordance with the *International Fire Code*.

[F] 704.1.1 Automatic sprinkler systems. (No change to current text)

[F] 704.1.2 Fire Department Connection. Where the fire department connection is not visible to approaching fire apparatus, the fire department connection shall be indicated by an approved sign mounted on the street front or on the side of the building. Such sign shall have the letters "FDC" at least 6 inches (152 mm) high and words in letters at least 2 inches (51 mm) high or an arrow to indicate the location. Such signs shall be subject to the approval of the fire code official.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

This language is currently found in section 912.2.2 of the International Building Code and should be in the IPMC. FDCs on existing buildings may not always be readily visible. A sign is critical to approaching fire-fighting operations.

Cost Impact: This proposal will not increase the cost of construction.

PM14-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

[F] 704.1.2 (NEW)-PM-BAJNAI-BCAC.DOC

PM15 – 13

[F] 704.2.1 (New), [F] 704.2.2 (New)

THIS CHANGE WILL BE HEARD BY THE IFC COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee, and Adolf Zubia, Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee (BajnaiC@chesterfield.gov)

Add text as follows:

[F] 704.2 Smoke alarms. Single- or multiple-station smoke alarms shall be installed and maintained in Groups R-2, R-3, R-4 and in dwellings not regulated in Group R occupancies, regardless of *occupant* load at all of the following locations:

1. On the ceiling or wall outside of each separate sleeping area in the immediate vicinity of *bedrooms*.
2. In each room used for sleeping purposes.
3. In each story within a *dwelling unit*, including *basements* and cellars but not including crawl spaces and uninhabitable attics. In dwellings or *dwelling units* with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full story below the upper level.

Single- or multiple-station smoke alarms shall be installed in other groups in accordance with the *International Fire Code*.

[F] 704.2.1 Installation near cooking appliances. Smoke alarms shall not be installed in the following locations unless this would prevent placement of a smoke alarm in a location required by Section R314.3.

1. Ionization smoke alarms shall not be installed less than 20 feet (6.1 m) horizontally from a permanently installed cooking appliance.
2. Ionization smoke alarms with an alarm-silencing switch shall not be installed less than 10 feet (3 m) horizontally from a permanently installed cooking appliance.
3. Photoelectric smoke alarms shall not be installed less than 6 feet (1.8 m) horizontally from a permanently installed cooking appliance.

[F] 704.2.2 Installation near bathrooms. Smoke alarms shall be installed not less than 3 feet (0.91 m) horizontally from the door or opening of a bathroom that contains a bathtub or shower unless this would prevent placement of a smoke alarm required by Section R314.3.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC) and the ICC Fire Code Action Committee (FCAC). These ICC committees were established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the these committees have held 6 open meetings and numerous workgroup meetings which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the CAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>. It is the intent of the ICC committees to have these sections scoped to the Fire Code Committee if approved.

This proposal is intended to reduce nuisance alarms attributed to locating smoke alarms in close proximity to cooking appliances and bathrooms in which steam is produced. The proposed provisions are based on the findings in the Task Group Report - Minimum Performance Requirements for Smoke Alarm Detection Technology - February 22, 2008, and are consistent with similar requirements included in Section 29.8.3.4 of the 2010 and 2013 editions of NFPA 72.

Cost Impact: None

PM15-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

[F] 704.2.1 (NEW)-PM-BAJNAI-ZUBIA-BCAC.DOC

PM16 – 13

705 (New)

Proponent: Rebecca Morley, representing National Center for Healthy Housing

Add new text as follows:

SECTION 705 **CARBON MONOXIDE ALARMS**

705.1 General. Carbon monoxide alarms shall be installed in accordance with Section 1103.9 of the *International Fire Code* in Group R occupancies and in dwellings not regulated as Group R occupancies.

Reason: Carbon monoxide (CO) is an odorless, tasteless, invisible gas that kills more than 300 people in homes each year. Thousands more are admitted to the hospital with carbon monoxide poisoning. This is a serious issue that affects people nationwide in all regions of the country.

The International Residential Code requires CO alarms for residences with fuel-fired appliances or attached garages. This change would make the IPMC consistent with the IRC.

This proposal expands on the requirement to specifically include portable fuel burning space heaters since these devices may not be considered an appliance, since these devices may be introduced by the property owner after construction.

The following states have required CO alarms in existing residences: Alaska, California, Colorado, Illinois, Massachusetts, Michigan, Minnesota, Montana, New Jersey, New York, North Carolina, Oklahoma, Oregon, Rhode Island, Vermont and Wisconsin. Deaths from CO are spread throughout the country as residents unwittingly use dangerous methods to stay warm in unusually cold weather.

Cost Impact: Yes, this code change proposal will increase the cost of property maintenance. A carbon monoxide alarm typically costs approximately \$25.

PM16-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

705 (NEW)-PM-MORLEY

PM17 – 13

Appendix B (New)

Proponent: Lynn Underwood, Norfolk, VA, representing the ICC Abatement of Dangerous Buildings Ad Hoc Committee.

Add new text as follows:

APPENDIX B **Provisions for Abatement of Dangerous Buildings**

The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance

CHAPTER B1 **SCOPE AND ADMINISTRATION**

SECTION B101 **GENERAL**

B101.1 Title. These provisions shall be known as the *Provisions for the Abatement of Dangerous Buildings* hereafter will be referred to as “The Abatement Provisions”.

B101.2 Scope. The Abatement Provisions apply to all buildings, or structures or portions of buildings or structures that have been deemed dangerous by the *building official*, which are now in existence or which hereafter become dangerous in this jurisdiction.

B101.3 Intent. The purpose of The Abatement Provisions is to provide for the repair, vacation or demolition of buildings or structures, which from any cause, endanger the life, limb, health, property, safety or welfare of the general public.

The purpose of The Abatement Provisions is not to create or otherwise establish or designate any particular class or group of persons who will or should be especially protected by or who would benefit from the terms of The Abatement Provisions.

B101.4 Application of other codes. Where determined appropriate by the building official, The Abatement Provisions are applicable in combination with the other codes of the jurisdiction, including, but not limited to, building, fire and property maintenance codes.

SECTION B102 **APPLICABILITY**

B102.1 General. Where, in any specific case, different sections of The Abatement Provisions specify different requirements, the most restrictive shall govern. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall be applicable.

B102.2 Other laws. The Abatement Provisions shall not be deemed to nullify any provisions of local, state or federal law and regulation.

B102.3 Application of references. References to chapter or section numbers, or to provisions not specifically identified by number, shall be construed to refer to such chapter, section or provision of The Abatement Provisions.

B102.4 Referenced codes and standards. The codes and standards referenced in The Abatement Provisions are considered part of the requirements of The Abatement Provisions to the prescribed extent

of each such reference. Where differences occur between The Abatement Provisions and referenced codes and standards, the requirements of The Abatement Provisions shall govern.

B102.5 Partial invalidity. In the event that any part or provision of The Abatement Provisions is held to be illegal or void, this shall not have the effect of making void or illegal any of the other parts or provisions.

B102.6 Existing remedies. The provisions to The Abatement Provisions shall not be construed to abolish or impair existing remedies of the jurisdiction or its officers or agencies relating to the removal or demolition of any structure which is dangerous, unsafe and insanitary.

SECTION B103

CONSTRUCTION IN COMPLIANCE WITH LOCALLY ADOPTED CODES

B103.1 General. Repairs, additions and alterations to buildings and structures shall be done in accordance with the procedures and provisions of the adopted codes of the jurisdiction.

SECTION B104

OWNER RESPONSIBILITY AND TRANSFER OF OWNERSHIP

B104.1 General. The owner of record shall be responsible for correcting all deficiencies in the notice and order, or appealing the notice and order.

B104.2 Transfer of ownership. It shall be unlawful for the owner of any building or structure who has received a compliance order or upon whom a notice of violation has been served to sell, transfer, mortgage, lease or otherwise dispose of such building or structure to another until the provisions of the compliance order or notice of violation have been complied with, or until such owner shall first furnish the grantee, transferee, mortgagee or lessee a true copy of any compliance order or notice of violation issued by the building official and shall furnish to the building official a signed and notarized statement from the grantee, transferee, mortgagee or lessee, acknowledging the receipt of such compliance order or notice of violation and fully accepting the responsibility without condition for abating the violation as required by such compliance order or notice of violation.

SECTION B105

DUTIES AND POWERS OF BUILDING OFFICIAL

B105.1 General. The building official is authorized to enforce The Abatement Provisions. The building official shall have the authority to interpret The Abatement Provisions and to adopt policies and procedures to clarify the application of its provisions. Such interpretations, rules and regulations shall be in conformity with the intent and purpose of The Abatement Provisions.

B105.2 Authority to disconnect service utilities. The building official shall have the authority to order disconnection of any electricity, fuel gas, water, or all other utility service to a building, structure or system where necessary to eliminate an immediate hazard to life or property. The building official shall notify the serving utility and, whenever practical, the owner and occupant of the building, structure or service system prior to taking such action. If not notified prior to disconnection, the owner and occupant of the building, structure or service system shall be notified as soon as practical thereafter.

B105.3 Liability. The building official, member of the board of appeals or employee charged with the enforcement of The Abatement Provisions, while acting for the jurisdiction, in good faith and without malice in the discharge of the duties required by The Abatement Provisions or other pertinent law or ordinance, shall not thereby be rendered liable personally, and is hereby relieved from all personal liability for any damage accruing to persons or property as a result of an act or by reason of an act or omission in the discharge of official duties. Any suit instituted against any officer or employee because of an act performed by that officer or employee in the lawful discharge of duties and under the provisions of The Abatement Provisions shall be defended by the legal representative of the

jurisdiction until the final termination of the proceedings. The building official or any subordinate shall not be liable for costs in an action, suit or proceeding that is instituted in pursuance of the provisions of The Abatement Provisions.

SECTION B106 **INSPECTION OF WORK**

B106.1 General. Buildings, structures or equipment within the scope of The Abatement Provisions shall be subject to inspection by the building official in accordance with The Abatement Provisions and the inspection provisions of the jurisdiction.

B106.2 Right of entry. Where it is necessary to make an inspection to enforce the provisions of The Abatement Provisions, or whenever the building official has reasonable cause to believe that there exists in a building or upon any premises a condition in violation of The Abatement Provisions which make the building or premises dangerous, the building official is authorized to enter the building or premises at reasonable times to inspect or to perform the duties imposed upon the building official by The Abatement Provisions. Where such building or premises is occupied, the building official shall present credentials to the occupant and request entry. Where such building or premises is unoccupied, the building official shall first make a reasonable effort to locate the owner or other person having charge or control of the building or premises and request entry. If entry is refused, the building official shall have recourse to the remedies provided by law to secure entry.

B106.2.1 Warrant. When the building official has first obtained a proper inspection warrant or other remedy provided by law to secure entry, an owner or occupant or person having charge, care or control of the building or premises shall not fail or neglect to permit entry by the building official for the purpose of inspection and examination pursuant to The Abatement Provisions.

SECTION B107 **ABATEMENT**

B107.1 General. Buildings or portions thereof which are determined after inspection by the building official to be dangerous are declared to be public nuisances and shall be abated by repair, rehabilitation, demolition or removal in accordance with the procedure specified in Section B109.

SECTION B108 **IMMINENT DANGER**

B108.1 General. When the building official finds that there is imminent danger of failure or collapse of a building or structure which endangers life, or when any structure or part of a structure has fallen and life is endangered by the occupation of the structure, or when there is actual or potential danger to building occupants or those in the proximity of any structure because of explosives, explosive fumes or vapors or the presence of toxic fumes, gases or materials, or operation of *dangerous equipment*, the building official is authorized and empowered to order and require the occupants to vacate the building or structure.

SECTION B109 **NOTICES AND ORDERS OF BUILDING OFFICIAL**

B109.1. General. Notices and orders of the building official, and the service of such notices and orders shall comply with the provisions of Sections B109.1.1 through B109.1.5.

B109.1.1 Commencement of proceedings. Whenever the building official has inspected or caused to be inspected any building or structure and determined that such building or structure is dangerous, the building official shall commence proceedings to cause the repair, vacation or demolition of the building or structure.

B109.1.2 Notice and order. The building official shall issue a notice and order to the owner of the building. The notice and order shall be in writing and shall contain the following:

1. The street address and a legal description sufficient for identification of the premises on which the building or structure is located.
2. A statement that the building or structure has been found to be dangerous, with a description of the conditions found to render the building dangerous under the provisions of Section B202.
3. A statement of the action required to be taken as determined by the building official.
 - 3.1. Where the building official has determined that the building or structure is required to be repaired, the order shall require that all required permits be secured therefore and the work physically commenced within such time and completed within such time as the building official shall determine is reasonable under all of the circumstances. Nothing in this section shall be deemed to prohibit vacating and demolishing a building ordered to be repaired. Work shall physically commence within 60 days of the order, or within the number of days set by the order, whichever occurs first.
 - 3.2. Where the building official has determined that the building or structure is required to be vacated, the order shall require that the building or structure shall be vacated within a time certain from the date of the order as determined by the building official to be reasonable. Nothing in this section shall be deemed to prohibit demolishing a building ordered to be vacated.
 - 3.3. Where the building official has determined that the building or structure is required to be demolished, the order shall require that the building be vacated within such time as the building official shall determine is reasonable; that all required permits be secured therefore within 60 days from the date of the order; and that the demolition be completed within such time as the building official shall determine is reasonable.
4. Statements advising that when required repair or demolition work is not commenced within the time specified, the building official is authorized to:
 - 4.1. Order the building vacated and posted to prevent further occupancy until the work is completed, and
 - 4.2. Proceed to cause the work to be done. Where the building official has caused work to be done, the costs of the work shall be charged against the property or its owner.
5. A statement of the right of the jurisdiction to file a lien.
6. Statements advising that:
 - 6.1. Any person having any title or legal interest in the building has the right to appeal from the notice and order or any action of the building official to the board of appeals; and
 - 6.2. Failure to appeal shall constitute a waiver of all rights to an administrative hearing and determination of the matter.
 - 6.3. Appeals shall be in writing as provided in Section B110 and filed with the building official within 20 days from the date of service of such notice and order.
7. In the case of buildings and structures to be vacated or demolished, the building official shall include, in the notice and order, notification specifying the emergency and conditions which necessitate placarding in accordance with Section B109.4.

B109.1.3 Service of notice and order. The notice and order, and any amended or supplemental notice and order, shall be:

1. Served on the owner;
2. Posted on the property;

Where known to the building official or disclosed from official public records, a copy of the notice and order also shall be served on:

1. The holder of any mortgage or deed of trust or other lien or encumbrance of record;
2. The owner or holder of any lease of record; and
3. The holder of any other estate or legal interest of record in or to the building or the land on which it is located.

The failure of the building official to serve any person required herein to be served shall not invalidate any proceedings hereunder as to any other person duly served or relieve any such person from any duty or obligation imposed by the provisions of this section.

B109.1.4 Method of service. The notice and order shall be deemed to be properly serviced where a copy thereof is:

1. Delivered personally; or
2. Sent by certified or first-class mail addressed to the last known address; or
3. Delivered by private delivery service with proof of delivery; or
4. When the notice is returned showing that the letter was not delivered, a copy thereof shall be posted in a conspicuous place in or about the structure affected by such notice.

B109.1.5 Proof of service. Proof of service of the notice and order shall be certified to at the time of service by a written declaration under penalty of perjury executed by the persons effecting service, declaring the time, date and manner in which service was made. The declaration, together with any receipt card returned in acknowledgment of receipt by certified mail shall be affixed to the copy of the notice and order retained by the building official. Proof of service by private delivery service shall be in the form usually used by said service in the normal course of business.

B109.2 Recordation of notice and order. Notices and orders shall be recorded according to this section.

B109.2.1 Non-compliance. If compliance is not had with the order within the time specified therein, and no appeal has been properly and timely filed, the building official shall file in the office of the county recorder a certificate describing the property and certifying the following:

1. The building is a *dangerous building*, and
2. The owner has been so notified.

B109.2.2 Compliance. When the corrections ordered have been completed or the building demolished so that it no longer exists as a *dangerous building* on the property described in the certificate, the building official shall file a new certificate with the county recorder certifying that the building has been demolished or all required corrections have been made so that the building is no longer dangerous, whichever is appropriate.

B109.3 Repair, vacation and demolition. Where a *dangerous building* or structure is subject to an order to be repaired, vacated or demolished, the building official shall comply with the following criteria. Where the order follows the conclusion of an appeal, the board of appeals shall follow the same criteria.

1. Where the building is declared a *dangerous building* under The Abatement Provisions, it shall be made to comply with one of the following:
 - 1.1. The building shall be repaired in accordance with the adopted building codes of the jurisdiction;
 - 1.2. The building shall be demolished either in compliance with an order to demolish, or where the owner chooses to demolish rather than repair the building; or
 - 1.3. Where the building does not constitute an immediate danger to the life, limb, property or safety of the public, the building is vacated, secured and maintained against entry.
2. Where the building or structure is in such condition as to make it immediately dangerous to the life, limb, property or safety of the public or its occupants, it shall be ordered to be vacated.

B109.4. Placard Posting. Properties subject to notice and order shall be posted and placarded in accordance with Sections B109.4.1 through B109.4.4.

B109.4.1 Posting. In addition to the required serving of the notice in B109.1.3, whenever the building official has ordered the vacation or demolition of a building or structure, notice, in the form of placarding,

shall be posted at or near the entrances of the building and in one or more conspicuous places in or about the structure affected by such notice.

B109.4.2 Placarding. The posted placard shall be in substantially the following form:

DO NOT ENTER
UNSAFE TO OCCUPY

It shall be unlawful to enter or occupy this building, or to remove or deface this notice.

[Name]

Building Official

[Jurisdiction]

For more information please contact...

B109.4.3 Prohibited occupancy and entry. No person shall enter, occupy, or remain in any building placarded by the building official in accordance with Section B109.4. Any person who enters or occupies a placarded premises or any owner or any person responsible for the premises who allows anyone enter or occupy a placarded premises shall be subject to the penalties provided for in The Abatement Provisions.

Exception: The building official is permitted to allow entry into the structure or premises.

B109.4.4 Placard removal. The building official shall remove the placard whenever the *dangerous conditions* for which the placard was required have been eliminated. Any person who defaces or removes a placard without the approval of the building official shall be subject to the penalties provided for in The Abatement Provisions.

SECTION B110
APPEAL

B110.1 General. Appeals to a notice or order of the building official shall comply with Sections B110.2 through B110.5.

B110.2 Right to appeal. Any person served a notice or order under the provisions of Section B109 has the right to appeal the order or notice to the Board of Appeals.

B110.2.1 Failure to appeal. Failure of any person to file an appeal in accordance with the provisions of Section B110.5 shall constitute a waiver of the right to an administrative hearing and adjudication of the notice and order or any portion thereof.

B110.3 Imminent danger. Where the building is an imminent danger to public safety, the building official shall have the authority to direct abatement of the hazard in accordance with Section B108 of The Abatement Provisions prior to the filing of an appeal, or resolution of any filed appeal.

B110.4 Board of appeals established. In order to hear and decide appeals of orders, decisions or determinations made by the building official relative to the application and interpretations of The Abatement Provisions, there shall be and is hereby created a board of appeals

B110.4.1 Appointment. The board of appeals shall be appointed by the governing body and shall hold office at its pleasure. The board of appeals shall consist of members who are qualified by experience and training to pass on matters pertaining to building construction and maintenance. The members shall not be employees of the jurisdiction. The building official shall be an ex officio member and shall act as secretary to said board but shall have no vote on any matter before the board.

B110.4.2 Rules. The board shall adopt rules of procedure for conducting its business. The decisions and findings of the board shall be in writing and provided to the appellant. A copy of each decision and finding shall be provided to the building official. Appeals to the board shall be processed in accordance with the

provisions contained in Sections B110.5 through B110.6.2 of The Abatement Provisions. Copies of all rules or regulations adopted by the board shall be delivered to the building official, who shall make them freely accessible to the public.

B110.4.3 Limitations of Authority. An application for appeal shall be based on the following:

1. A claim that the true intent of The Abatement Provisions or the rules legally adopted thereunder have been incorrectly interpreted;
2. The provisions of The Abatement Provisions do not fully apply; or
3. An equally good or better form of compliance is proposed.

The board shall have no authority to waive requirements of The Abatement Provisions.

B110.5 Form of appeal. Any person entitled to service under Section B109.1.3 has the right to appeal any notice and order or any action of the building official under The Abatement Provisions by filing at the office of the building official a written appeal on a form provided by the board of appeal.

The appeal shall be filed within 20 days from the date of the service of such order or notice of the building official; provided, however, that if the building or structure is in such condition as to make it immediately dangerous to the life, limb, property or safety of the public or adjacent property, is ordered vacated and is posted in accordance with Section B109.4, such appeal shall be filed within 10 days from the date of the service of the notice and order of the building official.

B110.6 Processing of appeal. Upon receipt of any appeal filed pursuant to this section, the building official shall present it at the next regular or special meeting of the board of appeals.

B110.6.1 Scheduling of appeal hearing. As soon as practicable after receiving the written appeal, the building official shall review the petition and determine whether the appeal is complete. When determined to be incomplete, the appellant shall be notified as to additional information required, to make the petition complete. When the appeal is determined to be complete, the appeal request shall be processed in accordance with Sections B110.6 and B110.6.2. The hearing date shall not be less than 10 days nor more than 60 days from the date the complete appeal was filed with the building official.

B110.6.2. Notice of appeal hearing. Written notice of the time and place of the hearing shall be given at least 10 days prior to the date of the hearing to each appellant by the secretary of the board either, by causing a copy of such notice to be delivered to the appellant personally, or by mailing a copy thereof, postage prepaid, addressed to the appellant at the address shown on the appeal.

B110.6.3 Scope of hearing. A hearing on appeal shall only consider matters within the scope of The Abatement Provisions. Only those matters or issues specifically raised by the appellant shall be considered in the hearing of the appeal.

B110.6.4 Staying an order under appeal. Except for vacation orders made pursuant to Section B109.4 and imminent danger pursuant to Section B108.1, enforcement of any notice and order of the building official issued under The Abatement Provisions shall be stayed during the pendency of an appeal therefrom which is properly and timely filed.

B110.7 Procedure for conduct of appeal hearings. The procedures for conduct of hearing appeals shall be as determined by the jurisdiction. All rules shall be available to appellant in advance of the hearing date. In jurisdictions where rules have not been established, procedures for conduct of hearing appeals provided in Chapter B3 of The Abatement Provisions shall be used.

SECTION B111
ENFORCEMENT OF THE ORDER OF THE BUILDING OFFICIAL
OR THE BOARD OF APPEALS

B111.1 Compliance. After any order of the building official or the board of appeals made pursuant to The Abatement Provisions has become final, no person to whom any such order is directed shall fail, neglect or refuse to obey any such order.

B111.2 Failure to obey order. Where a person fails to comply with a final order or notice issued by the building official, or issued by the board of appeals subsequent to the resolution of an appeal, the building official is authorized to take appropriate action to abate such building or premises as a public nuisance.

B111.3 Failure to commence work. Whenever the required repair or demolition is not commenced within 30 days after any final notice and order issued under The Abatement Provisions becomes effective:

1. The building official is authorized to cause the building described in such notice and order to be vacated by posting at each entrance thereto a notice as described in Section B109.4.
2. No person shall occupy any building which has been posted as specified in this section. No person shall remove or deface any such notice so posted until the repairs, demolition or removal ordered by the building official have been completed and a certificate of occupancy, as applicable, has been issued.
3. In addition to any other remedy herein provided, the building official is authorized to cause the building or structure to be repaired to the extent necessary to correct the conditions which render the building or structure dangerous as set forth in the notice and order; or, if the notice and order requires demolition, to cause the building or structure to be demolished and the materials, rubble and debris therefrom removed and the lot cleaned. Any such repair or demolition work shall be accomplished and the cost thereof paid and recovered in the manner hereinafter provided in The Abatement Provisions.

B111.4 Extension of time to perform work. The building official is authorized to grant an extension of time, not to exceed an additional 120 days, within which to complete said repair, rehabilitation or demolition, provided the building official determines that such an extension of time will not create or perpetuate a situation imminently dangerous to life or property. The building official's authority to extend time is limited to the physical repair, rehabilitation or demolition of the premises and will not in any way affect the time to appeal the notice and order.

B111.5 Interference with repair or demolition work prohibited. It shall be unlawful for any person to obstruct, impede or interfere with any officer, employee, contractor or authorized representative of this jurisdiction or with any person who owns or holds any estate or interest in any building which has been ordered repaired, vacated or demolished under The Abatement Provisions; or with any person to whom such building has been lawfully sold pursuant to The Abatement Provisions, whenever such officer, employee, contractor or authorized representative of this jurisdiction, person having an interest or estate in such building or structure, or purchaser is engaged in the work of repairing, vacating and repairing, or demolishing any such building, pursuant to The Abatement Provisions, or in performing any necessary act preliminary to or incidental to such work or authorized or directed pursuant to The Abatement Provisions.

SECTION B112
REPAIR OR DEMOLITION WORK PERFORMED BY THE JURISDICTION

B112.1 Procedure. When any work of repair or demolition is performed by the jurisdiction or at its direction pursuant to The Abatement Provisions, the required work is to be accomplished by the appropriate personnel of this jurisdiction or by private contract under the direction of the office designated by the jurisdiction

Plans and specifications necessary to perform such work shall be prepared according to the following:

1. By the office designated by the jurisdiction, or
2. Where deemed reasonably necessary the jurisdiction employ architectural and engineering assistance on a contract basis.

B112.2 Costs. The jurisdiction shall keep an itemized account of the expense incurred by this jurisdiction in the repair or demolition of any building done pursuant to the provisions of Section B111.3, of The Abatement Provisions. Upon the completion of the work of repair or demolition, an abatement expense report shall be prepared and filed, specifying the work done, the itemized and total cost of the work, a description of the real property on which the building or structure is or was located, and the names and addresses of the persons entitled to notice pursuant to Section B109.1.3.

All costs associated with such work shall be paid by the jurisdiction and shall be recovered by one of the following processes:

1. Apply a special assessment against the property involved,
2. Be made a personal obligation of the property owner, or
3. Be added to the tax roll of the premises, in conformance with applicable laws.

B112.3 Repair and demotion fund. The legislative body of this jurisdiction is authorized to establish a special revolving fund to be designated as the repair and demolition fund. Payment is authorized to be made out of said fund on the demand to defray the costs and expenses which are incurred by this jurisdiction in doing or causing to be done the necessary work of repair or demolition of *dangerous buildings*.

B112.3.1 Maintenance of Fund. The legislative body is authorized at any time to transfer to the repair and demolition fund, out of any money in the general fund of this jurisdiction, such sums as it deems necessary in order to expedite the performance of the work of repair or demolition, and any sum so transferred shall be deemed a loan to the repair and demolition fund and shall be repaid out of the proceeds of the collections hereinafter provided for. All funds collected under the proceedings hereinafter provided for shall be paid to the treasurer of this jurisdiction who shall credit the same to the repair and demolition fund.

B112.2.3 Salvage materials. Where any structure has been ordered demolished and removed, the governing body or other designated officer under said contract or arrangement aforesaid shall have the right to sell the salvage and valuable materials at the highest price obtainable. The net proceeds of such sale, after deducting the expenses of such demolition and removal, shall be promptly remitted with a report of such sale or transaction, including the items of expense and the amounts deducted, for the person who is entitled thereto, subject to any order of a court. If such a surplus does not remain to be turned over, the report shall so state.

SECTION B113 **VIOLATIONS**

B113.1 Violation penalties. Any person who violates a provision of The Abatement Provisions or fails to comply with any of the requirements thereof shall be subject to penalties as described by law. It is unlawful and a public nuisance for any person to maintain an unsafe or *dangerous building* or structure. Each and every day that a building or structure is maintained in an unsafe or *dangerous condition* is a new violation of The Abatement Provisions. It is a violation of The Abatement Provisions and unlawful to occupy a building or structure that has been ordered to be vacated.

CHAPTER B2 **DEFINITIONS**

SECTION B201 **GENERAL**

B201.1 Scope. Unless otherwise expressly stated, the following terms shall, for the purposes of The Abatement Provisions, have the meanings shown in this chapter.

B201.2 Interchangeability. Words stated in the present tense include the future; words stated in the masculine gender include the feminine and neuter; the singular number includes the plural and the plural, the singular.

B201.3 Terms defined in other codes. Where terms are not defined in this chapter and are defined in the *International Building Code*, *International Residential Code*, *International Fire Code*, *International Zoning Code*, *International Plumbing Code*, *International Mechanical Code*, *International Fuel Gas Code*, *NFPA 70*, or the adopted building codes of the jurisdiction, such terms shall have the meanings ascribed to them as in those codes.

B201.4 Terms not defined. Where terms are not defined through the methods authorized by this section, such terms shall have ordinarily accepted meanings such as the context implies.

SECTION B202 **DEFINITIONS**

Dangerous building. A *dangerous building* is a building or portion thereof which is found to be dangerous to the life, health, property or safety of the public or the occupants of the structure when described below as *dangerous structures*, having *dangerous equipment*, structures unfit for human occupancy, or having *dangerous conditions*.

Dangerous conditions. Any building, structure or part thereof that has one or more of the conditions or defects described below shall be deemed dangerous. *Dangerous conditions* include but are not limited to the following:

1. Any door, aisle, passageway, stairway, exit or other means of egress component that does not provide adequate access to an exit or sufficient capacity to provide a safe means of egress.
2. The walking surface of any aisle, passageway, stairway, exit or other means of egress is so warped, loose, torn or otherwise unsafe as to not provide safe and adequate means of egress.
3. Any portion of a building, structure or appurtenance that has been damaged by fire, earthquake, wind, flood, deterioration, neglect, abandonment, vandalism or by any other cause to such an extent that it is likely to partially or completely collapse, or to become detached or dislodged.
4. Any portion of a building, or any member, appurtenance or ornamentation on the exterior thereof that is not of sufficient strength or stability, or is not so anchored, attached or fastened in place so as to be capable of resisting loads of one half of that specified by the building code for new buildings or structures or similar construction, purpose and location without exceeding the working stresses permitted in the building code.
5. The building or structure, or part of the building or structure, because of dilapidation, deterioration, decay, faulty construction, the removal or movement of some portion of the ground necessary for the support, or for any other reason, is likely to partially or completely collapse, or some portion of the foundation or underpinning of the building or structure is likely to fail or give way.
6. The building or structure, or any portion thereof, is hazardous for its use and occupancy.
7. The building or structure is neglected, damaged, dilapidated, unsecured or abandoned so as to become an attractive nuisance to children who might play in the building or structure to their danger, becomes a harbor for vagrants, criminals, or enables persons to resort to the building or structure for committing an unlawful act.

8. Any building or structure that has been constructed, exists or is maintained in violation of any specific requirement or prohibition applicable to such building or structure provided by the building or fire code of the jurisdiction, or of any law or ordinance to such an extent as to present either a substantial risk of fire, building collapse or any other threat to life and safety.
9. A building or structure, used or intended to be used for dwelling purposes, because of inadequate maintenance, dilapidation, decay, damage, faulty construction or arrangement, inadequate light, ventilation, mechanical or plumbing system, or otherwise, is determined by the building official to be insanitary, unfit for human habitation or in such a condition that is likely to cause sickness or disease.
10. Any building or structure, because of a lack of maintenance of fire-resistance-rated construction, fire protection systems, electrical system, fuel connections, mechanical system, plumbing system or other cause, is determined by the building official to be a threat to life or health.
11. Any portion of a building remains on a site after the demolition or destruction of the building or structure or whenever any building or structure is abandoned so as to constitute such building or portion thereof as an attractive nuisance or hazard to the public.

Dangerous equipment. *Dangerous equipment* includes any boiler, heating equipment, elevator, moving stairway, electrical wiring or device, flammable liquid containers, or other equipment which is in such disrepair or condition that such equipment is a hazard to life, health, property or safety of the public or occupants.

Dangerous structure. The building or structure, or part of the building or structure, because of dilapidation, deterioration, decay, damage, unstable foundation or faulty construction is in a condition that partial or complete collapse is possible and is judged to be hazardous.

Structure unfit for human occupancy. A structure is unfit for human occupancy whenever the structure contains a *dangerous condition* or the building official finds that such structure is dangerous due to the degree to which the structure is in disrepair, lacks maintenance, is insanitary, vermin or rat infested, contains filth and contamination, lacks ventilation, illumination, heating, sanitary facilities or other essential equipment, or the location of the structure constitutes a hazard to the occupants of the structure or to the public.

CHAPTER B3 **PROCEDURES FOR CONDUCT OF APPEAL HEARING**

SECTION B301 **GENERAL**

B301.1 Hearing. The hearing for any appeal case brought to the board of appeals, shall be conducted in one of the following manners:

1. By the board of appeals;
2. By one or more members of the board designated by the board to serve as hearing examiners;
or
3. By one or more hearing examiners appointed by the board who are not members of the board.

B301.1.1 Authority. The examiner hearing the case shall exercise all powers relating to the conduct of hearings until it is submitted to the board of appeals for decision.

B301.2 Record. A record of the entire proceedings related to an appeal hearing shall be made. The record shall be retained in the records of the board of appeals in a manner and length of time established by the board.

B301.3 Transcripts. At the request of any party a transcript shall be made of the proceedings. The requesting party shall be responsible for any and all costs of recording the proceeding and producing the

transcripts. If a transcript is produced, the transcript shall be made available to all parties upon request and upon payment of any required fee. Where required by written policy of the board, requests for transcripts shall be submitted to the jurisdiction. The jurisdiction is authorized to establish necessary fees, but in no event shall the fees be greater than the costs involved.

B301.4 Continuances. The board of appeals is authorized to grant continuances in the proceedings related to an appeal hearing for good cause shown. Where a hearing has been assigned to a hearing examiner, the examiner is authorized to grant such continuances provided the matter remains before the examiner.

B301.5 Oaths—certification. In any proceedings under this chapter, the board of appeals, or the hearing examiner has the authority to administer oaths and affirmations and to certify to official acts.

B301.6 Reasonable dispatch. The board of appeals and its representatives shall proceed with reasonable dispatch to conclude any matter before it. Due regard shall be shown for the convenience and necessity of any parties or their representatives.

B301.7 Timeliness of process. When an appeal has been filed in accordance with Section B110.5, a hearing shall be scheduled within the time period required by Section B110.6.1. The board of appeals shall issue its final decision within 180 calendar days of the date when the appeal was filed. Where agreed to by all parties to the appeal, extensions in deadline for final action by the board are authorized if good cause is shown.

SECTION B302 **FORM OF NOTICE OF HEARING**

B302.1 General. The notice to appellant shall be substantially in the following form. The notice shall include the information specified below as well as additional information determined necessary to provide complete notice.

"You are hereby notified that a hearing will be held before [the board of appeals or name of hearing examiner] at [] on [] day of [], 20[], at the hour [], on the notice and order served on you. You may be present at the hearing. You may be, but need not be, represented by counsel. You may present any relevant evidence and will be given full opportunity to cross-examine all witnesses testifying against you. You may request the issuance of subpoenas to compel the attendance of witnesses and the production of books, documents or other things by filing an affidavit therefor with [board of appeals or name of hearing examiner]."

SECTION B303 **SUBPOENAS**

B303.1 Filing of Affidavit. The board of appeals or hearing examiner is authorized to obtain the issuance and service of a subpoena for the attendance of witnesses or the production of other evidence at a hearing on the request of a member of the board or on the written demand of any party to the appeal. The issuance and service of such subpoena shall be obtained on the filing of an affidavit therefor which states the name and address of the proposed witness; specifies the exact things sought to be produced and the materiality thereof in detail to the issues involved; and states the witness has the desired things in possession or under control. A subpoena need not be issued when the affidavit is defective in any particular.

B303.2 Cases referred to hearing examiner. In cases where a hearing is referred to a hearing examiner, all subpoenas shall be obtained through the examiner.

B303.3 Penalties. Any person who refuses, without lawful excuse, to attend any hearing or to produce material evidence which the person possesses or controls as required by any subpoena served on such person as provided for herein shall be guilty of a misdemeanor.

SECTION B304

CONDUCT OF HEARING

B304.1 Rules. The board of appeals shall regulate the course of the hearings, and require the presentation of evidence in such manner and order that is most beneficial to the board. To the extent not inconsistent with The Abatement Provision and to the extent it advances the purposes of The Abatement Provision, practice before the board of appeal shall be guided by prevailing laws and regulations.

B304.2 Oral evidence. Oral evidence shall be taken only on oath or affirmation.

B304.3 Hearsay evidence. Hearsay evidence is permissible for the purpose of supplementing or explaining any direct evidence, but shall not be sufficient in itself to support a finding unless it would be admissible over objection in civil actions in courts of competent jurisdiction in this state.

B304.4 Admissibility of evidence. Any relevant evidence shall be admitted if it is the type of evidence on which responsible persons are accustomed to rely in the conduct of serious affairs, regardless of the existence of any common law or statutory rule which might make improper the admission of such evidence over objection in civil actions in courts of competent jurisdiction in this state.

B304.5 Exclusion of evidence. Irrelevant and unduly repetitious evidence shall be excluded.

B304.6 Rights of parties. Each party shall have these rights, among others:

1. To call and examine witnesses on any matter relevant to the issues of the hearing;
2. To introduce documentary and physical evidence;
3. To cross-examine opposing witnesses on any matter relevant to the issues of the hearing;
4. To impeach any witness regardless of which party first called the witness to testify;
5. To rebut the evidence; and
6. To be represented by anyone who is lawfully permitted to do so.

B304.7 Official notice. The official notice procedure shall be in accordance with Sections B304.7.1 through B304.7.4.

B304.7.1 What may be noticed. In reaching a decision, official notice may be taken, either before or after submission of the case for decision, of any fact which may be judicially noticed by the courts of this state or of official records of the board or departments and ordinances of the city or rules and regulations of the board.

B304.7.2 Parties to be notified. Parties present at the hearing shall be informed of the matters to be noticed, and these matters shall be noted in the record, referred to therein, or appended thereto.

B304.7.3 Opportunity to refute. Parties present at the hearing shall be given a reasonable opportunity, on request, to refute the officially noticed matters by evidence or by written or oral presentation of authority, the manner of such refutation to be determined by the board or hearing examiner.

B304.7.4 Inspection of the premises. The board of appeals or the hearing examiner is authorized to inspect any building or premises involved in the appeal during the course of the hearing, provided that:

1. Notice of such inspection shall be given to the parties before the inspection is made,
2. The parties are given an opportunity to be present during the inspection, and
3. The board of appeals or the hearing examiner shall state for the record upon completion of the inspection the material facts observed and the conclusions drawn therefrom.

Each party then shall have a right to rebut or explain the matters so stated by the board or hearing examiner.

SECTION B305

METHOD AND FORM OF DECISION

B305.1 Hearing before board of appeals. When a contested case is heard before the board of appeals, any member who did not hear the evidence or has not read the entire record of the proceedings shall not vote on or take part in the decision.

B305.2 Hearing before hearing examiner. If a contested case is heard by a hearing examiner alone, the examiner shall, within 30 days from the date the hearing is closed, submit a written report to the board of appeals. The report shall contain a brief summary of the evidence considered and state the examiner's findings, conclusions and recommendations. The report also shall contain a proposed decision in a form that it can be adopted by the board as its decision in the case. All examiner's reports filed with the board shall be matters of public record. A copy of each such report and proposed decision shall be mailed to each party on the date they are filed with the board.

B305.3 Consideration of report by board of appeals —notice. The board of appeals shall fix the time, date and place to consider the hearing examiner's report and proposed decision. Notice thereof shall be mailed to each interested party not less than five days prior to the date fixed, unless it is otherwise stipulated by all parties.

B305.4 Exceptions to report. Not later than two days before the date set to consider the report, any party has the right to file written exceptions to any part or all of the hearing examiner's report and offer an alternative to the proposed decision together with written argument in support of such decision. With permission of the board of appeals, any party has the right to present oral argument to the board.

B305.5 Disposition by the board of appeals. The board of appeals shall take one of the following actions regarding the proposed decision presented by the hearings examiner:

1. Adopt the decision in its entirety;
2. Reject the decision in its entirety; or
3. Modify the proposed decision.

B305.6 Proposed decision not adopted. When the proposed decision is not adopted by the board of appeals as provided in Section B305.5, the board shall either:

1. Decide the case on the entire record before it, with or without taking additional evidence, or
2. Refer the case to the same or another hearing examiner to take additional evidence. Where the case is reassigned to a hearing examiner, the examiner shall prepare a report and proposed decision as provided in Section B305.2 after any additional evidence is submitted. Consideration of such proposed decision by the board shall comply with the provisions of this section.

B305.7 Form of decision. The decision shall be in writing and shall contain findings of fact, a determination of the issues presented, the effective date of the decision, and those items that require compliance. A copy of the decision shall be delivered to the appellant personally or sent by certified mail, postage prepaid, and with a return receipt requested.

Appeal Application Form

Appellant Information:

Name: _____
Address: _____
Telephone Number: _____ Email Address: _____

Property Owner Information:

Name: _____
Address: _____
Telephone Number: _____ Email Address: _____

Order Under Appeal:

List date and details of order under appeal.

_____ Date of Order: _____

Description of Order:

Received from Municipality/Jurisdiction: _____

Name of Official issuing the order: _____

Property Description under APPEAL:

Name of Municipality/Jurisdiction: _____
Roll Number: _____
Legal Description: _____

Address: _____

Type of APPEAL:

Order for Demolition: _____
Order to Vacate Building: _____
Order to Repair Building: _____
Other: _____

Building Occupancy Type:

Examples: Residential - Single Family; Residential - Multi Family; Commercial; Duplex/ Fourplex; Row Housing; Condominium; Walkup Apartment; High-rise Apartment; Townhouse; Other

Reason for Appeal: *(must check one of the following)*. An application for appeal shall be based on _____1) a claim that the true intent of The Abatement Provisions or the rules legally adopted thereunder have been incorrectly interpreted, _____2) the provisions of The Abatement Provisions do not fully apply, or _____3) an equally good or better form of compliance is proposed.

Explain relief sought, why it is claimed that the protested order or action should be reversed, modified or otherwise set aside.

Signature of Appellant/Owner/Authorized representative

Date Appeal Filed/Accepted

Reason: The proposed code change would add a new Appendix B to the International Property Maintenance Code (IPMC) to provide an important tool for jurisdictions that need it, but not mandate the provisions for jurisdictions that might not need it. The new proposed Appendix B is titled Provisions for Abatement of Dangerous Buildings.

In 2010, the ICC Board of Directors established an Ad Hoc committee to draft provisions for the abatement of dangerous buildings. The initiative for the committee's work arose due to numerous requests from ICC members whose jurisdictions had formerly adopted the Uniform Code for Abatement of Dangerous Buildings (UCADB), published by the ICC Legacy organization ICBO. The concern was that as jurisdictions adopted ICC codes, this valuable tool for code enforcement officials, that had previously been available, was lost.

There are many jurisdictions where adoption of a full property maintenance code is simply politically untenable. For the code officials in those jurisdictions there remains a pressing need for the proposed document to provide legal authority and guidance to abate distinctly dangerous buildings and conditions. Many such jurisdictions are still using older versions of some abatement documents without good coordination with the adopted I-Codes.

The Ad Hoc committee reviewed and discussed several documents related to the abatement of dangerous buildings, including an internal draft document that had previously been developed by the ICC Hazard Abatement Ad Hoc Committee and the UCADB. The committee then decided to base its work on the UCADB's provisions but revise as needed and include provisions from other documents such as the Hazard Abatement committee work. The provisions were updated, streamlined and revised as needed to be consistent with current ICC practices and format.

This proposal would add a new Appendix B to the IPMC that would be suitable for adoption by jurisdictions that do not have other provisions for abatement of dangerous conditions in buildings and premises providing an important tool. The proposed appendix provides a means for enforcement, as well as procedures that can be used to conduct appeals. The proposal will not affect those jurisdictions that have no need for it.

The ICC Ad Hoc Committee for Abatement of Dangerous Buildings consisted of the following members:

Chair Lynn Underwood, CBO, MCP, City of Norfolk, VA;

Vice Chair Steven Rocklin, R.A. Assistant Director, Regional Services, Albany, NY

Members:

James Doody, Consulting Engineer, Calgary, Alberta, Canada

Joe Ehrlich, Senior Building Inspector, St. Paul, MN

Steve Ikkanda, JAS Pacific, VP Research and Code Development, Alhambra, CA (partial attendance)

Wayne R. Jewell, CBO, Building Official, Southfield, MI (partial attendance)

Paul R Klein, CBO, CASp, Chief Building Official, Yuba City, CA (partial attendance)

Paul R. Lopes, Littleton, NH

John H. Mertens, Fire Protection Engineer, Phoenix, AZ

Jim Olk, Building Official, Farmers Branch, TX

Linda Pieczynski, Attorney at Law, Hinsdale, IL

Anne R. vonWeller, Public Services Deputy Director, Murray, UT
Hector Buitrago, Chief of Code Enforcement Bureau, Los Angeles, CA (partial attendance)

Cost Impact: The Proposed code change will not increase the cost of construction.

PM17-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

APPENDIX B (NEW)-G-UNDERWOOD

PM18 – 13

Appendix B (New)

Proponent: Rebecca Morley, representing National Center for Healthy Housing

Add new text as follows:

APPENDIX B **ENVIRONMENTAL SAFETY**

B101 **GENERAL**

B101.1 Scope. The provisions of this chapter shall govern the minimum conditions and standards for the environmental safety a premises.

B101.2 Responsibility. The owner of a premise shall maintain the premises in compliance with these requirements. A person shall not occupy as owner-occupant, permit another person to occupy, or allow the public to use any premises which does not comply with the requirements of this appendix. Occupants of a dwelling unit, rooming unit or housekeeping unit shall not cause an area or space that they occupy and control to violate the provisions of this appendix.

B101.3 Approved Testing Methods. The code official is authorized to require testing or inspection consistent with approved methods as evidence of compliance with this appendix. The code official shall accept results from a recognized agency regularly engaged in conducting tests or furnishing inspection services or from an individual licensed in accordance with the statutory requirements of federal, state, or jurisdiction laws to conduct the testing or inspection. The testing or inspection results shall be deemed sufficient to establish whether a premise is in compliance with the requirements of this appendix. The building owner shall pay the cost of testing or inspection.

B101.4 Vacating. When an area is required to be vacated by this chapter due to a hazardous condition, entry shall be prohibited except by persons performing or overseeing the removal of the hazard. The code official shall order the area to be vacated in accordance with Section 108 of this code.

B102 **ANIMAL WASTES**

B102.1 Exterior accumulations. Animal wastes shall be contained and disposed of in a safe and sanitary manner so as to control insects, vermin, odor and the spread of disease.

B102.2 Interior accumulation. Animal waste shall not be allowed to accumulate in any dwelling unit except in an approved device which is properly maintained to contain excrement and control odor.

B103 **HAZARDOUS BUILDING MATERIALS**

B103.1 Maintenance. Building materials containing hazardous substances shall be maintained intact and in such a manner as to prevent the hazardous substances from becoming airborne or ingestible. Substances when present above the following amounts are deemed hazardous:

Asbestos (including vermiculite) – materials containing 1% asbestos by weight or area.

Formaldehyde - materials containing 0.00016% formaldehyde by weight or area.

Lead based paint– 0.5% lead by weight; 1.0 milligrams of lead per square centimeter.

Lead-based paint hazards - dust on floors containing 40 micrograms of lead per square foot; dust on interior window sills containing 250 micrograms of lead per square foot; bare soil in children's play

areas containing 400 parts per million (ppm) of lead; bare soil in areas of the yard that are not children's play areas containing 1200 ppm average.

When another adopted standard conflicts with these allowable levels, the more restrictive shall apply.

B103.2 Remediation. When building materials containing hazardous substances are deteriorated or have released hazardous substances, the condition causing the building material to deteriorate or to release hazardous substances shall be corrected and the exposed area shall be cleared of the hazardous substances. The code official is authorized to prohibit occupancy of the affected space as provided by section 108 of this code until the contaminated area and the cause of the building material becoming deteriorated has been remediated or removed.

B104 **HAZARDOUS GASES**

B104.1 Allowable levels. Within a dwelling unit, the following gases shall not exceed these specified allowable levels:

Carbon monoxide-- 9 PPM averaged over 8 hours; 35 PPM averaged over 1 hour; and 200 PPM maximum concentration as measured in general indoor air not directly above a combustion source.
Formaldehyde-- 0.05 PPM based on a 60 minute sampling period.
Radon-- 4 picocuries of radon per liter of air in the lowest occupied level.

When another adopted standard conflicts with these allowable levels, the more restrictive shall apply.

B104.2 Mitigation. Gaseous hazardous substances determined by an approved testing method to exceed the levels provided in section B104.1 shall be mitigated. The code official is authorized to order the affected area to be vacated until testing by an approved testing method finds the area to be in compliance with section B104.1.

B105 **PESTICIDES**

B105.1 General. Pesticides shall be stored in the manner prescribed by the manufacturer and shall be applied only in areas and at concentrations which comply with the labeling of the manufacturer.

B105.2 Mitigation. When it is determined by an approved method that a pesticide has been applied in -a location or at a concentration contrary to manufacturer labeling, the code official is authorized to order the area affected by or containing such pesticide to be vacated until the hazard has been mitigated.

B105.3 Removal. If a pesticide is stored in a location that does not comply with manufacturer labeling, the code official is authorized to order the area containing such pesticide to be vacated until the pesticide has been properly stored or removed.

B106 **CHEMICAL CONTAMINANTS**

B106.1 Vacating. When determined by an approved testing method that a dwelling unit is contaminated by a chemical at a concentration and in such a condition as to be hazardous to human health after short term exposure, the code official is authorized to order the dwelling unit to be vacated and remain vacated until the hazard has been abated.

B106.2 Illegal Methamphetamine manufacturing sites. A dwelling unit declared by a law enforcement agency or health official to be a site of illegal Methamphetamine manufacture shall be vacated and shall not be occupied until certified by an approved testing method as safe from hazardous materials related to the Methamphetamine manufacturing process.

B107
BIOLOGICAL HAZARDS

B107.1 Waterborne organisms. When determined by an approved testing method that the domestic water supply of a dwelling unit is contaminated with toxin producing bacteria, human parasite, or other organism deemed by an approved testing method as dangerous to human health, the water supply shall be made safe. The code official is authorized to order the dwelling unit to be vacated until such time as the water supply is safe as determined by an approved testing method. The code official is authorized to permit use of a water purification system capable of removing organisms or use of an alternative water supply on a temporary basis provided the water so supplied is safe for drinking and bathing.

B107.2 Airborne organisms. Heating, air conditioning and ventilation systems shall be kept clean and maintained so as to prevent the growth of harmful organisms within the system.

B108
AIR-BORNE CONTAMINATES

B108.1 Air-borne contaminants. Spaces in which air borne contaminants are generated shall comply with the International Mechanical Code requirements for hazardous exhaust systems. Air-borne contaminants shall not be circulated between tenant spaces or dwelling units except where contaminants have been removed by properly installed and maintained equipment.

B109
SANITARY CLEANUP

B109.1 Sanitary cleanup. After an event such as sewage spill or flooding makes occupancy of a space unsafe or unhealthful due to sanitation hazards, the space shall not be occupied until the unsafe or unhealthful conditions are removed in accordance with this section.

B109. 2 Prescriptive methods. When the prescriptive methods contained in sections B109. 2.1 through B109. 2.2 are used, the hazard shall be deemed to have been abated.

B109. 2.1 Sewage spills. All water containing sewage and all sewage solids shall be removed and disposed of in a safe and sanitary manner. Every absorbent material in contact with sewage or water which contains sewage shall be removed. Every non-absorbent material in contact with sewage or water which contains sewage shall be cleaned with detergent and disinfected household bleach in water.

B109.2.2 Flood damage. Any material that has been damaged or weakened by water shall be removed. Material saturated by water, such as insulation or gypsum board, shall be removed. All surfaces that support mold growth which have come in contact with water shall be removed or thoroughly dried and treated with a fungicide. All materials and systems required by this code, the International Building Code or the International Residential Code shall be replaced or restored to a dry condition and capable of performing the intended purpose. When flood water is known to be contaminated with harmful chemical compounds, the contamination shall be removed and the area shall be tested and found safe by an approved testing method in addition to the other requirements of this section.

B110
FOOD STORAGE AND PREPARATION AREAS

B110.1 Responsibility. The occupant of each space with a food storage or preparation area shall be responsible to maintain that area in accordance with this section.

B110.2 Food preparation areas. Food preparation areas shall be maintained free of spoiled or rotting foodstuffs. There shall be no accumulated grease on surfaces in food preparation areas, including counters, walls, floors, ceilings, appliances and storage areas.

B110.3 Food storage. Food shall be stored in a clean and sanitary condition and be protected from insect or animal pests.

Reason: Numerous hazards to health are present in the home environment. The proposed appendix provides parameters for the code official to recognize and address hazards such as those described below.

1. Asbestos products were extensively used in building materials. They continue to be legal to sell and to use. Intact asbestos is not a hazard. It becomes a hazard when damaged or deteriorated and releases friable asbestos. See www.epa.gov/asbestos/pubs/ashome.html for details. The U.S. Environmental Protection Agency (EPA) and most states license asbestos inspectors.
2. Radon is the leading cause of lung cancer in people who have never smoked. U.S. Environmental Protection Agency (EPA) has established a recommended maximum exposure level of four picocuries of radon per liter of air in occupied areas. This level can be achieved through established technology in a cost effective manner. The radon controls also reduce moisture and soil gas intrusion. See www.epa.gov/radon/pubs/newconst.html. Two national organizations and some states certify radon professionals to measure radon levels in residences.
3. Lead can cause permanent damage to a child's brain that is manifested as lower IQ levels, learning disorders and violent behavior. In adults, it can cause hypertension. The levels for lead in dust on floor and window sills are expected result in less than 5% of the children younger than six years of age playing on the floor to be lead poisoned. The current EPA standards of 40 micrograms of lead per square foot on the floor and 100 micrograms of lead per square foot on an interior window sill at 40 CFR Part 745 Subpart D. These levels can result in 15 to 20% of the children playing on the floor to be lead poisoned. See Dixon SL, Gaitens JM, Jacobs DE et al. (2009) Exposure of U.S. children to residential dust lead, 1999-2004: II: The contribution of lead-contaminated dust to children's blood lead levels. *Environmental Health Perspectives* 117(3) at www.nchh.org/LinkClick.aspx?fileticket=4Q/PvfvDTIs=&tabid=165. EPA and many states certify lead risk assessors, lead inspectors and dust sampling technicians to take the dust samples and make the determination.
4. Drinking water contamination at levels that exceed the contaminant standards established by EPA are unhealthy and can be dangerous. See U.S EPA standard at 40 Code of Federal Regulations Part 141 or www.epa.gov/safewater/contaminants. EPA and many states certify drinking water testing laboratories.
5. Arsenic is a known carcinogen and can be toxic. When properly sealed, the health risk is relatively low. However, arsenic from splinters that penetrate the skin can be a serious health problem that can be avoided by repairing wood that shows evidence of splintering.

This is the latest in efforts over several years to add health-related requirements to the code. Because the proposal addresses basic hazards that injure health and threaten life that can be present anywhere in the dwelling, these standards involve more building components and systems covered by more than one section of the IPC. The proposal clearly enumerates various health issues and describes minimum standards to enable the code official to have a more solid legal standing to address those issues. Although we have proposed it as an appendix, the material could also fit the code as a new Chapter 8.

Past comments concerned testing activities and concern about on what agency testing responsibility may fall. Here we propose that approved methods must be used when testing or inspections are required, and that the code official can order the property owner to pay for testing as needed. The code official is authorized to accept this documentation to establish compliance with other hazards where technical knowledge is required, much in the fashion an engineer's report would be accepted for a structural concern in a building. A clear basis for a decision strengthens the code official's position when challenged on appeal or in court.

Cost Impact: This proposal will not increase the cost of construction.

PM18-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

APPENDIX B (NEW)-PM-MORLEY

2013 PROPOSED CHANGES TO THE INTERNATIONAL RESIDENTIAL CODE - BUILDING

INTERNATIONAL RESIDENTIAL CODE – BUILDING COMMITTEE

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Assistant Director of Code Enforcement, Fire &
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Indianapolis, IN

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TENTATIVE ORDER OF DISCUSSION 2013 PROPOSED CHANGES TO THE INTERNATIONAL RESIDENTIAL CODE – BUILDING

The following is the tentative order in which the proposed changes to the code will be discussed at the public hearings. Proposed changes which impact the same subject have been grouped to permit consideration in consecutive changes.

Proposed change numbers that are indented are those which are being heard out of numerical order. Indentation **does not** necessarily indicate that one change is related to another. Proposed changes may be grouped for purposes of discussion at the hearing at the discretion of the chair. Note that some IRC code change proposals may not be included on this list, as they are being heard by other committees. Please consult the Cross Index of Proposed Changes.

RB464-13: NUMBER NOT USED

RB1-13	RB37-13	RB73-13	RB113-13
ADM1-13, Part IV	RB38-13	RB74-13	RB115-13
ADM2-13, Part II	RB40-13	RB75-13	RB114-13
ADM5-13, Part II	RB41-13	RB76-13	RB116-13
RB10-13	RB42-13	RB77-13	RB118-13
RB11-13	RB43-13	RB78-13	RB120-13
ADM6-13, Part II	RB45-13	RB79-13	RB121-13
ADM7-13	RB46-13	RB80-13	RB122-13
ADM8-13, Part II	RB44-13	RB82-13	RB123-13
RB2-13	RB39-13	RB81-13	RB119-13
RB3-13	RB47-13	RB84-13	RB124-13
ADM18, Part II	RB50-13	RB83-13	RB117-13
ADM21, Part II	RB49-13	RB86-13	RB125-13
RB4-13	RB48-13	RB85-13	RB126-13
ADM 23-13, Part II	RB51-13	RB87-13	RB127-13
ADM 24-13, Part II	RB52-13	RB88-13	RB128-13
RB6-13	RB53-13	RB89-13	RB129-13
ADM 27-13, Part II	RB54-13	RB90-13	RB130-13
ADM 40-13, Part IV	RB55-13	RB91-13	RB131-13
ADM 41-13, Part IV	RB56-13	RB92-13	RB132-13
RB7-13	RB57-13	RB93-13	RB133-13
RB8-13	RB58-13	RB95-13	RB134-13
ADM 47-13, Part IV	RB59-13	RB94-13	RB135-13
RB9-13	RB12-13	RB96-13 Part I	RB136-13
ADM 49-13, Part II	RB15-13	RB98-13	RB137-13
ADM 50-13, Part II	RB60-13	RB99-13	RB138-13
ADM 51-13, Part IV	RB61-13	RB97-13, Part I	RB139-13
ADM 52-13, Part IV	RB62-13	RB103-13	RB-31-13
ADM 53-13, Part IV	RB63-13	RB102-13	RB140-13
ADM 54-13, Part II	RB64-13	RB104-13	RB141-13
ADM 55-13, Part IV	RB65-13	RB106-13	RB142-13
ADM 58, Part II	RB66-13	RB105-13	RB143-13
ADM 59-13, Part II	RB68-13	RB108-13	RB144-13
ADM 60-13, Part IV	RB72-13	RB107-13	RB145-13
ADM61-13	RB69-13	RB109-13	RB146-13
RB34-13	RB67-13	RB110-13	RB147-13
RB35-13	RB70-13	RB111-13	RB150-13
RB36-13	RB71-13	RB112-13	RB149-13

RB151-13	RB208-13	RB268-13	RB329-13
RB152-13	RB209-13	RB269-13	RB330-13
RB153-13	RB210-13	RB270-13	RB371-13
RB148-13	RB211-13	RB271-13	RB331-13
RB155-13	RB212-13	RB272-13	RB332-13
RB157-13	RB213-13	RB273-13	RB24-13
RB158-13	RB214-13	RB274-13	RB333-13
RB156-13	RB215-13	RB275-13	RB334-13
RB159-13	RB216-13	RB276-13	RB335-13
F165-13, Part II	RB217-13	RB277-13	RB336-13
RB154-13	RB218-13	RB278-13	RB337-13
RB161-13	RB219-13	RB279-13	RB338-13
RB162-13	RB220-13	RB280-13	RB339-13
F183-13, Part II	RB221-13	RB281-13	RB340-13
RB160-13	RB222-13	RB282-13	RB341-13
RB163-13	RB223-13	RB283-13	RB342-13
RB164-13	RB224-13	RB284-13	RB343-13
RB165-13	RB225-13	RB285-13	RB344-13
RB167-13	RB226-13	RB286-13	RB345-13
RB168-13	RB227-13	RB287-13	RB346-13
RB170-13	RB228-13	RB288-13	RB347-13
RB171-13	RB229-13	RB289-13	RB348-13
RB169-13	RB230-13	RB290-13	RB5-13
RB166-13	RB231-13	RB291-13	RB23-13
RB172-13	RB232-13	RB292-13	RB22-13
RB173-13	RB233-13	RB293-13	RB349-13
RB175-13	RB234-13	RB294-13	RB350-13
RB174-13	RB235-13	RB295-13	RB351-13
RB176-13	RB236-13	RB296-13	RB352-13
F43-13	RB237-13	RB297-13	RB353-13
RB178-13	RB238-13	RB298-13	RB354-13
RB177-13	RB239-13	RB299-13	RB355-13
RB179-13	RB240-13	RB300-13	RB356-13
RB181-13	RB241-13	RB301-13	RB357-13
RB182-13	RB242-13	RB302-13	RB358-13
RB183-13	RB243-13	RB303-13	CE50-13, Part III
RB184-13	RB244-13	RB304-13	RB359-13
RB185-13	RB245-13	RB305-13	RB360-13
RB186-13	RB246-13	RB306-13	RB361-13
RB187-13	RB247-13	RB307-13	RB362-13
RB188-13	RB248-13	RB308-13	RB363-13
RB189-13	RB249-13	RB309-13	RB364-13
RB190-13	RB250-13	RB310-13	RB365-13
RB192-13	RB251-13	RB311-13	RB366-13
RB193-13	RB252-13	RB312-13	RB367-13
RB191-13	RB253-13	RB313-13	RB368-13
RB194-13	RB254-13	RB314-13	RB369-13
RB195-13	RB255-13	RB315-13	RB370-13
RB196-13	RB256-13	RB316-13	RB372-13
RB197-13	RB257-13	RB317-13	RB373-13
RB180-13	RB19-13	RB318-13	RB374-13
RB198-13	RB258-13	RB319-13	RB375-13
RB199-13	RB259-13	RB320-13	RB376-13
RB201-13	RB260-13	RB321-13	RB30-13
RB202-13	RB261-13	RB322-13	RB377-13
RB203-13	RB262-13	RB323-13	RB378-13
RB200-13	RB263-13	RB324-13	RB379-13
RB204-13	RB264-13	RB325-13	BB380-13
RB205-13	RB265-13	RB326-13	RB381-13
RB206-13	RB266-13	RB327-13	RB382-13
RB207-13	RB267-13	RB328-13	RB383-13

RB384-13	RB443-13
RB385-13	RB444-13, Part I
RB386-13	RB445-13, Part I
RB387-13	RM98-13, Part II
RB388-13	RB446-13
RB389-13	RB447-13
RB390-13	RB448-13, Part I
RB391-13	RM97-13, Part II
RB392-13	RB449-13
RB393-13	RB450-13
RB394-13	RB451-13
RB395-13	RB452-13
RB396-13	RB453-13
RB397-13	RB454-13
RB398-13	RB455-13
RB399-13	RB456-13
RB400-13	RB457-13
RB401-13	RB458-13
RB402-13	RB20-13
RB403-13	RB460-13
RB404-13	RB462-13
CE47-13, Part III	RB463-13
CE48-13, Part III	RB465-13
RB405-13	RB466-13
RB406-13	RB467-13
RB407-13	RB468-13
RB408-13	RB469-13
RB409-13	RB470-13
RB410-13	RB471-13
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RB440-13	
RB441-13	
RB442-13	

RB1 – 13

R101.2

Proponent: Steve Thomas, Colorado Code Consulting, LLC representing Colorado Chapter ICC
(stthomas@coloradocode.net)

Revise as follows:

R101.2 Scope. The provisions of the International Residential Code for One- and Two-family Dwellings shall apply to the construction, alteration, movement, enlargement, replacement, repair, equipment, use and occupancy, location, removal and demolition of detached one- and two-family dwellings and townhouses not more than three stories above grade plane in height with a separate means of egress and their accessory structures.

Exceptions:

1. Live/work units located in townhouses and complying with the requirements of Section 419 of the International Building Code shall be permitted to be built as one- and two-family dwellings or townhouses constructed in accordance with the International Residential Code for One- and Two-Family Dwellings. Fire suppression required by Section 419.5 of the International Building Code when constructed under the International Residential Code for One- and Two-family Dwellings shall conform to Section P2904.
2. Owner-occupied lodging houses with five or fewer guestrooms shall be permitted to be constructed in accordance with the International Residential Code for One- and Two-family Dwellings when equipped with a fire sprinkler system in accordance with Section P2904.

Reason: Live/work units are regulated by Section 419 of the IBC. This exception has created enforcement problems for local jurisdictions as it applies to one- and two-family dwellings. The way the language is written, it creates serious enforcement problems for building departments. If a homeowner wants to open a home business in an existing home, this section would require them to sprinkler the home. The IRC only requires new homes to be provided with fire sprinklers. A contractor that uses their garage to store their tools or build cabinets would be classified as live-work units under this exception as well. Is that really what we want the code to say? This provision is over-restrictive and unenforceable for the building official. This proposal limits the use of the live-work provisions would only apply to townhouses.

Cost Impact: This will reduce the cost of construction.

RB1-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R101.2-RB-THOMAS

RB2 – 13

R102.7.1

Proponent: David Bonowitz, Chair, Existing Buildings Subcommittee, Code Advisory Committee, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

Revise as follows:

R102.7.1 Additions, alterations or repairs. Additions, alterations or repairs to any structure shall conform to the requirements for a new structure ~~without requiring the existing structure to comply with all of the requirements of this code, unless otherwise stated. Additions, alterations or repairs shall not cause an existing structure to become unsafe or adversely affect the performance of the building.~~ Additions and repairs shall be such that the existing structure is no less complying with the provisions of this code than the existing structure was prior to the alteration or repair. For additions, alterations to the existing structure shall be made so that the existing structure with the addition is no less complying with the provisions of this code than the existing structure was prior to the addition.

Reason: This proposal updates the IRC language with respect to existing buildings, in coordination with the IBC and IEBC. It clarifies, but does not change, the current intent.

In general, the IRC (with or without Appendix J) is obsolete in its terminology and language regarding existing buildings. Especially regarding structural issues, its provisions continue to use terms and formulations that have long since been revised in IBC Chapter 34 and the IEBC Work Area method. (For examples, the term “unsafe” and the labels and definitions of project types in Appendix J.) This proposal does not seek complete uniformity with the other codes, but it does attempt to correct some obsolete language that is now prone to incorrect interpretation.

In the first sentence, the proposal clarifies the main purpose, which is to require the intended addition, alteration, or repair work itself to be as for new construction. The second half of the sentence is deleted, as it has been in IBC sections 3403.1 and 3404.1 and IEBC sections 402.1 and 403.1. The portion proposed for deletion is redundant, since the next sentence (either as is or as proposed) tells you when and how to consider the existing structure. It is also potentially confusing, since it incorrectly gives the impression that the only possibilities are either no upgrade or total upgrade of the entire building for “all of the requirements of this code.”

The proposal replaces the second sentence in order to correct four problems with the current text:

- The proposal removes the word “unsafe.” First, this term is redundant in R102.7.1, since any work that would make the building unsafe would certainly also “adversely affect the performance.” Second, the IRC does not define “unsafe” and so relies on the IBC, but the IBC’s definition is unorthodox, as it comes through the text of section 116.1, not through a formal definition. In any case, from a structural perspective, a building is unsafe when the structure is “dangerous” as defined in the IBC or IEBC, but that definition has in mind an extreme condition verging on collapse. We do not believe it is the intent of the IRC committee to allow structural modifications to dwellings that take them to a condition just shy of dangerous. (IRC Appendix J does have its own definition of dangerous, but section R102.7.1 must be able to stand on its own, since Appendix J will not necessarily be adopted. Besides, the Appendix J definition is obsolete as well and applies only to structural conditions.)
- It replaces the phrase “adversely affect the performance” with “no less complying” language consistent with IBC sections 3403.1 and 3404.1 and IEBC sections 402.1 and 403.1. The IRC is compliance-based, not performance-based, so vague reference to “performance” is not enforceable. More important, the “adversely affect” phrase suggests that the existing building cannot be made worse by any measure, a restriction more severe than is probably intended. That is, as long as the building still complies, some reduction in capacity should be allowed.
- It restates the provision as an enforceable instruction, not as a blanket prohibition. That is, provisions for existing buildings are more useful and effective when they say what must be done, not what is prohibited. The IBC and IEBC provisions have been revised and written with this approach since 2009.
- It separates the project types, where necessary. Here, the provisions for additions, alterations, and repairs do not vary much, but the proposal reorganizes the provision to set a precedent and make future revisions by project type easier. This is consistent with the 2009 revisions to IBC Chapter 34, the IEBC Work Area method and IRC Appendix J.

Cost Impact: None

RB2-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R102.7.1 #1-RB-BONOWITZ

RB3 – 13

R102.7.1

Proponent: David Bonowitz, Chair, Existing Buildings Subcommittee, Code Advisory Committee, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

Revise as follows:

R102.7.1 Additions, alterations ~~or~~, repairs, or relocations. Additions, alterations or repairs to any structure shall conform to the requirements for a new structure without requiring the existing structure to comply with all of the requirements of this code, unless otherwise stated. Additions, alterations ~~or~~, repairs, or relocations shall not cause an existing structure to become unsafe or adversely affect the performance of the building.

Reason: This proposal adds relocations to the list of possible project types applicable to existing dwellings. The IBC and IEBC recognize five project types: Additions, alterations, repairs, relocations, and changes of occupancy. Change of occupancy need not be included here since it is already covered in IRC section R110.2, but relocations are common, and the IRC should consider them.

The proposal modifies the section title and the last sentence. The first sentence is not modified because that sentence refers to projects that affect only part of an existing structure, whereas relocations affect the entire structure.

The intent of this proposal is not to negate, reverse, or otherwise interfere with any other proposal for this section. Any other approved proposal should be made. Then, this proposal, if approved, would merely add relocations to the list of project types.

Per R201.4, it should not be necessary to add a definition of relocation to the IRC. That term is also used in the IBC and IEBC without definition.

Cost Impact: None

RB3-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R102.7.1 #2-RB-BONOWITZ

RB4 – 13

R104.10.1, R105.3.1.1, R112.2.1, R112.2.2, R301.2.4, R322.1

Proponent: Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency (Gregory.wilson2@fema.dhs.gov); Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency (rcquinn@earthlink.net)

Revise as follows:

R104.10.1 Flood hazard areas. The building official shall not grant modifications to any provisions related to flood hazard areas as established by Table R301.2(1) ~~without the granting of a variance to such provisions by the board of appeals unless a determination has been made that:~~

1. A showing of good and sufficient cause that the unique characteristics of the size, configuration or topography of the site render the elevation standards of Section R322 inappropriate.
2. A determination that failure to grant the modification would result in exceptional hardship by rendering the lot undevelopable.
3. A determination that the granting of a modification will not result in increased flood heights, additional threats to public safety, extraordinary public expense, cause fraud on or victimization of the public, or conflict with existing laws or ordinances.
4. A determination that the modification is the minimum necessary to afford relief, considering the flood hazard.
5. Submission to the applicant of written notice specifying the difference between the design flood elevation and the elevation to which the building is to be built, stating that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced floor elevation, and stating that construction below the design flood elevation increases risks to life and property.

R105.3.1.1 Determination of substantially improved or substantially damaged existing buildings in flood hazard areas. For applications for reconstruction, rehabilitation, alteration, repair, addition or other improvement of existing buildings or structures located in a flood hazard area as established by Table R301.2(1), the building official shall examine or cause to be examined the construction documents and shall make a determination prepare a finding with regard to the value of the proposed work. For buildings that have sustained damage of any origin, the value of the proposed work shall include the cost to repair the building or structure to its predamage condition. If the building official finds that the value of proposed work equals or exceeds 50 percent of the market value of the building or structure before the damage has occurred or the improvement is started, ~~the finding shall be provided to the board of appeals for a determination of substantial improvement or substantial damage. Applications determined by the board of appeals to constitute substantial improvement or substantial damage the proposed work is a substantial improvement or restoration of substantial damage and the building official shall require all existing portions of the entire building or structure to meet the requirements of R322.~~

For the purpose of this determination, a substantial improvement means any repair, reconstruction, rehabilitation, addition or improvement of a building or structure, the cost of which equals or exceeds 50 percent of the market value of the building or structure before the improvement or repair is started. If the building or structure has sustained substantial damage, all repairs necessary to restore the building or structure to its pre-damaged condition are considered substantial improvement regardless of the actual repair work performed. The term does not include:

1. Improvements of a building or structure required to correct existing health, sanitary or safety code violations identified by the building official and which are the minimum necessary to assure safe living conditions; or
2. Any alteration of a historic building or structure, provided that the alteration will not preclude the continued designation as a historic building or structure. For the purposes of this exclusion, a historic building is:
 - 2.1. Listed or preliminarily determined to be eligible for listing in the National Register of

- Historic Places; or
- 2.2. Determined by the Secretary of the U.S. Department of Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined to qualify as an historic district; or
- 2.3. Designated as historic under a state or local historic preservation program that is approved by the Department of Interior.

~~R112.2.1 Determination of substantial improvement in flood hazard areas.~~ When the building official provides a finding required in Section R105.3.1.1, the board of appeals shall determine whether the value of the proposed work constitutes a substantial improvement. A substantial improvement means any repair, reconstruction, rehabilitation, addition or improvement of a building or structure, the cost of which equals or exceeds 50 percent of the market value of the building or structure before the improvement or repair is started. If the building or structure has sustained substantial damage, all repairs are considered substantial improvement regardless of the actual repair work performed. The term does not include:

- ~~1. Improvements of a building or structure required to correct existing health, sanitary or safety code violations identified by the building official and which are the minimum necessary to assure safe living conditions; or~~
- ~~2. Any alteration of a historic building or structure, provided that the alteration will not preclude the continued designation as a historic building or structure. For the purposes of this exclusion, a historic building is:~~
 - ~~2.1. Listed or preliminarily determined to be eligible for listing in the National Register of Historic Places; or~~
 - ~~2.2. Determined by the Secretary of the U.S. Department of Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined to qualify as an historic district; or~~
 - ~~2.3. Designated as historic under a state or local historic preservation program that is approved by the Department of Interior.~~

~~R112.2.2 Criteria for issuance of a variance for flood hazard areas.~~ A variance shall only be issued upon:

- ~~1. A showing of good and sufficient cause that the unique characteristics of the size, configuration or topography of the site render the elevation standards of Section 322 inappropriate.~~
- ~~2. A determination that failure to grant the variance would result in exceptional hardship by rendering the lot undevelopable.~~
- ~~3. A determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, cause fraud on or victimization of the public, or conflict with existing laws or ordinances.~~
- ~~4. A determination that the variance is the minimum necessary to afford relief, considering the flood hazard.~~
- ~~5. Submission to the applicant of written notice specifying the difference between the design flood elevation and the elevation to which the building is to be built, stating that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced floor elevation, and stating that construction below the design flood elevation increases risks to life and property.~~

R301.2.4 Floodplain construction. Buildings and structures constructed in whole or in part in flood hazard areas (including A or V Zones) as established in Table R301.2(1), and substantial improvement and restoration of substantial damage of buildings and structures in flood hazard areas, shall be designed and constructed in accordance with the provisions of Section R322. Buildings and structures located in whole or in part in identified floodways shall be designed and constructed in accordance with ASCE 24.

R322.1 General. Buildings and structures constructed in whole or in part in flood hazard areas (including A or V Zones) as established in Table R301.2(1), and substantial improvement and restoration of substantial damage of buildings and structures in flood hazard areas, shall be designed and constructed

in accordance with the provisions contained in this section. Buildings and structures located in whole or in part in identified floodways shall be designed and constructed in accordance with ASCE 24.

Reason: This proposal does three things related to existing dwellings in flood hazard areas:

1. Moves language from R112.2.2 to R104.10. The effect is to parallel both the IBC and IEBC which charge the building official with making certain determinations before granting modifications, rather than have the Board of Appeals make such determinations.
2. Moves language from R112.2.1 to R105.3.1.1. The effect is to more closely align the IRC with the IBC and IEBC, which rely on the building official to determine whether work on existing buildings in flood hazard areas meets the definitions "substantial improvement" and "substantial damage," rather than have the building official make a finding and have the Board of Appeals make such determinations
3. Clearly identify in R301.2.4 and R322.1, that the flood provisions apply to substantial improvement and substantial damage; R102.7.1 already makes clear that the IRC applies to additions, alterations, or repairs.

The IRC currently requires the Board of Appeals to do two things that are done by the building official under both the IBC and the IEBC – (1) determine whether requests for modifications to the flood provisions meet certain criteria and (2) determine whether work on existing dwellings constitutes substantial improvement or substantial damage (SI/SD). As stated in R112.1, the purpose of a Board of Appeals is to hear appeals of decisions, orders, and determinations of the building official. If the Board is charged with making decisions, such as the granting of a modification (variance) and the determination of SI/SD, then permit applicants and permittees have no recourse to appeal those decisions, except perhaps the courts. If building officials are capable of making these determinations under IBC and IEBC, then they should be permitted to do the same under the IRC.

The proposed changes to R301.2.4 and R322.1, which have the same phrasing, is to make clear that, as stated in R102.7.1, because the IRC applies to work on existing dwellings, the flood provisions apply to substantial improvement and substantial damage of existing dwellings. The added phrase is the same as used in IBC 1612.1.

Cost Impact: Costs will be reduced for permit applicants and permittees who challenge SI/SD determinations and decisions on requests for modifications (variances) because they can appeal the building official's decisions to the Board of Appeals instead of the courts. There is no change in the cost of compliance because the IRC already applies to existing dwellings and communities that participate in the NFIP have long required existing buildings that are SI/SD to be brought into compliance with the requirements for new construction.

RB4-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R104.10.1-RB-QUINN-WILSON

RB5 – 13

R105.1

Proponent: Joseph D. Belcher, JDB Code Services, Inc, representing the International Hurricane Protection Association (joe@jdbcodeservices.com)

Revise as follows:

R105.1 Required. Any owner or authorized agent who intends to construct, enlarge, alter, repair, move, demolish or change the occupancy of a building or structure, or to erect, install, enlarge, alter, repair, remove, convert or replace any impact protective system, electrical, gas, mechanical or plumbing system, the installation of which is regulated by this code, or to cause any such work to be done, shall first make application to the *building official* and obtain the required *permit*.

Reason: Opening protection by impact protective systems is an important aspect in maintaining structural integrity during a hurricane event. In addition to increasing the structural performance of buildings, they play a role in the life safety of the people weathering the storm out in their residence. Observations in the field reveal many installations do not meet the standards adopted for these devices as became apparent during storms in recent years. Unfortunately, many jurisdictions do not require permits or inspections for these important structural safeguards and life safety devices because they are not addressed in the section of the code addressing required permits. With the emphasis of emergency management shifting to defending in place due to the inability of the infrastructure to handle mass evacuations, these impact protective systems, be they impact rated glass or devices, and their proper installation becomes even more important.

The hurricane protection industry estimates annual sales in unapproved and mostly bogus “hurricane protection devices” at \$30M to \$40M at the minimum. These products have not been tested or investigated by anyone and meet no standards. The sellers of these products target citizens and give residents a false sense of security. Requiring permits and inspections for all impact protective systems would dramatically increase the protection provided to the residents of single family dwellings.

Cost Impact: The proposal may result in a slight increase for the cost of a permit solely for projects involving installation, alteration, repair or replacement projects. For new construction there should be no cost as the permit for the building would include the installation of the impact protective system. The benefit of the requirement, however, will far outweigh any added cost in permitting by increasing the assurance that these important structural and life safety protection devices are properly designed and installed. The industry has noted cases of substandard materials, inappropriate testing or claims of testing, and improper installation of products. We believe closer scrutiny of the design and installation of these important property protection and life safety systems will result in greater protection to the public and a better value to the consumer.

Staff Analysis: Mr. Belcher has a companion change for a new Section 614 that has criteria for impact protective systems. Requirements for these types of systems are in the IRC in Section 301.2.1.2 and 612.6.

RB5-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R105.1-RB-BELCHER

RB6 – 13

R105.2

Proponent: Rick Davidson, City of Maple Grove, representing Association of Minnesota Building Officials (rdavidson@maplegrovern.gov)

Revise as follows:

R105.2 Work exempt from permit. *Permits* shall not be required for the following. Exemption from *permit* requirements of this code shall not be deemed to grant authorization for any work to be done in any manner in violation of the provisions of this code or any other laws or ordinances of this *jurisdiction*.

Building:

1. One-story detached *accessory structures* used as tool and storage sheds, playhouses and similar uses, provided the floor area does not exceed 200 square feet (18.58 m²).
2. Fences not over 7 feet (2134 mm) high.
3. Retaining walls that are not over 4 feet (1219 mm) in height measured from the bottom of the footing to the top of the wall, unless supporting a surcharge.
4. Water tanks supported directly upon *grade* if the capacity does not exceed 5,000 gallons (18 927 L) and the ratio of height to diameter or width does not exceed 2 to 1.
5. Sidewalks and driveways.
6. Painting, papering, tiling, carpeting, cabinets, counter tops and similar finish work.
7. Prefabricated swimming pools that are less than 24 inches (610 mm) deep.
8. Swings and other playground equipment.
9. Window awnings supported by an exterior wall which do not project more than 54 inches (1372 mm) from the exterior wall and do not require additional support.
10. Decks ~~not exceeding 200 square feet (18.58 m²) in area~~, that are not more than 30 inches (762 mm) above *grade* at any point, ~~are not attached to a dwelling~~ and do not serve the exit door required by Section R311.4.

Reason: This proposal deletes certain provisions of the exemption for decks. 200 square feet is an arbitrary limit and without basis. If a jurisdiction wishes to limit the size of a deck, they may do so through their local zoning regulations. There is nothing unique about these structures that make a deck that is 210 square feet in area more dangerous than one that is 190 square feet.

Furthermore, whether or not it is attached to the dwelling should make no difference. It is common practice to set these low decks adjacent to the dwelling and often homeowners wish to attach them to the dwelling for added stability. Why would we want to discourage them from making their deck more secure by requiring a permit? All too often the regulations start to get pretty restrictive regarding the connections for these low decks. The owner may wish to add a few lag bolts to stabilize the deck or they may wish to support one entire length of the deck from the house.

The risks posed do not warrant the close regulations that permitting requires. Building department resources are stretched thin. Permit fees on these decks rarely cover the cost of enforcement. Public dollars can be better spent on more significant projects.

A common argument for requiring permits for these structures is for zoning compliance. That is a lousy reason for requiring a building permit. Local zoning ordinances often regulate other structures when a building permit is not required. Certain fences, arbors, trellises, and small accessory structures come to mind. Let the zoning folks carry their own water.

Cost Impact: None

RB6-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R105.2 #1-RB-DAVIDSON

RB7 – 13

R106.1.1, R106.1.3 (New)

Proponent: Michael D. Fischer, Kellen Company, representing the American Institute of Building Design (mfischer@kellencompany.com)

Revise as follows:

R106.1.1 Information on construction documents. *Construction documents* shall be drawn upon suitable material. Electronic media documents are permitted to be submitted when *approved* by the *building official*. *Construction documents* shall be of sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail that it will conform to the provisions of this code and relevant laws, ordinances, rules and regulations, as determined by the *building official*. ~~Where required by the *building official*, all braced wall lines, shall be identified on the *construction documents* and all pertinent information including, but not limited to, bracing methods, location and length of braced wall panels, foundation requirements of braced wall panels at top and bottom shall be provided.~~

R106.1.2 Manufacturer's installation instructions. Manufacturer's installation instructions, as required by this code, shall be available on the job site at the time of inspection.

R106.1.3 Information on braced wall design. For buildings and structures utilizing braced wall design, and where required by the *building official*, all braced wall lines shall be identified on the *construction documents*. All pertinent information including, but not limited to, bracing methods, location and length of braced wall panels, foundation requirements of braced wall panels at top and bottom shall be provided.

Reason: The code contains confusing language regarding braced wall design, and suggests the building official is the one who "requires" braced wall design. It seems to us the intent of the code provision is to specify the necessary detail for those projects where the building official requires they be included in the construction documents. This proposal seeks to satisfy that intent and clear up the confusion. Additionally, R106.1.1 contains general information regarding the media used; this technical detail rightfully belongs in its own section.

Cost Impact: None.

RB7-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R106.1.1-RB-FISCHER

RB8 – 13

R106.1.4 (New), R702.8 (New), R703.13 (New); Chapter 44, AJ301.1.1.1 (New), AJ701 (New)

Proponent: Rebecca Morley, representing National Center for Healthy Housing

Add new text as follows:

IRC SECTION R106 CONSTRUCTION DOCUMENTS

R106.1.4 Certifications and plans where painted surfaces are disturbed. Where a dwelling was completed prior to 1978 and repair, alteration or addition being performed will result in the disturbance of painted surfaces, the contractor shall provide to the code official one of the following:

1. Copies of EPA or state renovation firm certification, renovator certification and a plan for compliance in accordance with 40 CFR 745 requirements for renovations.
2. Documentation from an approved test in accordance with 40 CFR 745.82(a)(1) or (2) that shows that the disturbed paint contains lead that is below specified levels.

IRC SECTION R702 INTERIOR COVERINGS

R702.8 Disturbance of existing painted surfaces. In any dwelling completed prior to 1978, repairs, alteration and additions where painted surfaces are disturbed shall comply with the information distribution, certification and work practice requirements of 40 CFR 745 for renovations.

Exception: Where documentation is provided from an approved test in accordance with 40 CFR 745.82(a)(1) or (2) that proves that the disturbed paint contains lead levels below specified levels, the work is not required to comply with this section.

IRC SECTION R703 EXTERIOR COVERING

R703.13 Disturbance of existing painted surfaces. In any dwelling completed prior to 1978, repairs, alteration and additions where painted surfaces are disturbed shall comply with the information distribution, certification and work practice requirements of 40 CFR 745 for renovations.

Exception: Where documentation is provided from an approved test in accordance with 40 CFR 745.82(a)(1) or (2) that proves that the disturbed paint contains lead levels below specified levels, the work is not required to comply with this section.

CHAPTER 44 REFERENCED STANDARDS

EPA

U.S. Environmental Protection Agency

40 CFR 745-July 1, 2012 Lead-Based Paint Poisoning Prevention in Certain Residential Structures

SECTION AJ301 REPAIRS

AJ301.1.1.1 Disturbance of existing painted surfaces. In any dwelling completed prior to 1978, repairs, alteration and additions where painted surfaces are disturbed shall comply with the information distribution, certification and work practice requirements of 40 CFR 745 for renovations.

Exception: Where documentation is provided from an approved test in accordance with 40 CFR 745.82(a)(1) or (2) that proves that the disturbed paint contains lead levels below specified levels, the work is not required to comply with this section.

SECTION AJ701 REFERENCED STANDARDS

EPA

U.S. Environmental Protection Agency

40 CFR 745 Lead-Based Paint Poisoning Prevention in Certain Residential Structures

Reason: This code change proposal is to incorporate protection from lead-based paint by specifying (1) that additions, alterations, and repairs to pre-1978 homes comply with federal health-protective requirements to protect children from lead poisoning and (2) that permit applicants include, with the other construction documents, evidence of compliance.

The purpose of this proposed code language is to incorporate protection from lead-based paint into the Code through the requirement for construction documents. Once the Code requires permit applicants to demonstrate up front their knowledge of, and plans to follow, the federal and state renovation rule requirements, the code official will be positioned to provide important oversight and leadership in preventing lead poisoning without even leaving the office. This oversight will help level the playing field between contractors who are complying with the rule and noncompliant entities who are under-pricing and undercutting their competitors. By merely asking an applicant for the missing documents, the code official can influence entities not following the law into compliance before the work even starts. In a few cases, these entities may be unaware of the regulations. Although these regulations have been in effect since April 2010, and have been adopted by 12 states, reported non-compliance is affecting the compliant contractor and continuing the problem of lead poisoning in the US.

The proposed “plan for compliance in accordance with 40 CFR 745 requirements for renovations” with the federal disclosure and work practice requirements” can take different forms depending on what documents the builder is already using. Some builders who work on pre-1978 homes are already using a form to track their upfront assessments and another form for recordkeeping. Anyone working in pre-1978 homes should have an EPA or state certification for their firm, along with at least one individual renovator certification that the renovator received at the end of the required one-day training course. These requirements are already in effect in federal and state regulation.

The plan and certifications would only be needed for a structure likely to contain lead-based paint: a pre-1978 home. As noted under the exception, the requirement is waived if paint testing proves that the paint is not lead-based paint. A rebuttable presumption of lead’s presence allows the builder to demonstrate that lead is not present and obtain exemption from the requirements. EPA-approved tests include lead-based paint inspection or risk assessment, test kit used by a certified renovator, and collection of a lead-based paint chips for laboratory analysis.

Renovation of painted surfaces is a significant source of lead dust that poisons children. The dangers associated with lead poisoning are well-known: serious health effects, detrimental effects on cognitive and behavioral development, with serious personal and social consequences that may persist throughout their lifetime.

Multiple studies have demonstrated that lead dust is the major source of lead poisoning for young children. There is no safe level of lead exposure for children; lead affects intelligence even at very low levels.^{1,2,5,8,9} Indeed, the rate of IQ loss per 1 microgram of lead per deciliter of blood (µg/dL) is greatest at lead levels below 10 µg/dL. As a child’s BLL increases from 1 to 10 µg/dL, experts estimate a child may lose anywhere from 3.9 to 7.4 IQ points, but from 10 to 30 µg/dL the decrement is 2.5 to 3.0 IQ points. Low-level chronic exposure may have an even greater effect on IQ than a single instance of very high BLL.¹⁰

Research indicates that a five-point negative shift in IQ at the population level would increase the number of children with an “extremely low” IQ by 57%, substantially increasing the cost of special education programs.³ Considering the costs to the special education system alone, one study conservatively estimated that it costs \$38,000 over three years to educate a child with lead poisoning.¹¹ Low-level exposure to lead has also been linked to factors other than IQ that can further impact educational outcomes. EBLs are associated with Attention Deficit Hyperactivity Disorder (ADHD) and antisocial behavior, which in turn increase the likelihood of conduct disorder, criminal activity, and drug abuse.^{1,4} Each 1 µg/dL reduction in the average preschool blood lead level saves \$13.4 billion from the direct and indirect costs of crime.¹

Several recent studies have explored the specific effects of lead on educational outcomes. These studies show a strong relationship between slightly elevated blood lead levels in young children and decreased scores on end-of-grade tests in elementary school. While similar educational effects were documented for higher blood levels decades ago,¹² the recent studies confirm that the connection between blood lead and poor educational outcomes remains true for blood levels as low as 3-4 µg/dL. A more recent study of 57,000 North Carolina children found that children with a BLL as low as 4 µg/dL at three years of age were significantly more likely to be classified as learning-disabled than children with a BLL of 1 µg/dL.⁶

The consequences of lead exposure are clear. This code change proposal seeks to reduce the risk of lead exposure during and after work performed on a pre-1978 home – and level the playing field among contractors working on pre-1978 properties.

The EPA 40 CFR 745 standard is available at <http://www.gpo.gov/fdsys/pkg/CFR-2012-title40-vol32/xml/CFR-2012-title40-vol32-part745.xml>.

References:

1. Gould E. Childhood lead poisoning: conservative estimates of the social and economic benefits of lead hazard control. *Environ. Health Perspect.* 2009;117(7):1162–1167.
2. Jusko TA, Henderson CR, Lanphear BP, Cory-Slechta DA, Parsons PJ, Canfield RL. Blood lead concentrations. *Environ. Health Perspect.* 2008;116(2):243–248.
3. Mazumdar M, Bellinger DC, Gregas M, Abanilla K, Bacic J, Needleman HL. Low-level environmental lead exposure in childhood and adult intellectual function: a follow-up study. *Environ Health.* 2011;10:24.
4. Chandramouli K, Steer CD, Ellis M, Emond AM. Effects of early childhood lead exposure on academic performance and behaviour of school age children. *Arch. Dis. Child.* 2009;94(11):844–848.
5. Miranda ML, Kim D, Galeano MA, Paul CJ, Hull AP, Morgan SP. The relationship between early childhood blood lead levels and performance on end-of-grade tests. *Environ. Health Perspect.* 2007;115(8):1242–1247.
6. Miranda ML, Maxson P, Kim D. Early childhood lead exposure and exceptionality designations for students. *Int J Child Health Hum Dev.* 2010;3(1):77–84.
7. Advisory Committee on Childhood Lead Poisoning Prevention. Low Level Lead Exposure Harms Children: A Renewed Call for Primary Prevention. 2012:1–68. Available at: http://www.cdc.gov/nceh/lead/ACCLPP/Final_Document_030712.pdf. Accessed March 6, 2012.
8. Lanphear BP, Hornung R, Khoury J, et al. Low-level environmental lead exposure and children's intellectual function: an international pooled analysis. *Environ. Health Perspect.* 2005;113(7):894–899.
9. Canfield RL, Henderson CRJ, Cory-Slechta DA, Cox C, Jusko TA, Lanphear BP. Intellectual impairment in children with blood lead concentrations below 10 microg per deciliter. *N. Engl. J. Med.* 2003;348(16):1517–1526.16.
10. Lanphear BP, Dietrich K, Auinger P, Cox C. Cognitive deficits associated with blood lead concentrations. *Public Health Rep.* 2000;115(6):521–529.17.
11. Korfmacher KS. Long-term costs of lead poisoning: How much can New York save by stopping lead? Rochester, NY: University of Rochester; 2003.
12. Needleman HL, Leviton A, Bellinger D. Lead-associated intellectual deficit. *N Engl J Med.* 1982; 306(6):367.

Cost Impact: This code change proposal will not increase the cost of construction.

Staff analysis: A review of the standard proposed for inclusion in the code, EPA 40 CFR 745-July 1, 2012, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

RB8-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R106.1.4 (NEW)-RB-MORLEY

RB9 – 13

R109.1.4.1 (New)

Proponent: Andrew Herseth, US Dept of Homeland Security, Federal Emergency Management Agency (FEMA); Glenn Overcash, URS Corporation representing FEMA

Revise as follows:

R109.1.4.1 High wind region sheathing inspection. Where wind design is required in accordance with Section R301.2.1.1, inspection of the roof sheathing, wall sheathing and sheathing fasteners shall be made after all roof sheathing, wall sheathing and sheathing fasteners are in place. The sheathing inspection shall be permitted to coincide with the frame inspection, and shall be made prior to the dry-in inspection.

Reason: The purpose of this proposal is to ensure design-intended performance of roof and wall sheathing in hurricane prone regions by requiring inspection to verify those elements are installed as specified. As summarized in Fact Sheet 1.1 of FEMA P-499, *Home Builder's Guide to Coastal Construction* (FEMA, 2010), "construction inspections and quality control are essential for building success (as even) "minor" construction errors and defects can lead to major damage during high-wind or flood events." The need for roof and wall sheathing inspection is supported by post-disaster investigations. Numerous FEMA-sponsored MAT observations have documented failed sheathing installations resulting from inadequate connections to framing, as shown on pages 4-58 (wall) and 4-59 (roof) of *Hurricane Katrina in the Gulf Coast* (2006, FEMA). Hurricane Recovery Advisory No. 1 from FEMA 488, *Hurricane Charley in Florida* (2004), further identifies the verification of proper roof sheathing attachment as a key issue in the installation of roof underlayment in hurricane-prone regions. Failed sheathing attachments can lead to water intrusion, loss of roof structure, and wall collapse.

Cost Impact: The code change proposal will not increase the cost of construction since inspections will be through building code official.

RB9-13

Public Hearing: Committee:
Assembly:

AS
ASF

AM
AMF

D
DF

R109.1.4.1 (NEW)-RB-HERSETH-OVERCASH

RB10 – 13

R202

Proponent: Tim Pate, City and County of Broomfield, CO, representing Colorado Chapter Code Change Committee

Revise as follows:

R202 DEFINITIONS

Accessory Structure. A structure ~~not greater than 3,000 square feet (279 m²) in floor area, and not more than two stories in height, the use of which is customarily accessory to and incidental to that of dwelling (s) and which is located on the same lot.~~

Reason: This code change proposal will delete the limitation of an accessory structure being 3,000 square feet or less. It does not make sense to limit accessory structures to only 3,000 square feet when there is no restriction to a size of a single family dwelling. These types of structures are typically used for vehicle and farm equipment storage, shops, etc. and are still only accessory and incidental to that of a dwelling. Houses in rural areas routinely need much larger accessory structures to store farm equipment.

Cost Impact: Will not increase cost

Analysis: This term is also defined in the *International Wildland-Urban Interface Code*. The definitions were not identical and this proposal does not make them identical.

RB10-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R202-ACCESSORY STRUCTURE-RB-PATE

RB11 – 13

R202

Proponent: Mike Winkler, Chair of the IRC Interpretations Committee, representing IRC interpretations committee

Revise as follows:

R202 DEFINITIONS

ACCESSORY STRUCTURE. A structure with a total floor area not greater than 3,000 square feet (279m²) including basements in floor area, and not over two stories in height, the use of which is customarily accessory to and incidental to that of the dwelling(s) and which is located on the same *lot*.

Reason: The current language is silent on whether the 3,000 square foot limit is per floor or the total aggregate area of all floors. This oversight was the subject of a formal interpretation and the IRC interpretation committee is requesting the language be amended to reflect the committees' interpretation. The revisions only clarify the scope of the IRC relating to accessory buildings. A larger building would not be prohibited; it would simply need to comply with the IBC.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: This term is also defined in the *International Wildland-Urban Interface Code*. The definitions were not identical and this proposal does not make them identical.

RB11-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R202-ACCESSORY STRUCTURE-RB-WINKLER

RB12 – 13

R202

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials
(rdavidson@maplegrovern.gov)

Revise as follows:

SECTION R202 DEFINITIONS

ATTIC. The unfinished space between the ceiling assembly of the top story and the roof assembly.

Reason: The current definition of “attic” is insufficient in that it excludes spaces that clearly should be regulated. Attics exist at locations other than the top story. It encourages a lack of uniformity in enforcement and confusion from all users of the code.

Examples of areas where the current definition becomes problematic include rules regarding attics with limited storage, exposed foam plastics, insulation requirements, fire separations, draft stops, structural requirements, access, and ventilation. These rules are intended to apply to all attics, not just those defined as being above the top story.



Cost Impact: None

RB12-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R202-ATTIC-RB-DAVIDSON

RB13 – 13

R202

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

SECTION R202 DEFINITIONS

BACKFLOW PREVENTER. A backflow prevention assembly, a backflow prevention device or other means or method to prevent backflow into the potable water supply.

Reason: The proposed language was approved for the 2015 IPC. This definition is used throughout the code. However, it does not define to the user of the code, how to specifically identify or apply proper “protection” to a use or connection. Industry standards differentiate between backflow prevention devices and backflow prevention assemblies. A backflow prevention assembly is a specific type of mechanical backflow prevention protection which is field testable and repairable in-line, with shutoff valves and test cock fittings.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. X1 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RB13-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

202 BACKFLOW PREVENTER-RB-HALL-PMGCAC

RB14 – 13

R202

Proponent: Michael S. Moss, American Backflow Prevention Association (msmoss@utah.gov)

Revise as follows:

R202 DEFINITIONS

BACKFLOW PREVENTER. A backflow prevention assembly, a backflow prevention device or other means or methods to prevent backflow into the potable water supply.

Reason: This definition is used throughout the code. However, it does not define to the user of the code, how to specifically identify or apply proper "protection" to a use or connection. Industry standards differentiate between backflow prevention devices and backflow prevention assemblies. A backflow prevention assembly is a specific type of mechanical backflow prevention protection which is field testable and repairable in-line, with shutoff valves and test cock fittings.

Cost Impact: The code change proposal will not increase the cost of construction.

RB14-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R202-BACKFLOW PREVENTER-RB-MOSS.doc

RB15 – 13

R202

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials

Add definitions as follows:

SECTION R202 DEFINITIONS

BALCONY. An exterior floor projecting from and supported by a structure without additional independent supports.

DECK. An exterior floor system supported on at least two opposing sides by an adjoining structure and/or posts, piers, or other independent supports.

Reason: This proposal restores the definitions for “balcony” and “deck” that had previously been in the IRC. There is a need for a definition of the terms because of their frequent use in the IRC and in ICC Evaluation Service Reports that are not as easily understood with undefined terms. In fact, there is now an entire section in the IRC title “Decks”. The definitions were deleted from the IRC in the last code cycle because of structural interpretation issues that had nothing to do with the need for the definitions. The terms are frequently used in the IRC and there needs to be a means to distinguish between the terms “balcony” and “deck”, both of which are regulated. These definitions are necessary to create some uniformity in code interpretations and to prevent unnecessary regulations from being imposed.

Cost Impact: None

RB15-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R202-BALCONY (NEW)-RB-DAVIDSON

RB16 – 13

R202

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

THIS CODE CHANGE WILL BE HEARD BY THE IRC-PLUMBING/MECHANICAL COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

Revise definition as follows:

R202 DEFINITIONS

CONDITIONED SPACE. For energy purposes, space within a building that is provided with heating and/or cooling *equipment* or systems capable of maintaining, through design or heat loss/gain, 50°F (10°C) during the heating season and 85°F (29°C) during the cooling season, or communicates directly with a *conditioned space*. For mechanical purposes, an area, room or space that is being heated or cooled by any equipment or appliance, enclosed within the building thermal envelope and that is directly heated or cooled or that is indirectly heated or cooled. Spaces are indirectly heated or cooled where they communicate thru openings with conditioned spaces, where they are separated from conditioned spaces by un-insulated walls, floors or ceilings or where they contain un-insulated ducts, piping or other sources of heating or cooling.

Reason: This revised language was approved for the 2015 IMC. Confusion exists between the two different definitions in the IRC and IECC. The IECC attempts to define how a space is indirectly conditioned; however, further clarification is needed. This proposed change is similar to the definition in ASHRAE 90.1 – 2010.

Cost Impact: The code change proposal will not increase the cost of construction.

RB16-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R202-CONDITIONED SPACE-RB-HALL-PMGCAC

RB17 – 13

R202

Proponent: Michael S. Moss, American Backflow Prevention Association (msmoss@utah.gov)

Revise as follows:

R202 DEFINITIONS

BACKFLOW PREVENTER. A backflow prevention assembly, a backflow prevention device or other means or methods to prevent backflow into the potable water supply.

Reason: This definition is used throughout the code. However, it does not define to the user of the code, how to specifically identify or apply proper "protection" to a use or connection. Industry standards differentiate between backflow prevention devices and backflow prevention assemblies. A backflow prevention assembly is a specific type of mechanical backflow prevention protection which is field testable and repairable in-line, with shutoff valves and test cock fittings.

Cost Impact: The code change proposal will not increase the cost of construction.

RB17-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R202-BACKFLOW PREVENTER-RB-MOSS.doc

RB18 – 13

R202

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

THIS CODE CHANGE WILL BE HEARD BY THE IRC-PLUMBING/MECHANICAL COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

Add new definition as follows:

R202 DEFINITIONS

FACTORY MADE AIR DUCT. A listed and labeled duct manufactured in a factory and assembled in the field in accordance with the manufacturer's installation instructions and conditions of the listing.

Reason: The term is used in Sections M1601.1.1 and M1601.2 but is not defined. It is unclear if the term includes both factory-built fibrous glass ducts and flexible ducts and also any other duct material made in a factory. The IMC does not use this term which is unique to the IRC. Section M1601.2 requires that factory made ducts be listed to UL 181 and that standard does not limit the material.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Cost Impact: The code change proposal will not increase the cost of construction.

RB18-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R202-FACTORY MADE AIR DUCT (NEW)-RB-HALL-PMGCAC

RB19 – 13

R202

Proponent: John Mulder, Intertek Testing Services NA, Inc., representing International Standards Organization Technical Committee 77, Products in Fibre-reinforced Cement and self

Revise as follows:

R202 DEFINITIONS

FIBER-CEMENT (BACKER BOARD, SIDING, SOFFIT, TRIM, AND UNDERLAYMENT) PRODUCTS. ~~A manufactured thin section composites of hydraulic cementitious matrices and discrete non-asbestos fibers, fiber-reinforced products made with an inorganic hydraulic or calcium silicate binder formed by chemical reaction and reinforced with discrete organic or inorganic nonasbestos fibers, or both. Additives that enhance manufacturing or product performance are permitted.~~

Reason: The current definition is limited to fiber-cement siding products. The proposal corrects the definition to that published in ASTM C1154-06, *Standard Terminology for Non-Asbestos Fiber-reinforced Cement Products* (see attached copy of ASTM C1154-06), for “fiber-cement products”. Additional text describes types of fiber-cement products to include also fiber-cement backer board, soffit, trim and underlayment products currently recognized in the Code (IRC Sections R703.10, R703.10.1, R703.10.2, Table R503.2.1.1(2), and R702.4.2) The proposed code change eliminates a barrier to trade by including other fiber-cement products currently permitted by the Code.

IBC Section 202 has, as a result of the Group A IBC Code Hearings, already been revised to this definition (see attached “Final Action Hearing” results). This proposed revision would bring the two code definitions of “Fiber-cement Products” into alignment.

Cost Impact: The code change proposal will not increase the cost of construction because the change simply corrects the current definition to be consistent with the National Standard and provides examples of the types of products covered by the definition.

RB19-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R202-FIBER CEMENT (BACKER BOARD, SIDING, SOFFIT, TRIM AND UNDERLAYMENT) PRODUCTS-RB-MULDER

RB20 – 13

R202

Proponent: Bob Eugene, representing UL LLC (Robert.Eugene@ul.com)

Revise as follows:

R202 DEFINITIONS

FIREPLACE. An assembly consisting of a hearth and fire chamber of noncombustible material and provided with a chimney, for use with solid fuels.

Factory-built fireplace. A *listed* and *labeled* fireplace and chimney system composed of factory-made components, and assembled in the field in accordance with manufacturer's instructions and the conditions of the listing.

~~**Masonry chimney.** A field-constructed chimney composed of solid masonry units, bricks, stones or concrete.~~

Masonry fireplace. A field-constructed fireplace composed of solid masonry units, bricks, stones or concrete.

Reason: Eliminates duplication of definition of masonry chimney which is defined with the letter "M" definitions.

Cost Impact: None

RB20-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R202-FIREPLACE-EUGENE

RB21 – 13

R202

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

THIS CODE CHANGE WILL BE HEARD BY THE IRC-PLUMBING/MECHANICAL COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

Add new definition as follows:

R202 DEFINITIONS

FLEXIBLE AIR CONNECTOR. A conduit for transferring air between an air duct or plenum and an air terminal unit, an air inlet or an air outlet. Such conduit is limited in its use, length and location.

Reason: The code does not define "flexible air connector." As seen in the field, flexible air connectors are often indistinguishable from flexible ducts and the only way to tell them apart is to look at their labels. It is the product listing and label that dictates whether the product is an air connector or an air duct. This definition was approved for the 2015 IMC.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Cost Impact: The code change proposal will not increase the cost of construction.

RB21-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R202-FLEXIBLE AIR CONNECTOR (NEW)-RB-HALL-PMGCAC

RB22 – 13

R202 (New)

Proponent: Michael Gardner, representing Gypsum Association (mgardner@gypsum.org)

Add new definition as follows:

R202 DEFINITIONS

GYPSUM BOARD. The generic name for a family of sheet products consisting of a noncombustible core primarily of gypsum with paper surfacing. Gypsum wallboard, gypsum sheathing, gypsum base for gypsum veneer plaster, exterior gypsum soffit board, predecorated gypsum board and water-resistant gypsum backing board complying with the standards listed in Section R702.3 and Part IX of this code are types of gypsum board.

Reason: The IRC has incorporated the term gypsum board since the creation of the first edition of the code; however, the code does not define the term. To correct this oversight, this proposal adds a definition for gypsum board.

The definition of gypsum board in the IBC was modified during the Group 'A' hearings in 2012. The proposed definition in this proposal is identical to the definition that will appear in the 2015 IBC. It is also the definition contained in the ASTM standards referenced in Section R702.3.

A separate proposal submitted by the Gypsum Association proposes to add language to Chapters 2 and 7 to define and incorporate gypsum panel products. Adding the panel product definition to the code creates the need to add a definition for gypsum board. Gypsum boards are paper-faced gypsum sheet materials. Gypsum panel products are gypsum sheet materials with facings other than paper.

Cost Impact: None.

RB22-13

Public Hearing: Committee:
Assembly:

AS
ASF

AM
AMF

D
DF

R202-GYPSUM BOARD (NEW)-RB-GARDNER

RB23 – 13

R202

Proponent: Joseph D. Belcher, JDB Code Services, Inc, representing the International Hurricane Protection Association (joe@jdbcodeservices.com)

Add new definition as follows:

R202 DEFINITIONS

IMPACT PROTECTIVE SYSTEM: Construction that has been shown by testing to withstand the impact of test missiles and that is applied, attached, or locked over exterior glazing.

Reason: Definition is added as companion to proposed change to Section R105.1 adding impact protective systems to the permitting requirements of the code. The definition is taken from ASCE 7-10 to assure consistency.

Cost Impact: The proposal is to add a definition and will have no cost.

Staff Analysis: Mr. Belcher has a companion change for a new Section 614 that has criteria for impact protective systems. Requirements for these types of systems are in the IRC in Section R301.2.1.2 and R612.6.

RB23-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R202 IMPACT PROTECTIVE SYSTEM (NEW)-RB-BELCHER

RB24 – 13

R202

Proponent: Jason Thompson, National Concrete Masonry Association representing Masonry Alliance for Codes and Standards

Revise as follows:

R202 DEFINITIONS

MASONRY UNIT. Brick, tile, stone, architectural cast stone, glass block or concrete block conforming to the requirements specified in Section 2103 of the *International Building Code*.

Reason: In the last cycle a reference to ASTM C1364 for architectural cast stone was added to Section 2103 of the IBC. This modification clarifies that architectural cast stone materials cited within the IRC must also comply with the material requirements for these products as required by the IBC.

Cost Impact: This code change will not increase the cost of construction.

RB24-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R202-MASONRY UNIT-THOMPSON

RB25 – 13

R202 (New)

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

THIS CODE CHANGE WILL BE HEARD BY THE IRC-PLUMBING/MECHANICAL COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

Add new definition as follows:

R202 DEFINITIONS

MECHANICAL JOINT.

1. A connection between pipes, fittings, or pipes and fittings that is not welded, brazed, caulked, soldered, solvent cemented or heat-fused.
2. A general form of gas or liquid-tight connections obtained by the joining of parts through a positive holding mechanical construction such as, but not limited to, flanged, screwed, clamped or flared connections.

Reason: This language will be the 2015 IMC. Heat fusion is now a defined type of joint for plastic piping, and is considered to be separate from welding because there is no additional filler material used in forming the joint. However, heat-fusion joints are not mechanical joints and as such should be excluded from the definition of mechanical joints.

Cost Impact: This proposal will not increase the cost of construction.

RB25-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

202-MECHANICAL JOINT (NEW)-RB-HALL-PMGCAC

RB26 – 13

R202 (New)

Proponent: Mark S. Graham, representing National Roofing Contractors Association
(mgraham@nrca.net)

THIS CODE CHANGE WILL BE HEARD BY THE IRC-PLUMBING/MECHANICAL COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

Add new definitions as follows:

R202 DEFINITIONS

PHOTOVOLTAIC MODULE. A complete, environmentally-protected unit consisting of solar cells, optics and other components, exclusive of a tracker, designed to generate DC power when exposed to sunlight.

PHOTVOLTAIC PANEL. A collection of modules mechanically fastened together, wired and designed to provide a field-installable unit.

Reason: This code change proposal is intended to clarify the code by providing specific terms and definitions for photovoltaic devices already addressed in the Code.

These definitions for the terms “photovoltaic module” and photovoltaic panel” are taken from NFPA 70, “National electrical Code, 2011 Edition.”

This same code change proposal was submitted for consideration as a portion of S3-12 for Group A of the International Building Code and was Approved as Modified; the modification was to a portion of the code change proposal separate from the definitions.

Cost Impact: This code change proposal will not increase the cost of construction

RB26-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R202-PHOTOVOLTAIC MODULE (NEW)-RB-GRAHAM

RB27 – 13

R202

Proponent: Mark S. Graham, representing National Roofing Contractors Association
(mgraham@nrca.net)

THIS CODE CHANGE WILL BE HEARD BY THE IRC-PLUMBING/MECHANICAL COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

Add new definitions as follows:

R202 DEFINITIONS

PHOTOVOLTIAIC MODULES/SHINGLES. A roof covering ~~composed of flat-plate photovoltaic modules fabricated into that~~ resembles shingles and incorporates photovoltaic modules.

Reason: This code change proposal is intended to clarify the term and definition for “photovoltaic modules/shingles” in Chapter 2-Definitions and make it consist with that of the next edition of the International Building Code.

This same code change proposal was submitted for consideration as a portion of S2-12 for Group A of the International Building Code and was Approved as Modified; the modification was to a portion of the code change proposal separate from the definition.

Cost Impact: This code change proposal will not increase the cost of construction

RB27-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R202-PHOVOLTIAIC MODULES/SHINGLES-RB-GRAHAM

RB28 -13

R202

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

R202 DEFINITIONS

PLUMBING SYSTEMS. ~~Includes the water supply and distribution pipes, plumbing fixtures, supports and appurtenances; soil, waste and vent pipes; sanitary drains and building sewers to an approved point of disposal.~~ Includes the water distribution pipes; plumbing fixtures and traps; water-treating or water-using equipment; soil, waste and vent pipes; and building drains; in addition to their respective connections, devices and appurtenances within a structure or premises; and the water service, building sewer and building storm sewer serving such structure or premises.

Reason: The proposed language was approved for the 2015 IPC. There is no technical reason for the IRC and the IPC to be different for this definition.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. X3 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RB28-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

202 PLUMBING SYSTEMS-RB-HALL-PMGCAC

RB29 – 13

R202

Proponent: Michael S. Moss, American Backflow Prevention Association (msmoss@utah.gov)

Revise as follows:

R202 DEFINITIONS

POLLUTION. ~~An~~ A low hazard or non-health hazard impairment of the quality of the potable water to a degree that does not create a hazard to the public health, but that does adversely and unreasonably affect the aesthetic qualities of such potable water supply for domestic use.

Reason: The code does not define "low hazard" or non-health, however, the term is used in Table 608.1 as a footnote. This terminology is required to more correctly determine the type of backflow prevention assembly, backflow prevention device, means or method which is required for the protection of the water system to ensure protection of public health.

Cost Impact: This code change proposal will not increase the cost of construction.

RB29-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R202-POLLUTION-RB-MOSS.doc

RB30 – 13

R202 (New)

Proponent: Gary J. Ehrlich, P.E., representing National Association of Home Builders (NAHB)
(gehrlich@nahb.org)

Add new text as follows:

R202 DEFINITIONS

SHINGLE FASHION. A method of installing roof or wall coverings, water-resistive barriers, flashing, or other building components such that upper layers of material are placed overlapping lower layers of material to provide for drainage via gravity and moisture control.

Reason: The purpose of this code change is to introduce to the IRC a definition for “shingle fashion”. This term is used in the IBC and IRC to describe the required method of applying moisture control layers such as roof underlayment and water-resistive barriers to the building. The intent is to direct the builder, contractor or installer to place upper layers of material lapping over lower layers of material, in the fashion of placing roof shingles, so moisture is provided with a clear path to drain down and away from the building. In field investigations of buildings with mold and moisture issues, it is frequently discovered that flashing, WRBs or underlayment have been placed in **reverse** shingle fashion, with the upper layer tucked behind the lower layer. This permits moisture to drain behind or below the intended protective layer or material where it can be trapped and lead to mold and decay of building components. The above definition was approved earlier this cycle (G21-12) for inclusion in the 2015 IBC.

Cost Impact: The code change proposal will not increase the cost of construction.

RB30-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R202-SHINGLE FASHION (NEW)-RB-EHRlich

RB31– 13

R202 (New)

Proponent: David W. Cooper, Stair Manufacturing and Design Consultants, representing the Stairway Manufacturers' Association (sma@stairways.org)

Add new definition as follows:

SECTION R202 DEFINITIONS

STAIRWAY, SPIRAL. A stairway with a plan view of closed circular form and uniform section-shaped treads radiating from a minimum-diameter circle.

Reason: The IRC does not define spiral stairway however the term is defined in the IBC and consequently R201.3 states this definition would apply to spiral stairs in the IRC. The IBC definition of spiral stairway is:

STAIRWAY, SPIRAL. A stairway having a closed circular form in its plan view with uniform section-shaped treads attached to and radiating from a minimum-diameter supporting column.

This definition is flawed. The requirement of a supporting column is superfluous and restricts many safe designs that conform to the spiral stairway geometry but provide a supporting stringer and a guard with additional handrail instead of a column. These space saving stairs function as spiral stairways with the preferred walking path at the outside perimeter and enhance their safe use with handrails on both sides without intruding into the required width as when wrapping a support column with a handrail. This change would not restrict the continued use of a column or require an additional handrail.

This change is part of several related changes being proposed to clarify the regulations related to spiral stairways. In particular please see our change to R311.7.10.1 limiting the minimum diameter and defining the point at which curved stair requirements would apply.

Cost Impact: This code change will not increase the cost of construction.

RB31-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R202=STAIWAY, SPIRAL (NEW)-RB-COOPER

RB32 – 13

R202

Proponent: Richard Grace/Fairfax County/Virginia Plumbing and Mechanical Inspectors Association and Virginia Building and Code Officials Association (Richard.Grace@fairfaxcounty.gov)

Add new definition as follows:

R202 DEFINITIONS

WASTE RECEPTOR. A floor sink, standpipe, hub drain or a floor drain that receives the discharge of one or more indirect waste pipes.

Reason: A definition for “waste receptor” is needed. The term is found several times in the code with no exact description. Also, see coordinated proposed change in Chapter 27 based on this definition.

Cost Impact: This code change will not increase the cost of construction.

RB32-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R202-WASTE RECEPTOR (NEW)-RB-GRACE.DOC

RB33 – 13

R202

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Add new definition as follows:

R202 DEFINITIONS

WASTE RECEPTOR. A floor sink, standpipe, hub drain or a floor drain that receives the discharge of one or more indirect waste pipes.

Reason: The proposed language was approved for the 2015 IPC. A definition for “waste receptor” is needed. The term is found in the code over 10 times with no exact description.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. X4 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RB33-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

202 WASTE RECEPTOR (NEW)-RB-HALL-PMGCAC

RB34 – 13

R301.1

Proponent: Kevin S. Moore, S.E., Chair of Seismic Subcommittee to Code Advisory Committee, National Council of Structural Engineers Associations; Matt Mlakar, Chair of General Engineering Committee, Structural Engineers Association of California

Revise as follows:

R301.1 Application. Buildings and structures, and all parts thereof, shall be constructed to safely support all loads, including dead loads, live loads, roof loads, flood loads, snow loads, wind loads and seismic loads as prescribed by this code. The construction of buildings and structures in accordance with the provisions of this code shall result in a system that provides a complete load path that meets all requirements for the transfer of all loads from their point of origin through the load-resisting elements to the foundation. ~~Buildings and structures constructed as prescribed by this code are deemed to comply with the requirements of this section.~~

Reason: Execution of prescriptive measures promulgated by the IRC may not result in a complete load path for the transfer of all loads from their point of origin through the load-resisting elements to the foundation.

Several examples include:

1. Absence of provision for connection between roof framing member perpendicular to interior braced wall lines.
2. Absence of prescriptive requirements to provide positive lateral force connection between roof trusses and top of wall.
3. Discontinuous load path from roof sheathing to top of wall where gap between roof sheathing and blocking is required per following figure R602.10.8.2(1).
4. Provision for anchorage requirement of 24" return panel for wall bracing located on second story.

Deleting the last sentence of R301.1 will better ensure complete load path is provided when using IRC.

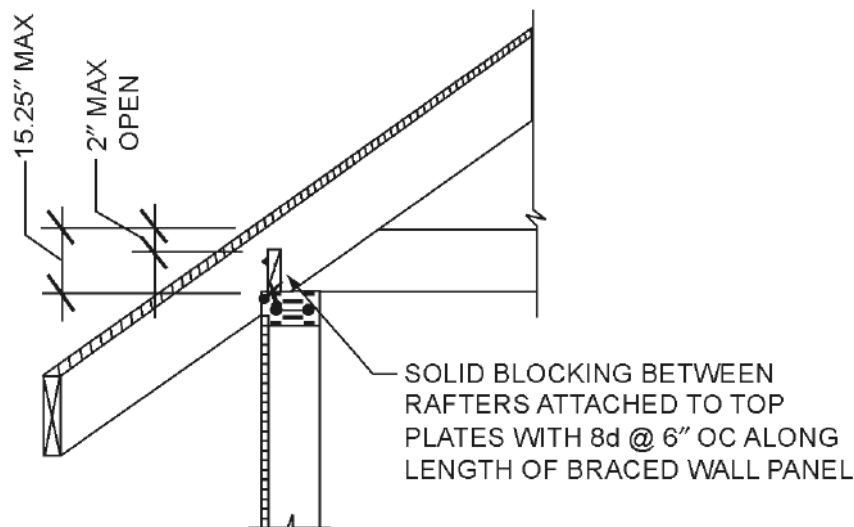


FIGURE R602.10.8.2(1)
BRACED WALL PANEL CONNECTION TO PERPENDICULAR RAFTERS

Cost Impact: This code change proposal will not increase construction cost.

RB34-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R301.1-RB-MLAKAR-MOORE

RB35 – 13

R301.1.1, R301.2.1.1, Table R602.3(1), Table R602.3(2), R803.2.3, R803.2.3.1 (New)

Proponent: T. Eric Stafford, Insurance Institute for Business and Home Safety

Revise as follows:

R301.1.1 Alternative provisions. As an alternative to the requirements in Section R301.1 the following standards are permitted subject to the limitations of this code and the limitations therein. Where engineered design is used in conjunction with these standards, the design shall comply with the *International Building Code*.

1. AF&PA *Wood Frame Construction Manual* (WFCM).
2. AISI *Standard for Cold-Formed Steel Framing—Prescriptive Method for One- and Two-Family Dwellings* (AIS S230).
3. ICC *Standard on the Design and Construction of Log Structures* (ICC 400).

Exception: Wood structural panels used as roof sheathing for wood roof framing shall be attached in accordance with Section R803.

R301.2.1.1 Wind limitations and wind design required. The wind provisions of this code shall not apply to the design of buildings where wind design is required in accordance with Figure R301.2(4)B or where the basic wind speed from Figure R301.2(4)A equals or exceeds 110 miles per hour (49 m/s).

Exceptions:

1. For concrete construction, the wind provisions of this code shall apply in accordance with the limitations of Sections R404 and R611.
2. For structural insulated panels, the wind provisions of this code shall apply in accordance with the limitations of Section R613.
3. Wood structural panels used as roof sheathing for wood roof framing shall be attached in accordance with Section R803.

TABLE R602.3(1)
FASTENER SCHEDULE FOR STRUCTURAL MEMBERS

FASTENER SCHEDULE FOR STRUCTURAL MEMBERS				
ITEM	DESCRIPTION OF BUILDING MATERIALS	DESCRIPTION OF FASTENER ^{b,c,e}	SPACING OF FASTENERS	
			Edges (inches) ⁱ	Intermediate supports ^{c,e}
Wood structural panels, subfloor, roof and interior wall sheathing to framing and particleboard wall sheathing to framing				
32	3/8" - 1/2"	6d common (2" x 0.113") nail (subfloor wall) ^j 8d common (2½" x 0.131") (roof) ^{f,k}	(no change to remainder of table)	
33	19/32" - 1"	8d common (2½" x 0.131") nail (subfloor wall) (roof) ^{f,k}		

f. For regions having basic wind speed of 110 mph or greater, 8d deformed (2½" x 0.120) ring-shank nails complying with Section R803.2.3.1 shall be used for attaching plywood and wood structural panel roof sheathing to framing within minimum 48-inch distance from gable end walls, if mean roof height is more than 25 feet, up to 35 feet maximum.

k. Where wind design is required in accordance with Figure R301.2(4)B, wood structural panel roof sheathing shall be fastened in accordance with Section R803.2.3.1.

(Portions of table and footnotes not shown to remain unchanged.)

TABLE R602.3(2)
ALTERNATE ATTACHMENTS TO TABLE R602.3(1)

NOMINAL MATERIAL THICKNESS (inches)	DESCRIPTION ^{a,b} OF FASTENER AND LENGTH (inches)	SPACING ^c OF FASTENERS	
		Edges (inches) ⁱ	Intermediate supports ^{c,e}
Wood structural panels, subfloor, roof ^{g,h} and interior wall sheathing to framing and particleboard wall sheathing to framing ^f			

h. Where wind design is required in accordance with Figure R301.2(4)B, wood structural panel roof sheathing shall be fastened in accordance with Section R803.2.3.1.

(Portions of table and footnotes not shown to remain unchanged.)

R803.2.3 Installation. Wood structural panel used as roof sheathing shall be installed with joints staggered or not staggered in accordance with Table R602.3(1), or APA E30 for wood roof framing or with Table R804.3 for steel roof framing. Where wind design is required in accordance with Figure R301.2(4)B, wood structural panels used as roof sheathing for wood framed roofs shall be installed with joints staggered and fastened in accordance with Section R803.2.3.1.

R803.2.3.1 Sheathing fastenings. Wood structural panel sheathing shall be fastened to roof framing with ring-shank nails spaced not more than 6 inches on center at edges and 6 inches on center at intermediate framing. Ring-shank nails shall have the following properties:

1. Not less than 0.113-inch nominal shank diameter
2. Ring diameter shall be 0.005-inch larger than nominal shank diameter
3. Rings shall be not less than 3/4-inch from the head
4. 16 to 32 rings per inch
5. 0.270 inch nominal full round head diameter; for other head shapes such as D and clipped heads, the smaller dimension shall be not less than 0.190-inches and the larger dimension shall be not less than 0.270-inches
6. Not less than 2 3/8-inch nominal nail length

Exceptions:

1. Where roof framing with a specific gravity of 0.42 to not more than 0.49 is used, ring-shank nails shall be spaced not more than 4-inches on center in Nailing Zone 3 in accordance with Figure R803.2.3.1 where the basic wind speed equals or exceeds 130 mph.
2. Where roof framing with a specific gravity of 0.42 to not more than 0.49 is used, ring-shank nails shall be spaced not more than 12 inches on center at intermediate framing in the following Nailing Zones:
 - 2.1. In nailing zone 1 in accordance with Figure R803.2.3.1 for any basic wind speed, and
 - 2.2. In nailing zone 2 in accordance with Figure R803.2.3.1 where the basic wind speed is not more than 110 mph.
3. Where roof framing with a specific gravity of 0.49 or more is used, ring-shank nails shall be spaced not more than 12 inches on center at intermediate framing in the following Nailing Zones:
 - 3.1 In nailing zone 1 in accordance with Figure R803.2.3.1 for any basic wind speed, and
 - 3.2 In nailing zone 2 in accordance with Figure R803.2.3.1 where the basic wind speed is not more than 120 mph.
4. Where roof framing with a specific gravity of 0.49 or more is used, 8d common or 8d hot dipped galvanized box nails shall be spaced not more than 6 inches on center at edges and 6 inches on center at intermediate framing where the basic wind speed is not more than 100 mph.

5. Where the roof diaphragm shear load exceeds 170 plf in the direction parallel to the ridge or 225 plf in the direction perpendicular to the ridge, the size and spacing of fasteners shall be designed to resist the applicable shear load.

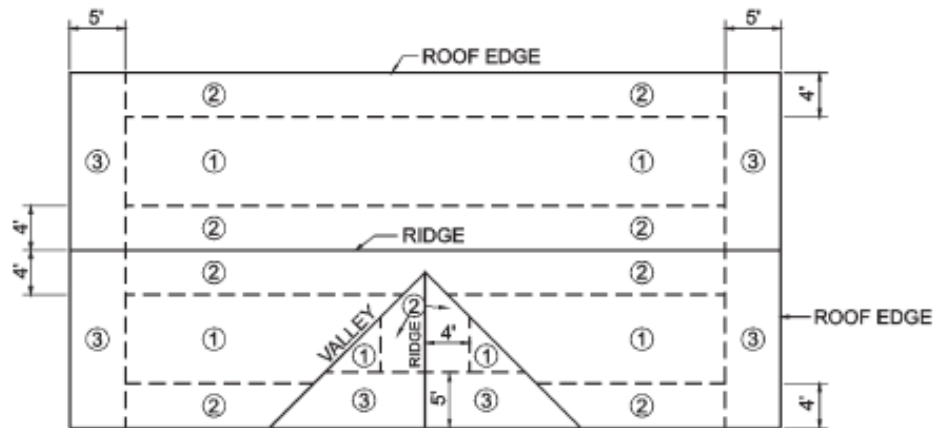


FIGURE R803.2.3.1
WOOD STRUCTURAL PANEL ROOF SHEATHING NAILING ZONES

Reason: Table R602.3(1) in the IRC currently requires the use of deformed shank nails in higher wind regions and on locations of the roof where pressures are known to be the highest. Thus, the IRC currently recognizes the benefit of using deformed shank fasteners for attaching roof sheathing to resist wind loads. However, the IRC is somewhat inconsistent with the specification of the deformed shank fasteners required in Table R602.3(1). This proposal corrects that inconsistency and specifically references the nail dimensions that are consistent with tests that form the basis for this proposal.

This proposed modification, if approved, will significantly improve the performance of wood structural panel roofs when subjected to high wind loads. It does so at a minimal to negligible cost which provides an extremely generous benefit/cost ratio. The requirements are based on hundreds of true wood structural panel tests. Extensive roof sheathing fastening tests at Clemson University (Reinhold 2000 – 2002, McKinley 2001) and at the International Hurricane Center – Florida International University (Reinhold, Alvarez 2003) compared the Mean Failure Pressure in psf for roof sheathing panels using both the 8d common and the 8d ring shank nails spaced at 6 inches as prescribed by the code. Sheathing consisted of 5/8 inch thick plywood attached to nominal 2x4 Southern Yellow Pine rafters.

The results of these tests were as follows:

1. Mean ultimate uplift capacity for panels attached with 8d common nails at 6 inch spacing: 126 pounds per square foot
2. Mean ultimate uplift capacity for panels attached with 8d ring shank nails at 6 inch spacing: 292 pounds per square foot

This shows a 131% improvement in performance when 8d ring shank nails are used instead of the currently prescribed 8d common nails. The original nail specifications adopted in the Florida Building Code and submitted to the IBC have been modified based on additional tests of nail withdrawal capacities. This testing has shown that a wider variety of ring dimensions consistently produce enhanced withdrawal capacities over those of smooth shank nails. The new specifications are more inclusive of nails available from a number of manufacturers and recognize that nail head characteristics can be varied without reducing the reliability of the sheathing attachment because of the close spacing of fasteners required for higher design load situations.

Additionally, the tests showed that the mean ultimate nail pullout for the 8d common nail was 175 lbs which is about half the value given by the NDS.

Requiring the use of 8d ring shank nails would result in an almost negligible increase in cost. While variations will occur regionally, it's estimated that the cost increase will be less than \$10 for 2000 square foot roof.

This proposal is written with wind speed triggers that are consistent with the current wind speed maps in the IRC. However, the author is aware of a group developing a code change proposal to update the wind speed maps in the IRC, including applicable wind speed triggers, to be consistent with the IBC and ASCE 7-10. Therefore, a corresponding code change has been submitted that provides wind speed triggers consistent with the wind speed maps in the IBC and ASCE 7-10. If the proposal to adopt the wind speed maps from the IBC and ASCE 7-10 is approved for the IRC, it is recommended that the corresponding proposal be approved.

Cost Impact: will increase cost

RB35-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R301.1.1-RB-STAFFORD

RB36 – 13

R301.1.3.1 (New)

Proponent: Kevin S. Moore, S.E., Chair of Seismic Subcommittee to Code Advisory Committee, National Council of Structural Engineers Associations; Matt Mlakar, Chair of General Engineering Committee, Structural Engineers Association of California

Add new text as follows:

R301.1.3.1 Wood-frame structures. The building official shall require construction documents to be approved and stamped by a licensed architect or engineer for all dwellings of wood-frame construction more than one story in height above grade plane that are located in Seismic Design Category D₀, D₁, D₂ or E.

Reason: After the 1994 Northridge earthquake, Los Angeles City building officials and the Structural Engineers Association of Southern California Wood Frame Construction Joint Task Force recommended that the quality of wood frame construction be greatly improved for regions of significant seismic risk. For buildings or structures located in Seismic Design Category D and E, the requirement to have a California licensed architect or engineer prepare construction documents is intended to minimize or reduce structural deficiencies that may cause excessive damage or injuries in wood frame buildings. Licensed architects and engineers can reduce or eliminate the design of structural deficiencies such as plan and vertical irregularities, inadequate construction details necessary to transfer seismic shear transfer throughout the seismic force-resisting system and improper application of prescriptive requirements of the California Residential Code. This is consistent with the intent of efforts following the costly 1994 Northridge earthquake.

This proposal recommends that the use of IRC be limited to **single story buildings in SDC D and E**. This is consistent with the conventional provisions in the **2012 IBC (Section 2308.12.1)**.

Reference:

B. Schmidt, R. Harder, circa 1994, "Report on Plywood Shear Wall Performance," City of Los Angeles Department of Building and Safety and Structural Engineers Associations of Southern California Joint Task Force Plywood Shear Wall Committee

Cost Impact: This code change proposal may increase construction cost but should reduce damage after an earthquake event.

RB36-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R301.1.3.1 (NEW)-RB-MLAKAR-MOORE

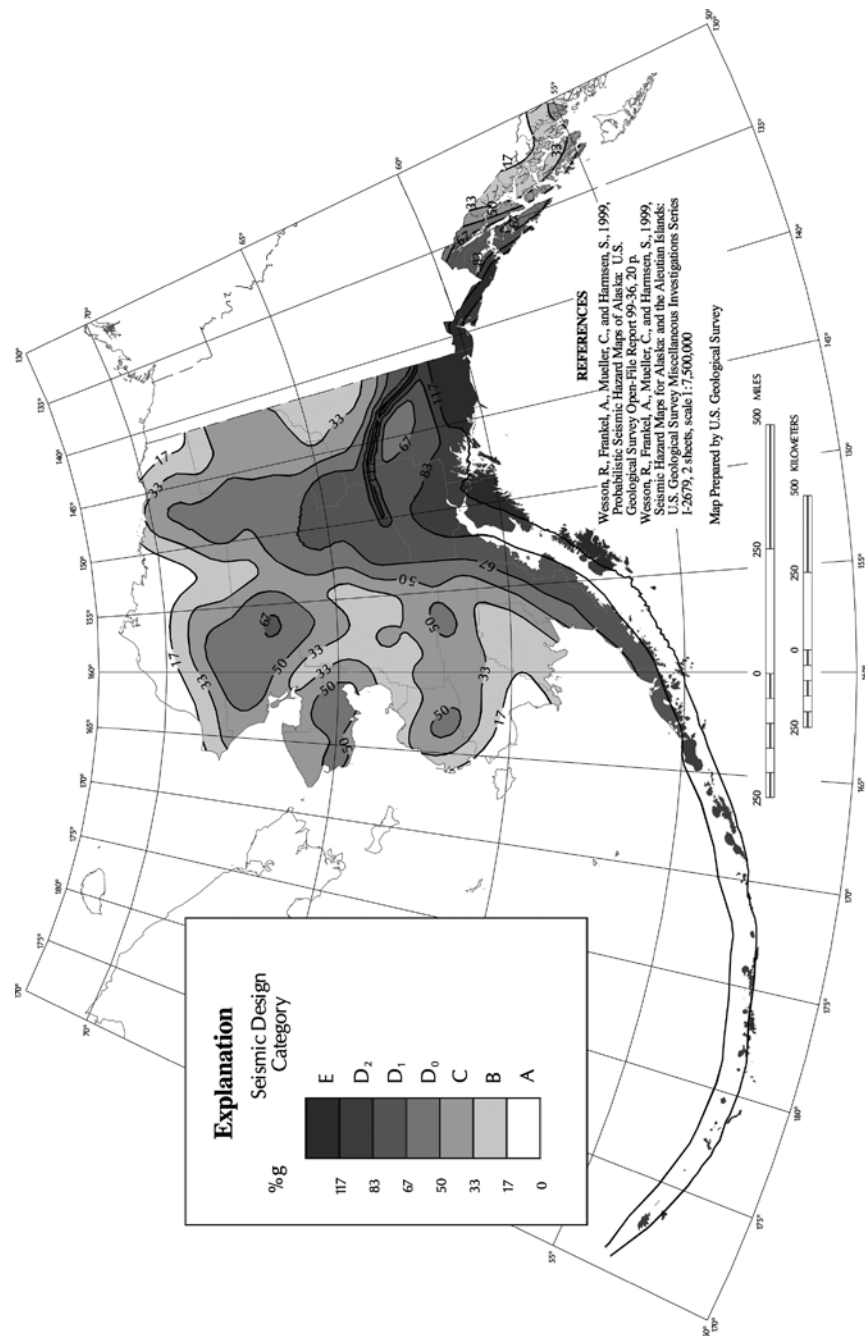
RB37 – 13

Figure R301.2(2)

Proponent: James Bela, Oregon Earthquake Awareness, representing Oregon Earthquake Awareness

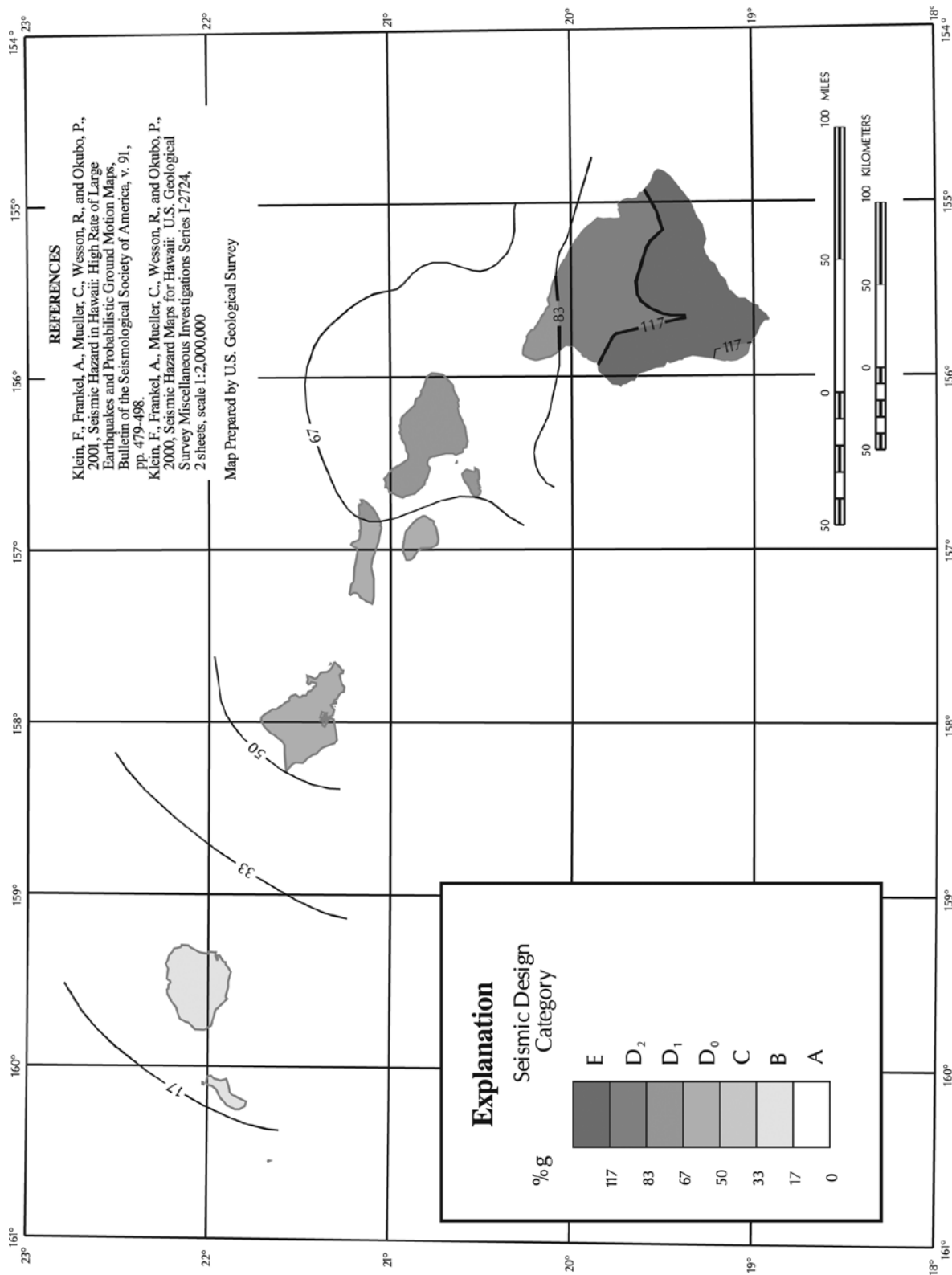
Delete and substitute as follows:

FIGURE R301.2(2)
SEISMIC DESIGN CATEGORIES—
SITE CLASS D



For SI: 1 mile = 1.61 km.

FIGURE R301.2(2)
SEISMIC DESIGN CATEGORIES—SITE CLASS D
(continued)



For SI: 1 mile = 1.61 km.

FIGURE R301.2(2)—continued
SEISMIC DESIGN CATEGORIES—SITE CLASS D
(continued)

For SI: 1 mile = 1.61 km.

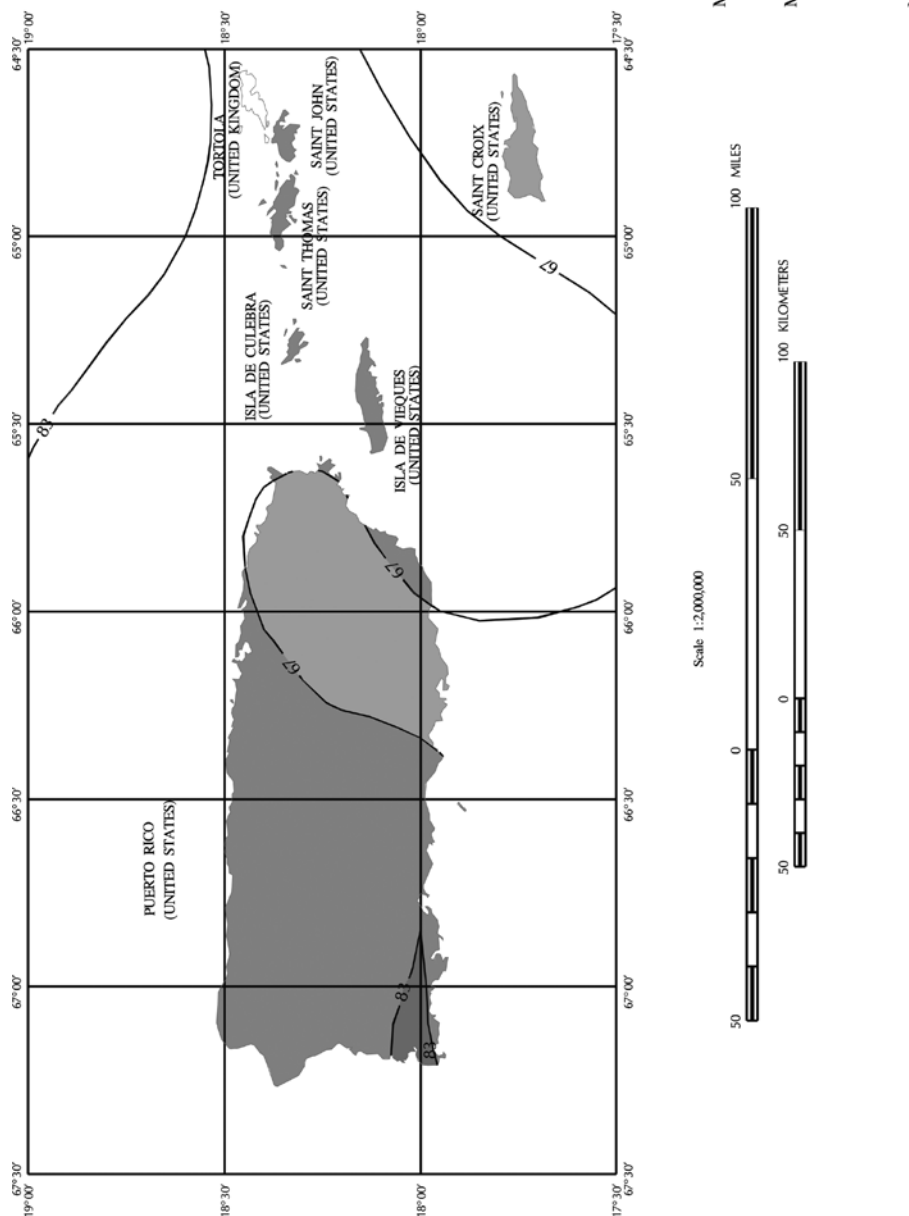


FIGURE R301.2(2)—continued
SEISMIC DESIGN CATEGORIES—SITE CLASS D
(continued)

REFERENCES

- Mueller, C., Frankel, A., Petersen, M., and Leyendecker, E., 2003, Documentation for 2003 USGS Seismic Hazard Maps for Puerto Rico and the U.S. Virgin Islands, U.S. Geological Survey Open-File Report 03-379.
- Mueller, C., Frankel, A., Petersen, M., and Leyendecker, E., 2004, Seismic-Hazard Maps for Puerto Rico and the U.S. Virgin Island, Sheet 2—2% Probability of Exceedance in 50 Years for Peak Horizontal Acceleration and Horizontal Spectral Response Acceleration for 0.2, 0.3, and 1.0 Second Periods U.S. Geological Survey Geologic Investigation Series (in progress).

Map Prepared by U.S. Geological Survey

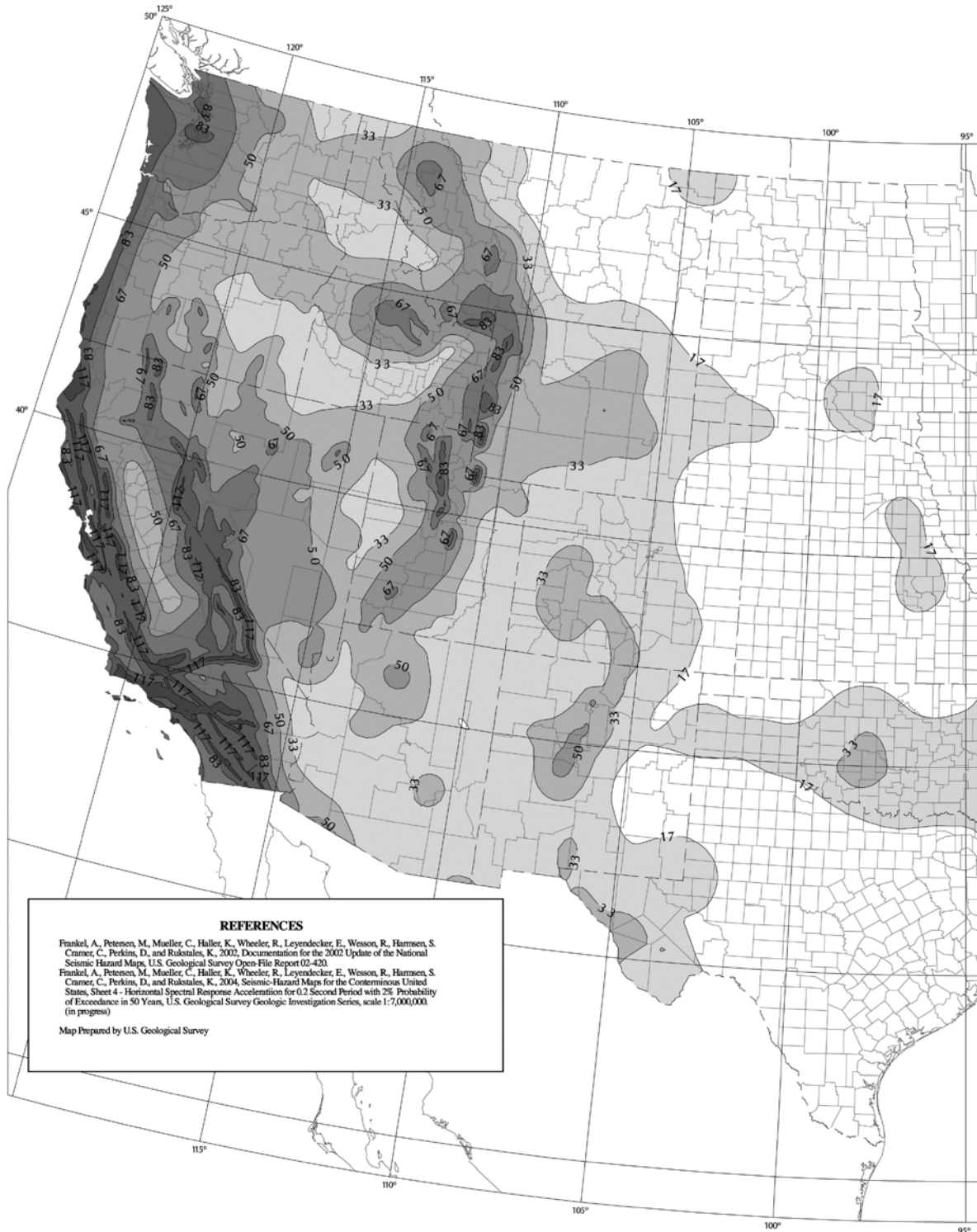


FIGURE R301.2(2)—continued
SEISMIC DESIGN CATEGORIES—SITE CLASS D
(continued)

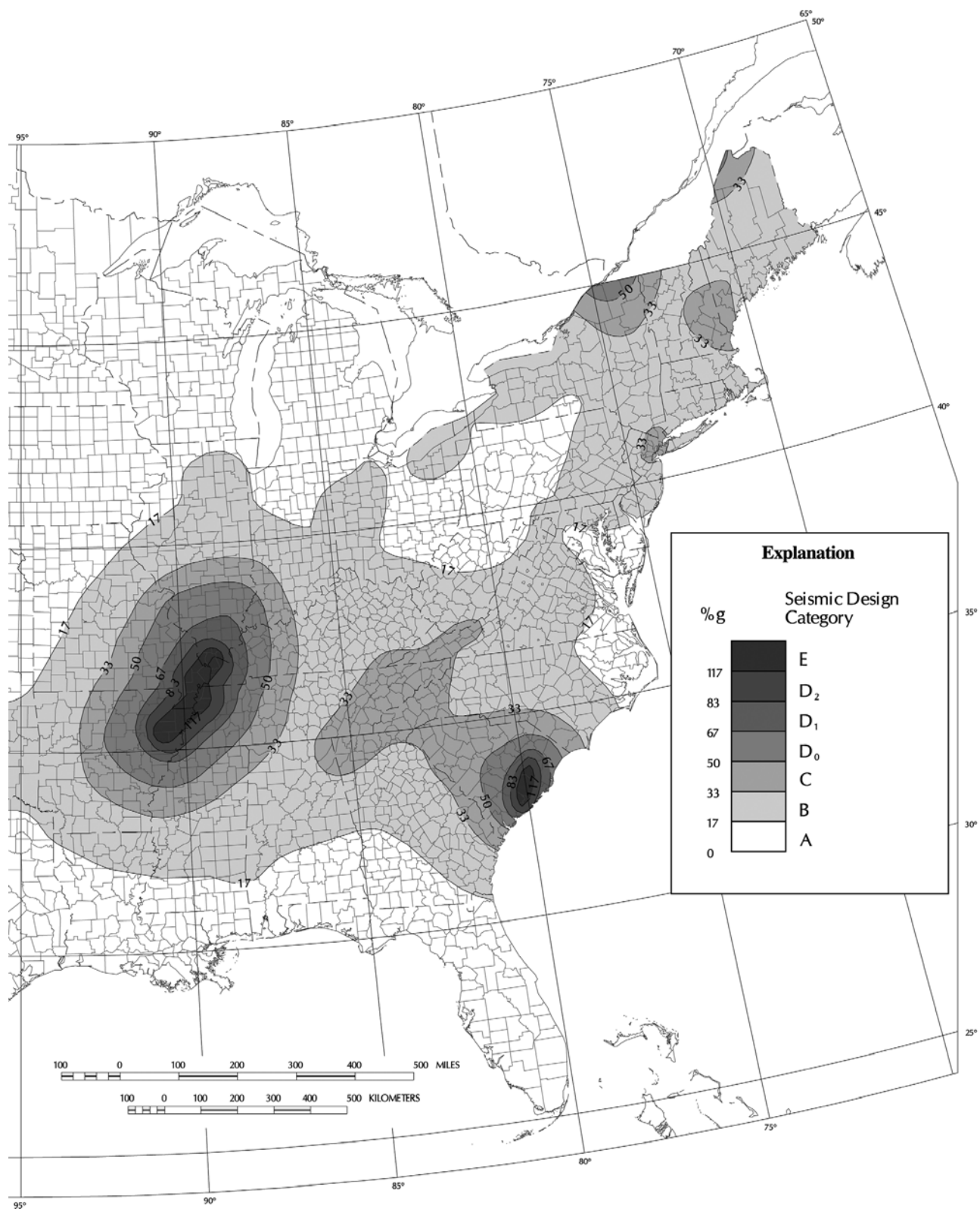


FIGURE R301.2(2)—continued
SEISMIC DESIGN CATEGORIES—SITE CLASS D
(continued)

Reason: This proposal replaces the Risk-Targeted seismic design maps of the 2012 IRC with the same named figures from the previous 2009 edition, thereby deleting Risk-Targeted seismic design maps from the code.

So-called Risk-Targeted National Seismic Hazard Maps are not appropriate for protecting public safety in residential construction, because they do not realistically consider the “maximum potential earthquake” impacts and effects from known “active” earthquake source regions; in particular from the M 9 Cascadia subduction zone along coastal regions of the entire Pacific Northwest.

The NOW so-called Risk Basis is: (a) arbitrary; (b) not explicitly defined; (c) unsubstantiated by any true standards approval process; (d) not a true consensus; and (e) inappropriate for such huge inventories of residential structures (where minimal efforts in design implementation and expense for resiliency in realistic earthquake threats both can and should make major differences in the intended outcomes). Since earthquakes are by their very natures “rare events,” any perceived or assigned probabilities as to their likelihood, occurrence, reoccurrence, periodicity, frequency, return period, etc. are most assuredly “unreliable.”

Specifically, these newly derived maps are not meeting the R101.3 Intent or purpose of this code: which is to establish minimum requirements to safeguard the public safety, health and general welfare through affordability, **structural strength**, means of egress facilities, **stability, sanitation**, light and ventilation, energy conservation and **safety to life and property** from fire and other **[earthquake] hazards** attributed to the built environment and **to provide safety to fire fighters and emergency responders during emergency operations.**

- (1) Constantly changing the USGS National Seismic Hazard Maps’ “ground motion response accelerations contours” is **destabilizing** to design practice, plan review requirements, and code enforcement provisions, because such changes are:
 - (a) creating **yo-yo earthquake design standards** – “high” one code cycle and “low” the next; or vice-versa; making it, as a result, ever more difficult to develop, practice and apply “professional engineering judgment” in the design process.
 - (b) creating serious and perplexing problems for addressing seismic hazards for **existing buildings** – which must then “**benchmark**” to a specific year and to a specific version (year & edition) of seismic hazard map (for any specific public policy mandate/requirements for earthquake retrofit/mitigation ordinances or measures. These required “benchmark” seismic hazard maps will then be different (sometimes a lot different) from the current (and ever-changing and ever-evolving) USGS National Seismic Hazard Maps. This is, and will continue to be, a big source of confusion.
- (2) **RISK-TARGETED MAXIMUM CONSIDERED EARTHQUAKE (MCE_R) GROUND MOTION RESPONSE ACCELERATIONS** contours in the IBC 2012 / ASCE 7-10 are sometimes **30% lower** than previous map values of just a decade ago:
 - (a) the recent 08-23-2011 M 5.8 Mineral VA (Cuckoo) earthquake had 30% lower design values (with these new maps) than a decade ago – making the earthquake’s epicentral region **Seismic Design Category A-B**; yet the **actual intensity of earthquake ground shaking** experienced there was the “stated intensity” that could be expected for the IBC/ASCE 7-10 designation **SDC D!**. (Bela 2011)
 - (b) when the seismic hazard maps **depict such low hazard ground motion response accelerations** and their corresponding **low** Seismic Design Categories, they both foster and create the “circumstances” for “**comfortable inaction**,” and, unfortunately, this feeling of “comfortable inaction” easily transfers to the arena of public policy.
 - (c) The condition of “comfortable inaction” (due to perceived low hazard - depicted on the seismic hazard map) was cited as perhaps the main culprit in Christchurch, New Zealand’s lack of adequate preparedness during its recent hammering by a “pair” of earthquakes – which killed around 200 people in unsafe “**Killer Buildings**” in the M 6.3 Feb. 22, 2011 event.
- (3) The basic underlying methodology for preparing the USGS National Seismic Hazard Maps (and their derivative so-called Risk-Targeted Maximum Considered Earthquake (MCE_R) Ground Motion Response Accelerations contours); i.e., probabilistic seismic hazard assessment (or psha) is fatally “**flawed**” – due to systemic “errors” in the applied mathematics which both create and define it. And it is, unfortunately, these same flawed “mathematics” that are prescribing how these psha-determined ground motion contours are ultimately derived, computed . . . and then finally codified.
- (4) Errors in its methodology aside, the basic problems, difficulties and really insurmountable obstacles to performing a psha seismic hazard assessment (*Mualchin, 2010; Bela and Mualchin 2011*) have **never** actually been “solved.” And they still remain unsolved! These problems involve data-driven earth-science requirements for a knowledge and understanding of:
 - (a) **fault slip rates**;
 - (b) **frequency** of occurrence of earthquakes (and their known magnitudes); and
 - (c) **earthquake source mechanisms** – specifically, (i) the style of faulting; and (ii) the hypocentral depth (or where exactly the earthquake rupture process begins).
- (5) The psha methodology is easily “manipulated,” particularly in the sense that: (i) selecting the probabilistic hazard level is a totally **arbitrary** process; and (ii) changing the hazard level (higher hazard or lower hazard) gives a completely different ground motion response acceleration contour – and consequently, then, different code requirements!
- (6) These very real and insurmountable problems with psha’s methodology have been swept away by its proponents: by convoluted (and mostly unintelligible) efforts and preoccupations with “logic trees,” “quantifying uncertainties,” etc. These efforts proceed busily ahead; but, meanwhile, they are “neglecting baseline principles” (of “what” the earthquake can do to you – and “how” it can do it – and the maximum Magnitude it could be). All that mathematical busywork, logic-tree accounting, and so-called “expert opinion” built the “better model” (or -- so the proponents believe). Unfortunately, that “better model” then:
 - (a) has become “**substituted**” for “reality” by its creators;
 - (b) has dismissed criticisms of it -- by claiming (itself) to be “best available science;” and
 - (c) has become ultimately so “**complicated**” -- that not even its proponents now can logically and successfully explain how it came to be (Hamburger et. al., 2010; Bela, 2011); nor can they effectively explain how to apply it to the real world of earthquake engineering, public safety, and socioeconomic issues of community resiliency.
- (7) The ground motion accelerations, and their probabilities for exceeding them, are combined and co-mingled in such a way that the actual sources (or **earthquake magnitudes, frequency content of earthquake ground motions, and duration** of strong ground shaking) are treated more-or-less equally—and they are most certainly not!
- (8) The “**Maximum Credible Earthquake**” (**MCE**) or “Maximum Capable Earthquake” or “Maximum Possible Earthquake” (within ¼ unit of Magnitude, M) is never explicitly stated. And it’s really “Magnitude, Magnitude,

Magnitude!" (and for the same reasons previously stated in (4)) – that has everything to do with building performance (damage and repair costs) and, more importantly, public safety and community resilience.

- (9) **R-Factors, or Response Modification Factors**, that are used in design provisions in the IBC become **less reliable** in ascertaining/predicting the “**end result**” (or the building’s actual performance in an earthquake). And, “**an earthquake**” really needs to explicitly consider the full suite of earthquake possibilities that the regional tectonics forewarn us can occur (including MCE = Maximum Credible Earthquake, or Maximum Possible Earthquake). “R-Factors” have become less reliable primarily because:
- (a) quite a lot of the “ductility” or building “toughness” that the code relies upon to: (i) ride out the earthquake (by bending, not breaking, and absorbing energy); and (ii) remain standing (without killing the occupants) -- is due to “over-strength;” and. (b) when the code design “strength” is systematically diminished (weakened) or reduced (over several-to-many iterations of seismic hazard mapping --by lowering (yo-yo effect) the “numerator” quantity in the design strength equation; then when dividing this numerator (now smaller number) by the same “large” number (R-Factor in denominator) – we have now “lost” perhaps a good portion of our “over-strength” – that was implicit in selecting the weights of the various R-Factors in the first place! Basically, with RISK-TARGETED (MCE_R), the code is now dividing an ever-decreasing and now smaller number (perhaps by 30%) by the same “large” number (R-Factor denominator) -- with the result that the buildings’ performances and outcomes are really now much less certain . . . and also now much more problematical.
- (10) The psha methodology has been shown in dramatic and tragic fashion to be not only “misleading”, but also deadly, in the last decade or so of the “**Eleven of the World’s Deadliest Earthquakes.**” (Panza et. al. 2011, Table 1) In example after example, and all across the globe (where now more than 700, 000 people have perished); the psha-methodology “prescribed” seismic hazard: was determined to be either low or very low – but was “disproved” in these many cases by earthquakes that were “surprises” from what psha had determined could be expected. In too many of these deadly “surprises”, the actual intensities of ground shaking experienced were greater by factors of 2X to 4X – than what psha had predicted. (Bela 2010; Bela and Mualchin, 2011; Kossobokov and Nekrasova, 2010;) It is clear that this is an unsafe situation (to general public) that must **not** continue; but it does continue for some of these following main reasons:
- (a) the psha methodology is “anonymous,” so when there is clear evidence (> 700,000 casualties) that it is “not working;” no one is accountable for its: (i) external failures (mass casualties); and/or (ii) internal failures (very real errors in its “applied mathematics” derivations).
- (b) the psha methodology has a hierarchial and powerful elite behind its influence and continued use.
- (c) the psha methodology has a pedigree of high sounding terms (like “quantifying uncertainty,” “logic-tree”, “expert opinion,” “best science,” etc.) -- all purporting to increase the method’s “**precision**.” But the end result, as these Eleven Deadliest Earthquakes” have shown us, is, unfortunately, still too “**inaccurate**” and “too deadly” for protecting the public safety. And in this regard, it is clearly missing its target!

BIBLIOGRAPHY

- Bela, J. (2011). Take Me Home . . . Seismic Loads: commentary on the results of lowering the USGS National Seismic Hazard Maps (response accelerations) values by 30%; prior to the 23 August 2011 Mineral (Cuckoo) VA M 5.8 earthquake, 2 p.
- Bela, J. (2010). Table A – Fatal Evidence Global Earthquake Occurrence: since the GSHAP terminated, seismic reality was testing the prediction given by Global Seismic Hazard Maps, 3 p.-
- Bela, J. and L. Mualchin (2011). Keys to Public Safety & Disaster Reduction in view of Earthquakes and Hurricanes, EERI Annual Meeting Poster Session, San Diego, CA, 2 p.
- Kossobokov, V.G. and A.K. Nekrasova (2010). Global Seismic Hazard Program Maps are Misleading, Abstract U 13A – 0020 Poster presented at 2010 Fall Meeting, AGU, San Francisco, Calif., 13-17 Dec.
http://www.agu.org/meetings/fm10/fm10-sessions/fm10_U13A.html
- Mualchin, L. (2010) History of Modern Earthquake Hazard Mapping and Assessment in California Using a Deterministic or Scenario Approach, Pure and Applied Geophysics Volume 168, Numbers 3-4, 383-407, DOI: 10.1007/s00024-010-0121-1
 [From the issue entitled "Special Issue: Advanced Seismic Hazard Assessment. Part II: Regional Seismic Hazard and Seismic Microzonation Case Studies"]
<http://www.springerlink.com/content/p301955r53nk5x12/>
- Panza, G.F.; Irikura, K.; Kouteva-Guentcheva, M.; Peresan, A.; Wang, Z.; Saragoni, R. (Eds.) (2011). Advanced Seismic Hazard Assessment, 320 p.
<http://www.springer.com/earth+sciences+and+geography/book/978-3-0348-0091-4>
- Table 1** List of the top eleven deadliest earthquakes occurred during the period 2000-2011 and the corresponding intensity differences (ΔI) among the observed values and those predicted by the Global Seismic Hazard Assessment Program, or GSHAP.
- Allesandro Martelli, Paolo Clemente, Massimo Forni, Giuliano F. Panza, Antonello Salvatori (2011). RECENT DEVELOPMENT AND APPLICATION OF SEISMIC ISOLATION AND ENERGYDISSIPATION SYSTEMS, IN PARTICULAR IN ITALY, CONDITIONS FOR THEIR CORRECT USE AND RECOMMENDATIONS FOR CODE IMPROVEMENTS -12TH WORLD CONFERENCE ON SEISMIC ISOLATION, ENERGY DISSIPATION AND ACTIVE CONTROL OF STRUCTURES Sept. 20-23, 2011 Sochi-city, Russia
<http://12wcsi.com/site/invitation-jacob-eisenberg>

Cost Impact: The code change proposal will not increase the cost of construction (in most cases).

RB37-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R301.2(2)F-RB-BELA

RB38 – 13

Table R301.2(1)

Proponent: Matthew L. Mlakar, Barrish Pelham & Associates, Inc., representing Structural Engineers Association of California

Revise as follows:

TABLE R301.2(1)
CLIMATIC AND GEOGRAPHIC DESIGN CRITERIA

GROUND SNOW LOAD	WIND DESIGN			SEISMIC DESIGN CATEGORY ^f
	Speed ^d (mph)	Topographic effects ^k	Special wind region ^l	Wind-borne debris zone ^m

(Portions of table not shown to remain unchanged.)

a through k (No changes to text)

l. In accordance with Table R301.2(4)B, where there is local historical data documenting unusual wind conditions, the jurisdiction shall fill in this part of the table with "YES" and identify any specific requirements. Otherwise, the jurisdiction shall indicate "NO" in this part of the table.

m. In accordance with Table R301.2(4)C, the jurisdiction shall indicate the wind-borne debris wind zone(s). Otherwise, the jurisdiction shall indicate "NO" in this part of the table.

Reason: Currently, the special wind regions in Table R301.2(4)B and the wind-borne debris regions in Table R301.2(4)C are shown on a single map for the entire continental United States. Attempting to interpret the map in areas where the contour lines occur can be difficult and may lead to mis-application of the tables especially since the contour lines do not follow county lines or readily identifiable borders. The identification of the transitions should be provided by the local *jurisdiction* to ensure that the proper coefficients are used.

Cost Impact: The proposed change will not impact the cost of construction.

RB38-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R301.2(1)T-RB-MLAKAR

RB39 – 13

R202, R301.2.1, R301.2.1.1, R301.2.1.2, R301.2.1.2.1 (New), R301.2.1.3, R301.2.1.4, Table R301.2(2), Table R301.2(4)A, Table R301.2(4)B, Table R301.2(4)C, Table R301.2.1.2, Table R301.2.1.3, Table R301.2.1.5.1, Table R301.2(2), Table 301.7, Figure R301.2(4)A (New), Figure R301.2(4)B, Figure R301.2(4)C, Figure R301.2(7)

Proponent: Gary J. Ehrlich, P.E., National Association of Home Builders (NAHB);

Revise definitions as follows:

SECTION R202 DEFINITIONS

HURRICANE-PRONE REGIONS. Areas vulnerable to hurricanes, defined as the U.S. Atlantic Ocean and Gulf of Mexico coasts where the ultimate design wind speed, V_{ult} , basic wind speed is greater than 115 90 miles per hour (5140 m/s), and Hawaii, Puerto Rico, Guam, Virgin Islands, and America Samoa.

WIND-BORNE DEBRIS REGION. Areas within *hurricane-prone regions* located as designated in accordance with Figure R302.1(4)C. :

1. Within 1 mile (1.61 km) of the coastal mean high water line where the ultimate design wind speed, V_{ult} , is 130 mph (58 m/s) or greater; or
2. In areas where the ultimate design wind speed, V_{ult} , is 140 mph (63.6 m/s) or greater; or Hawaii.

Revise as follows:

R301.2.1 Wind design criteria. Buildings and portions thereof shall be constructed in accordance with the wind provisions of this code using the ultimate design ~~basic~~ wind speed in Table R301.2(1) as determined from Figure R301.2(4)A. The structural provisions of this code for wind loads are not permitted where wind design is required as specified in Section R301.2.1.1. Where different construction methods and structural materials are used for various portions of a building, the applicable requirements of this section for each portion shall apply. Where not otherwise specified, the wind loads listed in Table R301.2(2) adjusted for height and exposure using Table R301.2(3) shall be used to determine design load performance requirements for wall coverings, curtain walls, roof coverings, exterior windows, skylights, garage doors and exterior doors. Asphalt shingles shall be designed for wind speeds in accordance with Section R905.2.4. A continuous load path shall be provided to transmit the applicable uplift forces in Section R802.11.1 from the roof assembly to the foundation.

R301.2.1.1 Wind limitations and wind design required. The wind provisions of this code shall not apply to the design of buildings where wind design is required in accordance with Figure R301.2(4)B ~~or where the basic wind speed from Figure R301.2(4)A equals or exceeds 110 miles per hour (49 m/s).~~

Exceptions:

1. For concrete construction, the wind provisions of this code shall apply in accordance with the limitations of Sections R404 and R611.
2. For structural insulated panels, the wind provisions of this code shall apply in accordance with the limitations of Section R613.

In regions where wind design is required in accordance with Figure R301.2(4)B ~~or where the basic wind speed shown on Figure R301.2(4)A equals or exceeds 110 miles per hour (49 m/s)~~, the design of buildings for wind loads shall be in accordance with one or more of the following methods:

1. AF&PA *Wood Frame Construction Manual* (WFCM); or

2. ICC *Standard for Residential Construction in High-Wind Regions* (ICC 600); or
3. ASCE *Minimum Design Loads for Buildings and Other Structures* (ASCE 7); or
4. AISI *Standard for Cold-Formed Steel Framing—Prescriptive Method For One- and Two-Family Dwellings* (AISI S230); or
5. *International Building Code*.

The elements of design not addressed by the methods in Items 1 through 5 shall be in accordance with the provisions of this code. When ASCE 7 or the *International Building Code* is used for the design of the building, the wind speed map and exposure category requirements as specified in ASCE 7 and the *International Building Code* shall be used.

TABLE R301.2(2)
COMPONENT AND CLADDING LOADS FOR A BUILDING WITH A MEAN
ROOF HEIGHT OF 30 FEET LOCATED IN EXPOSURE B (psf)

FIGURE R301.2(4)A
BASIC WIND SPEEDS

FIGURE R301.2(4)B
REGIONS WHERE WIND DESIGN IS REQUIRED

FIGURE R301.2(4)C
WIND-BORNE DEBRIS REGIONS

R301.2.1.2 Protection of openings. Exterior glazing in buildings located in windborne debris regions shall be protected from windborne debris. Glazed opening protection for windborne debris shall meet the requirements of the Large Missile Test of ASTM E 1996 and ASTM E 1886 as modified in Section R301.2.1.2.1 referenced therein. ~~The applicable wind zones for establishing missile types in ASTM E 1996 are shown on Figure R301.2(4)C.~~ Garage door glazed opening protection for windborne debris shall meet the requirements of an *approved* impact-resisting standard or ANSI/DASMA 115.

Exception: Wood structural panels with a minimum thickness of 7/16 inch (11 mm) and a maximum span of 8 feet (2438 mm) shall be permitted for opening protection in one- and two-story buildings. Panels shall be precut and attached to the framing surrounding the opening containing the product with the glazed opening. Panels shall be predrilled as required for the anchorage method and shall be secured with the attachment hardware provided. Attachments shall be designed to resist the component and cladding loads determined in accordance with either Table R301.2(2) or ASCE 7, with the permanent corrosion-resistant attachment hardware provided and anchors permanently installed on the building. Attachment in accordance with Table R301.2.1.2 is permitted for buildings with a mean roof height of 45 33 feet (10 058 mm) or less where the ultimate design wind speed, V_{ult} is 180 mph or less, ~~located in Wind Zones 1 and 2 in accordance with Figure R301.2(4)C.~~

TABLE R301.2.1.2
WINDBORNE DEBRIS PROTECTION FASTENING
SCHEDULE FOR WOOD STRUCTURAL PANELS^{a,b,c,d}

a. This table is based on 430 180 mph ultimate design wind speeds, V_{ult} and a 45 33-foot mean roof height.

(Table and footnotes not shown to remain unchanged.)

R301.2.1.2.1. Application of ASTM E 1996. The text of Section 2.2 of ASTM E 1996 shall be substituted as follows:

2.2 ASCE Standard:

ASCE 7-10 American Society of Civil Engineers Minimum Design Loads for Buildings and Other Structures

The text of Section 6.2.2 of ASTM E 1996 shall be substituted as follows:

6.2.2 Unless otherwise specified, select the wind zone based on the strength design wind speed, V_{ult} , as follows:

6.2.2.1 Wind Zone 1—130 mph \leq ultimate design wind speed, $V_{ult} < 140$ mph.

6.2.2.2 Wind Zone 2—140 mph \leq ultimate design wind speed, $V_{ult} < 150$ mph at greater than one mile (1.6 km) from the coastline. The coastline shall be measured from the mean high water mark.

6.2.2.3 Wind Zone 3—150 mph (58 m/s) \leq ultimate design wind speed, $V_{ult} \leq 160$ mph (63 m/s), or 140 mph (54 m/s) \leq ultimate design wind speed, $V_{ult} \leq 160$ mph (63 m/s) and within one mile (1.6 km) of the coastline. The coastline shall be measured from the mean high water mark.

6.2.2.4 Wind Zone 4—ultimate design wind speed, $V_{ult} > 160$ mph (63 m/s).

R301.2.1.3 Wind speed conversion. When referenced documents are based on nominal design-fastest mile wind speeds, the ultimate design-three-second gust basic wind speeds, $V_{ult}-V_{3s}$, of Figure R301.2(4)A shall be converted to nominal design-fastest mile wind speeds, $V_{asd}-V_{fm}$, using Table R301.2.1.3.

**TABLE R301.2.1.3
EQUIVALENT BASIC WIND SPEEDS**

**TABLE R301.2.1.3
WIND SPEED CONVERSIONS^a**

V_{ult}	110	115	120	130	140	150	160	170	180	190	200
V_{asd}	85	89	93	101	108	116	124	132	139	147	155

a. Linear interpolation is permitted

R301.2.1.4 Exposure category. For each wind direction considered, an exposure category that adequately reflects the characteristics of ground surface irregularities shall be determined for the site at which the building or structure is to be constructed. For a site located in the transition zone between categories, the category resulting in the largest wind forces shall apply. Account shall be taken of variations in ground surface roughness that arise from natural topography and vegetation as well as from constructed features. For a site where multiple detached one- and two-family dwellings, townhouses or other structures are to be constructed as part of a subdivision, master-planned community, or otherwise designated as a developed area by the authority having jurisdiction, the exposure category for an individual structure shall be based upon the site conditions that will exist at the time when all adjacent structures on the site have been constructed, provided their construction is expected to begin within one year of the start of construction for the structure for which the exposure category is determined. For any given wind direction, the exposure in which a specific building or other structure is sited shall be assessed as being one of the following categories:

1. Exposure A. Large city centers with at least 50 percent of the buildings having a height in excess of 70 feet (21 336 mm). Use of this exposure category shall be limited to those areas for which terrain representative of Exposure A prevails in the upwind direction for a distance of at least 0.5 mile (0.8 km) or 10 times the height of the building or other structure, whichever is greater. Possible channeling effects or increased velocity pressures due to the building or structure being located in the wake of adjacent buildings shall be taken into account.
12. Exposure B. Urban and suburban areas, wooded areas, or other terrain with numerous closely spaced obstructions having the size of single-family dwellings or larger. Exposure B shall be assumed unless the site meets the definition of another type exposure.
23. Exposure C. Open terrain with scattered obstructions, including surface undulations or other irregularities, having heights generally less than 30 feet (9144 mm) extending more than 1,500

feet (457 m) from the building site in any quadrant. This exposure shall also apply to any building located within Exposure B type terrain where the building is directly adjacent to open areas of Exposure C type terrain in any quadrant for a distance of more than 600 feet (183 m). This category includes flat, open country and grasslands.

34. Exposure D. Flat, unobstructed areas exposed to wind flowing over open water for a distance of at least 5000 feet (1,524 m) ~~1 mile (1.61 km)~~. ~~Shorelines in Exposure D include inland waterways, the Great Lakes, and coastal areas of California, Oregon, Washington and Alaska.~~ This exposure shall apply only to those buildings and other structures exposed to the wind coming from over the water. Exposure D extends inland from the shoreline a distance of 600 feet (183 m) ~~4500 feet (457 m)~~ or 20-40 times the height of the building or structure, whichever is greater. This category includes smooth mud flats, salt flats and unbroken ice.

TABLE R301.2.1.5.1
BASIC WIND MODIFICATION FOR TOPOGRAPHIC WIND EFFECT

TABLE R301.2.1.5.1
BASIC WIND MODIFICATION FOR TOPOGRAPHIC WIND EFFECT^a

BASIC WIND SPEED FROM FIGURE R301.2(4)	AVERAGE SLOPE OF THE TOP HALF OF HILL, RIDGE OR ESCARPMENT (percent)						
	0.10	0.125	0.15	0.175	0.20	0.23	0.25
	Required Basic Wind Speed, Modified for Topographic Wind Speed-Up (rounded)						
<u>110</u>	<u>132</u>	<u>137</u>	<u>142</u>	<u>147</u>	<u>152</u>	<u>158</u>	<u>162</u>
<u>115</u>	<u>138</u>	<u>143</u>	<u>148</u>	<u>154</u>	<u>159</u>	<u>165</u>	<u>169</u>
<u>120</u>	<u>144</u>	<u>149</u>	<u>155</u>	<u>160</u>	<u>166</u>	<u>172</u>	<u>176</u>
<u>130</u>	<u>156</u>	<u>162</u>	<u>168</u>	<u>174</u>	<u>179</u>	<u>N/A</u>	<u>N/A</u>
<u>140</u>	<u>168</u>	<u>174</u>	<u>181</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
<u>150</u>	<u>180</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>

a. Table applies to a feature height of 500 feet or less and dwellings sited a distance equal or greater than half the feature height.

TABLE R301.2(2)
COMPONENT AND CLADDING LOADS FOR A BUILDING WITH A MEAN ROOF HEIGHT OF 30 FEET LOCATED IN EXPOSURE B (ASD)(psf)^{a, b, c, d, e}

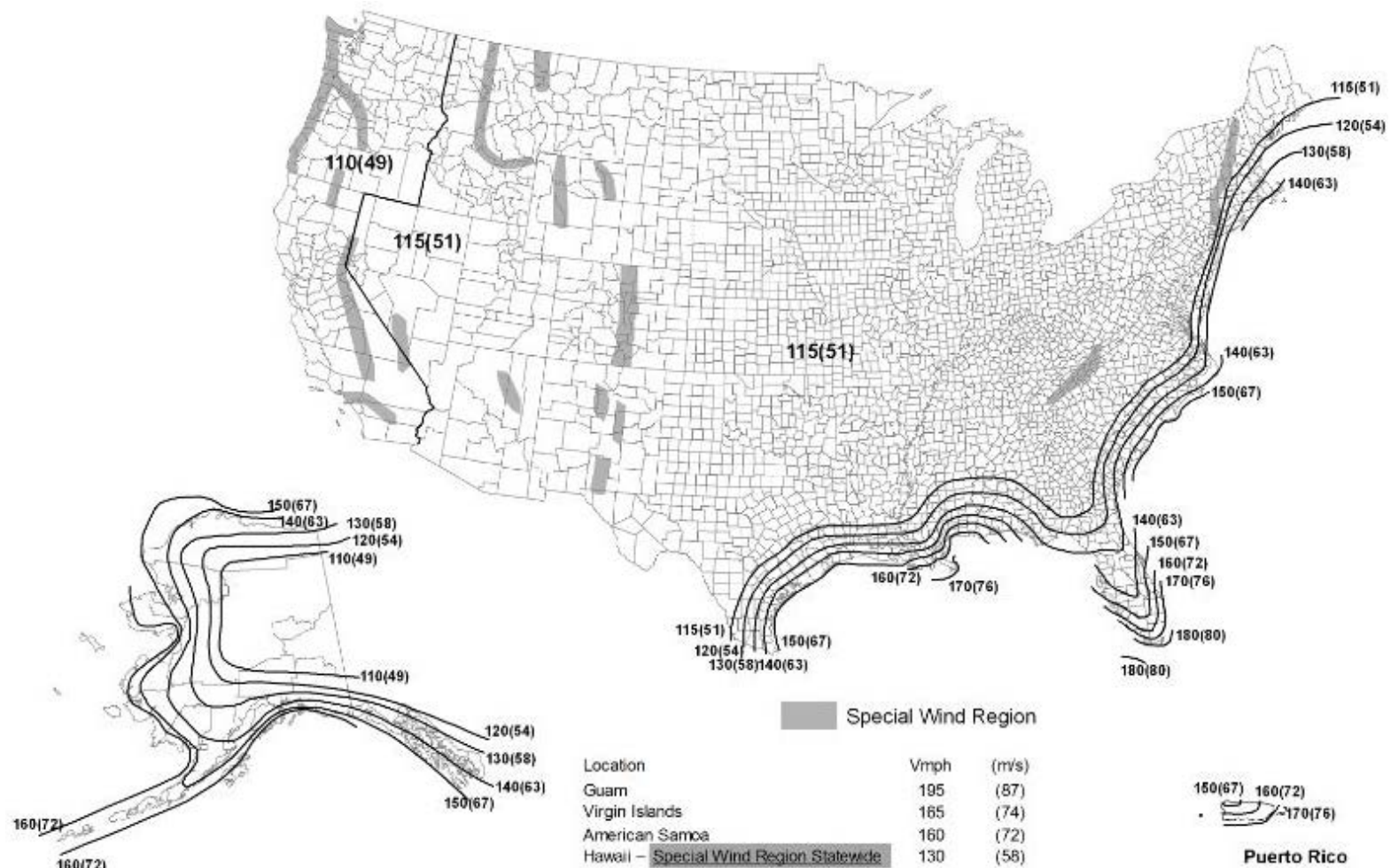
	ZONE	EFFECTIVE WIND AREA (feet2)	ULTIMATE DESIGN WIND SPEED, V_{ULT} (mph)																		
			110		115		120		130		140		150		160		170		180		
Roof 0 to 7 degrees	1	10	10.0	:	10.0	:	10.0	:	10.0	:	10.0	:	9.9	:	11.2	:	12.6	:	14.2	:	-35.0
	1	20	10.0	:	10.0	:	10.0	:	10.0	:	10.0	:	9.2	:	10.6	:	11.9	:	13.3	:	34.1
	1	50	10.0	:	10.0	:	10.0	:	10.0	:	10.0	:	8.5	:	10.0	:	10.8	:	12.2	:	-32.9
	1	100	10.0	:	10.0	:	10.0	:	10.0	:	10.0	:	7.8	:	10.0	:	10.0	:	11.3	:	-32.0
	2	10	10.0	:	10.0	:	10.0	:	10.0	:	10.0	:	9.9	:	11.2	:	12.6	:	14.2	:	-58.7
	2	20	10.0	:	10.0	:	10.0	:	10.0	:	10.0	:	9.2	:	10.6	:	11.9	:	13.3	:	-52.4
	2	50	10.0	:	10.0	:	10.0	:	10.0	:	10.0	:	8.5	:	10.0	:	10.8	:	12.2	:	-44.1
	2	100	10.0	:	10.0	:	10.0	:	10.0	:	10.0	:	7.8	:	10.0	:	10.0	:	11.3	:	-37.9
	3	10	10.0	:	10.0	:	10.0	:	10.0	:	10.0	:	9.9	:	11.2	:	12.6	:	14.2	:	-88.3
	3	20	10.0	:	10.0	:	10.0	:	10.0	:	10.0	:	9.2	:	10.6	:	11.9	:	13.3	:	-73.1
	3	50	10.0	:	10.0	:	10.0	:	10.0	:	10.0	:	8.5	:	10.0	:	10.8	:	12.2	:	-53.1
	3	100	10.0	:	10.0	:	10.0	:	10.0	:	10.0	:	7.8	:	10.0	:	10.0	:	11.3	:	-37.9
Roof > 7 to 27 degrees	1	10	10.0	:	10.0	:	10.0	:	10.5	:	12.2	:	14.0	:	15.9	:	17.9	:	20.2	:	-32.0
	1	20	10.0	:	10.0	:	10.0	:	10.0	:	11.1	:	12.8	:	14.5	:	16.4	:	18.4	:	-31.1
	1	50	10.0	:	10.0	:	10.0	:	10.0	:	10.0	:	11.1	:	12.7	:	14.3	:	16.0	:	-29.9
	1	100	10.0	:	10.0	:	10.0	:	10.0	:	10.0	:	9.9	:	11.2	:	12.6	:	14.2	:	-29.0
	2	10	10.0	:	10.0	:	10.0	:	10.5	:	12.2	:	14.0	:	15.9	:	17.9	:	20.2	:	-55.8
	2	20	10.0	:	10.0	:	10.0	:	10.0	:	11.1	:	12.8	:	14.5	:	16.4	:	18.4	:	-51.2
	2	50	10.0	:	10.0	:	10.0	:	10.0	:	10.0	:	11.1	:	12.7	:	14.3	:	16.0	:	-45.4

	<u>2</u>	<u>100</u>	<u>10.0</u>	<u>-</u>	<u>10.0</u>	<u>-</u>	<u>10.0</u>	<u>-</u>	<u>10.0</u>	<u>-</u>	<u>9.9</u>	<u>-</u>	<u>11.2</u>	<u>-</u>	<u>12.6</u>	<u>-</u>	<u>14.2</u>	<u>-40.9</u>
	<u>3</u>	<u>10</u>	<u>10.0</u>	<u>-</u>	<u>10.0</u>	<u>-</u>	<u>10.0</u>	<u>-</u>	<u>10.5</u>	<u>-</u>	<u>12.2</u>	<u>-</u>	<u>14.0</u>	<u>-</u>	<u>15.9</u>	<u>-</u>	<u>20.2</u>	<u>-82.4</u>
	<u>3</u>	<u>20</u>	<u>10.0</u>	<u>-</u>	<u>10.0</u>	<u>-</u>	<u>10.0</u>	<u>-</u>	<u>10.0</u>	<u>-</u>	<u>11.1</u>	<u>-</u>	<u>12.8</u>	<u>-</u>	<u>14.5</u>	<u>-</u>	<u>18.4</u>	<u>-77.0</u>
	<u>3</u>	<u>50</u>	<u>10.0</u>	<u>-</u>	<u>10.0</u>	<u>-</u>	<u>10.0</u>	<u>-</u>	<u>10.0</u>	<u>-</u>	<u>11.1</u>	<u>-</u>	<u>12.7</u>	<u>-</u>	<u>14.3</u>	<u>-</u>	<u>16.0</u>	<u>-69.9</u>
	<u>3</u>	<u>100</u>	<u>10.0</u>	<u>-</u>	<u>10.0</u>	<u>-</u>	<u>10.0</u>	<u>-</u>	<u>10.0</u>	<u>-</u>	<u>9.9</u>	<u>-</u>	<u>11.2</u>	<u>-</u>	<u>12.6</u>	<u>-</u>	<u>14.2</u>	<u>-64.6</u>
Roof > 27 to 45 degrees	<u>1</u>	<u>10</u>	<u>11.9</u>	<u>-</u>	<u>13.1</u>	<u>-</u>	<u>14.2</u>	<u>-</u>	<u>16.7</u>	<u>-</u>	<u>19.4</u>	<u>-</u>	<u>22.2</u>	<u>-</u>	<u>25.3</u>	<u>-</u>	<u>32.0</u>	<u>-35.0</u>
	<u>1</u>	<u>20</u>	<u>11.6</u>	<u>-</u>	<u>12.7</u>	<u>-</u>	<u>13.8</u>	<u>-</u>	<u>16.2</u>	<u>-</u>	<u>18.8</u>	<u>-</u>	<u>21.6</u>	<u>-</u>	<u>24.6</u>	<u>-</u>	<u>31.1</u>	<u>-33.2</u>
	<u>1</u>	<u>50</u>	<u>11.2</u>	<u>-</u>	<u>12.2</u>	<u>-</u>	<u>13.3</u>	<u>-</u>	<u>15.6</u>	<u>-</u>	<u>18.1</u>	<u>-</u>	<u>20.8</u>	<u>-</u>	<u>23.6</u>	<u>-</u>	<u>29.9</u>	<u>-30.8</u>
	<u>1</u>	<u>100</u>	<u>10.9</u>	<u>-</u>	<u>11.9</u>	<u>-</u>	<u>12.9</u>	<u>-</u>	<u>15.1</u>	<u>-</u>	<u>17.6</u>	<u>-</u>	<u>20.2</u>	<u>-</u>	<u>22.9</u>	<u>-</u>	<u>29.0</u>	<u>-29.0</u>
	<u>2</u>	<u>10</u>	<u>11.9</u>	<u>-</u>	<u>13.1</u>	<u>-</u>	<u>14.2</u>	<u>-</u>	<u>16.7</u>	<u>-</u>	<u>19.4</u>	<u>-</u>	<u>22.2</u>	<u>-</u>	<u>25.3</u>	<u>-</u>	<u>32.0</u>	<u>-40.9</u>
	<u>2</u>	<u>20</u>	<u>11.6</u>	<u>-</u>	<u>12.7</u>	<u>-</u>	<u>13.8</u>	<u>-</u>	<u>16.2</u>	<u>-</u>	<u>18.8</u>	<u>-</u>	<u>21.6</u>	<u>-</u>	<u>24.6</u>	<u>-</u>	<u>31.1</u>	<u>-39.1</u>
	<u>2</u>	<u>50</u>	<u>11.2</u>	<u>-</u>	<u>12.2</u>	<u>-</u>	<u>13.3</u>	<u>-</u>	<u>15.6</u>	<u>-</u>	<u>18.1</u>	<u>-</u>	<u>20.8</u>	<u>-</u>	<u>23.6</u>	<u>-</u>	<u>29.9</u>	<u>-36.8</u>
	<u>2</u>	<u>100</u>	<u>10.9</u>	<u>-</u>	<u>11.9</u>	<u>-</u>	<u>12.9</u>	<u>-</u>	<u>15.1</u>	<u>-</u>	<u>17.6</u>	<u>-</u>	<u>20.2</u>	<u>-</u>	<u>22.9</u>	<u>-</u>	<u>29.0</u>	<u>-35.0</u>
	<u>3</u>	<u>10</u>	<u>11.9</u>	<u>-</u>	<u>13.1</u>	<u>-</u>	<u>14.2</u>	<u>-</u>	<u>16.7</u>	<u>-</u>	<u>19.4</u>	<u>-</u>	<u>22.2</u>	<u>-</u>	<u>25.3</u>	<u>-</u>	<u>32.0</u>	<u>-40.9</u>
	<u>3</u>	<u>20</u>	<u>11.6</u>	<u>-</u>	<u>12.7</u>	<u>-</u>	<u>13.8</u>	<u>-</u>	<u>16.2</u>	<u>-</u>	<u>18.8</u>	<u>-</u>	<u>21.6</u>	<u>-</u>	<u>24.6</u>	<u>-</u>	<u>31.1</u>	<u>-39.1</u>
	<u>3</u>	<u>50</u>	<u>11.2</u>	<u>-</u>	<u>12.2</u>	<u>-</u>	<u>13.3</u>	<u>-</u>	<u>15.6</u>	<u>-</u>	<u>18.1</u>	<u>-</u>	<u>20.8</u>	<u>-</u>	<u>23.6</u>	<u>-</u>	<u>29.9</u>	<u>-36.8</u>
	<u>3</u>	<u>100</u>	<u>10.9</u>	<u>-</u>	<u>11.9</u>	<u>-</u>	<u>12.9</u>	<u>-</u>	<u>15.1</u>	<u>-</u>	<u>17.6</u>	<u>-</u>	<u>20.2</u>	<u>-</u>	<u>22.9</u>	<u>-</u>	<u>29.0</u>	<u>-35.0</u>
Wall	<u>4</u>	<u>10</u>	<u>13.1</u>	<u>-</u>	<u>14.3</u>	<u>-</u>	<u>15.5</u>	<u>-</u>	<u>18.2</u>	<u>-</u>	<u>21.2</u>	<u>-</u>	<u>24.3</u>	<u>-</u>	<u>27.7</u>	<u>-</u>	<u>35.0</u>	<u>-37.9</u>
	<u>4</u>	<u>20</u>	<u>12.5</u>	<u>-</u>	<u>13.6</u>	<u>-</u>	<u>14.8</u>	<u>-</u>	<u>17.4</u>	<u>-</u>	<u>20.2</u>	<u>-</u>	<u>23.2</u>	<u>-</u>	<u>26.4</u>	<u>-</u>	<u>33.4</u>	<u>-36.4</u>
	<u>4</u>	<u>50</u>	<u>11.7</u>	<u>-</u>	<u>12.8</u>	<u>-</u>	<u>13.9</u>	<u>-</u>	<u>16.3</u>	<u>-</u>	<u>19.0</u>	<u>-</u>	<u>21.7</u>	<u>-</u>	<u>24.7</u>	<u>-</u>	<u>31.3</u>	<u>-34.3</u>
	<u>4</u>	<u>100</u>	<u>11.1</u>	<u>-</u>	<u>12.1</u>	<u>-</u>	<u>13.2</u>	<u>-</u>	<u>15.5</u>	<u>-</u>	<u>18.0</u>	<u>-</u>	<u>20.6</u>	<u>-</u>	<u>23.5</u>	<u>-</u>	<u>29.8</u>	<u>-32.7</u>
	<u>4</u>	<u>500</u>	<u>10.0</u>	<u>-</u>	<u>10.6</u>	<u>-</u>	<u>11.6</u>	<u>-</u>	<u>13.6</u>	<u>-</u>	<u>15.8</u>	<u>-</u>	<u>18.1</u>	<u>-</u>	<u>20.6</u>	<u>-</u>	<u>23.2</u>	<u>-29.0</u>
	<u>5</u>	<u>10</u>	<u>13.1</u>	<u>-</u>	<u>14.3</u>	<u>-</u>	<u>15.5</u>	<u>-</u>	<u>18.2</u>	<u>-</u>	<u>21.2</u>	<u>-</u>	<u>24.3</u>	<u>-</u>	<u>27.7</u>	<u>-</u>	<u>35.0</u>	<u>-46.8</u>
	<u>5</u>	<u>20</u>	<u>12.5</u>	<u>-</u>	<u>13.6</u>	<u>-</u>	<u>14.8</u>	<u>-</u>	<u>17.4</u>	<u>-</u>	<u>20.2</u>	<u>-</u>	<u>23.2</u>	<u>-</u>	<u>26.4</u>	<u>-</u>	<u>33.4</u>	<u>-43.7</u>
	<u>5</u>	<u>50</u>	<u>11.7</u>	<u>-</u>	<u>12.8</u>	<u>-</u>	<u>13.9</u>	<u>-</u>	<u>16.3</u>	<u>-</u>	<u>19.0</u>	<u>-</u>	<u>21.7</u>	<u>-</u>	<u>24.7</u>	<u>-</u>	<u>31.3</u>	<u>-39.5</u>
	<u>5</u>	<u>100</u>	<u>11.1</u>	<u>-</u>	<u>12.1</u>	<u>-</u>	<u>13.2</u>	<u>-</u>	<u>15.5</u>	<u>-</u>	<u>18.0</u>	<u>-</u>	<u>20.6</u>	<u>-</u>	<u>23.5</u>	<u>-</u>	<u>29.8</u>	<u>-36.4</u>
	<u>5</u>	<u>500</u>	<u>10.0</u>	<u>-</u>	<u>10.6</u>	<u>-</u>	<u>11.6</u>	<u>-</u>	<u>13.6</u>	<u>-</u>	<u>15.8</u>	<u>-</u>	<u>18.1</u>	<u>-</u>	<u>20.6</u>	<u>-</u>	<u>23.2</u>	<u>-29.0</u>

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m², 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

Notes:

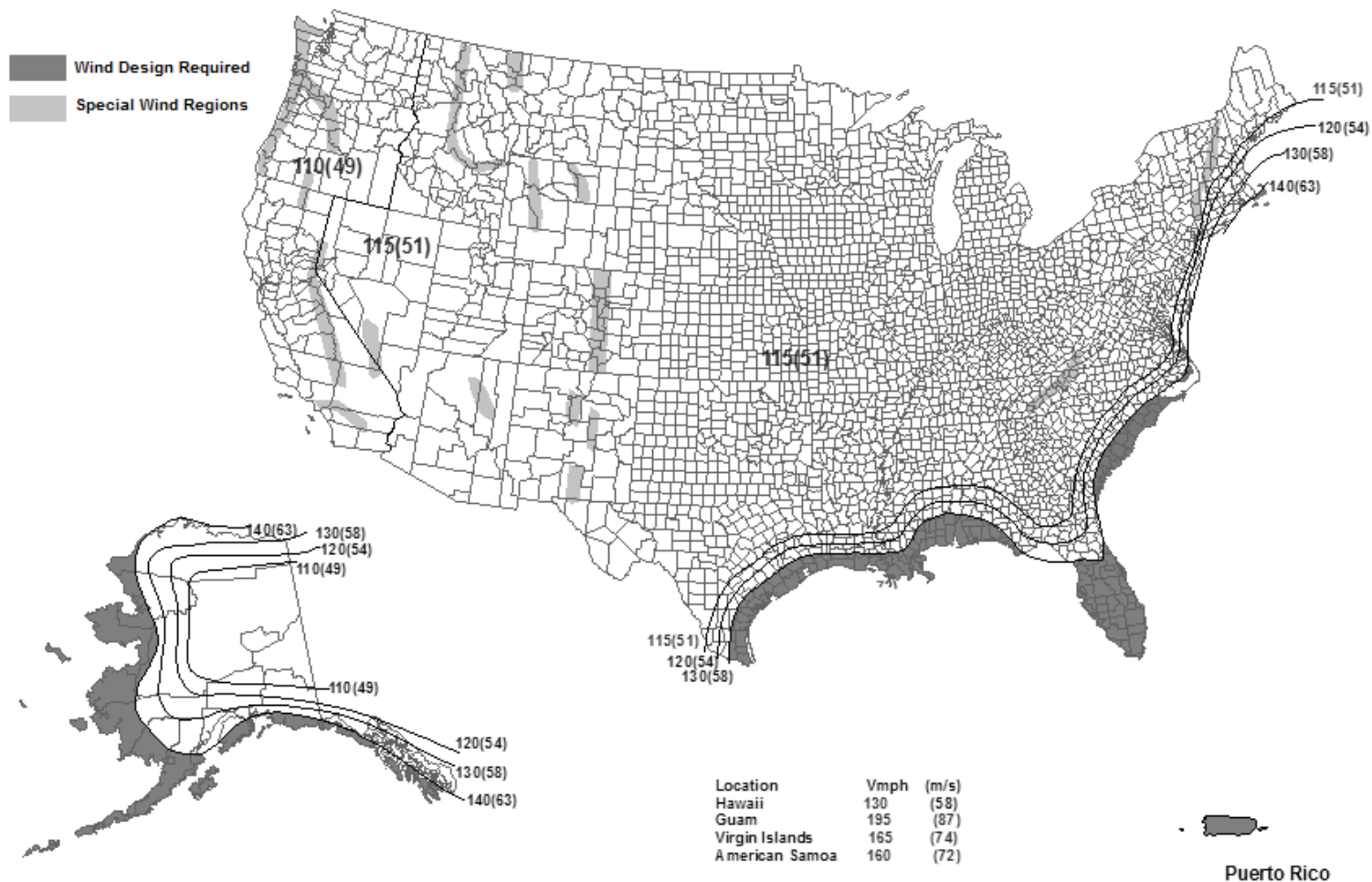
- The effective wind area shall be equal to the span length multiplied by an effective width. This width shall be permitted to be not be less than one-third the span length. For cladding fasteners, the effective wind area shall not be greater than the area that is tributary to an individual fastener.
- For effective areas between those given above, the load may be interpolated; otherwise, use the load associated with the lower effective area.
- Table values shall be adjusted for height and exposure by multiplying by the adjustment coefficient in Table R301.2(3).
- See Figure R301.2(7) for location of zones.
- Plus and minus signs signify pressures acting toward and away from the building surfaces.



Notes:

1. Values are nominal design 3-second gust wind speeds in miles per hour (m/s) at 33 ft (10m) above ground for Exposure C category.
2. Linear interpolation between contours is permitted.
3. Islands and coastal areas outside the last contour shall use the last wind speed contour of the coastal area.
4. Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.
5. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (Annual Exceedance Probability = 0.00143, MRI = 700 Years).

FIGURE R301.2(4)A
ULTIMATE DESIGN WIND SPEEDS



Notes:

1. Values are nominal design 3-second gust wind speeds in miles per hour (m/s) at 33 ft (10m) above ground for Exposure C category.
2. Linear interpolation between contours is permitted.
3. Islands and coastal areas outside the last contour shall use the last wind speed contour of the coastal area.
4. Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.
5. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years.

FIGURE R301.2(4)B
REGIONS WHERE WIND DESIGN IS REQUIRED

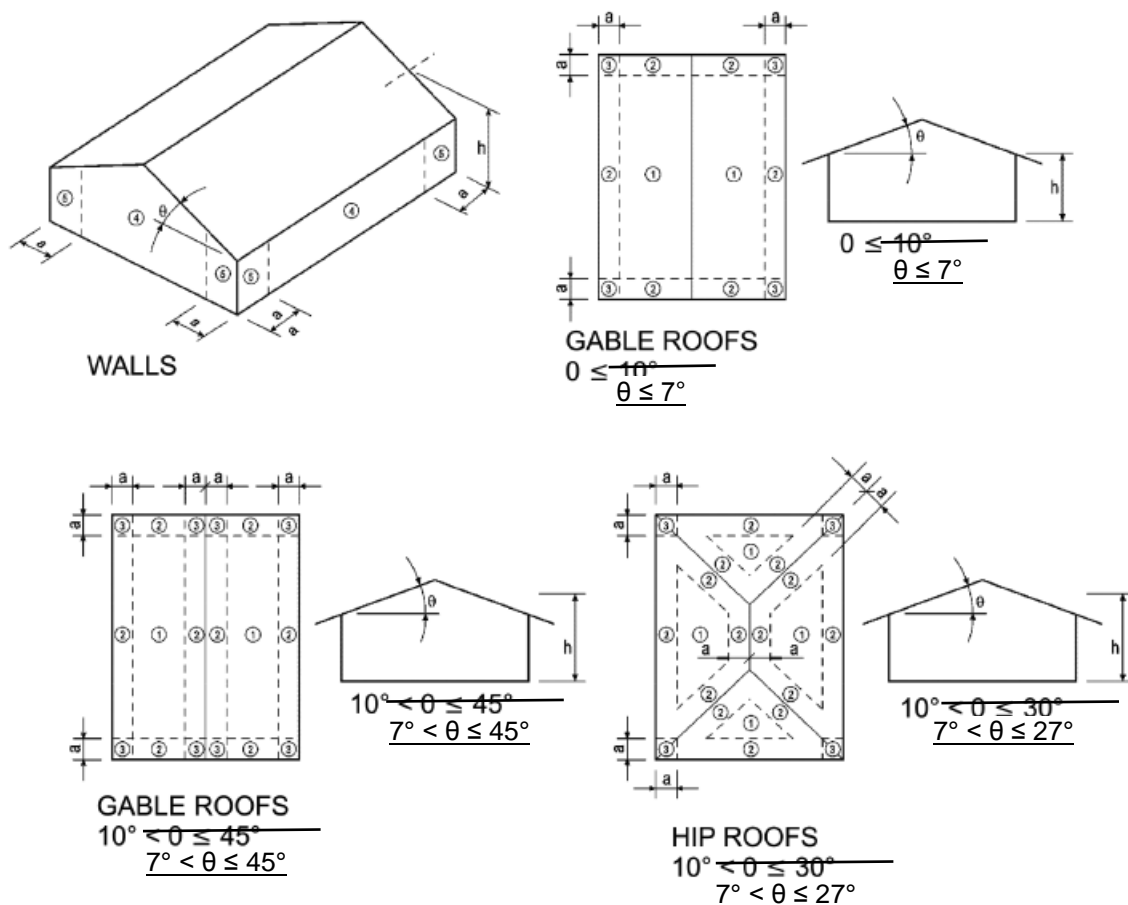


FIGURE R301.2(7)
COMPONENT AND CLADDING PRESSURE ZONES

TABLE R301.7
ALLOWABLE DEFLECTION OF STRUCTURAL MEMBERS^{a, b, c, d, e}

STRUCTURAL MEMBER	ALLOWABLE DEFLECTION
Exterior walls ^a — wind loads ^a with plaster or stucco finish	H/360
Exterior walls ^a with other brittle finishes	H/240
Exterior walls ^a with flexible finishes	H/120 ^d
Lintels supporting masonry veneer walls ^e	L/600

Note: L = span length, H = span height.

a. The wind load shall be permitted to be taken as 0.7 times the Component and Cladding (ASD) loads obtained from Table R301.2(2) for the purpose of determining deflection limits herein.

(Footnotes not shown to remain unchanged.)

Reason: The purpose of this code change is to bring the wind provisions of the IRC in line with the 2012 IBC and ASCE 7-10. As a result of the schedule changes implemented during the 2009-2010 ICC code development cycle changes, there was not sufficient time to revise the IRC to fully implement the new ultimate wind speed basis of ASCE 7-10 and the 2012 IBC, due to the extent of prescriptive IRC provisions and tables which are directly related to basic wind speed. New maps based on the ASCE 7-10 ultimate wind speed data but converted back down to nominal (ASD) basis were provided in the IRC. This has led to a fair amount of confusion among those stakeholders who work with both codes.

A working group of stakeholders including NAHB, the major material associations, ASCE, and the Insurance Institute for Business and Home Safety developed a series of IRC proposals to implement the new ultimate wind speed basis. This proposal updates the Chapter 3 design criteria, including definitions, a new ultimate wind speed map, a new map of the regions where special high-wind design is required, a conversion table to the nominal (ASD) wind speed basis for use with those standards which have not updated their provisions, and a revised table of component and cladding pressures.

It is noted the component and cladding pressure table is set up using the ultimate design wind speed, but reports pressures at an ASD level. That is, the listed pressures incorporate the 0.6 multiplier on wind loads per the allowable stress design load combinations shown in Section 1605.3 of the *International Building Code* and Section 2.3.2 of ASCE 7-10. This is done here and throughout this series of proposals to allow for easy adaptation of existing stock designs, construction documents and guidelines to the 2015 IRC, as the loads and pressures will be comparable to previous editions of the IRC for most sites.

The region in revised Figure R301.2(4)B where the use of alternate prescriptive high-wind standards or engineered design is required is defined using the 130mph contour along the Gulf Coast and along the southern portions of the Atlantic coast from Florida up to North Carolina. The 140mph contour is used for the northern portions of the Atlantic coast from Virginia up to Maine, and for Alaska. A 130mph trigger is also used for the assorted Caribbean and Pacific islands that are also considered part of the "hurricane-prone" region. This creates a region that approximately equals the region defined by the 110mph contour under the wind map used in the 2000 through 2009 IRC, maintains areas of Florida and the Gulf Coast traditionally outside of the prescriptive limits of the IRC, and maintains areas of New England traditionally included within the prescriptive limits of the IRC.

Code users desiring a more accurate determination in areas near or along a particular contour (or in general) can make use of the Applied Technology Council's Windspeed by Location web site (<http://www.atcouncil.org/windspeed/>) to obtain site-specific wind speeds using latitude/longitude or site address. This site was developed by ATC using the same data used to develop the wind maps for ASCE 7, the IBC and the IRC. As the site is not a reference standard or maintained by a government agency, we could not make a direct reference in the code figures. However, we include mention of the Windspeed by Location web site here to draw code users' attention to its existence and in hopes that mention of the web site could become part of the IRC Commentary.

Cost Impact: The code change proposal will not increase the cost of construction.

RB39-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R301.2.1-RB-EHRLICH

RB40 – 13

R301.2.1.1.1 (New), Chapter 44

Proponent: Julie Ruth, P.E., JRuth Code Consulting, representing the American Architectural Manufacturers Association (julruth@aol.com); Daniel J. Walker, P.E., Thomas Associates, representing the National Sunroom Association

Add new text as follows:

R301.2.1.1.1 Sunrooms. Sunrooms shall comply with the wind loads, structural requirements and testing provisions of Section 5.2.1 of AAMA/NPEA/NSA 2100, with the following modifications:

1. Basic wind speed in miles per hour (mph) shall be determined in accordance with Section R301.2.1 of this code; and
2. Sunrooms including exposed structure, components, cladding, and roof covering shall be designed to resist the wind loads as established in Section R301.2.1 of this code.

For the purpose of applying the criteria of AAMA/NPEA/NSA-2100 based on the intended use, sunrooms shall be identified as one of the following categories by the permit applicant, design professional or the property owner in the construction documents. Component and Cladding pressures shall be used for the design of elements that do not qualify as main wind force resisting systems. Main wind force resisting systems pressures shall be used for the design of elements assigned to provide support and stability for the overall sunroom.

Category I: A Thermally Isolated Sunroom with walls that are open or enclosed with insect screening or 0.5 mm (20 mil) maximum thickness plastic film. The space is nonhabitable and unconditioned.

Category II: A Thermally Isolated Sunroom with enclosed walls. The openings are enclosed with translucent or transparent plastic or glass. The space is nonhabitable and unconditioned.

Category III: A Thermally Isolated Sunroom with enclosed walls. The openings are enclosed with translucent or transparent plastic or glass. The sunroom fenestration complies with additional requirements for air infiltration resistance and water-penetration resistance. The space is nonhabitable and unconditioned.

Category IV: A Thermally Isolated Sunroom with enclosed walls. The sunroom is designed to be heated or cooled by a separate temperature control or system and is thermally isolated from the primary structure. The sunroom fenestration complies with additional requirements for water penetration resistance, air infiltration resistance, and thermal performance. The space is nonhabitable and conditioned.

Category V: A Sunroom with enclosed walls. The sunroom is designed to be heated or cooled and is open to the main structure. The sunroom fenestration complies with additional requirements for water-penetration resistance, air infiltration resistance, and thermal performance. The space is habitable and conditioned.

Add standards to Chapter 44 as follows:

AAMA American Architectural Manufacturers Association
1827 Walden Office Square, Suite 550
Schaumburg, IL 60173

AAMA/NSA/NPEA 2100-12 Specifications for Sunrooms

NSA National Sunroom Association
1300 Sumner Ave.
Cleveland, OH 44115-2851

AAMA/NSA/NPEA 2100-12 Specifications for Sunrooms

NPEA National Sunroom Association
1300 Sumner Ave.
Cleveland, OH 44115-2851

AAMA/NSA/NPEA 2100-12 Specifications for Sunrooms

Reason: The 2012 *International Residential Code* defines a sunroom as "A one-story structure attached to a *dwelling* with a *glazing area* in excess of 40 percent of the gross area of the structure's *exterior walls* and roof." These structures are typically constructed in one of two manners: 1) using typical wood framing techniques, or 2) using a stick system that consists of prefabricated framing of aluminum, fiberglass, wood or other materials, with glass or opaque wall or roof panels, and steel or aluminum connections.

The first technique can be done in accordance with the current provisions of the IRC for wood framed construction. There are no provisions in the IRC for the second method of constructing a sunroom other than by engineering analysis or demonstrating equivalence to the current provisions of the *International Residential Code* by some other means.

This proposal seeks to clarify the requirements for sunrooms under the IRC by adding reference to the provisions of AAMA/NPEA/NSA 2100 - 12 *Specifications for Sunrooms* to the available options for approval of sunroom construction in the IRC. Sunrooms designed and constructed in accordance with AAMA/NPEA/NSA 2100 are required within the standard to meet the structural provisions of the IRC or the IBC. Therefore, the appropriate engineering analysis has already been conducted for these structures. In addition, the standard establishes the specific requirements for these unique structures based upon their designated Category.

In 2002 the American Architectural Manufacturers Association (AAMA), the National Sunroom Association (NSA) and the National Patio Enclosure Association (NPEA) published the first U.S. standard for the design and specification of sunrooms – AAMA/NPEA/NSA 2100 – 02. The standard established five categories of sunrooms based upon the intended use of the space, and established specific design and performance criteria for them based on the end use.

As the document began to be used and referenced in various local codes (such as the Florida Building Code) the members of the AAMA Sunroom Council and NSA became aware that improvements and updates were needed. These improvements included revisions that would bring the document in line with the requirements of AAMA/WDMA/CSA 101/I.S.2/A440 for the design, testing and labeling of windows, glass doors and skylights, and revisions that would bring the foundation requirements more closely in line with the requirements of the *International Residential Code*. The most recent edition of the standard is AAMA/NPEA/NSA 2100-12. The table below provides an overview of the requirements of AAMA/NPEA/NSA 2100-12, as they apply to the various categories of sunrooms.

Minimum Requirements	Cat. I	Cat. II	Cat. III	Cat. IV	Cat. V
Structural Design in accordance with IRC or IBC.	x	x	x	x	x
Fenestration products comply with AAMA/WDMA/CSA 101/I.S.2/A440 (includes resistance to air leakage, water penetration, forced entry, etc. as well as structural design pressure rating).		x	x	x	x
Comply with IECC or IRC Chapter 11.				x	x
Comply with the Foundation/footings, site location, and emergency escape and rescue openings requirements of the IRC or local code.	x	x	x	x	x
Emergency escape and rescue openings are permitted to open onto sunroom.	x				
Comply with the natural lighting requirements of the IRC or local code.	x	x	x	x	x
Openings for natural lighting are permitted to open onto sunroom.	x				
Comply with the requirements of the IRC or local code for stairway and egress illumination.	x	x	x	x	x
Required to have exit lighting.		x	x	x	x
Receptacle outlets as required by NFPA 70, Article 314.				x	x

The 2002 edition of AAMA/NPEA/NSA 2100 has been used successfully in previous editions of the Florida Building Code. Reference to the 2012 edition in the 2015 IRC to facilitate its use on a nationwide basis is appropriate at this time.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, [AAMA/NSA/NPEA 2100-12] with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

RB40-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R301.2.1.1.1 (NEW)-RB-RUTH-WALKER

RB41 – 13

R301.2.1.2

Proponent: Edward L. Keith, APA, representing The Engineered Wood Association
(ed.keith@apawood.org)

Revise as follows:

R301.2.1.2 Protection of openings. ~~Exterior openings in buildings located in windborne debris regions shall be protected from windborne debris. Windows in buildings located in windborne debris regions shall have glazed openings protected from windborne debris.~~ Glazed opening protection for windborne debris shall meet the requirements of the Large Missile Test of ASTM E 1996 and ASTM E 1886 referenced therein. ~~The applicable wind Zones for establishing missile types in ASTM E 1996 are shown on Figure R301.2(4)C.~~ Garage door glazed opening protection for windborne debris shall meet the requirements of an *approved* impact resisting standard or ANSI/DASMA 115.

Exception: Wood structural panels with a minimum thickness of 7/16 inch (11 mm) and a maximum span of 8 feet (2438 mm) shall be permitted for opening protection in buildings with a mean roof height of 33 feet (10 058 mm) or less, one- and two-story buildings. Panels shall be precut and attached to the framing surrounding the opening containing the product with the glazed opening. Panels shall be predrilled as required for the anchorage method and shall be secured with the attachment hardware provided. Attachments shall be designed to resist the component and cladding loads determined in accordance with either Table R301.2(2) or ASCE 7, with the permanent corrosion resistant attachment hardware provided and anchors permanently installed on the building. Attachment in accordance with Table R301.2.1.2 is permitted for buildings with a mean roof height of 33 feet (10 058 mm) or less where wind speeds do not exceed 130 miles per hour (58 m/s) located in Wind Zones 1 and 2 in accordance with Figure R301.2(4)G.

Reason: This is a companion item to S99-12/13 adopted in Portland in the October Final Action Hearing.

In the early development of the SBCCI Deemed to Comply document (The precursor to the SBCCI Standard for Hurricane Resistant Residential Construction (SSTD-10) and ultimately the ICC Standard for Residential Construction in High Wind Regions (ICC 600).) limits were developed to the geometry of the structures covered by the standard. These limits included a height limit of 33 feet mean roof height. The 33 feet was based on then-current height zoning regulations, the referenced wind speed height in the contemporary ASTM wind standard, as well as height of most anemometers (wind measuring devices). As the Deemed to Comply and later documents were limited for wood buildings to two stories in height, as the standards evolved the height limit was changed from 33 feet mean roof height to simply two stories. Note that the information in the code is based on a mean roof height of 33 feet and NOT two stories. APA developed this information and it is based on 33 feet mean roof height. (APA Form Number T450, free PDF download at www.apawood.org.)

From a wind perspective only the geometry of the structure matters. Its internal make-up of floors and walls affect the *resistance* of the structure to the wind but has no impact on the load on the structure. The reason for this change is that the “two story-only” requirement puts artificial limitations on the use of the shutter provisions. This requirement has been used to limit the use of the shutter provisions from 3-story residential structures built on sloped surfaces or with the first story partially embedded in the ground. In either of the cases the mean roof height may be 33 feet or less.

From the other perspective, the geometry of a two-story house could be such that the mean roof height exceeds 33 feet. This would make the analytical basis for the shutter design incorrect.

This proposal will also eliminate the confusion in the provision that first limits the exception to two-stories and then in the last sentence of the paragraph limits it to a 33 foot mean roof height.

The provisions in the code were originally based on a mean roof height of 33 feet; the shift to two-story was an unfortunate attempt at simplifying the provisions of the early high-wind prescriptive publications. Approval of this change will correct an unintended consequence of this attempt at simplification. Please vote for approval of this provision.

Cost Impact: The code change proposal will not increase the cost of construction.

RB41-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R301.2.1.2-RB-KEITH

RB42 – 13

R301.2.1.2

Proponent: Julie Ruth, P.E., JRuth Code Consulting, representing the American Architectural Manufacturers Association (julruth@aol.com); Daniel J. Walker, P.E., Thomas Associates, representing the National Sunroom Association

Revise as follows:

R301.2.1.2 Protection of openings. Exterior glazing in buildings located in windborne debris regions shall be protected from windborne debris. Glazed opening protection for windborne debris shall meet the requirements of the Large Missile Test of ASTM E 1996 and ASTM E 1886 referenced therein. The applicable wind zones for establishing missile types in ASTM E 1996 are shown on Figure R301.2(4)C. Garage door glazed opening protection for windborne debris shall meet the requirements of an *approved* impact-resisting standard or ANSI/DASMA 115.

Exceptions:

1. Wood structural panels with a minimum thickness of 7/16 inch (11 mm) and a maximum span of 8 feet (2438 mm) shall be permitted for opening protection in one- and two-story buildings. Panels shall be precut and attached to the framing surrounding the opening containing the product with the glazed opening. Panels shall be predrilled as required for the anchorage method and shall be secured with the attachment hardware provided. Attachments shall be designed to resist the component and cladding loads determined in accordance with either Table R301.2(2) or ASCE 7 with the permanent corrosion-resistant attachment hardware provided and anchors permanently installed on the building. Attachment in accordance with Table R301.2.1.2 is permitted for buildings with a mean roof height of 33 feet (10 058 mm) or less where located in Wind Zones 1 and 2 in accordance with Figure R301.2(4)C.
2. Openings in walls enclosing sunrooms, balconies or porches constructed under existing roofs or decks are not required to be protected provided that the spaces are separated from the building interior by a wall and all openings in that separating wall are protected in accordance with this section. Such spaces shall be permitted to be designed as either partially enclosed or enclosed structures.

Reason: Frequently spaces such as sunrooms, balconies or porches that are separated from the interior of a building by an exterior wall will be constructed under existing roofs or decks. There may or may not be walls enclosing these spaces, or there may only be walls on one, two or three sides of the space. Or the space may be enclosed on all four sides, but still separated from the interior space by an exterior wall.

Although the spaces are provided some degree of protection from exterior elements such as sun, wind, rain or snow by the overhead assembly, and possibly by one or more enclosure walls, they are outside the building envelope and not completely protected from the exterior elements. They are not treated as interior, habitable spaces. They are exterior spaces.

It is not appropriate to require openings in the walls that may partially or completely enclose these spaces to be protected from wind borne debris, since these are exterior spaces, the walls themselves are not required and these spaces might otherwise be subject to wind borne debris regardless of whether or not openings in any enclosing walls are breached.

This proposal adds an exception for these spaces to the existing protection of opening requirements of the IRC. The exception is limited to spaces that are separated from the building interior by a wall whose openings are protected from wind borne debris. For the purposes of the application of ASCE 7, the enclosures of these spaces are to be designed as either partially or completely enclosed structures.

Cost Impact: None.

RB42-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R301.2.1.2-RB-RUTH

RB43 – 13

Tables R301.2.1.2, R602.3(2), R602.3.1, R602.3(3), R602.10.1.3, R602.10.3(1), R602.10.4, R602.10.5, R602.10.6.1, R603.3.1, R603.3.2(2), R603.3.2.1(1) through (4), R603.8, R611.6(1) through (4) and R613.5(1); and Sections R505.1.1, R602.10.6.5.1, R602.10.8.2, R603.1.1, R603.9.4.1, R611.2, R613.2, R802.10.2.1, R804.1.1, R804.3.2.1, R804.3.3 and R905.3.7

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee and Virginia Building and Code Officials Association (bajnaic@chesterfield.gov)

Revise as follows:

TABLE R301.2.1.2 WINDBORNE DEBRIS PROTECTION FASTENING SCHEDULE FOR WOOD STRUCTURAL PANELS

(Portions of table not shown remain unchanged)

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound = 4.448 N,
1 mile per hour = 0.447 m/s.

- a. This table is based on a 130mph basic wind speeds and a 33-foot mean roof height.
b through d (No change to current text)

Revise as follows:

R505.1.1 Applicability limits. The provisions of this section shall control the construction of cold-formed steel floor framing for buildings not greater than 60 feet (18 288 mm) in length perpendicular to the joist span, not greater than 40 feet (12 192 mm) in width parallel to the joist span, and less than or equal to three stories above *grade* plane. Cold-formed steel floor framing constructed in accordance with the provisions of this section shall be limited to sites subjected to a maximum where the basic ~~design~~ wind speed is not greater than 110 miles per hour (49 m/s), the Exposure Category is B or C, and the a ~~maximum~~ ground snow load is not greater than 70 pounds per square foot (3.35 kPa).

Revise as follows:

TABLE R602.3.1 MAXIMUM ALLOWABLE LENGTH OF WOOD WALL STUDS^{b, c, d} ~~EXPOSED TO WIND SPEEDS OF 100 mph OR LESS IN SEISMIC DESIGN CATEGORIES A, B, C, D0, D1 and D2~~

(Portions of table not shown remain unchanged)

- a. Design required.
b. Table is limited to buildings located where the basic wind speed is 100mph or less and for which the seismic design category is A, B, C, D0, D1, or D2
cb. Applicability of this table assumes the following: Snow load not exceeding 25 psf, *fb* not less than 1310 psi determined by multiplying the AF&PA NDS tabular base design value by the repetitive use factor, and by the size factor for all species except southern pine, *E* not less than 1.6 × 106 psi, tributary dimensions for floors and roofs not exceeding 6 feet, maximum span for floors and roof not exceeding 12 feet, eaves not over 2 feet in dimension and exterior sheathing. Where the conditions are not within these parameters, design is required.
de. Utility, standard, stud and No. 3 grade lumber of any species are not permitted.

TABLE R602.3(2) ALTERNATE ATTACHMENTS TO TABLE R602.3(1)

(Portions of table not shown remain unchanged)

a through f (No change to current text)

- g. Specified alternate attachments for roof sheathing shall be permitted for basic wind speeds less than 100 mph. Fasteners attaching wood structural panel roof sheathing to gable end wall framing shall be installed using the spacing listed for panel edges.

TABLE R602.3(3)
REQUIREMENTS FOR WOOD STRUCTURAL PANEL WALL SHEATHING USED TO RESIST WIND
PRESSURES^{a, b, c}

MINIMUM NAIL		MINIMUM WOOD STRUCTURAL PANEL SPAN RATING	MINIMUM NOMINAL PANEL THICKNESS (inches)	MAXIMUM WALL STUD SPACING (inches)	PANEL NAIL SPACING		MAXIMUM <u>BASIC</u> WIND SPEED (mph)		
Size	Penetration (inches)				Edges (inches o.c.)	Field (inches o.c.)	Wind exposure category		
							B	C	D

(Portions of table not shown remain unchanged)

TABLE R602.10.1.3
BRACED WALL LINE SPACING

APPLICATION	CONDITION	BUILDING TYPE	BRACED WALL LINE SPACING CRITERIA	
			Maximum Spacing	Exception to Maximum Spacing
Wind bracing	<u>Basic wind speed</u> 85mph to 110 mph	Detached, Townhouse	60 feet	None

(Portions of table not shown remain unchanged)

TABLE R602.10.3(1)
BRACING REQUIREMENTS BASED ON WIND SPEED

(Portions of table not shown remain unchanged)

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 mile per hour = 0.447 m/s.

a through b (No change to current text)

c. Method CS-SFB does not apply where the basic wind speed is greater than 100 mph.

TABLE R602.10.4
BRACING METHODS

(Portions of table not shown remain unchanged)

a through c (No change to current text)

d. Method CS-SFB does not apply in Seismic Design Categories D0, D1 and D2 and in areas where the basic wind speed exceeds 100 mph.

e. (No change to current text)

TABLE R602.10.5
MINIMUM LENGTH OF BRACED WALL PANELS

METHOD (See Table R602.10.4)		MINIMUM LENGTH ^a (in)					CONTRIBUTING LENGTH (in)
		Wall Height					
		8 feet	9 feet	10 feet	11 feet	12 feet	
ABW	SDC A, B and C <u>basic</u> wind speed < 110 mph	28	32	34	38	42	48
	SDC D ₀ , D ₁ and D ₂ , <u>basic</u> wind speed < 110 mph	32	32	34	NP	NP	

(Portions of table not shown remain unchanged.)

**TABLE R602.10.6.1
MINIMUM HOLD-DOWN FORCES FOR METHOD ABW BRACED WALL PANELS**

SEISMIC DESIGN CATEGORY AND WIND SPEED	SUPPORTING/STORY	HOLD DOWN FORCE (lb)				
		Height of Braced Wall Panel				
		8 ft	9 ft	10 ft	11 ft	12 ft
SDC A, B and C <u>Basic w</u> Wind speed < 110 mph	One story	1800	1800	1800	2000	2200
	First of two story	3000	3000	3000	3300	3600
SDC D ₀ , D ₁ and D ₂ <u>Basic w</u> Wind speed < 110 mph	One story	1800	1800	1800	NP ^a	NP ^a
	First of two story	3000	3000	3000	NP ^a	NP ^a

(Portions of table not shown remain unchanged.)

R602.10.6.5.1 Length of bracing. The length of bracing along each braced wall line shall be the greater of that required by the basic design wind speed and braced wall line spacing in accordance with Table R602.10.3(1) as adjusted by the factors in the Table R602.10.3(2) or the Seismic Design Category and braced wall line length in accordance with Table R602.10.6.5. Angled walls shall be permitted to be counted in accordance with Section R602.10.1.4, and braced wall panel location shall be in accordance with Section R602.10.2.2. The seismic adjustment factors in Table R602.10.3(4) shall not be applied to the length of bracing determined using Table R602.10.6.5. In no case shall the minimum total length of bracing in a braced wall line, after all adjustments have been taken, be less than 48 inches (1219 mm) total.

R602.10.8.2 Connections to roof framing. Top plates of exterior braced wall panels shall be attached to rafters or roof trusses above in accordance with Table R602.3(1) and this section. Where required by this section, blocking between rafters or roof trusses shall be attached to top plates of braced wall panels and to rafters and roof trusses in accordance with Table R602.3(1). A continuous band, rim, or header joist or roof truss parallel to the braced wall panels shall be permitted to replace the blocking required by this section. Blocking shall not be required over openings in continuously-sheathed braced wall lines. In addition to the requirements of this section, lateral support shall be provided for rafters and ceiling joists in accordance with Section R802.8 and for trusses in accordance with Section R802.10.3. Roof ventilation shall be provided in accordance with Section R806.1.

1. For Seismic Design Categories A, B and C and basic wind speeds less than 100 mph (45 m/s) where the distance from the top of the braced wall panel to the top of the rafters or roof trusses above is 91/4 inches (235 mm) or less, blocking between rafters or roof trusses shall not be required. Where the distance from the top of the braced wall panel to the top of the rafters or roof trusses above is between 91/4 inches (235 mm) and 151/4 inches (387 mm), blocking between rafters or roof trusses shall be provided above the braced wall panel in accordance with Figure R602.10.8.2(1).
2. For Seismic Design Categories D0, D1 and D2 or basic wind speeds of 100 mph (45 m/s) or greater, where the distance from the top of the braced wall panel to the top of the rafters or roof trusses is 151/4 inches (387 mm) or less, blocking between rafters or roof trusses shall be provided above the braced wall panel in accordance with Figure R602.10.8.2(1).
3. Where the distance from the top of the *braced wall panel* to the top of rafters or roof trusses exceeds 15¹/₄ inches (387 mm), the top plates of the *braced wall panel* shall be connected to perpendicular rafters or roof trusses above in accordance with one or more of the following methods:
 - 3.1. Soffit blocking panels constructed in accordance with Figure R602.10.8.2(2);
 - 3.2. Vertical blocking panels constructed in accordance with Figure R602.10.8.2(3);
 - 3.3. Full-height engineered blocking panels designed in accordance with the AF&PA WFCM; or
 - 3.4. Blocking, blocking panels, or other methods of lateral load transfer designed in accordance with accepted engineering practice.

R603.1.1 Applicability limits. The provisions of this section shall control the construction of exterior cold-formed steel wall framing and interior load-bearing cold-formed steel wall framing for buildings not more than 60 feet (18 288 mm) long perpendicular to the joist or truss span, not more than 40 feet (12 192 mm) wide parallel to the joist or truss span, and less than or equal to three stories above *grade plane*. All exterior walls installed in accordance with the provisions of this section shall be considered as load-bearing walls. Cold-formed steel walls constructed in accordance with the provisions of this section shall be limited to sites ~~subjected to a maximum~~ where the basic design wind speed is not greater than ~~of~~ 110 miles per hour (49 m/s), the Exposure Category is B or C, and ~~the a maximum~~ ground snow load is not greater than ~~of~~ 70 pounds per square foot (3.35 kPa).

TABLE R603.3.1
WALL TO FOUNDATION OR FLOOR CONNECTION REQUIREMENTS^{a,b}

FRAMING CONDITION	BASIC WIND SPEED (mph) AND EXPOSURE					
	85 B	90 B	100 B 85 C	110 B 90C	100 C	< 110 C

(Portions of table not shown remain unchanged.)

TABLE R603.3.2(2)
24-FOOT-WIDE BUILDING SUPPORTING ROOF AND CEILING ONLY^{a, b, c}
33 KSI STEEL

BASIC WIND SPEED		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)		
				8-foot Studs	9-foot Studs	10-foot Studs
Exp. B	Exp. C			Ground Snow Load (psf)		

(Portions of table not shown remain unchanged.)

TABLE R603.3.2(31)
40-FOOT-WIDE BUILDING SUPPORTING TWO FLOORS, ROOF AND CEILING^{a, b, c}
50 KSI STEEL

BASIC WIND SPEED		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)		
				8-foot Studs	9-foot Studs	10-foot Studs
Exp. B	Exp. C			Ground Snow Load (psf)		

(Portions of table not shown remain unchanged.)

TABLE R603.3.2.1(1)
ALL BUILDING WIDTHS GABLE ENDWALLS 8, 9 OR 10 FEET IN HEIGHT^{a, b, c}
33 KSI STEEL

BASIC WIND SPEED		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (Mils)		
Exp. B	Exp. C			8-foot Studs	9-foot Studs	10-foot Studs

(Portions of table not shown remain unchanged.)

(TABLE R603.3.2.1(2))
ALL BUILDING WIDTHS GABLE ENDWALLS 8, 9 OR 10 FEET IN HEIGHT^{a, b, c}
50 KSI STEEL

BASIC WIND SPEED		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (Mils)		
Exp. B	Exp. C			8-foot Studs	9-foot Studs	10-foot Studs

(Portions of table not shown remain unchanged.)

TABLE R603.3.2.1(3)
ALL BUILDING WIDTHS GABLE ENDWALLS OVER 10 FEET IN HEIGHT^{a, b, c}
33 KSI STEEL

BASIC WIND SPEED		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)					
Exp. B	Exp. C			Stud Height, h (feet)					
				10 < h <input type="checkbox"/> 12	12 < h <input type="checkbox"/> 14	14 < h <input type="checkbox"/> 16	16 < h <input type="checkbox"/> 18	18 < h <input type="checkbox"/> 20	20 < h <input type="checkbox"/> 22

(Portions of table not shown remain unchanged.)

TABLE R603.3.2.1(4)
ALL BUILDING WIDTHS GABLE ENDWALLS OVER 10 FEET IN HEIGHT^{a, b, c}
50 KSI STEEL

BASIC WIND SPEED		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)					
Exp. B	Exp. C			Stud Height, h (feet)					
				$10 < h$ 12	$12 < h$ 14	$14 < h$ 16	$16 < h$ 18	$18 < h$ 20	$20 < h$ 22

(Portions of table not shown remain unchanged.)

TABLE R603.8
HEAD AND SILL TRACK SPAN

(Portions of table not shown remain unchanged.)

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s.

- Deflection limit: $L/240$.
- Head and sill track spans are based on components and cladding wind pressures speeds and 48 inch tributary span.
- For openings less than 4 feet in height that have both a head track and sill track, the above spans are permitted to be multiplied by 1.75. For openings less than or equal to 6 feet in height that have both a head track and a sill track, the above spans are permitted to be multiplied by a factor of 1.5.

R603.9.4.1 Wind speeds greater than 100 mph. Where ~~the basic wind speeds are in excess of~~ exceeds 100 miles per hour (45 m/s) ~~and, Exposure C or D applies,~~ walls shall be provided with ~~wind~~ direct uplift connections in accordance with AISI S230, Section E13.3, and AISI S230, Section F7.2, as required for 110 miles per hour (49 m/s), Exposure C.

R611.2 Applicability limits. The provisions of this section shall apply to the construction of exterior concrete walls for buildings not greater than 60 feet (18 288 mm) in plan dimensions, floors with clear spans not greater than 32 feet (9754 mm) and roofs with clear spans not greater than 40 feet (12 192 mm). Buildings shall not exceed 35 feet (10 668 mm) in mean roof height or two stories in height above-grade. Floor/ceiling dead loads shall not exceed 10 pounds per square foot (479 Pa), roof/ceiling dead loads shall not exceed 15 pounds per square foot (718 Pa) and *attic* live loads shall not exceed 20 pounds per square foot (958 Pa). Roof overhangs shall not exceed 2 feet (610 mm) of horizontal projection beyond the exterior wall and the dead load of the overhangs shall not exceed 8 pounds per square foot (383 Pa).

Walls constructed in accordance with the provisions of this section shall be limited to buildings ~~subjected to a maximum~~ where the basic design wind speed is not greater than ~~of~~ 130 miles per hour (58 m/s) Exposure B, 110 miles per hour (49 m/s) Exposure C and 100 miles per hour (45 m/s) Exposure D. Walls constructed in accordance with the provisions of this section shall be limited to detached one- and two-family *dwellings* and townhouses assigned to Seismic Design Category A or B, and detached one- and two-family *dwellings* assigned to Seismic Design Category C.

TABLE R611.6(1)
MINIMUM VERTICAL REINFORCEMENT FOR FLAT ABOVE-GRADE WALLS ^{a, b, c, d, e}

BASIC MAXIMUM WIND SPEED (mph)			MAXIMUM UNSUPPORTED WALL HEIGHT PER STORY (feet)	MINIMUM VERTICAL REINFORCEMENT—BAR SIZE AND SPACING (inches) ^{f, g}							
				Nominal ^h wall thickness (inches)							
Exposure Category				4		6		8		10	
				Top ⁱ	Side ⁱ	Top ⁱ	Side ⁱ	Top ⁱ	Side ⁱ	Top ⁱ	Side ⁱ
B	C	D									

(Portions of table not shown remain unchanged.)

TABLE R611.6(2)
MINIMUM VERTICAL REINFORCEMENT FOR WAFFLE-GRID ABOVE-GRADE WALLS ^{a, b, c, d, e}

BASIC MAXIMUM WIND SPEED (mph)			MAXIMUM UNSUPPORTED WALL HEIGHT PER STORY (feet)	MINIMUM VERTICAL REINFORCEMENT-BAR SIZE AND SPACING (inches) ^{f, 9}			
				Nominal ^h wall thickness (inches)			
Exposure Category				6		8	
				Top ⁱ	Side ⁱ	Top ⁱ	Side ⁱ
B	C	D					

(Portions of table not shown remain unchanged.)

TABLE R611.6(3)
MINIMUM VERTICAL REINFORCEMENT FOR 6-INCH SCREEN-GRID ABOVE-GRADE WALLS ^{a, b, c, d, e}

BASIC MAXIMUM WIND SPEED (mph)			MAXIMUM UNSUPPORTED WALL HEIGHT PER STORY (feet)	MINIMUM VERTICAL REINFORCEMENT-BAR SIZE AND SPACING (inches) ^{f, g}	
				Nominal ^h wall thickness (inches)	
Exposure Category				6	
				Top ⁱ	Side ⁱ
B	C	D			

(Portions of table not shown remain unchanged.)

TABLE R611.6(4)
MINIMUM VERTICAL REINFORCEMENT FOR FLAT, WAFFLE- AND SCREEN-GRID ABOVE-GRADE WALLS DESIGNED CONTINUOUS WITH FOUNDATION STEM WALLS ^{a, b, c, d, e, k, l}

BASIC MAXIMUM WIND SPEED (mph)			HEIGHT OF STEM WALL ^{h, i} (feet)	MAXIMUM DESIGN LATERAL SOIL LOAD (psf/ft)	MAXIMUM UNSUPPORTED HEIGHT OF ABOVE- GRADE WALL (feet)	MINIMUM VERTICAL REINFORCEMENT—BAR SIZE AND SPACING (inches) ^{f, g}						
						Wall type and nominal thickness ^j (inches)						
Exposure Category						Flat				Waffle		Screen
						4	6	8	10	6	8	6
B	C	D										

(Portions of table not shown remain unchanged.)

R613.2 Applicability limits. The provisions of this section shall control the construction of exterior structural insulated panel walls and interior load-bearing structural insulated panel walls for buildings not greater than 60 feet (18 288 mm) in length perpendicular to the joist or truss span, not greater than 40 feet (12 192 mm) in width parallel to the joist or truss span and not greater than two stories in height with each wall not greater than 10 feet (3048 mm) high. All exterior walls installed in accordance with the provisions of this section shall be considered as load-bearing walls. Structural insulated panel walls constructed in accordance with the provisions of this section shall be limited to sites where the basic ~~subjected to a maximum design~~ wind speed is not greater than ~~of~~ 130 miles per hour (58 m/s), the

Exposure Category is A, B or C, and a ~~maximum~~ the ground snow load is not greater than of 70 pounds per foot (3.35 kPa), and the Seismic Design Category is ~~Categories~~ A, B, or and C.

TABLE R613.5(1)
MINIMUM THICKNESS FOR SIP WALL SUPPORTING SIP LIGHT-FRAME ROOF ONLY (inches)

BASIC WIND SPEED (3-second gust) (mph)		SNOW LOAD (psf)	MINIMUM STUD THICKNESS (mils)														
			24			28			32			36			40		
			Wall Height (ft)			Wall Height (ft)			Wall Height (ft)			Wall Height (ft)			Wall Height (ft)		
Exp. A/B	Exp. C		8	9	10	8	9	10	8	9	10	8	9	10	8	9	10

(Portions of table not shown remain unchanged.)

Revise as follows:

R802.10.2.1 Applicability limits. The provisions of this section shall control the design of truss roof framing when snow controls for buildings not greater than 60 feet (18 288 mm) in length perpendicular to the joist, rafter or truss span, not greater than 36 feet (10 973 mm) in width parallel to the joist, rafter or truss span, not greater than two stories in height with each *story* not greater than 10 feet (3048 mm) high, and roof slopes not smaller than 3:12 (25-percent slope) or greater than 12:12 (100-percent slope). Truss roof framing constructed in accordance with the provisions of this section shall be limited to sites ~~subjected to a maximum~~ where the basic design wind speed is not greater than of 110 miles per hour (49 m/s), the Exposure Category is A, B or C, and the ~~a maximum~~ ground snow load is not greater than of 70 pounds per square foot (3.35 kPa). For consistent loading of all truss types, roof snow load is to be computed as: 0.7 *pg*.

R804.1.1 Applicability limits. The provisions of this section shall control the construction of cold-formed steel roof framing for buildings not greater than 60 feet (18 288 mm) perpendicular to the joist, rafter or truss span, not greater than 40 feet (12 192 mm) in width parallel to the joist span or truss, less than or equal to three stories above *grade* plane and with roof slopes not less than 3:12 (25-percent slope) or greater than 12:12 (100 percent slope). Cold-formed steel roof framing constructed in accordance with the provisions of this section shall be limited to sites ~~subjected to a maximum~~ where the basic design wind speed is not greater than of 110 miles per hour (49 m/s), the Exposure Category is B or C, and the ~~a maximum~~ ground snow load is not greater than of 70 pounds per square foot (3.35 kPa).

R804.3.2.1 Minimum roof rafter sizes. Roof rafter size and thickness shall be determined in accordance with the limits set forth in Tables R804.3.2.1(1) and R804.3.2.1(2) based on the horizontal projection of the roof rafter span. For determination of roof rafter sizes, reduction of roof spans shall be permitted when a roof rafter support brace is installed in accordance with Section R804.3.2.2. The reduced roof rafter span shall be taken as the larger of the distance from the roof rafter support brace to the ridge or to the heel measured horizontally.

For the purpose of determining roof rafter sizes in Tables R804.3.2.1(1) and R804.3.2.1(2), basic wind speeds shall be converted to equivalent ground snow loads in accordance with Table R804.3.2.1(3). Roof rafter sizes shall be based on the higher of the ground snow load or the equivalent snow load converted from the basic wind speed.

R804.3.3 Hip framing. Hip framing shall consist of jack-rafters, hip members, hip support columns and connections in accordance with this section, or shall be in accordance with an *approved* design. The provisions of this section for hip members and hip support columns shall apply only where the jack rafter slope is greater than or equal to the roof slope. For the purposes of determining member sizes in this section, basic wind speeds shall be converted to equivalent ground snow load in accordance with Table R804.3.2.1(3).

Revise as follows:

R905.3.7 Application. Tile shall be applied in accordance with this chapter and the manufacturer's installation instructions, based on the following:

Clay and concrete roof tiles shall be fastened in accordance with this section and the manufacturer's installation instructions. Perimeter tiles shall be fastened with a minimum of one fastener per tile. Tiles with installed weight less than 9 pounds per square foot (0.4 kg/m²) require a minimum of one fastener per tile regardless of roof slope. Clay and concrete roof tile attachment shall be in accordance with the manufacturer's installation instructions where applied in areas where the basic wind speed exceeds 100 miles per hour (45 m/s) and on buildings where the roof is located more than 40 feet (12 192 mm) above *grade*. In areas subject to snow, a minimum of two fasteners per tile is required. In all other areas, clay and concrete roof tiles shall be attached in accordance with Table R905.3.7.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

The purpose of this proposal is to coordinate terminology in the code. Figure R301.2.4(A) supplies the "basic wind speed", defined as the "three-second gust speed at 33 feet (10 058 mm) above the ground in Exposure C (see Section R301.2.1). This wind speed, derived from ASCE 7, is a design wind speed based on an extensive modeling process using historical data, wind characteristics and computer simulations. It is not necessarily the "maximum" wind speed that can be experienced by a site, nor does it suggest the "maximum" wind speed an element is capable of resisting due to factors of safety in material standards and design procedures. This proposal corrects references throughout the IRC to properly refer to "basic wind speed."

Cost Impact: None

RB43-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

R301.2.1.2T-RB-BAJNAI-BCAC

RB44 – 13

R301.2.1.4, R603.3.2, R613.2, Table R613.5(1), Table R613.5(2), R802.10.2.1

Proponent: Matthew L. Mlakar, Barrish Pelham and Associates, Inc., representing Structural Engineers Association of California

Revise as follows:

R301.2.1.4 Exposure category. For each wind direction considered, an exposure category that adequately reflects the characteristics of ground surface irregularities shall be determined for the site at which the building or structure is to be constructed. For a site located in the transition zone between categories, the category resulting in the largest wind forces shall apply. Account shall be taken of variations in ground surface roughness that arise from natural topography and vegetation as well as from constructed features. For a site where multiple detached one- and two-family dwellings, *townhouses* or other structures are to be constructed as part of a subdivision, master-planned community, or otherwise designated as a developed area by the authority having jurisdiction, the exposure category for an individual structure shall be based upon the site conditions that will exist at the time when all adjacent structures on the site have been constructed, provided their construction is expected to begin within one year of the start of construction for the structure for which the exposure category is determined. For any given wind direction, the exposure in which a specific building or other structure is sited shall be assessed as being one of the following categories:

- ~~1. Exposure A. Large city centers with at least 50 percent of the buildings having a height in excess of 70 feet (21 336 mm). Use of this exposure category shall be limited to those areas for which terrain representative of Exposure A prevails in the upwind direction for a distance of at least 0.5 mile (0.8 km) or 10 times the height of the building or other structure, whichever is greater. Possible channeling effects or increased velocity pressures due to the building or structure being located in the wake of adjacent buildings shall be taken into account.~~
12. Exposure B. Urban and suburban areas, wooded areas, or other terrain with numerous closely spaced obstructions having the size of single-family dwellings or larger. Exposure B shall be assumed unless the site meets the definition of another type exposure.
23. Exposure C. Open terrain with scattered obstructions, including surface undulations or other irregularities, having heights generally less than 30 feet (9144 mm) extending more than 1,500 feet (457 m) from the building site in any quadrant. This exposure shall also apply to any building located within Exposure B type terrain where the building is directly adjacent to open areas of Exposure C type terrain in any quadrant for a distance of more than 600 feet (183 m). This category includes flat open country and grasslands.
34. Exposure D. Flat, unobstructed areas exposed to wind flowing over open water for a distance of at least 1 mile (1.61 km). Shorelines in Exposure D include inland waterways, the Great Lakes, and coastal areas of California, Oregon, Washington and Alaska. This exposure shall apply only to those buildings and other structures exposed to the wind coming from over the water. Exposure D extends inland from the shoreline a distance of 1500 feet (457 m) or 10 times the height of the building or structure, whichever is greater.

Revise as follows:

R603.3.2 Minimum stud sizes. Cold-formed steel walls shall be constructed in accordance with Figures R603.3.1(1), R603.3.1(2), or R603.3.1(3), as applicable. Exterior wall stud size and thickness shall be determined in accordance with the limits set forth in Tables R603.3.2(2) through R603.3.2(31). Interior load-bearing wall stud size and thickness shall be determined in accordance with the limits set forth in Tables R603.3.2(2) through R603.3.2(31) based upon an 85 miles per hour (38 m/s) Exposure A/B wind value and the building width, stud spacing and snow load, as appropriate. Fastening requirements shall be in accordance with Section R603.2.4 and Table R603.3.2(1). Top and bottom tracks shall have the same minimum thickness as the wall studs.

(No change to remaining text)

R613.2 Applicability limits. The provisions of this section shall control the construction of exterior structural insulated panel walls and interior load-bearing structural insulated panel walls for buildings not greater than 60 feet (18 288 mm) in length perpendicular to the joist or truss span, not greater than 40 feet (12 192 mm) in width parallel to the joist or truss span and not greater than two stories in height with each wall not greater than 10 feet (3048 mm) high. All exterior walls installed in accordance with the provisions of this section shall be considered as load-bearing walls. Structural insulated panel walls constructed in accordance with the provisions of this section shall be limited to sites subjected to a maximum design wind speed of 120 miles per hour (54 m/s), Exposure A or B or, 110 miles per hour (49 m/s) Exposure C, and a maximum ground snow load of 70 pounds per foot (3.35 kPa), and Seismic Design Categories A, B, and C.

TABLE R613.5(1)
MINIMUM THICKNESS FOR SIP WALL SUPPORTING SIP LIGHT-FRAME ROOF ONLY (inches)^a

Building Width (ft)							
Wind Speed (3-sec gust)		Snow Load (psf)	24	28	32	36	40
Exp A/B	Exp. C		Wall Height (feet)	Wall Height (feet)	Wall Height (feet)	Wall Height (feet)	Wall Height (feet)

(Portions of table not shown to remain unchanged.)

TABLE R613.5(2)
MINIMUM THICKNESS FOR SIP WALLS SUPPORTING SIP OR LIGHT-FRAME ONE STORY AND ROOF (inches)^a

Building Width (ft)							
Wind Speed (3 –sec gust)		Snow Load (psf)	24	28	32	36	40
Exp A/B	Exp. C		Wall Height (feet)	Wall Height (feet)	Wall Height (feet)	Wall Height (feet)	Wall Height (feet)

(Portions of table not shown to remain unchanged.)

Revise as follows:

R802.10.2.1 Applicability limits. The provisions of this section shall control the design of truss roof framing when snow controls for buildings not greater than 60 feet (18 288 mm) in length perpendicular to the joist, rafter or truss span, not greater than 36 feet (10 973 mm) in width parallel to the joist, rafter or truss span, not more than three stories above *grade plane* in height, and roof slopes not smaller than 3:12 (25-percent slope) or greater than 12:12 (100-percent slope). Truss roof framing constructed in accordance with the provisions of this section shall be limited to sites subjected to a maximum design wind speed of 110 miles per hour (49 m/s), Exposure A, B or C, and a maximum ground snow load of 70 psf (3352 Pa). For consistent loading of all truss types, roof snow load is to be computed as: $0.7 p_g$.

Reason: Exposure category A is no longer listed as an exposure category under ASCE 7-10 section 26.7.3, nor is it used in the current edition of the IBC. Most of the references to Exposure A have been removed from the IRC, however, a few still remain. The four sections and two tables included in this proposal represent the remaining locations where Exposure A is referenced. The removal of Exposure A will bring the IRC in line with the IBC and industry standards.

Cost Impact: The proposed code change will not change the cost of construction.

RB44-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R301.2.1.4 #1-RB-MLAKAR

RB45 – 13

R301.2.1.4

Proponent: Matthew L. Mlakar, Barrish Pelham and Associates, Inc., representing Structural Engineers Association of California

Revise as follows:

R301.2.1.4 Exposure category. For each wind direction considered, an exposure category that adequately reflects the characteristics of ground surface irregularities shall be determined for the site at which the building or structure is to be constructed. For a site located in the transition zone between categories, the category resulting in the largest wind forces shall apply. Account shall be taken of variations in ground surface roughness that arise from natural topography and vegetation as well as from constructed features. For a site where multiple detached one- and two-family dwellings, *townhouses* or other structures are to be constructed as part of a subdivision, master-planned community, or otherwise designated as a developed area by the authority having jurisdiction, the exposure category for an individual structure shall be based upon the site conditions that will exist at the time when all adjacent structures on the site have been constructed, provided their construction is expected to begin within one year of the start of construction for the structure for which the exposure category is determined. For any given wind direction, the exposure in which a specific building or other structure is sited shall be assessed as being one of the following categories:

1. Exposure A. Large city centers with at least 50 percent of the buildings having a height in excess of 70 feet (21 336 mm). Use of this exposure category shall be limited to those areas for which terrain representative of Exposure A prevails in the upwind direction for a distance of at least 0.5 mile (0.8 km) or 10 times the height of the building or other structure, whichever is greater. Possible channeling effects or increased velocity pressures due to the building or structure being located in the wake of adjacent buildings shall be taken into account.
2. Exposure B. Urban and suburban areas, wooded areas, or other terrain with numerous closely spaced obstructions having the size of single-family dwellings or larger. Exposure B shall be assumed unless the site meets the definition of another type exposure.
3. Exposure C. Open terrain with scattered obstructions, including surface undulations or other irregularities, having heights generally less than 30 feet (9144 mm) extending more than 1,500 feet (457 m) from the building site in any quadrant. This exposure shall also apply to any building located within Exposure B type terrain where the building is directly adjacent to open areas of Exposure C type terrain in any quadrant for a distance of more than 600 feet (183 m). This category includes flat open country and grasslands.
4. Exposure D. Flat, unobstructed areas exposed to wind flowing over open water, smooth mud flats, salt flats and unbroken ice for a distance of at least 1 mile (1.61 km) 5000 feet (1,524m). ~~Shorelines in Exposure D include inland waterways, the Great Lakes, and coastal areas of California, Oregon, Washington and Alaska.~~ This exposure shall apply only to those buildings and other structures exposed to the wind coming from over the water unobstructed area. Exposure D extends ~~inland~~ downwind from the ~~shoreline~~ edge of the unobstructed area a distance of ~~1500 feet (457 m)~~ 600 feet (183 m) or ~~10-20~~ times the height of the building or structure, whichever is greater.

Reason: The 2012 IRC definition for wind exposure category D does not match the definition in either the 2012 IBC or ASCE 7-10. Under ICC CP#28 policy section 1.3.1 the provisions of all codes shall be consistent with one another so that conflicts between codes do not occur. The proposed change is to incorporate the language of ASCE 7-10 section 26.7.3 into the IRC. It should be noted that ASCE 7-10 now requires the use of exposure D along hurricane coastlines. ASCE 7-10 commentary section C26.7, cites recent research which provides data showing that the surface roughness over the ocean in a hurricane is consistent with that of exposure D rather than exposure C.

The change to the exposure categories will bring the IRC in line with the IBC and industry standards.

Cost Impact: The proposal is editorial and will not impact the cost of construction.

RB45-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R301.2.1.4 #2-RB-MLAKAR

:

RB46 – 13

R301.2.1.4

Proponent: Andrew Herseth, US Dept of Homeland Security, Federal Emergency Management Agency (FEMA) and Glenn Overcash, URS Corporation representing FEMA

Revise as follows:

R301.2.1.4 Exposure category. For each wind direction considered, an exposure category that adequately reflects the characteristics of ground surface irregularities shall be determined for the site at which the building or structure is to be constructed. For a site located in the transition zone between categories, the category resulting in the largest wind forces shall apply. Account shall be taken of variations in ground surface roughness that arise from natural topography and vegetation as well as from constructed features. For a site where multiple detached one- and two-family dwellings, *townhouses* or other structures are to be constructed as part of a subdivision, master-planned community, or otherwise designated as a developed area by the authority having jurisdiction, the exposure category for an individual structure shall be based upon the site conditions that will exist at the time when all adjacent structures on the site have been constructed, provided their construction is expected to begin within one year of the start of construction for the structure for which the exposure category is determined. For any given wind direction, the exposure in which a specific building or other structure is sited shall be assessed as being one of the following categories:

- ~~1. Exposure A. Large city centers with at least 50 percent of the buildings having a height in excess of 70 feet (21 336 mm). Use of this exposure category shall be limited to those areas for which terrain representative of Exposure A prevails in the upwind direction for a distance of at least 0.5 mile (0.8 km) or 10 times the height of the building or other structure, whichever is greater. Possible channeling effects or increased velocity pressures due to the building or structure being located in the wake of adjacent buildings shall be taken into account.~~
- ~~2.1.~~ Exposure B. Urban and suburban areas, wooded areas, or other terrain with numerous closely spaced obstructions having the size of single family dwellings or larger. Use of this exposure category shall be limited to those areas for which terrain representative of Exposure B prevails in the upwind direction for a distance of at least 1,500 feet (460 m). Exposure B shall be assumed unless the site meets the definition of another type exposure.
- ~~3.2.~~ Exposure C. Open terrain with scattered obstructions, including surface undulations or other irregularities, having heights generally less than 30 feet (9144 mm) ~~extending more than 1,500 feet (457 m) from the building site in any quadrant.~~ This exposure shall also apply to any building located within Exposure B type terrain where the building is directly adjacent to open areas of Exposure C type terrain in any quadrant for a distance of more than 600 feet (183 m). This category includes flat, open country and grasslands. Exposure C shall be assumed unless the site meets the definition of another type exposure.
- ~~4.3.~~ Exposure D. Flat, unobstructed areas and areas exposed to wind flowing over open water for a distance of at least 5000 feet (1524 m) ~~1 mile (1.61 km).~~ Shorelines in Exposure D include inland waterways, the Great Lakes, and coastal areas of California, Oregon, Washington and Alaska. This exposure shall apply only to those buildings and other structures exposed to the wind coming from over the water. Exposure D extends inland from the shoreline a distance of 600 feet 1500 feet (457 m) or 20 ~~10~~ times the height of the building or structure, whichever is greater.

Reason: The purpose of this proposal is simply to update the methodology in the IRC for assigning an Exposure Category to a site, so that it is consistent with ASCE 7 and the IBC. The Exposure Category definitions in the IRC are essentially described in the same way that they were in the first version (2000) of the IRC. The Exposure Category definitions in ASCE 7 were substantially updated in the 2002 to include surface roughness concepts. These changes were subsequently incorporated in the 2006 IBC. Additionally, ASCE 7 and the IBC no longer refer to Exposure A. This proposal represents a simplified approach to bring the IRC up to date with some of the more substantial changes in site Exposure determination by maintaining language consistent with earlier versions of the code.

Exposure Categories provide a way of establishing the roughness of the terrain surrounding a building. The amount and type of roughness surrounding a building can significantly impact the applicable design wind loads. All things being equal, a building sited in Exposure C would have to be designed for wind loads that are approximately 20% higher than for the same building sited in

Exposure B. Similarly, a building sited in Exposure D would have to be designed for wind loads that are approximately 20% higher than for the same building sited in Exposure C. Therefore, the determination of the most likely Exposure at the site is essential to the determination of the appropriate wind loads for a building.

More importantly, the current Exposure Category definitions result in some anomalies related to Exposure Categories B and C. For example, consider a building that had a 100 ft buffer of trees on the north face of the building. Beyond the 100 ft buffer is completely open terrain. ASCE 7 and the IBC would clearly define the Exposure Category for this site as C. However, the IRC would define this site as Exposure B. Additionally, if the north side of the building was subject to wind blowing over a length of open water that was $\frac{3}{4}$ of a mile, the code is not very clear which Exposure Category would apply. However, Exposure D would not apply to the site because the length of the water Exposure is less than 1 mile. As such, the described Exposure condition doesn't fit within the description for Exposure C as currently established by the code. Therefore, the user may default to Exposure B, when ASCE 7 and IBC would be clear that situation would qualify as Exposure C.

Lastly, ASCE 7 and the IBC differ from the IRC with regard to Exposure D. The IRC requires Exposure D to extend inland from the shoreline 1500 ft or 10 times the height of the building, whichever is greater. ASCE 7 and the IBC essentially require Exposure D to extend inland from the shoreline 600 feet or 20 times the height of the building, whichever is greater. .

Eight years ago, FEMA P-488, *Mitigation Assessment Team Report: Hurricane Charley in Florida* (FEMA, 2004), recommended that Exposure Categories used in design be defined in a manner consistent with ASCE 7-02. It noted specifically that the refinements to design guidance for Exposure Categories included in ASCE 7-02 would help ensure that full-wind loads are calculated in open areas (Exposure C) where speed reductions are not appropriate. As previously noted, while the IBC adopted the updated ASCE 7 methodology for assigning Exposure Categories in the 2006 edition, the IRC has yet to move forward and risks underestimation of wind pressure as a result.

Cost Impact: The code change proposal will not increase the cost of construction.

RB46-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R301.2.1.4-RB-HERSETH-OVERCASH

RB47 – 13

R301.2.2.2.1, Table R301.2.2.2.1

Proponent: Edward L. Keith, APA, representing The Engineered Wood Association
(ed.keith@apawood.org)

Revise as follows:

R301.2.2.2.1 Weights of materials. Average dead loads shall not exceed 15 pounds per square foot (720 Pa) for the combined roof and ceiling assemblies (on a horizontal projection) or 10 pounds per square foot (480 Pa) for floor assemblies, except as further limited by Section R301.2.2. Dead loads for walls above grade shall not exceed:

1. Fifteen pounds per square foot (720 Pa) for exterior light-frame wood walls.
2. Fourteen pounds per square foot (670 Pa) for exterior light-frame cold-formed steel walls.
3. Ten pounds per square foot (480 Pa) for interior light-frame wood walls.
4. Five pounds per square foot (240 Pa) for interior light-frame cold-formed steel walls.
5. Eighty pounds per square foot (3830 Pa) for 8-inch-thick (203 mm) masonry walls.
6. Eighty-five pounds per square foot (4070 Pa) for 6-inch-thick (152 mm) concrete walls.
7. Ten pounds per square foot (480 Pa) for SIP walls.

Exceptions:

- ~~1. Roof and ceiling dead loads not exceeding 25 pounds per square foot (1190 Pa) shall be permitted provided the wall bracing amounts in Chapter 6 are increased in accordance with Table R301.2.2.2.1.~~
12. Light-frame walls with stone or masonry veneer shall be permitted in accordance with the provisions of Sections R702.1 and R703.
23. Fireplaces and chimneys shall be permitted in accordance with Chapter 10.

TABLE R301.2.2.2.1
WALL BRACING ADJUSTMENT FACTORS BY
ROOF COVERING DEAD LOAD^a

WALL SUPPORTING	ROOF/CEILING DEAD LOAD	
	15 psf or less	25 psf
Roof only	1.0	1.2
Roof plus one or two stories	1.0	1.1

For SI: 1 pound per square foot = 0.0479 kPa

a. Linear interpolation shall be permitted.

Reason: Exception 1 proposed for deletion in this proposal calls for the adjustment of the bracing amount in Chapter 6 to be increased by the Table R301.2.2.2.1 amounts. Currently the same adjustments are duplicated in Chapter 6 in Table R602.10.3(4) for the adjustment based on: "Roof/ceiling dead load for wall supporting". The way the exception is written could require the same adjustments be applied twice; once when determining Chapter 6 bracing, and once again it comply with Section R301.2.2.2.1. Deleting the requirement in Section R301.2.2.2.1 would eliminate the potential for "double dipping" and eliminate the resulting unnecessary construction costs.

Cost Impact: This code change proposal will not increase the cost of construction.

RB47-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R301.2.2.2.1-RB-KEITH

RB48 – 13

R301.2.2.2.5, R301.2.2.1.2, R502.2.2 (New), R502.3.3.1 (New), Table R502.3.3(1), R502.10.1 (New), R602.10, R602.10.9, R603.1.1, R802.9.1, AJ104.1

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee (bajnaic@chesterfield.gov)

Revise as follows:

~~R301.2.2.2.5 Irregular buildings.~~ The seismic provisions of this code shall not be used for irregular structures located in Seismic Design Categories C, D0, D1 and D2. Irregular portions of structures shall be designed in accordance with accepted engineering practice to the extent the irregular features affect the performance of the remaining structural system. When the forces associated with the irregularity are resisted by a structural system designed in accordance with accepted engineering practice, design of the remainder of the building shall be permitted using the provisions of this code. A building or portion of a building shall be considered to be irregular when one or more of the following conditions occur:

- ~~1. When exterior shear wall lines or *braced wall panels* are not in one plane vertically from the foundation to the uppermost story in which they are required.~~

Exception: For wood light frame construction, floors with cantilevers or setbacks not exceeding four times the nominal depth of the wood floor joists are permitted to support *braced wall panels* that are out of plane with *braced wall panels* below provided that:

- ~~1. Floor joists are nominal 2 inches by 10 inches (51 mm by 254 mm) or larger and spaced not more than 16 inches (406 mm) on center.~~
- ~~2. The ratio of the back span to the cantilever is at least 2 to 1.~~
- ~~3. Floor joists at ends of *braced wall panels* are doubled.~~
- ~~4. For wood frame construction, a continuous rim joist is connected to ends of all cantilever joists. When spliced, the rim joists shall be spliced using a galvanized metal tie not less than 0.058 inch (1.5 mm) (16 gage) and 1 1/2 inches (38 mm) wide fastened with six 16d nails on each side of the splice or a block of the same size as the rim joist of sufficient length to fit securely between the joist space at which the splice occurs fastened with eight 16d nails on each side of the splice; and 5. Gravity loads carried at the end of cantilevered joists are limited to uniform wall and roof loads and the reactions from headers having a span of 8 feet (2438 mm) or less.~~

- ~~2. When a section of floor or roof is not laterally supported by shear walls or *braced wall lines* on all edges.~~

Exception: Portions of floors that do not support shear walls or *braced wall panels* above, or roofs, shall be permitted to extend no more than 6 feet (1829 mm) beyond a shear wall or *braced wall line*.

- ~~3. When the end of a *braced wall panel* occurs over an opening in the wall below and ends at a horizontal distance greater than 1 foot (305 mm) from the edge of the opening. This provision is applicable to shear walls and *braced wall panels* offset in plane and to *braced wall panels* offset out of plane as permitted by the exception to Item 1 above.~~

Exception: For wood light frame wall construction, one end of a *braced wall panel* shall be permitted to extend more than 1 foot (305 mm) over an opening not more than 8 feet (2438 mm) wide in the wall below provided that the opening includes a header in accordance with the following:

- ~~1. The building width, loading condition and framing member species limitations of Table R502.5(1) shall apply; and~~

- ~~2. Not less than one 2 × 12 or two 2 × 10 for an opening not more than 4 feet (1219 mm) wide;
or~~
- ~~3. Not less than two 2 × 12 or three 2 × 10 for an opening not more than 6 feet (1829 mm) wide;
or~~
- ~~4. Not less than three 2 × 12 or four 2 × 10 for an opening not more than 8 feet (2438 mm) wide;
and~~
- ~~5. The entire length of the *braced wall panel* does not occur over an opening in the wall below.~~
- ~~4. When an opening in a floor or roof exceeds the lesser of 12 feet (3658 mm) or 50 percent of the least floor or roof dimension.~~
- ~~5. When portions of a floor level are vertically offset.~~

Exceptions:

- ~~1. Framing supported directly by continuous foundations at the perimeter of the building.~~
- ~~2. For wood light-frame construction, floors shall be permitted to be vertically offset when the floor framing is lapped or tied together as required by Section R502.6.1.~~
- ~~6. When shear walls and *braced wall lines* do not occur in two perpendicular directions.~~
- ~~7. When stories above *grade* plane partially or completely braced by wood wall framing in accordance with Section R602 or steel wall framing in accordance with Section R603 include masonry or concrete construction.~~

Exception: ~~Fireplaces, chimneys and masonry veneer as permitted by this code. When this irregularity applies, the entire story shall be designed in accordance with accepted engineering practice.~~

R301.2.2.1.2 Alternative determination of Seismic Design Category E. Buildings located in Seismic Design Category E in accordance with Figure R301.2(2) are permitted to be reclassified as being in Seismic Design Category D 2 provided one of the following is done:

1. A more detailed evaluation of the seismic design category is made in accordance with the provisions and maps of the International Building Code. Buildings located in Seismic Design Category E per Table R301.2.2.1.1, but located in Seismic Design Category D per the International Building Code, may be designed using the Seismic Design Category D2 requirements of this code.
2. Buildings located in Seismic Design Category E that conform to the following additional restrictions are permitted to be constructed in accordance with the provisions for Seismic Design Category D2 of this code:
 - 2.1. All exterior shear wall lines or braced wall panels are in one plane vertically from the foundation to the uppermost story.
 - 2.2. Floors shall not cantilever past the exterior walls.
 - 2.3. The building or portions of the building are constructed in accordance with the requirements for structures assigned to Seismic Design Category D2 elsewhere in this code. ~~is within all of the requirements of Section R301.2.2.2.5 for being considered as regular.~~

Revise as follows:

R502.2 Design and construction. Floors shall be designed and constructed in accordance with the provisions of this chapter, Figure R502.2 and Sections R317 and R318 or in accordance with AF&PA/NDS.

R502.2.1 Framing at braced wall lines. A load path for lateral forces shall be provided between floor framing and *braced wall panels* located above or below a floor, as specified in Section R602.10.8.

R502.2.2 Vertically offset floor diaphragms in Seismic Design Category C, D0, D1 and D2. In structures or portions of structures in Seismic Design Category C, D0, D1 and D2, floor diaphragms or portions of floor diaphragms shall not be vertically offset.

Exceptions:

1. Framing supported directly by continuous foundations at the perimeter of the building.
2. For wood light-frame construction, floors shall be permitted to be vertically offset when the floor framing is lapped or tied together as required by Section R502.6.1.

R502.3.3 Floor cantilevers. Floor cantilever spans shall not exceed the nominal depth of the wood floor joist. Floor cantilevers constructed in accordance with Table R502.3.3(1) shall be permitted when supporting a light frame bearing wall and roof only. Floor cantilevers supporting an exterior balcony are permitted to be constructed in accordance with Table R502.3.3(2).

R502.3.3.1 Floor cantilevers in Seismic Design Categories D0, D1 or D2. Floor cantilevers supporting *braced wall panels* in all structures assigned to *Seismic Design Categories* D0, D1 or D2 and in townhouses in Seismic Design Category C shall be constructed in accordance with Section R602.10.9.

TABLE R502.3.3(1)
CANTILEVER SPANS FOR FLOOR JOISTS SUPPORTING LIGHT-FRAME EXTERIOR BEARING
WALL AND ROOF ONLY^{a, b, c, f, g, h}
(Floor Live Load 540 psf, Roof Live Load)

(Portions of table not shown remain unchanged)

a through e (No changes to text)

f. See Section R301.2.2.2.5 R602.10.9, Item 1, for additional limitations on cantilevered floor joists for detached one- and two-family dwellings in Seismic Design Category D0, D1, or D2 and townhouses in Seismic Design Category C, D0, D1 or D2.

g through h (No change to text)

R502.10 Framing of openings. Openings in floor framing shall be framed with a header and trimmer joists. When the header joist span does not exceed 4 feet (1219 mm), the header joist may be a single member the same size as the floor joist. Single trimmer joists may be used to carry a single header joist that is located within 3 feet (914 mm) of the trimmer joist bearing. When the header joist span exceeds 4 feet (1219 mm), the trimmer joists and the header joist shall be doubled and of sufficient cross section to support the floor joists framing into the header. *Approved* hangers shall be used for the header joist to trimmer joist connections when the header joist span exceeds 6 feet (1829 mm). Tail joists over 12 feet (3658 mm) long shall be supported at the header by framing anchors or on ledger strips not less than 2 inches by 2 inches (51 mm by 51 mm).

R502.10.1 Framing of openings in Seismic Design Categories C, D0, D1 and D2. In structures in Seismic Design Category D0, D1 or D2 and in townhouses in Seismic Design Category C, where an opening in a floor exceeds the lesser of 12 feet (3658 mm) or 50 percent of the least floor dimension, that portion of the structure shall be designed in accordance with accepted engineering practice to the extent that the opening affects the performance of the remaining structural system.

Revise as follows:

R602.10 Wall bracing. Buildings shall be braced in accordance with this section or, when applicable, Section R602.12. Where a building, or portion thereof, does not comply with one or more of the bracing requirements in this section, those portions shall be designed and constructed in accordance with Section R301.1.

For all structures in Seismic Design Category D0, D1 or D2 and in townhouses in Seismic Design Category C, stories above grade plane partially or completely braced by wood wall framing in accordance with this section shall not include masonry or concrete construction or the entire story shall be designed in accordance with accepted engineering practice.

Exception: Fireplaces, chimneys and masonry veneer as permitted by this code.

R602.10.9 Braced wall panel support. *Braced wall panel* support shall be provided as follows:

1. Cantilevered floor joists complying with Section R502.3.3 shall be permitted to support *braced wall panels*.

For structures in Seismic Design Category D0, D1 and D2 and in townhouses in Seismic Design Category C, cantilevered floor joists supporting braced wall panels shall also comply with all of the following:

1. Floor joists shall be nominal 2 inches by 10 inches (51 mm by 254 mm) or larger and spaced not more than 16 inches (406 mm) on center.
 2. The ratio of the back span to the cantilever shall be at least 2 to 1.
 3. Floor joists at ends of *braced wall panels* shall be doubled.
 4. For wood-frame construction, a continuous rim joist shall be connected to ends of all cantilever joists. When spliced, the rim joists shall be spliced using a galvanized metal tie not less than 0.058 inch (1.5 mm) (16 gage) in thickness and 1 1/2 inches (38 mm) in width fastened with six 16d nails on each side of the splice or a block of the same size as the rim joist of sufficient length to fit securely between the joist space at which the splice occurs fastened with eight 16d nails on each side of the splice; and
 5. Gravity loads carried at the end of cantilevered joists shall be limited to uniform wall and roof loads and the reactions from headers having a span of 8 feet (2438 mm) or less.
2. Elevated post or pier foundations supporting *braced wall panels* shall be designed in accordance with accepted engineering practice.
 3. Masonry stem walls with a length of 48 inches (1219 mm) or less supporting *braced wall panels* shall be reinforced in accordance with Figure R602.10.9. Masonry stem walls with a length greater than 48 inches (1219 mm) supporting *braced wall panels* shall be constructed in accordance with Section R403.1 Methods ABW and PFH shall not be permitted to attach to masonry stem walls.
 4. Concrete stem walls with a length of 48 inches (1219 mm) or less, greater than 12 inches (305 mm) tall and less than 6 inches (152 mm) thick shall have reinforcement sized and located in accordance with Figure R602.10.9.
 5. For all structures in Seismic Design Category D0, D1 or D2 and in townhouses in Seismic Design Category C, the end of a *braced wall panel* over an opening in the wall below shall not extend a horizontal distance greater than 1 foot (305 mm) from the end of the panel to the edge of the opening. This provision is applicable to *braced wall panels* offset in plane and to *braced wall panels* offset out of plane as permitted by the exception to Item 1 above.

Exception: For wood light-frame wall construction, one end of a *braced wall panel* shall be permitted to extend more than 1 foot (305 mm) over an opening not more than 8 feet (2438 mm) wide in the wall below provided that the opening includes a header in accordance with the following:

1. The building width, loading condition and framing member species limitations of Table R502.5(1) shall apply; and
2. Not less than one 2 × 12 or two 2 × 10 for an opening not more than 4 feet (1219 mm) wide; or
3. Not less than two 2 × 12 or three 2 × 10 for an opening not more than 6 feet (1829 mm) wide; or
4. Not less than three 2 × 12 or four 2 × 10 for an opening not more than 8 feet (2438 mm) wide; and
5. The entire length of the *braced wall panel* does not occur over an opening in the wall below.

R603.1.1 Applicability limits. The provisions of this section shall control the construction of exterior cold-formed steel wall framing and interior load-bearing cold-formed steel wall framing for buildings not more than 60 feet (18 288 mm) long perpendicular to the joist or truss span, not more than 40 feet (12 192 mm) wide parallel to the joist or truss span, and less than or equal to three stories above *grade plane*. All exterior walls installed in accordance with the provisions of this section shall be considered as load-bearing walls. Cold-formed steel walls constructed in accordance with the provisions of this section shall be limited to sites subjected to a maximum design wind speed of 110 miles per hour (49 m/s) Exposure B or C and a maximum ground snow load of 70 pounds per square foot (3.35 kPa).

For all structures in Seismic Design Category D0, D1 or D2 and in townhouses in Seismic Design Category C, stories above grade plane walls partially or completely braced by cold-formed wall framing in accordance with this section shall not include masonry or concrete construction or the entire story shall be designed in accordance with accepted engineering practice.

Exception: Fireplaces, chimneys and masonry veneer as permitted by this code.

Revise as follows:

R802.9 Framing of openings. Openings in roof and ceiling framing shall be framed with header and trimmer joists. When the header joist span does not exceed 4 feet (1219 mm), the header joist may be a single member the same size as the ceiling joist or rafter. Single trimmer joists may be used to carry a single header joist that is located within 3 feet (914 mm) of the trimmer joist bearing. When the header joist span exceeds 4 feet (1219 mm), the trimmer joists and the header joist shall be doubled and of sufficient cross section to support the ceiling joists or rafter framing into the header. *Approved* hangers shall be used for the header joist to trimmer joist connections when the header joist span exceeds 6 feet (1829 mm). Tail joists over 12 feet (3658 mm) long shall be supported at the header by framing anchors or on ledger strips not less than 2 inches by 2 inches (51 mm by 51 mm).

R802.9.1 Framing of openings in Seismic Design Categories C, D0, D1 and D2. For structures or portions of structures in Seismic Design Category C, D0, D1 or D2 when an opening in a roof exceeds the lesser of 12 feet (3658 mm) or 50 percent of the least roof dimension, that portion of the structure shall be designed in accordance with accepted engineering practice to the extent the opening affects the performance of the remaining structural system.

Revise as follows:

SECTION AJ104 EVALUATION OF AN EXISTING BUILDING

AJ104.1 General. The *building official* may require an existing building to be investigated and evaluated by a registered design professional in the case of proposed reconstruction of any portion of a building. The evaluation shall determine the existence of any potential non-conformities to these provisions, and shall provide a basis for determining the impact of the proposed changes on the performance of the building. The evaluation shall use the following sources of information, as applicable:

1. Available documentation of the existing building.
 - 1.1. Field surveys.
 - 1.2. Tests (nondestructive and destructive).
 - 1.3. Laboratory analysis.

Exception: Detached one- or two-family dwellings that comply with Section R102.7. ~~are not irregular buildings under Section R301.2.2.2.5 and~~ are not undergoing an extensive reconstruction shall not be required to be evaluated.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes

both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

This proposal is to delete the concept of "Irregular Structures" from Section R301.2.2.2.5 from the code and relocate the specific construction requirements of the irregular structures into the applicable sections of the code where they are relevant. As currently written, the list of items defining "Irregular Structures" in high seismic categories is a laundry list of items that cause the structure to be outside of the scope of this code. Then, for most of the defined irregularities there is an exception including technical construction requirements that, when done, allow the structure to not be classified as "Irregular". So, in essence, the current section of "Irregular structures" items are exceptions to the code. Then the exceptions to each item are exceptions to the exception. This makes poor code language.

In addition, many code users are not aware of these requirements because they are located in Chapter 3. As an example, when a code user is looking to the code to determine how to construct cantilever floor joists, they would go to Chapter 5, "Floor Framing". There is a section addressing cantilevers. However, in this section in Chapter 3 it says when a floor cantilevers and supports a wall above (not in the same vertical plane) it is irregular. Then the exception to the exception defines how to construct the floor so that it will not be considered irregular. The BCAC determined that it would be much better to actually include the cantilever construction requirements in the actual section in Chapter 5 that describes cantilevered floor construction.

This proposal does not make any technical changes to the code. It merely moves the construction requirements and limitations therein to the applicable sections that already exist in Chapter 5, Floor framing, Chapter 6, Wall framing and Chapter 8 Roof framing. The limitations are still applicable and by relocating them they will be more noticeable and apparent. The current code already has language and provisions to cover construction that exceeds the limitations of this code.

As shown below, R301.1 states that when, "... construction is in accordance with the provision of this code..." it is deemed to comply and the converse is true as well. When construction is NOT in accordance with the provisions it does not comply. Further, Section R301.1.3 it states that, "...elements exceeding the limits of Section R301 or otherwise not conforming to this code." shall require an engineered design. With the specific construction requirements now in the applicable code sections, those two provisions already exist and adequately address the cases when mandatory code requirements are exceeded.

R301.1 Application. *Buildings and structures, and all parts thereof, shall be constructed to safely support all loads, including dead loads, live loads, roof loads, flood loads, snow loads, wind loads and seismic loads as prescribed by this code. The construction of buildings and structures in accordance with the provisions of this code shall result in a system that provides a complete load path that meets all requirements for the transfer of all loads from their point of origin through the load-resisting elements to the foundation. Buildings and structures constructed as prescribed by this code are deemed to comply with the requirements of this section.*

R301.1.3 Engineered design. *When a building of otherwise conventional construction contains structural elements exceeding the limits of Section R301 or otherwise not conforming to this code, these elements shall be designed in accordance with accepted engineering practice. The extent of such design need only demonstrate compliance of nonconventional elements with other applicable provisions and shall be compatible with the performance of the conventional framed system. Engineered design in accordance with the International Building Code is permitted for all buildings and structures, and parts thereof, included in the scope of this code.*

The existing Section R301.2.2.2 defines limitations for the use and scope of this code for structures in Seismic Design Category C such as weights of materials, stone and masonry veneer, masonry and concrete construction. The existing Section R301.2.2.3 defines further limitations for Seismic Design Category D0, D1 and D2 in addition to the Seismic Design Category C limitations such as height limitations. These two sections remain as is and the current limitations apply. The net effect is the same and proposal makes the code much more user friendly and will prevent the oversight of the specific construction requirements and limitations that now exist in Chapter 3.

Cost Impact: The code change does not change the existing requirements of the code and will not increase the cost of construction.

RB48-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R301.2.2.2.5-RB-BAJNAI-BCAC

RB49 – 13

R301.2.2.2.5, R301.3, R803.2.3

Proponent: Bonnie Manley, P.E., American Iron and Steel Institute (bmanley@steel.org)

Revise as follows:

R301.2.2.2.5 Irregular buildings. The seismic provisions of this code shall not be used for irregular structures located in Seismic Design Categories C, D0, D1 and D2. Irregular portions of structures shall be designed in accordance with accepted engineering practice to the extent the irregular features affect the performance of the remaining structural system. When the forces associated with the irregularity are resisted by a structural system designed in accordance with accepted engineering practice, design of the remainder of the building shall be permitted using the provisions of this code. A building or portion of a building shall be considered to be irregular when one or more of the following conditions occur:

1 through 6 *(No changes to current text)*

7. When stories above *grade* plane partially or completely braced by wood wall framing in accordance with Section R602 or cold-formed steel wall framing in accordance with Section R603 include masonry or concrete construction.

Exception: Fireplaces, chimneys and masonry veneer as permitted by this code. When this irregularity applies, the entire *story* shall be designed in accordance with accepted engineering practice.

R301.3 Story height. The wind and seismic provisions of this code shall apply to buildings with story heights not exceeding the following:

1. *(No changes to current text)*

2. For cold-formed steel wall framing, a stud height of 10 feet (3048 mm), plus a height of floor framing not to exceed 16 inches (406 mm).

3 through 5 *(No changes to current text)*

Individual walls or walls studs shall be permitted to exceed these limits as permitted by Chapter 6 provisions, provided story heights are not exceeded. Floor framing height shall be permitted to exceed these limits provided the story height does not exceed 11 feet 7 inches (3531 mm). An engineered design shall be provided for the wall or wall framing members when they exceed the limits of Chapter 6. Where the story height limits of this section are exceeded, the design of the building, or the non-compliant portions thereof, to resist wind and seismic loads shall be in accordance with the International Building Code.

R803.2.3 Installation. Wood structural panel used as roof sheathing shall be installed with joints staggered or not staggered in accordance with Table R602.3(1), or APA E30 for wood roof framing or with Table R804.3 for cold-formed steel roof framing.

Reason: These editorial modifications correct the terminology to reflect what is adopted throughout the IRC and the IBC.

Cost Impact: No impact to the cost of construction is anticipated.

RB49-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R301.2.2.2.5-RB-MANLEY

RB50 – 13

R301.2.2.2.5, Table R301.2.2.2.5 (New)

Proponent: Kevin S. Moore, S.E., Chair of Seismic Subcommittee to Code Advisory Committee, National Council of Structural Engineers Associations; Matt Mlakar, Chair of General Engineering Committee, Structural Engineers Association of California

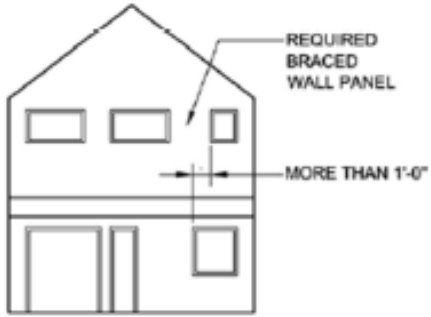
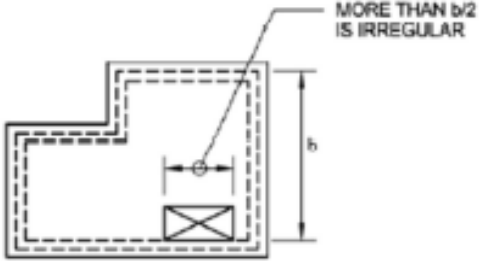
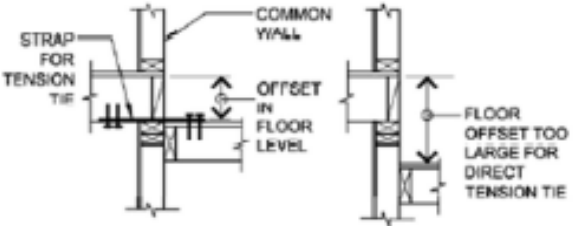
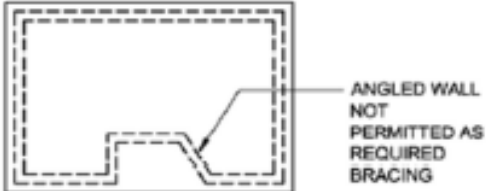
Revise as follows:

R301.2.2.2.5 Irregular buildings. The seismic provisions of this code shall not be used for irregular structures illustrated in Table R301.2.2.2.5 that are located in seismic Design Categories C, D_o, D₁ and D₂.

in addition to the requirements of this code, cold-formed steel framing shall comply with the requirements of AISI S230.

TABLE R301.2.2.2.5
CONFIGURATION IRREGULARITIES

<u>Irregularity Number</u>	<u>Description</u> <u>IRC Section R301.2.2.2.5</u>	<u>Illustration</u>
<u>1</u>	<u>Where exterior shear wall lines or braced wall panels are not in one plane vertically from the foundation to the uppermost story in which they are required.</u>	
<u>2</u>	<u>Where a section of floor or roof is not laterally supported by shear walls or braced wall lines on all edges. Also called an “open front” irregularity.</u>	

<p><u>3.</u></p>	<p>Where the end of a braced wall panel occurs over an opening in the wall below and ends at a horizontal distance greater than one (1) foot from the edge of the opening. This provision is applicable to shear walls and braced wall panels offset out of plane in accordance with Exception to Item 1 of Section R301.2.2.2.5 of this code.</p>	 <p>REQUIRED BRACED WALL PANEL</p> <p>MORE THAN 1'-0"</p> <p>EXTERIOR ELEVATION</p>
<p><u>4</u></p>	<p>Where an opening in a floor or roof exceeds the lesser of 12 feet or 50 percent of the least floor or roof dimension.</p>	 <p>MORE THAN $b/2$ IS IRREGULAR</p> <p>b</p> <p>PLAN VIEW</p>
<p><u>5</u></p>	<p>Where portions of a floor level are vertically offset. Also called "split level" irregularity.</p>	 <p>STRAP FOR TENSION TIE</p> <p>COMMON WALL</p> <p>OFFSET IN FLOOR LEVEL</p> <p>IRC MAY BE USED</p> <p>FLOOR OFFSET TOO LARGE FOR DIRECT TENSION TIE</p> <p>ENGINEERED DESIGN REQUIRED</p>
<p><u>6</u></p>	<p>Where shear walls and braced wall lines do not occur in two perpendicular directions.</p>	 <p>ANGLED WALL NOT PERMITTED AS REQUIRED BRACING</p> <p>ROOF PLAN</p>

Reason: Exceptions listed under R301.2.2.2.5 "irregular buildings" lacks clarification and requires engineering judgment commonly missing by most non-engineer users. Illustrations on configuration irregularity are added similar to those used in Section 2.3 of FEMA 232, one of the source documents for IRC.

Cost Impact: This code change proposal will not increase construction cost.

RB50-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R301.2.2.2.5-RB-MLAKAR-MORE

RB51 – 13

R301.2.4, R322.1

Proponent: Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency (Gregory.wilson2@fema.dhs.gov); Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency (rcquinn@earthlink.net).

Add new text as follows:

R301.2.4 Floodplain construction. Buildings and structures constructed in whole or in part in flood hazard areas (including A or V Zones) as established in Table R301.2(1) shall be designed and constructed in accordance with Section R322. Buildings and structures that are located in more than one flood hazard area shall comply with the provisions associated with the most restrictive flood hazard area. Buildings and structures located in whole or in part in identified floodways shall be designed and constructed in accordance with ASCE 24.

R322.1 General. Buildings and structures constructed in whole or in part in flood hazard areas (including A or V Zones) as established in Table R301.2(1) shall be designed and constructed in accordance with the provisions contained in this section. Buildings and structures that are located in more than one flood hazard area shall comply with the provisions associated with the most restrictive flood hazard area. Buildings and structures located in whole or in part in identified floodways shall be designed and constructed in accordance with ASCE 24.

Reason: General requirements for all dwellings in flood hazard area are in R322.1. Then specific requirements are in R322.2 (Zone A) or R322.3 (Zone V), depending on the nature of the flood hazard area. This proposal clarifies that buildings that are located such they are affected by more than one of these areas ("flood zones" on Flood Insurance Rate Maps) must comply with the provisions that take into account flood loads and conditions of the area that requires the more restrictive design. For example, a dwelling that straddles the line that separates Zone A from Zone V must comply with the requirements for Zone V. The IBC has the same phrasing in 1612.1.

Cost Impact: None. It has always been an NFIP requirement that buildings that are in more than one zone have to meet the requirements of the more restrictive zone.

RB51-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R301.2.4-RB-QUINN-WILSON

RB52 – 13

R301.2.4.1, R322.1.1

Proponent: Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency (Gregory.wilson2@fema.dhs.gov); Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency (rcquinn@earthlink.net).

Revise as follows

R301.2.4.1 Alternative provisions. As an alternative to the requirements in Section ~~R322, R322.3~~ for buildings and structures located in whole or in part in coastal high-hazard areas (V Zones) and Coastal A Zones, if delineated, ASCE 24 is permitted subject to the limitations of this code and the limitations therein.

R322.1.1 Alternative provisions. As an alternative to the requirements in Section ~~R322, R322.3~~ for buildings and structures located in whole or in part in coastal high-hazard areas (V Zones) and Coastal A Zones, if delineated, ASCE 24 is permitted subject to the limitations of this code and the limitations therein.

Reason: This code change provides an alternative for buildings and structures in any flood hazard areas to be designed and constructed according to the standard ASCE 24 *Flood Resistant Design and Construction*. There is no reason to limit use of ASCE 24 as an alternative. There are many flood hazard areas where the builder, designer or building official may deem it appropriate to not use prescriptive foundations, such as along riverine waterways and some coastal areas (inland of Zone V) where flood depths are significant and dwellings would need very tall foundations or in riverine floodplains where flood velocities are very fast which suggests it is appropriate to specifically consider hydrodynamic loads.

Another situation where use of ASCE 24 is appropriate is for dwellings in flood hazard areas on alluvial fans. The IBC, by reference to ASCE 24, has specific limitations for buildings on alluvial fans. The fact that the IRC does not have explicit provisions for alluvial fans does not mean code officials should ignore credible information on Flood Insurance Rate Maps or other sources that identifies flood hazard areas subject to high risk conditions, including alluvial fans. Specifying that ASCE 24 is an alternative allows its use where the prescriptive provisions of the IRC may not adequately account for flood risks.

Cost Impact: Use of ASCE 24 is an alternative; there are no cost impacts imposed by providing an alternative.

RB52-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R301.2.4.1-RB-QUINN-WILSON

RB53 – 13

R301.3

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee and Virginia Building and Code Officials Association (bajnaic@chesterfield.gov)

Revise as follows:

R301.3 Story height. The wind and seismic provisions of this code shall apply to buildings with story heights not exceeding the following:

1. For wood wall framing, the maximum story height shall not exceed 11 feet 7 inches (3531 mm) and the laterally unsupported bearing wall stud height shall not exceed that permitted by Table R602.3(5) plus a height of floor framing not to exceed 16 inches (406 mm).

Exception: ~~For wood-framed wall buildings with bracing in accordance with Tables R602.10.3(1) and R602.10.3(3), the wall stud clear height used to determine the maximum permitted story height may be increased to 12 feet (3658 mm) without requiring an engineered design for the building wind and seismic force-resisting systems provided that the length of bracing required by Table R602.10.3(1) is increased by multiplying by a factor of 1.10 and the length of bracing required by Table R602.10.3(3) is increased by multiplying by a factor of 1.20. Wall studs are still subject to the requirements of this section.~~

2. For steel wall framing, the maximum story height shall not exceed 11 feet 7 inches (3531 mm) and the a maximum unsupported bearing wall stud height shall not exceed of 10 feet (3048 mm), plus a height of floor framing not to exceed 16 inches (406 mm).
3. For masonry walls, the maximum story height shall not exceed 13 feet 7 inches (4140 mm) and the a maximum bearing wall clear height shall not exceed of 12 feet (3658 mm) plus a height of floor framing not to exceed 16 inches (406 mm).

Exception: An additional 8 feet (2438 mm) of bearing wall clear height is permitted for gable end walls.

4. For insulating concrete form walls, the maximum story height shall not exceed 11 feet 7 inches (3531 mm) and the maximum unsupported bearing wall height per story as permitted by Section R611 tables shall not exceed 10 feet (3048 mm) plus a height of floor framing not to exceed 16 inches (406 mm).
5. For structural insulated panel (SIP) walls, the maximum story height shall not exceed 11 feet 7 inches (3531 mm) and the maximum bearing wall height per story as permitted by Section R613 tables shall not exceed 10 feet (3048 mm) plus a height of floor framing not to exceed 16 inches (406 mm).

Individual walls or walls studs shall be permitted to exceed these limits as permitted by Chapter 6 provisions, provided *story heights* are not exceeded. ~~Floor framing height shall be permitted to exceed these limits provided the story height does not exceed 11 feet 7 inches (3531 mm).~~ An engineered design shall be provided for the wall or wall framing members when they exceed the limits of Chapter 6. Where the *story height* limits of this section are exceeded, the design of the building, or the noncompliant portions thereof, to resist wind and seismic loads shall be in accordance with the *International Building Code*.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the

BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

The purpose of this proposal is to revise the story height limits. Proposal S100-06/07 introduced the 11'-7" story height limit into the IBC and IRC as an alternative to limiting the floor framing height to 16" where wall stud heights were less than 10'-0". In the IBC this change was implemented directly into the equivalent provision under Section 2308 to Item #1 above. In the IRC, the exception was added to the paragraph following the five individual limits. This has led to confusion with Chapter 6 provisions including stud size/height and wall bracing. This revision relocates the story height limit to each of the individual material limits and coordinates it with the material-specific provisions.

The current exception for wood wall studs is deleted as it is redundant with other provisions of Chapter 6 and not necessary. Table R602.3(5) covers when studs in non-bearing walls can exceed 10'-0". Table R602.3.1 provides limited cases when studs in bearing walls can exceed 10'-0". The wall bracing section provides adjustments to wind and seismic bracing amounts for heights up to 12'-0". It is not necessary to repeat that requirement here, in fact that could result in an accidental double-application of the increase factors. Finally, simply applying the wall bracing provisions for walls permitted to be 12'-0" high does not automatically address other structural concerns resulting from an overall increase in story height. This is why only the limited conditions in Table R602.3.1 are allowed for studs greater than 10' in height and supporting floor or roof loads.

Cost Impact: None

RB53-13

Public Hearing:	Committee:	AS	M	D
	Assembly:	ASF	AMF	DF

R301.3-RB-BAJNAI-BCAC

RB54 – 13

R301.3

Proponent: Edward L. Keith, APA, representing The Engineered Wood Association
(ed.keith@apawood.org)

Revise as follows:

R301.3 Story height. The wind and seismic provisions of this code shall apply to buildings with story heights not exceeding the following:

1. For wood wall framing, the laterally unsupported bearing wall stud height permitted by Table R602.3(5) plus a height of floor framing not to exceed 16 inches (406 mm).

Exception: For wood-framed wall buildings with bracing in accordance with Tables R602.10.3(1) and R602.10.3(3), the wall stud clear height used to determine the maximum permitted *story height* may be increased to 12 feet (3658 mm) without requiring an engineered design for the building wind and seismic force-resisting systems provided that the length of bracing required is increased in accordance with Tables R602.10.3(2) and R602.10.3(4) for wind and seismic, respectively. ~~by Table R602.10.3(1) is increased by multiplying by a factor of 1.10 and the length of bracing required by Table R602.10.3(3) is increased by multiplying by a factor of 1.20.~~ Wall studs are still subject to the requirements of this section.

2 through 5 *(No changes to current text)*

Individual walls or walls studs shall be permitted to exceed these limits as permitted by Chapter 6 provisions, provided story heights are not exceeded. Floor framing height shall be permitted to exceed these limits provided the story height does not exceed 11 feet 7 inches (3531 mm). An engineered design shall be provided for the wall or wall framing members when they exceed the limits of Chapter 6. Where the story height limits of this section are exceeded, the design of the building, or the non-compliant portions thereof, to resist wind and seismic loads shall be in accordance with the International Building Code.

Reason: The original exception proposed for modification requires an increase in the amount of bracing for wind and/or seismic application when the maximum story height is increased from 10 to 12 feet. The factors given in this original section are duplicated in Tables R602.10.3(2) and R602.10.3(4). As it is written it is unclear that the adjustments must only be applied once. Replacing the requirements in Section R301.2.2.2.1 with a reference to the tables in Chapter 6 would make it clear that the adjustments are to be applied only once and eliminate the potential for “double dipping” along with the unnecessary construction costs.

Cost Impact: This code change proposal will not increase the cost of construction.

RB54-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R301.1-RB-KEITH

RB55 – 13

R301.4 (New), R301.6 (New), R301.7 (New), R318.1, R505.2, R603.2, R804.2, M1308.1, M2101.6, P2603.2

Proponent: Bonnie Manley, P.E., American Iron and Steel Institute (bmanley@steel.org)

Add new text as follows:

R301.4 Additional design loads. In addition to the requirements of Section R301.2, additional design loads for buildings and structures, and all parts thereof, shall be in accordance with this section.

R301.4.1 ~~R301.4~~ Dead load. The actual weights of materials and construction shall be used for determining dead load with consideration for the dead load of fixed service *equipment*.

R301.4.2 ~~R301.5~~ Live load. The minimum uniformly distributed live load shall be as provided in Table R301.5.

R301.4.3 ~~R301.6~~ Roof load. The roof shall be designed for the live load indicated in Table R301.6 or the snow load indicated in Table R301.2(1), whichever is greater.

R301.5 ~~R301.7~~ Deflection. The allowable deflection of any structural member under the live load listed in Sections R301.4.2~~5~~ and R301.4.3~~6~~ or wind loads determined by Section R301.2.1 shall not exceed the values in Table R301.5~~7~~.

R301.6 Material requirements. The general material requirements set forth in this section shall apply to the use of load-bearing materials in buildings and structures, and all parts thereof.

R301.6.1 Wood framing. Load-bearing wood-wood frame members shall be designed in accordance with Sections R502, R602, R802 and this section.

R301.6.1.1 ~~R301.8~~ Nominal sizes. For the purposes of this code, where dimensions of lumber are specified, they shall be deemed to be nominal dimensions unless specifically designated as actual dimensions.

R301.6.2 Cold-formed steel framing. Load-bearing cold-formed steel framing members designed in accordance with Sections R505, R603 or R804 shall be in accordance with this section.

R301.6.2.1 Material. Load-bearing cold-formed steel framing members shall be cold formed to shape from structural quality sheet steel complying with the requirements of ASTM A 1003, Structural Grades 33 Type H and 50 Type H.

R301.6.2.2 Corrosion protection. Load-bearing cold-formed steel framing shall have a metallic coating complying with ASTM A 1003 and one of the following:

1. A minimum of G 60 in accordance with ASTM A 653.
2. A minimum of AZ 50 in accordance with ASTM A 792.

R301.6.2.3 Dimension, thickness and material grade. Load-bearing cold-formed steel framing members shall comply with Figure R301.6.2.3(1) and with the dimensional and thickness requirements specified in Table R301.6.2.3. Additionally, all c-shaped sections shall have a minimum flange width of 1.625 inches (41 mm) and a maximum flange width of 2 inches (51 mm). The minimum lip size for c-shaped sections shall be 0.5 inches (13 mm). Track sections shall comply with Figure R301.6.2.3(2) and shall have a minimum flange width of 1¹/₄ inches (32 mm). Minimum Grade 33 ksi steel shall be used wherever 33 mil and 43 mil thicknesses are specified. Minimum Grade 50 ksi steel shall be used wherever 54 and 68 mil thicknesses are specified.

TABLE R301.6.2.3
LOAD-BEARING COLD-FORMED STEEL FRAMING MEMBER SIZES AND THICKNESSES

MEMBER DESIGNATION^a	WEB DEPTH (inches)	MINIMUM BASE STEEL THICKNESS mil (inches)
350S162-t	3.5	33 (0.0329), 43 (0.0428), 54 (0.0538)
550S162-t	5.5	33 (0.0329), 43 (0.0428), 54 (0.0538), 68 (0.0677)
800S162-t	8	33 (0.0329), 43 (0.0428), 54 (0.0538), 68 (0.0677)
1000S162-t	10	43 (0.0428), 54 (0.0538), 68 (0.0677)
1200S162-t	12	43 (0.0428), 54 (0.0538), 68 (0.0677)

For SI: 1 inch = 25.4 mm

a. The member designation is defined by the first number representing the member depth in hundredths of an inch, the letter "s" representing a stud or joist member, the second number representing the flange width in hundredths of an inch, and the letter "t" shall be a number representing the minimum base metal thickness in mils.

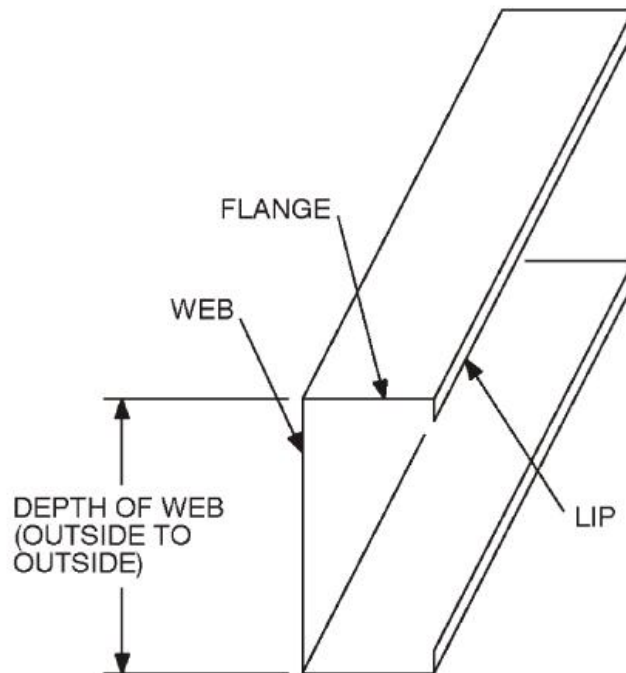


FIGURE R301.6.2.3(1)
C-SHAPED SECTION

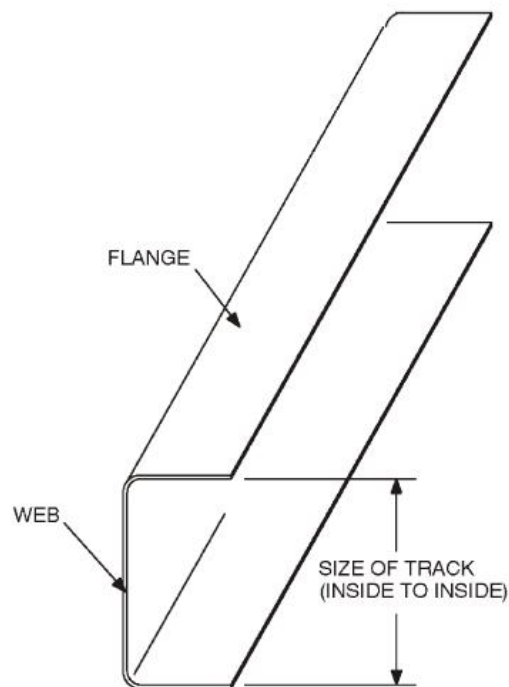


FIGURE R301.6.2.3(2)
TRACK SECTION

R301.6.2.4 Identification. Load-bearing cold-formed steel framing members shall have a legible *label*, stencil, stamp or embossment with the following information as a minimum:

1. Manufacturer's identification.
2. Minimum base steel thickness in inches (mm).
3. Minimum coating designation.
4. Minimum yield strength, in kips per square inch (ksi) (MPa).

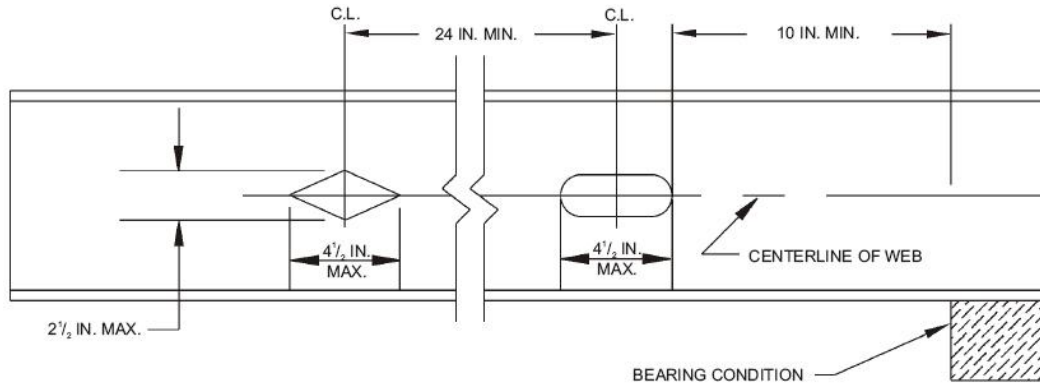
R301.6.2.5 Fastening. Screws for steel-to-steel connections shall be installed with a minimum edge distance and center-to-center spacing of $\frac{1}{2}$ inch (12.7 mm), shall be self-drilling tapping, and shall conform to ASTM C 1513. Structural sheathing shall be attached to cold-formed steel framing members with minimum No. 8 self-drilling tapping screws that conform to ASTM C 1513. Screws attaching structural-sheathing to cold-formed steel framing members shall have a minimum head diameter of 0.292 inch (7.4 mm) with countersunk heads and shall be installed with a minimum edge distance of $\frac{3}{8}$ inch (9.5 mm). Gypsum board shall be attached to cold-formed steel framing members with minimum No. 6 screws conforming to ASTM C 954 or ASTM C 1513 with a bugle head style and shall be installed in accordance with Section R702. For all connections, screws shall extend through the steel a minimum of three exposed threads. All fasteners shall have a rust inhibitive coating suitable for the installation in which they are being used, or shall be manufactured from material not susceptible to corrosion.

R301.6.2.6 Web holes, web hole reinforcing and web hole patching. Web holes, web hole reinforcing, and web hole patching shall be in accordance with this section.

R301.6.2.6.1 Web holes. Web holes in load-bearing cold-formed steel framing members shall comply with all of the following conditions:

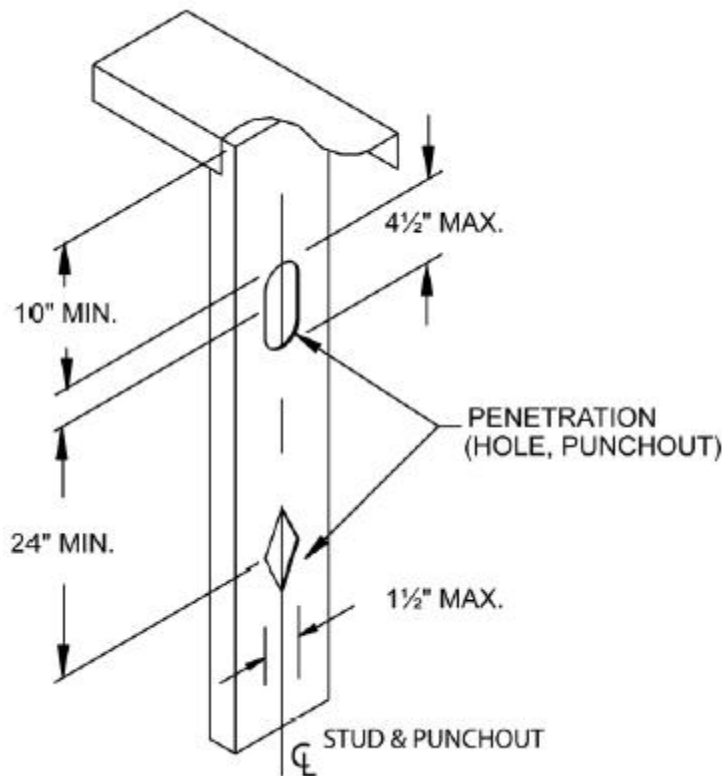
1. Holes shall conform to Figure R301.6.2.6.1(1) for floor and ceiling joists and Figure R301.6.2.6.1(2) for wall studs;
2. Holes shall be permitted only along the centerline of the web of the framing member;
3. Holes shall have a center-to-center spacing of not less than 24 inches (610 mm);
4. Holes shall have a web hole width not greater than 0.5 times the member depth, or $1\frac{1}{2}$ inches (38 mm) for wall studs and $2\frac{1}{2}$ inches (64.5 mm) for floor joists and roof framing members;
5. Holes shall have a web hole length not exceeding $4\frac{1}{2}$ inches (114 mm); and
6. Holes shall have a minimum distance between the edge of the bearing surface and the edge of the web hole of not less than 10 inches (254 mm).

Framing members with web holes not conforming to the above requirements shall be reinforced in accordance with Section R301.6.2.6.2, patched in accordance with Section R301.6.2.6.3 or designed in accordance with accepted engineering practices.



For SI: 1 inch = 25.4 mm.

FIGURE R301.6.2.6.1(1)
FLOOR AND CEILING JOIST WEB HOLES



For SI: 1 inch = 25.4 mm.

FIGURE R301.6.2.6.1(2)
WALL STUD WEB HOLES

R301.6.2.6.2 Web hole reinforcing. Reinforcement of web holes in floor joists, gable endwall studs, and ceiling joists not conforming to the requirements of Section R301.6.2.6.1 shall be permitted if the hole is located fully within the center 40 percent of the span and the depth and length of the hole does not exceed 65 percent of the flat width of the web. The reinforcing shall be a steel plate or C-shape section with a hole that does not exceed the web hole size limitations of Section R301.6.2.6.1 for the member being reinforced. The steel reinforcing shall be the same thickness as the receiving member and shall extend at least 1 inch (25.4 mm) beyond all edges of the hole. The steel reinforcing shall be fastened to the web of the receiving member with No. 8 screws spaced not more than 1 inch (25.4 mm) center-to-center along the edges of the patch with minimum edge distance of $\frac{1}{2}$ inch (12.7 mm).

R301.6.2.6.3 Hole patching. Patching of web holes in cold-formed steel framing members not conforming to the requirements in Section R301.6.2.6.1 shall be permitted in accordance with either of the following methods:

1. Framing members shall be replaced or designed in accordance with accepted engineering practices where web holes exceed the following size limits:
 - 1.1. The depth of the hole, measured across the web, exceeds 70 percent of the flat width of the web; or
 - 1.2. The length of the hole measured along the web, exceeds 10 inches (254 mm) or the depth of the web, whichever is greater.
2. Web holes not exceeding the dimensional requirements in Section R301.6.2.6.3, Item 1, shall be patched with a solid steel plate, stud section, or track section in accordance with Figure R301.6.2.6.3(1) for floor and ceiling joists and Figure R301.6.2.6.3(2) for wall studs. The steel patch shall, as a minimum, be of the same thickness as the receiving member and shall extend at least 1 inch (25 mm) beyond all edges of the hole. The steel patch shall be fastened to the web of the receiving member with No. 8 screws spaced no more than 1 inch (25 mm) center-to-center along the edges of the patch with minimum edge distance of $\frac{1}{2}$ inch (13 mm).

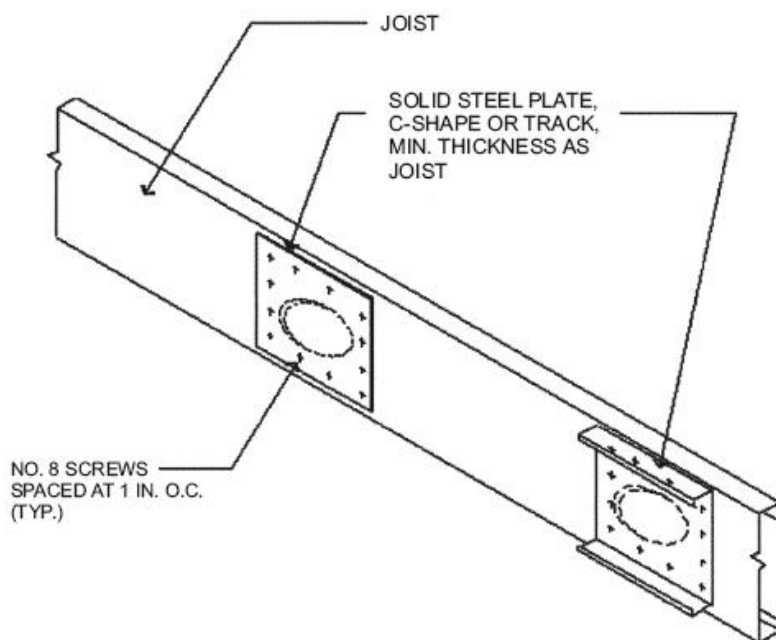
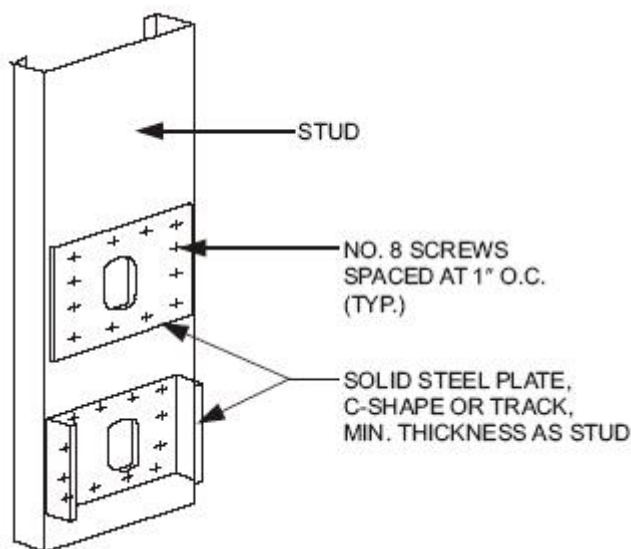


FIGURE R301.6.2.6.3(1)
FLOOR AND CEILING JOIST WEB HOLE PATCH



For SI: 1 inch = 25.4 mm.

FIGURE R301.6.2.6.3(2)
WALL STUD WEB HOLE PATCH

Revise as follows:

R318.1 Subterranean termite control methods. In areas subject to damage from termites as indicated by Table R301.2(1), methods of protection shall be one of the following methods or a combination of these methods:

1. Chemical termiticide treatment, as provided in Section R318.2.
2. Termite baiting system installed and maintained according to the *label*.
3. Pressure-preservative-treated wood in accordance with the provisions of Section R317.1.
4. Naturally durable termite-resistant wood.
5. Physical barriers as provided in Section R318.3 and used in locations as specified in Section R317.1.
6. Cold-formed steel framing in accordance with Sections ~~R301.6.2.1 and R603.2.1~~.

Delete and substitute as follows:

~~**R505.2 Structural framing.** Load-bearing cold-formed steel floor framing members shall comply with Figure R505.2(1) and with the dimensional and minimum thickness requirements specified in Tables R505.2(1) and R505.2(2). Tracks shall comply with Figure R505.2(2) and shall have a minimum flange width of 11/4 inches (32 mm).~~

R505.2 Structural framing. Load-bearing cold formed steel floor framing members shall comply with Section R301.6.2

Delete and substitute as follows:

~~**R603.2 Structural framing.** Load-bearing cold-formed steel wall framing members shall comply with Figure R603.2(1) and with the dimensional and minimum thickness requirements specified in Tables R603.2(1) and R603.2(2). Tracks shall comply with Figure R603.2(2) and shall have a minimum flange width of 11/4 inches (32 mm).~~

R603.2 Structural framing. Load-bearing cold formed steel wall framing members shall comply with Section R301.6.2

Delete and substitute as follows:

~~**R804.2 Structural framing.** Load-bearing, cold-formed steel roof framing members shall comply with Figure R804.2(1) and with the dimensional and minimum thickness requirements specified in Tables R804.2(1) and R804.2(2). Tracks shall comply with Figure R804.2(2) and shall have a minimum flange width of 11/4 inches (32 mm).~~

R804.2 Structural framing. Load-bearing cold formed steel roof framing members shall comply with Section R301.6.2

Revise as follows:

M1308.1 Drilling and notching. Wood-framed structural members shall be drilled, notched or altered in accordance with the provisions of Sections R502.8, R602.6, R602.6.1 and R802.7. Holes in load-bearing members of cold-formed steel light-frame construction shall be permitted only in accordance with Sections ~~R301.6.2.6~~ R505.2.5, R603.2.5 and R804.2.5. In accordance with the provisions of Sections R505.3.5, R603.3.4 and R804.3.4, cutting and notching of flanges and lips of load-bearing members of cold-formed steel light frame construction shall not be permitted. Structural insulated panels (SIPs) shall be drilled and notched or altered in accordance with the provisions of Section R613.7.

Revise as follows:

M2101.6 Drilling and notching. Wood-framed structural members shall be drilled, notched or altered in accordance with the provisions of Sections R502.8, R602.6, R602.6.1 and R802.7. Holes in load bearing members of cold-formed steel light-frame construction shall be permitted only in accordance with Sections ~~R301.6.2.6~~ R505.2.5, R603.2.5 and R804.2.5. In accordance with the provisions of Sections R505.3.5, R603.3.4 and R804.3.4, cutting and notching of flanges and lips of load-bearing members of cold-formed steel light frame construction shall not be permitted.

Structural insulated panels (SIPs) shall be drilled and notched or altered in accordance with the provisions of Section R613.

Revise as follows:

P2603.2 Drilling and notching. Wood-framed structural members shall not be drilled, notched or altered in any manner except as provided in Sections R502.8, R602.6, R802.7 and R802.7.1. Holes in load-bearing members of cold-formed steel light-frame construction shall be permitted only in accordance with Sections ~~R301.6.2.6~~~~R505.2.5~~, ~~R603.2.5~~ and ~~R804.2.5~~. In accordance with the provisions in Sections R505.3.5, R603.3.4 and R804.3.4, cutting and notching of flanges and lips of load-bearing members of cold-formed steel light frame construction shall not be permitted. Structural insulated panels (SIPs) shall be drilled and notched or altered in accordance with the provisions of Section R613.7.

Reason: This proposal represents a trial balloon, which was developed in the process of updating and streamlining the cold-formed steel framing (CFSF) provisions of the IRC. Rather than repeat the CFSF material requirements in Sections R505, R603 and R804, it was suggested that the material requirements be stated once in Chapter 3. This proposal incorporates the CFSF provisions in a new Section R301.6 on load-bearing material requirements.

In order for this new section to work as fully intended, it is expected that general requirements for the other load-bearing materials in the IRC would be incorporated into this new section as well. For example, in the case of wood frame construction, that would involve moving and combining requirements from Sections R502.1, R602.1 and R802.1. We believe that this could go a long way towards streamlining the IRC. Additionally, the section numbering changes recommended for design loads (Section R301.4) is editorial in nature and an attempt to better organize the chapter. It would be ideal to move the wind load and seismic load requirements under this section as well. However, that was deemed too ambitious for this code change without the general consent of the many affected parties.

Please note that the provisions recommended for Section R301.6.2 are not extracted directly from the 2012 IRC; rather, they reflect a generalized version of the language recommended in AISI's separate proposals on Section R505, R603 and R804. If this proposal is successful, it is intended to build on top of those proposals. See their reason statements for additional information on the specific changes to the section from the 2012 IRC.

Cost Impact: No impact to the cost of construction is anticipated.

RB55-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R301.4-RB-MANLEY

RB56 – 13

R301.5, Table R301.5

Proponent: Stephen Kerr, S.E., Josephson Werdowatz and Associates Inc., representing self (skerr@jwa-se.com)

Revise as follows:

R301.5 Live load. The minimum uniformly distributed and concentrated live loads shall be as provided in Table R301.5.

TABLE R301.5
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS
AND MINIMUM CONCENTRATED LIVE LOADS
(in pounds per square foot)

<u>OCCUPANCY OR USE</u>	<u>LIVE LOAD UNIFORM</u> <u>(psf)</u>	<u>CONCENTRATED</u> <u>(lbs.)</u>
Uninhabitable attics without storage ^b	10	-
Uninhabitable attics with limited storage ^{b,g}	20	-
Habitable attics and attics served with fixed stairs	30	-
Balconies (exterior) and decks ^e	40	-
Fire escapes	40	-
Guardrails and handrails ^d	- 200 ^h	<u>200</u> ^h
Guardrail in-fill components ^f	- 50 ^h	<u>50</u> ^h
Passenger vehicle garages ^a	40 <u>50</u> ^a	<u>Note a</u>
Rooms other than sleeping room	40	-
Sleeping rooms	30	-
Stairs	40 ^e	<u>300</u> ^c

- a. Elevated garage floors shall be capable of supporting a 3,000 ~~2,000~~-pound load applied on an area of over a 20 square inches area.
- b. *(No change to current text)*
- c. The minimum concentrated load on stair treads shall be applied on individual stair treads shall be designed for the uniformly distributed live load or a 300-pound concentrated load acting over an area of 4 square inches. This load need not be assumed to act concurrently with the uniform load, whichever produces the greater stresses.
- d through h *(No change to current text)*

Reason: As currently presented, the title of Table R301.5 states that the loads are uniformly distributed and that the loads are in pounds per square foot. However, this is incorrect, since the guardrail and handrail loads shown are concentrated loads. By splitting the loads into two columns, the Live Load table will accurately represent what type of live load is shown. The passenger vehicle garage loads were also changed to reflect the changes that occurred to the live load in the 2012 IBC.

These changes will make the IRC Live Load table match the format and values of the IBC and ASCE 7 Live Load tables.

Cost Impact: This code change proposal will not increase construction cost.

RB56-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R301.5-RB-KERR

RB57 – 13

Table R301.5

Proponent: Larry Wainright, Qualtim, representing the Structural Building Components Association (lwainright@qualtim.com)

Revise as follows:

TABLE R301.5 MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS (in pounds per square foot)

(Portions of table not shown remain unchanged)

a through f (No change to current text)

g. Uninhabitable attics with limited storage are those where the maximum clear height between joists and rafters is 42 inches or greater, or where there are two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses. The live load need only be applied to those portions of the joists or truss bottom chords where all of the following conditions are met:

1. The attic area is accessible from an opening not less than 20 inches in width by 30 inches in length that is located where the clear height in the attic is a minimum of 30 inches.
2. The slopes of the joists or truss bottom chords are no greater than 2 inches vertical to 12 units horizontal.
3. Required insulation depth is less than the joist or truss bottom chord member depth.

The remaining portions of the joists or truss bottom chords shall be designed for a uniformly distributed non-concurrent live load of not less than 10 lb/ft².

h. (No change to current text)

Reason The intent of this proposal is to bring the IRC into agreement with the IBC, Table 1607.1, footnote "i"; ASCE 7, Table 4-1, footnotes "l" and "m" and the IRC Table R301.5, footnote "b".

The requirement for the 10 PSF live load on those portions of the bottom chords not serving as storage areas was originally intended to reflect the requirement to provide a 10 PSF load per Table R301.5, footnote "b" for uninhabitable attics without storage on those portions of the joist or truss where a storage load is not applied. Footnote b clearly indicates that this is a non-concurrent load (intended for occasional access for maintenance). This is confirmed by the Commentary to the 2012 IBC, Table 1607.1 which states in part, "...Historically, a minimum load of 10 psf (0.48 kN/m²) has been viewed as appropriate where occasional access to the attic is anticipated for maintenance purposes, but significant storage is restricted by physical constraints, such as low clearance or the configuration of truss webs. It provides a minimum degree of structural integrity, allowing for occasional access to an attic space for maintenance purposes. ***Allowing the application of this load to be independent of other live loads is deemed appropriate, since it would be rare for this load and other maximum live loads to occur at once.***"[emphasis added]

Current truss design methodology also treats this 10 PSF non-storage load as a non-concurrent live load intended for occasional access for maintenance purposes. Furthermore, the change to this section (S57-09/10) was intended to coordinate the language with the ASCE 7-10 which was in draft form at the time the original proposal was submitted. During the public comment period, ASCE 7 was corrected to show that this is a non-concurrent load but the change was not picked up in the IRC. This code change simply coordinates this footnote with Table 1607.1, Table R301.5 footnote b, ASCE 7, and with the original intent of S57-09/10.

For reference, Table R301.5, footnote "b" states:

b. Uninhabitable attics without storage are those where the maximum clear height between the joist and rafter is less than 42 inches, or where there are not two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses. **This live load need not be assumed to act concurrently with any other live load requirements.**

ASCE 7-10, Table 4-1, footnotes "l" and "m" state:

^l Uninhabitable attic areas without storage are those where the maximum clear height between the joist and rafter is less than 42 in. (1,067 mm), or where there are not two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 in. (1,067 mm) in height by 24 in. (610 mm) in width, or greater, within the plane of the trusses. **This live load need not be assumed to act concurrently with any other live load requirement.**

^m Uninhabitable attic areas with storage are those where the maximum clear height between the joist and rafter is 42 in. (1,067 mm) or greater, or where there are two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 in. (1,067 mm) in height by 24 in. (610 mm) in width, or greater, within the plane of the trusses. At the trusses, the live load need only be applied to those portions of the bottom chords where both of the following conditions are met:

- i. The attic area is accessible from an opening not less than 20 in. (508 mm) in width by 30 in. (762 mm) in length that is located where the clear height in the attic is a minimum of 30 in. (762 mm); and

- ii. The slope of the truss bottom chord is no greater than 2 units vertical to 12 units horizontal (9.5% slope).

The remaining portions of the bottom chords shall be designed for a uniformly distributed nonconcurrent live load of not less than 10 lb/ft² (0.48 kN/m²).

IBC Table 1607.1, footnote "i" states:

- i. Uninhabitable attics without storage are those where the maximum clear height between the joists and rafters is less than 42 inches, or where there are not two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses. **This live load need not be assumed to act concurrently with any other live load requirements.**

Note that the IBC, Table 1607.1 footnote "j" is also inconsistent with ASCE 7, the IRC and the IBC, table 1607.1, footnote "i".

Cost Impact: This code change will not increase the cost of construction.

RB57-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R301.5-RB-WAINRIGHT

RB58 – 13

Table R301.5, R311.7.8.1, R317.4, R317.4.1, R507.3

Proponent: Glenn Mathewson, MCP, representing the North American Deck and Railing Association (GlennMathewson@nadra.org)

Revise as follows:

TABLE R301.5
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS
(in pounds per square foot)

USE	LIVE LOAD
Uninhabitable attics without storage ^b	10
Uninhabitable attics with limited storage ^{b, g}	20
Habitable attics and attics served with fixed stairs	30
Balconies (exterior) and decks ^e	40
Fire escapes	40
Guardrails and handrails ^d	200 ^h
Guardrail in-fill components ^f	50 ^h
Passenger vehicle garages ^a	50 ^a
Rooms other than sleeping room	40
Sleeping rooms	30
Stairs	40 ^c

R311.7.8.1 Height. Handrail height, measured vertically from the sloped plane adjoining the tread nosing, or finish surface of ramp slope, shall be not less than 34 inches (864 mm) and not more than 38 inches (965 mm).

Exceptions:

1. The use of a volute, turnout or starting easing shall be allowed over the lowest tread.
2. When handrail fittings or bending are used to provide continuous transition between flights, transitions at winder treads, the transition from handrail to guardrail or used at the start of a flight, the handrail height at the fittings or bending shall be permitted to exceed the maximum height.

R317.4 Wood/plastic composites. Wood/plastic composites used in exterior deck boards, stair treads, handrails and guardrail systems shall bear a *label* indicating the required performance levels and demonstrating compliance with the provisions of ASTM D 7032.

R317.4.1 Labeling. Deck boards and stair treads shall bear a label that indicates compliance to ASTM D 7032 and includes the allowable load and maximum allowable span. Handrails and guardrail systems or their packaging shall bear a label that indicates compliance to ASTM D 7032 and includes the maximum allowable span.

R507.3 Wood/plastic composites. Wood/plastic composites used in exterior deck boards, stair treads, handrails, and guardrail systems shall bear a label indicating the required performance levels and demonstrating compliance with the provisions of ASTM D 7032.

Reason: There is no construction component recognized or required by the IRC called a “guardrail”. A “guard” is clearly defined by the IRC in chapter two and does not in anyway require the presence of a “rail”. In the decking industry, it is quite common to see guards constructed as outdoor kitchen counters, benches, planter boxes and numerous other architectural elements. Use of the term “guardrail” inappropriately implies that a “rail” must be present in guard assemblies, and has been known to unnecessarily restrict design freedom in the decking industry. Note that footnote “d”, associated with the term “guardrail” uses the correct term “guard” within its text. The use of appropriate, IRC-defined terms clarifies the intent of the provisions.

Cost Impact: The code change proposal will not increase the cost of construction.

RB58-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R301.5T-RB-MATHEWSON

RB59 – 13

Table R301.5

Proponent: Dennis Pitts, American Wood Council, representing American Wood Council
(dpitts@awc.org)

Revise as follows:

TABLE R301.5 MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS (in pounds per square foot)

(Portions of table not shown remain unchanged.)

- a *(No change to current text)*
- b. Uninhabitable attics without storage are those where the maximum clear height between joists and rafters is less than 42 inches, or where there are not two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches high by 24 inches in width, or greater, within the plane of the trusses. This live load need not be assumed to act concurrently with any other live load requirements.
- c through f *(No change to current text)*
- g. Uninhabitable attics with limited storage are those where the maximum clear height between joists and rafters is 42 inches or greater, or where there are two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses. The live load need only be applied to those portions of the joists or truss bottom chords where all of the following conditions are met:
 - 1. The attic area is accessible from an opening not less than 20 inches in width by 30 inches in length that is located where the clear height in the attic is a minimum of 30 inches.
 - 2. The slopes of the joists or truss bottom chords are no greater than 2 inches vertical to 12 units horizontal.
 - 3. Required insulation depth is less than the joist or truss bottom chord member depth.

The remaining portions of the joists or truss bottom chords shall be designed for a uniformly distributed ~~concurrent~~ live load of not less than 10 lb/ft². This live load need not be assumed to act concurrently with any other live load requirements.

- h *(No change to current text)*

Reason: In ASCE 7-10, uninhabited attics without storage are assigned a 10 psf live load for design of ceiling joists and truss bottom chords. This live load is intended to address occasional access of the space and wording in ASCE 7-10 footnote "l" does not require this live load to be applied concurrently with other live loads when designing the full roof assembly or supporting members such as headers and studs.

Similarly in ASCE 7-10, uninhabited attics with limited storage are also assigned a 10 psf live load in the portions of the attic above ceiling joists and truss bottom chords where significant storage is not possible. As with uninhabited attics without storage, ASCE 7-10 footnote "m" does not require the 10 psf live load to be applied concurrently with other live loads when designing the full roof assembly or supporting members such as headers and studs. However, the current wording in the IRC dropped the prefix "non" from "nonconcurrent" when these new provisions from ASCE 7-10 were incorporated. This change returns the wording to the ASCE 7-10 intent.

Cost Impact: No increase in cost of construction.

RB59-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R301.5T-RB-PITTS

RB60 – 13

Table R301.7

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee and Virginia Building and Code Officials Association (bajnaic@chesterfield.gov)

Revise as follows:

TABLE R301.7
ALLOWABLE DEFLECTION OF STRUCTURAL MEMBERS ^{b,c}

STRUCTURAL MEMBER	ALLOWABLE DEFLECTION
Rafters having slopes greater than 3:12 with no finished ceiling attached to rafters	L/180
Interior walls and partitions	H/180
Floors/ ceilings with plaster or stucco finish (including deck floors)	L/360
<u>Ceilings with brittle finishes (plaster, stucco, etc)</u>	<u>L/360</u>
<u>Ceilings with flexible finishes (gypsum board, etc)</u>	<u>L/240</u>
All other structural members	L/240
Exterior walls—wind loads ^a with plaster or stucco finish	H/360
Exterior walls with other brittle finishes	H/240
Exterior walls with flexible finishes	H/120 ^d
Lintels supporting masonry veneer walls ^e	L/600

Note: *L* = span length, *H* = span height.

- The wind load shall be permitted to be taken as 0.7 times the Component and Cladding loads for the purpose of the determining deflection limits herein.
- For cantilever members, *L* shall be taken as twice the length of the cantilever.
- For aluminum structural members or panels used in roofs or walls of sunroom additions or patio covers, not supporting edge of glass or sandwich panels, the total load deflection shall not exceed *L*/60. For continuous aluminum structural members supporting edge of glass, the total load deflection shall not exceed *L*/175 for each glass lite or *L*/60 for the entire length of the member, whichever is more stringent. For sandwich panels used in roofs or walls of sunroom additions or patio covers, the total load deflection shall not exceed *L*/120.
- Deflection for exterior walls with interior gypsum board finish shall be limited to an allowable deflection of *H*/180.
- Refer to Section R703.7.2.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

This code change was intended to clarify two issues.

1. There is confusion regarding the deflection allowed for deck joists. It was not clear if the original authors intended deck joists to be considered as a floor joist (L/360) or as "other structural members" (L/240). This clarifies the intention.
2. The other significant change addresses the flexibility/stiffness of gypsum board which is a lot more common than either plaster or stucco in most parts of the country. There is now cleaner differentiation between materials and is consistent with the allowable deflection limits in Table R802.4(1) and R802.4(2).

Cost Impact: None.

RB60-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R301.7T-RB-BAJNAI-BCAC

RB61 – 13

Table R301.7

Proponent: Cole Graveen PE, SE, Rath, Rath & Johnson, Inc., representing self (cwgraveen@rrj.com)

Revise as follows:

TABLE R301.7
ALLOWABLE DEFLECTION OF STRUCTURAL MEMBERS^{b,c}

STRUCTURAL MEMBER	ALLOWABLE DEFLECTION
All other structural members	L/240
<u>Guards^{f,g}</u>	
<u>Post (horizontal deflection)</u>	$\frac{H}{12}$
<u>Top Rail (horizontal deflection)</u>	$\frac{H}{24} + \frac{L}{96}$
<u>Top Rail (vertical deflection)</u>	$\frac{L}{96}$

(Portions of table not shown remain unchanged)

a through e *(No change to current text)*

f. For the guard post, H shall be taken as the distance from the top of the top rail to the first point of support.

g. For the guard top rail, H shall be taken as the height of the rail and L shall be taken as the distance between edges of the post supports. The deflection of the top rail is measured relative to the center of the two posts.

Reason: Specific deflection limits for guards are proposed to clarify serviceability requirements and to help ensure occupant safety and comfort.

The serviceability requirements for guards in both the IBC and IRC are vague and open to interpretation. The IBC requires all structural systems and members to have adequate stiffness to limit deflections and lateral drift, Section 1604.3, however it contains no specific deflection limits for guards. The IRC contains a general deflection limit of L/240 in Table R301.7 for all structural members not otherwise listed in the table. However, it is not likely that this limit was originally intended to apply to guards nor does it appear that this limit is commonly applied to guards in design or code enforcement.

The deflection limits proposed in this code change are based upon existing requirements in ASTM E985, *Standard Specification for Permanent Metal Railing Systems and Rails for Buildings*, ASTM D7032, *Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite Deck Boards and Guardrail Systems (Guards or Handrails)*, and ICC-ES AC273, *Acceptance Criteria for Handrails and Guards*. The proposed limits allow reasonable deflection of the guard post and top rail while still ensuring that the guard will perform its intended function of preventing accidental falls. It is important to note that while excessive deflection is undesirable, some deflection is desirable⁴ as it can provide warning to the occupant that they are at an edge of an elevated surface and may be unduly loading the guard.

Specific deflection limits are needed not only for clarity, but also to establish acceptable performance. Guards are provided to minimize the possibility of occupants accidentally falling from an elevated surface. The ability of a guard to prevent such an accidental fall depends on its stiffness as well as its height and strength. Guards that meet the strength and height requirements of the code but that move excessively under load could potentially not prevent an accidental fall. Limiting guard deflections to appropriate amounts will help protect occupants against accidentally falling from an elevated surface.

In addition, specific deflection limits are also necessary to help ensure that occupants are comfortable and feel safe. Similar to floor deflection limits that ensure that occupants are not uncomfortable or annoyed with bouncy floors or building drift limits that ensure that occupants are not uncomfortable or sick due to the swaying motion of tall buildings, reasonable lateral deflection limits for guards will help ensure that occupants do not feel that the guard is unsafe.

Example: Under the proposed deflection provisions, the post for a residential guard with a top rail height of 36" above the walking surface and a point of support 3' below the walking surface would have a deflection limit of $(36 + 3)/12 = 3.25$ inches. The top rail spanning between 4" wide posts that are spaced 4' apart would have a horizontal deflection limit of $(48 - 4)/96 + (36 + 3)/24 = 2.10$ inches.

References:

1. ASTM E985-00(2006), Standard Specification for Permanent Metal Railing Systems and Rails for Buildings
2. ASTM D7032-08, Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite Deck Boards and Guardrail Systems (Guards or Handrails)
3. ICC-ES AC273, Acceptance Criteria for Handrails and Guards, Corrected January 2009
4. Loferski, J., Albright, D., and Woeste, F. (July 2007) Tested Guardrail Post Connections for Residential Decks, Structure Magazine

Cost Impact: This code change proposal may increase the cost of construction by increasing the design costs. Designers may have to perform additional serviceability calculations.

RB61-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R301.7T-RB-GRAVEEN

RB62 – 13

Table R301.7

Proponent: Edward L. Keith, APA, representing The Engineered Wood Association
(ed.keith@apawood.org)

Revise as follows:

TABLE R301.7
ALLOWABLE DEFLECTION OF STRUCTURAL MEMBERS^{b,c}

STRUCTURAL MEMBERS	ALLOWABLE DEFLECTION
Rafters having slopes greater than 3:12 with no finished ceiling attached to rafters	<i>L/180</i>
Interior walls and partitions	<i>H/180</i>
Floors/ceilings with plaster or stucco finish	<i>L/360</i>
All other structural members	<i>L/240</i>
Exterior walls – wind loads ^a with plaster or stucco finish	<i>H/360</i>
Exterior walls - <u>wind loads^a</u> with other brittle finishes	<i>H/240</i>
Exterior walls - <u>wind loads^a</u> with flexible finishes	<i>H/120^d</i>
Lintels supporting masonry veneer walls ^e	<i>L/600</i>

(Portions of table not shown remain unchanged)

Reason: The proposed changes may be considered editorial. When the current table was put into the 2012 IRC the proposed changes above were inadvertently left out of the table when the changes approved in RB18-09/10 were incorporated.

Cost Impact: The code change proposal will not increase the cost of construction.

RB62-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R301.7T-RB-KEITH

RB63 – 13

R302.1

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee
(bajnaic@chesterfield.gov)

Revise as follows:

SECTION R302 FIRE-RESISTANT CONSTRUCTION

R302.1 Exterior walls. ~~Construction-Walls~~, projections, openings and penetrations of *exterior walls* of *dwelling*s and accessory buildings shall comply with Table R302.1(1); or *dwelling*s equipped throughout with an *automatic sprinkler system* installed in accordance with Section P2904 shall comply with Table R302.1(2). The minimum fire separation distance shall be measured at right angles from the face of the wall.

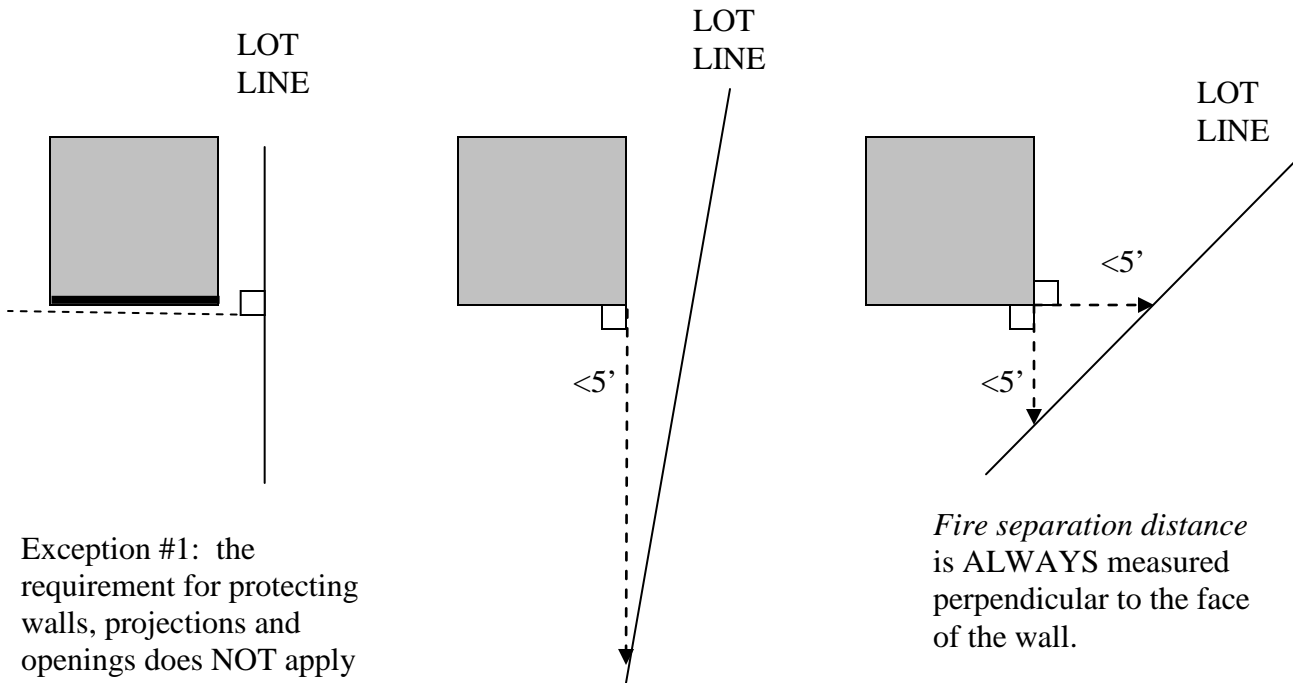
Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the *fire separation distance*.
2. Walls of *dwelling*s and their *accessory structures* located on the same *lot*.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

Fire Separation distance is among many of the code requirements that is often misinterpreted or is improperly enforced. To minimize the confusion, the BCAC decided that the best way to clarify how the fire separation distance is measured would be to incorporate language in Section 302.1 that restates the portion of the definition for fire separation distance that explains how it is measured.

The word "Construction" was deleted to correspond with the term "Wall" used in Tables R302.1(1) and R302.1(2).



Exception #1: the requirement for protecting walls, projections and openings does NOT apply when the walls, projections or opening are perpendicular to the line- no matter how close it is to the lot line.

Conversely Exception #1: the requirements for protecting walls, projections and openings applies to all walls, projections or openings NOT perpendicular to the lot line. To determine the degree that the walls, projections or openings have to be protected, use the *fire separation distance* (as measured perpendicular to the wall)

Fire separation distance is ALWAYS measured perpendicular to the face of the wall.

Cost Impact: None

RB63-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R302.1-RB-BAJNAI-BCAC

RB64 – 13

R302.1

Proponent: Ali M. Fattah, P.E., City of San Diego, representing the San Diego Area Chapter of ICC
(afattah@sandiego.gov)

Revise as follows:

R302.1 Exterior walls. Construction, projections, openings and penetrations of *exterior walls* of *dwelling*s and accessory buildings shall comply with Table R302.1(1); or *dwelling*s equipped throughout with an *automatic sprinkler system* installed in accordance with Section P2904 shall comply with Table R302.1(2).

Where non-residential buildings are located on the same lot containing dwellings and their accessory structures, exterior wall and opening protection and the protection of projections based on fire separation distance shall be determined in accordance with the *International Building Code*.

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the *fire separation distance*.
2. Walls of *dwelling*s and *accessory structures* located on the same *lot*.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the *lot*. Projections beyond the *exterior wall* shall not extend over the *lot line*.
4. Detached garages accessory to a *dwelling* located within 2 feet (610 mm) of a *lot line* are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation vents installed in compliance with this code are permitted.

Reason: Section R302.1 of the IRC is not clear as to when an imaginary line shall be used to determine protection due fire separation distance between dwellings and buildings other than dwellings or accessory structures thereto located on the same lot. Furthermore, the IBC in Chapter 5 allows for options other than assuming an imaginary line when determining fire separation distance.

The IBC Section 503.1.2 exempts multiple buildings located on the same lot from exterior fire protection due to fire separation distance when the when considered as portions of one building. Since the IRC does not limit the area of a building and does not require fire sprinkler protection for additions, the equivalent of Section 503.1.2 does not exist in the IRC.

This code change makes a reference to the IBC to make clear that the protection due to fire separation distance shall be determined based on the requirements of the IBC for both a dwelling and the non-residential building that is regulated by the IBC. Without this code change IBC Section 503.1.2 may be construed to not apply. While the IRC has been designed to be a standalone code, the building official will be regulating the non-residential building based on the IBC and this code change provides a clear reference.

Cost Impact: None. This code change will not increase the cost of construction.

RB64-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R302.1 #1-RB-FATTAH

RB65 – 13

R302.1

Proponent: Ali M. Fattah, P.E., City of San Diego, representing the San Diego Area Chapter of ICC
(afattah@sandiego.gov)

Revise as follows:

R302.1 Exterior walls. Construction, projections, openings and penetrations of *exterior walls* of *dwelling*s and accessory buildings shall comply with Table R302.1(1); or *dwelling*s equipped throughout with an *automatic sprinkler system* installed in accordance with Section P2904 shall comply with Table R302.1(2).

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the *fire separation distance*.
2. Walls of *dwelling*s shall not be separated from ~~and~~ accessory structures located on the same lot.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the lot. Projections beyond the *exterior wall* shall not extend over the *lot line*.
4. Detached garages accessory to a *dwelling* located within 2 feet (610 mm) of a *lot line* are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation vents installed in compliance with this code are permitted.

Reason: Exception 2 of Section R302.1 of the IRC is not clear and can be read in two different ways. It may be read to exempt only accessory structures other than those discussed in exception 3 and 4 or all dwellings and structures accessory to any of them from the fire separation distance requirements. The IBC Section 503.1.2 exempts multiple buildings located on the same lot from exterior fire protection due to fire separation distance when the when considered as portions of one building. Since the IRC does not limit the area of a building and does not require fire sprinkler protection for additions, the equivalent of Section 503.1.2 does not exist in the IRC.

The National Institutes for Standards and Technology (NIST) has performed full scale fire testing on the fire exposure between buildings of light framed construction and in "NIST Technical Note 1600 - Residential Structure Separation Fire Experiments" (<http://www.fire.nist.gov/bfrlpubs/fire08/PDF/f08034.pdf>) concludes that "... an adjacent structure can be ignited if flames from a fire inside a house exit through window openings. The experiments illustrated how a fire resistant barrier can, in the scenario tested, slow down flame spread between two structures separated by 1.8 m (6 ft)." The full scale testing demonstrates the benefits of fire separation and the need to limit exterior wall openings and to protect exterior walls.

It is not clear why the IBC and IRC are different with respect to the issue of fire separation. Neither IBC Chapter 6 nor Chapter 7 exempts structures from protections due to fire separation distance, however the IRC through this exception 2 can be construed to exempt a dwelling from being protected relative to an adjacent dwelling owned and operated by a different owner. The definition of fire separation distance in Section R202 includes the use of an imaginary line between buildings, and without this proposed code change the IRC may only require fire separation distance to buildings on the same lot that are not dwellings or accessory structures.

Cost Impact: This code change will have a minimal increase to the cost of construction since land use regulations may restrict the separation between buildings on the same lot due to zoning and other considerations.

RB65-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R302.1 #2-RB-FATTAH

RB66 – 13

R302.1

Proponent: Ali M. Fattah, P.E., City of San Diego, representing the San Diego Area Chapter of ICC
(afattah@sandiego.gov)

Revise as follows:

R302.1 Exterior walls. Construction, projections, openings and penetrations of exterior walls of dwellings and accessory buildings shall comply with Table R302.1(1); or dwellings equipped throughout with an automatic sprinkler system installed in accordance with Section P2904 shall comply with Table R302.1(2).

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the fire separation distance.
2. Walls of dwellings and accessory structures located on the same lot.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the lot. Projections beyond the exterior wall shall not extend over the lot line.
4. Detached garages accessory to a dwelling located within 2 feet (610 mm) of a lot line are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation vents installed in compliance with this code are permitted.
6. Detached patio covers and deck structures located greater than 5 feet from dwellings or lot lines.

Reason: Section R302.1 of the IRC is not clear insofar as detached patio covers and deck structures are concerned and can be read in two different ways. It may be read to exempt the detached accessory structures listed in exception 3 and require that detached patio covers and deck structures comply with fire separation distance requirements. The IBC does not regulate these accessory structures when associated with residential construction and does not exempt them either when associated with non-residential construction.

The IBC Section 503.1.2 exempts multiple buildings located on the same lot from exterior fire protection due to fire separation distance when the when considered as portions of one building. Since the IRC does not limit the area of a building and does not require fire sprinkler protection for additions, the equivalent of Section 503.1.2 does not exist in the IRC.

The National Institutes for Standards and Technology (NIST) has performed full scale fire testing on the fire exposure between buildings of light framed construction and in "NIST Technical Note 1600 - Residential Structure Separation Fire Experiments" (<http://www.fire.nist.gov/bfrlpubs/fire08/PDF/f08034.pdf>) concludes that "... an adjacent structure can be ignited if flames from a fire inside a house exit through window openings. The experiments illustrated how a fire resistant barrier can, in the scenario tested, slow down flame spread between two structures separated by 1.8 m (6 ft)." The full scale testing demonstrates the benefits of fire separation and the need to limit exterior wall openings and to protect exterior walls.

The proposed code change clarifies that if it is the intent of the IRC not to regulate the fire separation between accessory structures and between accessory structures and dwellings on the same lot that those accessory structures should at least be separated from lot lines as if they were dwellings.

Cost Impact: This code change will have a minimal increase to the cost of construction since land use regulations may restrict the separation between buildings on the same lot due to zoning and other considerations.

RB66-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R302.1 #3-RB-FATTAH

RB67 – 13

Table R302.1(1), Table R302.1(2)

Proponent: C. Ray Allshouse AIA, CBO, City of Shoreline, WA, representing the Washington Association of Building Officials Technical Code Development Committee (rallshouse@shorelinewa.gov)

Revise as follows:

R302.1 Exterior walls. Construction, projections, openings and penetrations of *exterior walls* of *dwelling*s and accessory buildings shall comply with Table R302.1(1); or *dwelling*s equipped throughout with an *automatic sprinkler system* installed in accordance with Section P2904 shall comply with Table R302.1(2).

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the *fire separation distance*.
2. Walls of *dwelling*s and *accessory structures* located on the same *lot*.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the *lot*. Projections beyond the *exterior wall* shall not extend over the *lot line*.
4. Detached garages accessory to a *dwelling* located within 2 feet (610 mm) of a *lot line* are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation vents installed in compliance with this code are permitted.

**TABLE R302.1(1)
EXTERIOR WALLS**

EXTERIOR WALL ELEMENT		MINIMUM FIRE-RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE
Walls	Fire-resistance rated	1 hour—tested in accordance with ASTM E 119 or UL 263 with exposure from both sides	< 5 feet
	Not fire-resistance rated	0 hours	³ 5 feet
Projections	Fire-resistance rated	1 hour on the underside ^{a, b}	³ 2 feet to < 5 feet
	Not fire-resistance rated	0 hours	³ 5 feet
Openings in walls	Not allowed	N/A	< 3 feet
	25% maximum of wall area	0 hours	3 feet
	Unlimited	0 hours	5 feet
Penetrations	All	Comply with Section R302.4	< 5 feet
		None required	5 feet

For SI: 1 foot = 304.8 mm.

N/A = Not Applicable

a. Roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave if fire blocking is provided from the wall top plate to the underside of the roof sheathing.

b. Roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave provided no gable vent openings are installed.

TABLE R302.1(2)
EXTERIOR WALLS-DWELLINGS WITH FIRE SPRINKLERS

EXTERIOR WALL ELEMENT		MINIMUM FIRE-RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE
Walls	Fire-resistance rated	1 hour—tested in accordance with ASTM E 119 or UL 263 with exposure from the outside	0 feet
	Not fire-resistance rated	0 hours	3 feet ^a
Projections	Fire-resistance rated	1 hour on the underside ^{b,c}	2 feet ^a
	Not fire-resistance rated	0 hours	3 feet
Openings in walls	Not allowed	N/A	< 3 feet
	Unlimited	0 hours	3 feet ^a
Penetrations	All	Comply with Section R302.4	< 3 feet
		None required	3 feet ^a

For SI: 1 foot = 304.8 mm.

N/A = Not Applicable

- a. For residential subdivisions where all dwellings are equipped throughout with an automatic sprinkler system installed in accordance with P2904, the fire separation distance for nonrated exterior walls and rated projections shall be permitted to be reduced to 0 feet, and unlimited unprotected openings and penetrations shall be permitted, where the adjoining lot provides an open setback yard that is 6 feet or more in width on the opposite side of the property line
- b. The roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave if fire blocking is provided from the wall top plate to the underside of the roof sheathing.
- c. The roof eave fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave provided gable vent openings are not installed.

Reason: This change is primarily intended to address construction problems associated with having to simultaneously provide fire-resistive eave projections and adequate roof ventilation vents. In addition, current code language is silent on a potential problem of fire-spread to unprotected attics from exterior sources through roof vents where residential structures are built tight to fire separation requirements. Roof ventilation, typically handled by the installation of “bird block” vents under roof eave projections, unfortunately serve as a path for fire spread from adjacent structures. This problem is further aggravated by the fact that NFPA 13D Fire Sprinkler Systems do not require sprinklers in attic spaces. The proposed change provides a builder's option to mitigate this situation by providing for the installation of a top-side roof vent in lieu of fire-resistance treatment of the eave projection. The resulting solid wood fire-block in place of the otherwise required eave vents protects the attic from fire intrusion. Under this scenario, the unprotected eave is viewed to be expendable and therefore need not be fire rated.

Cost Impact: The code change proposal will not increase the cost of construction.

RB67-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R302.1 (1)T-RB-ALLSHOUSE

RB68 – 13

Table R302.1(1)

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials
(rdavidson@maplegrovern.gov)

Revise as follows:

**TABLE R302.1(1)
EXTERIOR WALLS**

EXTERIOR WALL ELEMENT		MINIMUM FIRE-RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE
Walls	Fire-resistance rated	1 hour—tested in accordance with ASTM E 119 or UL 263 with exposure from both sides	< 5 feet
	Not fire-resistance rated	0 hours	³ 5 feet
Projections	Fire-resistance rated	1 hour on the underside	³ 2 feet to < 5 feet
	Not fire-resistance rated	0 hours	³ 5 feet
Openings in walls	Not allowed	N/A	< 3 feet
	25% maximum of wall area	0 hours	3 feet
	Unlimited	0 hours	5 feet
Penetrations	All	Comply with Section R302.4	< 5 <u>3</u> feet
		None required	5 <u>3</u> feet

For SI: 1 foot = 304.8 mm.

N/A = Not Applicable.

Reason: This proposal reduces the penetration protection requirements for non sprinklered buildings to the same level as sprinklered buildings. The code currently allows walls 3 feet from a lot line to have openings up to 25% of the wall area but penetrations are required to be protected. This is senseless. The code overreacts to penetration protection. Foundation vents can be installed without limitation up to a lot line. Walls can have openings up to 25% of the area of the wall at 3 feet from the lot line. But install a penetration for a sill cock at 4 feet and it needs protection! This proposal creates some sense of reason to this section of the code.

Cost Impact: None

RB68-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R302.1(1)T-RB-DAVIDSON

RB69 – 13

Table R302.1(1), R302.1(2)

Proponent: Ali M. Fattah, P.E., City of San Diego, representing the San Diego Area Chapter of ICC
(afattah@sandiego.gov)

Revise as follows:

**TABLE R302.1(1)
EXTERIOR WALLS**

EXTERIOR WALL ELEMENT		MINIMUM FIRE-RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE
Walls	Fire-resistance rated	1 hour—tested in accordance with ASTM E 119 or UL 263 with exposure from both sides	< 5 feet
	Not fire-resistance rated	0 hours	³ 5 feet
Projections	Fire-resistance rated	1 hour on the underside	³ ≥2 feet to < 5 feet <u>distance to projection</u>
	Not fire-resistance rated	0 hours	³ ≥5 feet <u>distance to projection</u>
Openings in walls	Not allowed	N/A	< 3 feet
	25% maximum of wall area	0 hours	3 feet
	Unlimited	0 hours	5 feet
Penetrations	All	Comply with Section R302.4	< 5 feet
		None required	5 feet

For SI: 1 foot = 304.8 mm.

N/A = Not Applicable.

TABLE R302.1(2)
EXTERIOR WALLS-DWELLINGS WITH FIRE SPRINKLERS

EXTERIOR WALL ELEMENT		MINIMUM FIRE-RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE
Walls	Fire-resistance rated	1 hour—tested in accordance with ASTM E 119 or UL 263 with exposure from the outside	0 feet
	Not fire-resistance rated	0 hours	3 feet ^a
Projections	Fire-resistance rated	1 hour on the underside	2 feet ^a <u>distance to projection</u>
	Not fire-resistance rated	0 hours	3 feet <u>distance to projection</u>
Openings in walls	Not allowed	N/A	< 3 feet
	Unlimited	0 hours	3 feet ^a
Penetrations	All	Comply with Section R302.4	< 3 feet
		None required	3 feet ^a

For SI: 1 foot = 304.8 mm.

N/A = Not Applicable

- a. For residential subdivisions where all dwellings are equipped throughout with an automatic sprinkler system installed in accordance with P2904, the fire separation distance for nonrated exterior walls and rated projections shall be permitted to be reduced to 0 feet, and unlimited unprotected openings and penetrations shall be permitted, where the adjoining lot provides an open setback yard that is 6 feet or more in width on the opposite side of the property line.

Reason: Table R302.1(1) and Table R302.1(2) are not clear when restrictions on projections are concerned. The term fire separation distance is defined in Section R202 clarifies that the fire separation distance is established by measuring “from the building face” to an imaginary line, lot line or the center line of a street. As a result once a fire separation distance is established the exterior wall elements shown in column 1 of both tables are restricted or protected based on their location. Projections however are regulated by the amount that they encroach into the fire separation distance. This code change updates the table for consistency with the TABLE 705.2 of the IBC that limits the distance from the line used to determine fire separation distance to the projection. The IRC and IBC editions preceding the 2012 edition included regulations restricting the length of projections encroaching into the fire separation distance, the famous 1/3 to 1/2 the fire separation distance approach. This editorial code change proposes to clarify the table and to assist the user.

This code change is being offered in a text format or tabular format in separate code changes to allow the membership a choice in the way that the regulations are adopted into the 2015 IBC.

Cost Impact: None. This code change will not increase the cost of construction.

RB69-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R302.1(1)T-RB-FATTAH

RB70 – 13

Table R302.1(1), Table R302.1(2)

Proponent: Steve Orlowski, representing National Association of Home Builders (NAHB)
(sorlowski@nahb.org)

Revise as follows:

**TABLE R302.1(1)
EXTERIOR WALLS**

EXTERIOR WALL ELEMENT		MINIMUM FIRE-RESISTANCE RATING <u>Fire Protection</u>	MINIMUM FIRE SEPARATION DISTANCE
Walls	Fire-resistance rated	1 hour—tested in accordance with ASTM E 119 or UL 263 with exposure from both sides	< 5 feet
	Not fire-resistance rated	0 hours	≥5 feet
Projections	Fire-resistance rated	1 hour <u>1 layer of 5/8 inch (mm) Type X gypsum board or equivalent^a</u> on the underside	≥2 feet to < 5 feet
	Not fire-resistance	0 hours	≥5 feet
Openings in walls	Not allowed	N/A	< 3 feet
	25% maximum of wall area	0 hours	3 feet
	Unlimited	0 hours	5 feet
Penetrations	All	Comply with Section R302.4	< 5 feet
		None required	5 feet

For SI: 1 foot = 304.8 mm.

N/A = Not Applicable.

a. Attic and crawlspace ventilation shall be permitted in projections, provided such vents are covered with noncombustible corrosion-resistant mesh with openings not to exceed ¼ inch (6.4mm).

**TABLE R302.1(2)
EXTERIOR WALLS—DWELLINGS WITH FIRE SPRINKLERS**

EXTERIOR WALL ELEMENT		MINIMUM FIRE-RESISTANCE RATING <u>FIRE PROTECTION</u>	MINIMUM FIRE SEPARATION DISTANCE
Walls	Fire-resistance rated	1 hour—tested in accordance with ASTM E 119 or UL 263 with exposure from both sides	0 feet
	Not fire-resistance rated	0 hours	3 feet ^a
Projections	Fire-resistance rated	1 hour <u>1 layer of 5/8 inch (mm) Type X gypsum board or equivalent^b</u> on the underside ^b	2 feet ^a

EXTERIOR WALL ELEMENT		MINIMUM FIRE-RESISTANCE RATING <u>FIRE PROTECTION</u>	MINIMUM FIRE SEPARATION DISTANCE
	Not fire-resistance	rated 0 hours	3 feet
Openings in walls	Not allowed	N/A	< 3 feet
	Unlimited	0 hours	3 feet ^a
Penetrations	All	Comply with Section R302.4	< 3 feet
		None required	3 feet

For SI: 1 foot = 304.8 mm.

N/A = Not Applicable

- a. For residential subdivisions where all dwellings are equipped throughout with an automatic sprinkler systems installed in accordance with Section P2904, the fire separation distance for nonrated exterior walls and rated projections shall be permitted to be reduced to 0 feet, and unlimited unprotected openings and penetrations shall be permitted, where the adjoining lot provides an open setback yard that is 6 feet or more in width on the opposite side of the property line.
- b. Attic and crawlspace ventilation in projections required to be fire protected shall be covered with noncombustible corrosion-resistant mesh with openings not to exceed ¼ inch (6.4mm).

Reason: After reviewing several UL listed fire-resistant rated assemblies, the NAHB discovered a problem between attempting to provide adequate attic ventilation to certain roof types (hip roofs, cathedral ceilings, etc) and achieving the one-hour fire resistance rating. The UL listed roof assemblies do not allow for any openings in the rated assembly for roofs, thereby creating a problem for proper roof ventilation as required in section R806. The NAHB proposes this code change to balance the needs of both adequate fire protection for exposure fires and proper ventilation of the attic. Under the 2012 IRC, projections are not permitted within two feet of the fire separation distance and the required ventilation opening for attics are minimal, 1/150 of the area of the vented space. The IRC also currently allows 25% of the wall space to be occupied by windows in exterior walls that are within 3'-0" of the fire separation distance. The IRC currently exempt foundation vents from being protected. NAHB suggests that due to the minimal openings required to provide ventilation in the attic, these openings should also be exempted. This proposal suggests removing the current performance requirement of providing a one hour fire-resistant rating on the underside of projections and replacing the language with a prescriptive method which achieves the same performance and allows for minimal openings for ventilation.

Cost Impact: The code change proposal will not increase the cost of construction.

RB70-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R301.1(1)T-RB-ORLOWSKI

RB71 – 13

Table R302.1(1), Table R302.1(2)

Proponent: Steve Thomas, Colorado Code Consulting, LLC representing Colorado Chapter ICC
(stthomas@coloradocode.net)

Revise as follows:

**TABLE R302.1(1)
EXTERIOR WALLS**

EXTERIOR WALL ELEMENT		MINIMUM FIRE-RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE
Walls	Fire-resistance rated	1 hour—tested in accordance with ASTM E 119 or UL 263 with exposure from both sides	< 5 feet
	Not fire-resistance rated	0 hours	≥ 5 feet
Projections	<u>Not allowed</u>	N/A	< 2 feet
	Fire-resistance rated	1 hour on the underside	≥ 2 feet to < 5 feet
	Not fire-resistance rated	0 hours	≥ 5 feet
Openings in walls	<u>Not allowed</u>	N/A	< 3 feet
	25% maximum wall area	0 hours	3 feet
	Unlimited	0 hours	5 feet
Penetrations	All	Comply with Section R302.4	< 5 feet
		None Required	5 feet

**TABLE R302.1(2)
EXTERIOR WALLS – DWELLINGS WITH FIRE SPRINKLERS**

EXTERIOR WALL ELEMENT		MINIMUM FIRE-RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE
Walls	Fire-resistance rated	1 hour—tested in accordance with ASTM E 119 or UL 263 with exposure from both sides	0 feet
	Not fire-resistance rated	0 hours	3 feet ^a
Projections	<u>Not allowed</u>	N/A	< 2 feet
	Fire-resistance rated	1 hour on the underside	2 feet ^a
	Not fire-resistance rated	0 hours	3 feet
Openings in walls	<u>Not allowed</u>	N/A	< 3 feet
	Unlimited	0 hours	3 feet ^a
Penetrations	All	Comply with Section R302.4	< 3 feet
		None Required	3 feet ^a

For SI: 1 foot = 304.8 mm.

N/A = Not Applicable

- a. For residential subdivisions where all dwellings are equipped throughout with an automatic sprinkler systems installed in accordance with Section P2904, the fire separation distance for nonrated exterior walls and rated projections shall be permitted to be reduced to 0 feet, and unlimited unprotected openings and penetrations shall be permitted, where the adjoining lot provides an open setback yard that is 6 feet or more in width on the opposite side of the property line.

Reason: There is currently no specific language that states that projections cannot be any closer to a property line than 2 feet. Table 302.1 infers it, but it is not clear. It appears that this requirement was lost when we put the projection requirements into the table format in the 2009 IRC. Our proposal clears up this hole in the code and provides specific language stating that projections are not permitted within 2 feet of the line used to determine the fire separation distance.

Cost Impact: Construction costs will not be affected by this proposal.

RB71-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R302.1(1)T-RB-THOMAS

RB72 – 13

Table R302.1(1)

Proponent: Maureen Traxler, Washington Association of Building Officials Technical Code Development Committee (maureen.traxler@seattle.gov)

Revise as follows:

**TABLE R302.1(1)
EXTERIOR WALLS**

EXTERIOR WALL ELEMENT		MINIMUM FIRE-RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE
Walls	Fire-resistance rated	1 hour—tested in accordance with ASTM E 119 or UL 263 with exposure from both sides	< 5 feet
	Not fire-resistance rated	0 hours	≥ 5 feet
Projections	Fire-resistance rated	1 hour on the underside	≥ 2 feet to < 5 feet
	Not fire-resistance rated	0 hours	≥ 5 feet
Openings in walls	Not allowed	N/A	< 3 feet
	25% maximum of wall area <u>per story</u>	0 hours	3 feet
	Unlimited	0 hours	5 feet
Penetrations	All	Comply with Section R302.4	< 5 feet
		None required	5 feet

For SI: 1 foot = 304.8 mm.

N/A = Not Applicable.

Reason: The IRC is ambiguous about how to calculate the percentage of openings allowed in exterior walls. The limitation could be calculated either as a percentage of the area of the entire exterior wall, or as a percentage of each story. This proposal requires that openings in exterior walls be calculated for each story. This method is consistent with IBC Section 705.8.1. Consider this example of the potential consequence of not using the proposed interpretation. If the area of openings was allowed to be calculated based on the entire face of the wall, on a 3-story building the first story of a building 3 feet from a property line could have 75% openings if there were no openings in the other 2 stories.

Cost Impact: None

RB72-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R302.1(1)T-RB-TRAXLER

RB73 – 13

Table R302.1(2), R309.5

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials
(rdavidson@maplegrovern.gov)

Revise as follows:

TABLE R302.1(2) EXTERIOR WALLS—DWELLINGS WITH FIRE SPRINKLERS

(Portions of table not shown remain unchanged.)

- a. ~~For residential subdivisions where all dwellings are equipped throughout with an automatic sprinkler systems installed in accordance with Section P2904, the fire separation distance for nonrated exterior walls and rated projections shall be permitted to be reduced to 0 feet, and unlimited unprotected openings and penetrations shall be permitted, where the adjoining lot provides an open setback yard that is 6 feet or more in width on the opposite side of the property line.~~

~~R309.5 Fire sprinklers.~~ ~~Private garages shall be protected by fire sprinklers where the garage wall has been designed based on Table R302.1(2), Footnote a. Sprinklers in garages shall be connected to an automatic sprinkler system that complies with Section P2904. Garage sprinklers shall be residential sprinklers or quick-response sprinklers, designed to provide a density of 0.05 gpm/ft². Garage doors shall not be considered obstructions with respect to sprinkler placement.~~

Reason: It is reasonable to delete this footnote and related section R309.5 because the code doesn't define what a "subdivision" is and there is no way to apply this footnote in a fair manner. Because it only applies to "subdivisions" where **all** dwellings are equipped with sprinklers and because there are huge numbers of undeveloped lots scattered throughout existing "subdivisions" in this country because of the financial crises, there is an incentive for lot owners to replat their lots, even single lots, to a separate "subdivision" to take advantage of this exception. It then gives special treatment to a lot owner if there is open space on an adjoining lot by allowing them to construct to a lot line and effectively requiring the adjoining owner to maintain a six foot setback. This effectively limits what that adjoining lot owner can do based on "the neighbor got there first" and can have an impact on the value of the properties.

How do you deny a permit to a homeowner because of something an adjoining owner did? Code philosophy has always been based on the correlation of a building located on its own lot with no credit being given for space on an adjoining lot that is not under the control of the jurisdiction or the owner in question. This code section is so confusing that it will result in a lack of uniformity where ever it is used.

Additionally, as it now stands, this requirement will require record keeping and plan submittals that would not have been necessary previously and require some surveys and site plans to include information on the adjoining lot. For example, if one lot owner exercised this option and placed their building two feet from a lot line, this would require the adjoining owner to maintain a 4 foot setback. Site plans would need to indicate the setback of adjoining lots in order for this to be properly enforced. This will increase the cost of site plan/survey preparation. It also assumes that ready access to adjoining properties will be permitted. This code change is necessary to avoid confusion and treat all property owners equally.

Cost Impact: None

RB73-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R302.1(2)T-RB_DAVIDSON

RB74 – 13

R302.1.1 (New)

Proponent: Ali M. Fattah, P.E., City of San Diego, representing the San Diego Area Chapter of ICC
(afattah@sandiego.gov)

Add new text as follows:

R302.1 Exterior walls. Construction, projections, openings and penetrations of *exterior walls* of *dwellings* and accessory buildings shall comply with Table R302.1(1); or dwellings equipped throughout with an automatic sprinkler system installed in accordance with Section P2904 shall comply with Table R302.1(2).

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the fire separation distance.
2. Walls of dwellings and accessory structures located on the same lot.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the lot. Projections beyond the exterior wall shall not extend over the lot line.
4. Detached garages accessory to a dwelling located within 2 feet (610 mm) of a lot line are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation vents installed in compliance with this code are permitted.

R302.1.1 Exterior stairways. Exterior stairways located above grade shall have a minimum fire separation distance of 5 feet (1524 mm) as measured from the exterior edge of the *stairway*, including landings, to adjacent *lot lines* and from other buildings on the same lot.

Exception: Where the *exterior walls* and openings on the adjacent building on the same lot are protected in accordance with Table R302.1(1) based on *fire separation distance*.

Reason: Section R302.1 of the IRC is not clear insofar as exterior stairways located in close proximity to lot lines. The IBC Section 1026.5 requires a fire separation distance of not less than 10 ft since it considers exterior stairways to be exits. The IRC does not fire protection for stairways and as a consequence a dwelling unit located on the second floor served independently with an exterior stairway can be served with a stairway located at a fire separation distance of 0 ft. This lack of protection to a combustible exterior exit element is not prudent as has been demonstrated by full scale fire testing for building exposures.

The National Institutes for Standards and Technology (NIST) has performed full scale fire testing on the fire exposure between buildings of light framed construction and in "NIST Technical Note 1600 - Residential Structure Separation Fire Experiments" (<http://www.fire.nist.gov/bfrlpubs/fire08/PDF/f08034.pdf>) concludes that "... an adjacent structure can be ignited if flames from a fire inside a house exit through window openings. The experiments illustrated how a fire resistant barrier can, in the scenario tested, slow down flame spread between two structures separated by 1.8 m (6 ft)." The full scale testing demonstrates the benefits of fire separation and the need to limit exterior wall openings and to protect exterior walls and by extension the reason that it is necessary to protect or separate elevated exterior exit ways.

Cost Impact: This code change will have a minimal increase to the code of construction since local use regulations may restrict the separation between buildings on the same lot due to zoning and other considerations.

RB74-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R302.1.1 (NEW) #1-RB-FATTAH

RB75 – 13

R302.1.1 (New)

Proponent: Ali M. Fattah, P.E., City of San Diego, representing the San Diego Area Chapter of ICC
(afattah@sandiego.gov)

Add new text as follows:

R302.1 Exterior walls. Construction, projections, openings and penetrations of exterior walls of dwellings and accessory buildings shall comply with Table R302.1(1); or dwellings equipped throughout with an automatic sprinkler system installed in accordance with Section P2904 shall comply with Table R302.1(2).

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the fire separation distance.
2. Walls of dwellings and accessory structures located on the same lot.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the lot. Projections beyond the exterior wall shall not extend over the lot line.
4. Detached garages accessory to a dwelling located within 2 feet (610 mm) of a lot line are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation vents installed in compliance with this code are permitted.

R302.1.1 Attached and detached accessory structures. Accessory structures such as patio covers and deck structures, whether attached or detached, shall be located not less than a fire separation distance of 5 ft or more from lot lines.

Reason: Section R302.1 of the IRC is not clear insofar as detached patio covers and deck structures are concerned and can be read in two different ways. It may be read to exempt the detached accessory structures listed in exception 3 and require that detached patio covers and deck structures comply with fire separation distance requirements. The IBC does not regulate these accessory structures when associated with residential construction and does not exempt them either when associated with non-residential construction.

The IBC Section 503.1.2 exempts multiple buildings located on the same lot from exterior fire protection due to fire separation distance when the when considered as portions of one building. Since the IRC does not limit the area of a building and does not require fire sprinkler protection for additions, the equivalent of Section 503.1.2 does not exist in the IRC.

The National Institutes for Standards and Technology (NIST) has performed full scale fire testing on the fire exposure between buildings of light framed construction and in "NIST Technical Note 1600 - Residential Structure Separation Fire Experiments" (<http://www.fire.nist.gov/bfrlpubs/fire08/PDF/f08034.pdf>) concludes that "... an adjacent structure can be ignited if flames from a fire inside a house exit through window openings. The experiments illustrated how a fire resistant barrier can, in the scenario tested, slow down flame spread between two structures separated by 1.8 m (6 ft)." The full scale testing demonstrates the benefits of fire separation and the need to limit exterior wall openings and to protect exterior walls.

The proposed code change clarifies that if it is the intent of the IRC not to regulate the fire separation between accessory structures and between accessory structures and dwellings on the same lot that those accessory structures should at least be separated from lot lines as if they were dwellings.

Cost Impact: This code change will have a minimal increase to the cost of construction since land use regulations may restrict the separation between buildings on the same lot due to zoning and other considerations.

RB75-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

(NEW) #2-RB-FATTAH

RB76 – 13

R302.1.1 (New)

Proponent: Ali M. Fattah, P.E., City of San Diego, representing the San Diego Area Chapter of ICC(afattah@sandiego.gov)

Add new text as follows:

R302.1 Exterior walls. Construction, projections, openings and penetrations of exterior walls of dwellings and accessory buildings shall comply with Table R302.1(1); or dwellings equipped throughout with an automatic sprinkler system installed in accordance with Section P2904 shall comply with Table R302.1(2).

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the fire separation distance.
2. Walls of dwellings and accessory structures located on the same lot.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the lot. Projections beyond the exterior wall shall not extend over the lot line.
4. Detached garages accessory to a dwelling located within 2 feet (610 mm) of a lot line are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation vents installed in compliance with this code are permitted.

R302.1.1 Projections. Projections shall be located a minimum distance from the line used to determine fire separation distance based on Table R302.1(1) and Table R302.1(2). Projections shall be fire resistance rated where required by Table R302.1(1) and Table R302.1(2).

Reason: Table R302.1(1) and Table R302.1(2) are not clear when restrictions on projections are concerned. The term fire separation distance is defined in Section R202 clarifies that the fire separation distance is established by measuring "from the building face" to an imaginary line, lot line or the center line of a street. As a result once a fire separation distance is established the exterior wall elements shown in column 1 of both tables are restricted or protected based on their location. Projections however are regulated by the amount that they encroach into the fire separation distance. This code change updates the table for consistency with the TABLE 705.2 of the IBC that limits the distance from the line used to determine fire separation distance to the projection. The IRC and IBC editions preceding the 2012 edition included regulations restricting the length of projections encroaching into the fire separation distance, the famous 1/3 to 1/2 the fire separation distance approach. This editorial code change proposes to clarify the table and to assist the user.

This code change is being offered in a text format or tabular format in separate code changes to allow the membership a choice in the way that the regulations are adopted into the 2015 IBC.

Cost Impact: None. This code change will not increase the cost of construction.

RB76-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R302.1.1 (NEW) #3-RB-FATTAH

RB77 – 13

R302.2

Proponent: Matt Archer, Douglas County, CO representing Colorado Chapter Code Change Committee (marcher@douglas.co.us)

Revise as follows:

R302.2 Townhouses. Each *townhouse* shall be considered a separate building and shall be separated by fire-resistance-rated wall assemblies meeting the requirements of Section R302.1 for exterior walls.

Exception: A common 1-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263 is permitted for townhouses if such walls do not contain plumbing or mechanical equipment, ducts or vents in the cavity of the common wall. ~~The wall shall be rated for fire exposure from both sides, and shall extend to and be tight against exterior walls and the underside of the roof sheathing. Electrical installations shall be installed in accordance with Chapters 34 through 43. Penetrations of electrical outlet boxes shall be in accordance with Section R302.4.~~

Reason: This language is redundant and needs to be deleted because it is already covered in the next section, R302.2.1, Continuity.

"The fire-resistance-rated wall or assembly separating *townhouses* shall be continuous from the foundation to the underside of the roof sheathing, deck or slab. The fire-resistance rating shall extend the full length of the wall or assembly, including wall extensions through and separating attached enclosed *accessory structures*."

The language about electrical installations is not needed. This section is about fire-resistance-rated construction, not about how to wire a home.

Cost Impact: None

RB77-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R302.2-RB-ARCHER

RB78 – 13

R302.2

Proponent: Michael Gardner, representing Gypsum Association (mgardner@gypsum.org); Jeffrey Hugo, representing National Fire Sprinkler Association (hugo@nfsa.org)

Revise as follows:

R302.2 Townhouses. Each *townhouse* shall be considered a separate building and shall be separated by fire-resistance rated wall assemblies meeting the requirements of Section R302.1 for exterior walls-

Exception: A common ~~1-hour~~ fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263 is permitted for townhouses if such walls do not contain plumbing or mechanical equipment, ducts or vents in the cavity of the common wall. The wall shall be rated for fire exposure from both sides and shall extend to and be tight against exterior walls and the underside of the roof sheathing. Electrical installations shall be installed in accordance with Chapters 34 through 43. Penetrations of electrical outlet boxes shall be in accordance with Section R302.4. The common wall shall be 1-hour-fire-resistance-rated for townhouses complying with Section R313.1 and 2-hour-fire-resistance-rated in all other installations.

Reason: A number of governmental entities, primarily local jurisdictions in states where a state-wide code does not exist, are electing to eliminate the residential sprinkler requirement when adopting a new version of the IRC. In so doing, the jurisdiction runs the risk of overlooking the need to re-insert the language that requires the townhouse separation wall to have a two-hour fire rating if the option to use a common wall is chosen.

This proposal addresses this potential oversight. By reference to Section R313.1, it re-establishes the 2-hour common wall requirement only in the instance where adjacent townhouse units are not sprinklered. If sprinkler systems that meet the requirements of Section R313.1 are installed in adjacent townhouse units, the common wall rating remains 1- hour.

Cost Impact: None

RB78-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R302.2-RB-HUGO-GARDNER

RB79 – 13

R302.2, R302.2.4

Proponent: Jeffrey M. Shapiro, representing IRC Fire Sprinkler Coalition
(jeff.shapiro@intlcodeconsultants.com)

Revise as follows:

R302.2 Townhouses. Each *townhouse* shall be considered a separate building and shall be separated by fire-resistance rated wall assemblies meeting the requirements of Section R302.1 for exterior walls.

Exceptions:

1. Where a fire sprinkler system in accordance with Section P2904 is provided, a common 1-hour-fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263 is permitted for townhouses if such walls do not contain plumbing or mechanical equipment, ducts or vents in the cavity of the common wall. The wall shall be rated for fire exposure from both sides and shall extend to and be tight against exterior walls and the underside of the roof sheathing. Electrical installations shall be installed in accordance with Chapters 34 through 43. Penetrations of electrical outlet boxes shall be in accordance with Section R302.4.
2. Where a fire sprinkler system in accordance with Section P2904 is not provided, a common 2-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263 is permitted for townhouses where such walls do not contain plumbing or mechanical equipment, ducts or vents in the cavity of the common wall. The wall shall be rated for fire exposure from both sides and shall extend to and be tight against exterior walls and the underside of the roof sheathing. Electrical installations shall be installed in accordance with Chapters 34 through 43. Penetrations of electrical outlet boxes shall be in accordance with Section R302.4.

R302.2.4 Structural independence. Each individual *townhouse* shall be structurally independent.

Exceptions:

1. Foundations supporting *exterior walls* or common walls.
2. Structural roof and wall sheathing from each unit may fasten to the common wall framing.
3. Nonstructural wall and roof coverings.
4. Flashing at termination of roof covering over common wall.
5. *Townhouses* separated by a common ~~4-hour fire resistance-rated~~ wall as provided in Section R302.2, Exceptions 1 or 2.

Reason: The 1-hour separation requirements in these sections were reduced from 2-hour ratings in prior editions of the IRC based on the assumption that fire sprinklers mandated by the IRC would be present in all townhouses. Because some jurisdictions are amending the IRC to remove the fire sprinkler requirement, it is essential that the IRC provide for townhouse separation fire ratings to be returned to 2-hours if sprinklers are not provided. No justification, other than sprinklers, was ever provided for allowing a 1-hour separation, and this reduced rating is inappropriate for non-sprinklered buildings.

Cost Impact: The code change proposal will not increase the cost of construction.

RB79-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R302.2-RB-SHAPIRO

RB80 – 13

R302.2, R302.2.4

Proponent: Jason Thompson, National Concrete Masonry Association representing Masonry Alliance for Codes and Standards (jthompson@ncma.org)

Revise as follows:

R302.2 Townhouses. Each *townhouse* shall be considered a separate building and shall be separated by fire-resistance-rated wall assemblies meeting the requirements of Section R302.1 for exterior walls.

Exception: A common ~~1-hour fire-resistance-rated~~ wall assembly with a minimum 1-hour fire-resistance-rating as tested in accordance with ASTM E 119 or UL 263 is permitted for *townhouses* if such walls do not contain plumbing or mechanical equipment, ducts or vents in the cavity of the common wall. The wall shall be rated for fire exposure from both sides and shall extend to and be tight against exterior walls and the underside of the roof sheathing. Electrical installations shall be installed in accordance with Chapters 34 through 43. Penetrations of electrical outlet boxes shall be in accordance with Section R302.4.

R302.2.4 Structural independence. Each individual townhouse shall be structurally independent.

Exceptions:

1. Foundations supporting exterior walls or common walls.
2. Structural roof and wall sheathing from each unit may fasten to the common wall framing.
3. Nonstructural wall coverings.
4. Flashing at termination of roof covering over common wall.
5. Townhouses separated by a common ~~1-hour fire-resistance-rated~~ wall as provided in Section R302.2.

Reason: The present language in R302.2 specifically requires a 1-hour fire resistance rating for common walls between townhouses. It is unclear if the code user could specify and construct a 2-hour or 3-hour fire rated wall assembly if they wanted to though common walls with a higher fire resistance rating should be allowed. This proposal is intended to allow the code user to construct common walls between townhouses with a fire resistance rating of 1-hour or greater.

As a corollary change Exception No. 5 to Section 302.2.4 applies to the common walls between townhouses that have a 1-hour fire resistance rating as specified in R302.2. The exception permits these common walls to be shared by townhouses without having to provide structural independence. However, the wording in the exception also prevents a person who may want to use a common wall with a fire resistance rating that is more than 1-hour from applying the structural independence exemption. This proposal deletes the hourly fire resistance rating from Exception No. 5 so the "common wall" is only required to meet the provisions in accordance with Section R302.2, which includes the requirement for a fire resistance rating of at least 1-hour. The use of the term "common wall" in Exception No. 5 is also consistent with the "common wall" terminology in Exceptions 1, 2 and 4 to Section R302.2.4.

Cost Impact: This proposal will not increase the cost of construction.

RB80-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R302.2 #1-RB-THOMPSON

RB81 – 13

R302.2, R302.2.4, R313.1, R313.2 and R313.3 (New)

Proponent: Jason Thompson, P.E., National Concrete Masonry Association representing Masonry Alliance for Codes and Standards (jthompson@ncma.org)

Revise as follows:

R302.2 Townhouses. Each *townhouse* shall be considered a separate building and shall be separated by fire-resistance-rated wall assemblies meeting the requirements of Section R302.1 for exterior walls.

Exception: A common 1-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263 is permitted for *townhouses* with automatic fire sprinkler systems in accordance with Section R313.1 if such walls do not contain plumbing or mechanical equipment, ducts or vents in the cavity of the common wall. The wall shall be rated for fire exposure from both sides and shall extend to and be tight against exterior walls and the underside of the roof sheathing. Electrical installations shall be installed in accordance with Chapters 34 through 43. Penetrations of electrical outlet boxes shall be in accordance with Section R302.4.

R302.2.4 Structural independence. Each individual townhouse shall be structurally independent.

Exceptions:

1. Foundations supporting exterior walls or common walls.
2. Structural roof and wall sheathing from each unit may fasten to the common wall framing.
3. Nonstructural wall coverings.
4. Flashing at termination of roof covering over common wall.
5. Townhouses separated by a common ~~1-hour fire-resistance-rated~~ wall as provided in Section R302.2 or Section R313.3.

R313.1 Townhouse automatic fire sprinkler systems. Except as provided in Section R313.3, A ~~an~~ automatic residential fire sprinkler system shall be installed in *townhouses*.

Exception: An automatic residential fire sprinkler system shall not be required when *additions* or *alterations* are made to existing *townhouses* that do not have an automatic residential fire sprinkler system installed.

R313.1.1 Design and installation. Automatic residential fire sprinkler systems for *townhouses* shall be designed and installed in accordance with Section P2904.

R313.2 One- and two-family dwellings automatic fire systems. Except as provided in Section R313.3, A ~~an~~ automatic residential fire sprinkler system shall be installed in one- and two-family *dwellings*.

Exception: An automatic residential fire sprinkler system shall not be required for *additions* or *alterations* to existing buildings that are not already provided with an automatic residential sprinkler system.

R313.2.1 Design and installation. Automatic residential fire sprinkler systems shall be designed and installed in accordance with Section P2904 or NFPA 13D.

R313.3 Automatic fire sprinkler system alternative. Where an automatic fire sprinkler system is not required to be installed by the adopting authority, the following requirements shall be met.

1. Construction, projections, openings and penetrations of exterior walls of dwellings shall comply with Table R302.1(1);

2. Townhouses constructed with a common wall assembly in accordance with the exception to Section R302.2 shall have a minimum 2-hour fire-resistance-rating. The common wall shall not contain plumbing or mechanical equipment, ducts or vents in the cavity of the common wall. The wall shall be rated for fire exposure from both sides and shall extend to and be tight against exterior walls and the underside of the roof sheathing. Electrical installations shall be installed in accordance with Chapters 34 through 43. Penetrations for electrical outlet boxes shall be in accordance with Section R302.4.

Reason: Where adoption of the 2009 and 2012 editions of the International Residential Building Code have been considered, many adopting authorities have made modifications to negate the requirement for mandatory automatic fire sprinkler protection. In some instances the adopting authorities have re-instated the previous requirements for the fire resistance for exterior walls for dwellings and the fire resistance for common walls separating townhouses to those established in the 2006 edition. However, some jurisdictions negated the mandatory automatic fire sprinkler protection but did not require the previous fire resistance requirements for these exterior walls and common walls resulting in reduced fire safety for the occupants and property.

This proposal provides an alternative within the code to permit adopting authorities an option to permit townhouses and one- and two-family dwellings to be unsprinklered provided the fire resistance rating for exterior walls and common walls are established at the code prescribed levels prior to the 2009 IRC.

Cost Impact: This proposal will not increase the cost of construction.

RB81-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R302.2 #2-RB-THOMPSON

RB82 – 13

R302.2, R302.2.4

Proponent: Jason Thompson, National Concrete Masonry Association representing Masonry Alliance for Codes and Standards (jthompson@ncma.org)

Revise as follows:

R302.2 Townhouses. Each *townhouse* shall be considered a separate building and shall be separated by fire-resistance-rated wall assemblies meeting the requirements of Section R302.1 for exterior walls.

Exception: A common ~~1-hour fire-resistance-rated~~ wall assembly with a minimum 2-hour fire-resistance-rating as tested in accordance with ASTM E 119 or UL 263 is permitted for townhouses if such walls do not contain plumbing or mechanical equipment, ducts or vents in the cavity of the common wall. The wall shall be rated for fire exposure from both sides and shall extend to and be tight against exterior walls and the underside of the roof sheathing. Electrical installations shall be installed in accordance with Chapters 34 through 43. Penetrations of electrical outlet boxes shall be in accordance with Section R302.4.

R302.2.4 Structural independence. Each individual townhouse shall be structurally independent.

Exceptions:

1. Foundations supporting exterior walls or common walls.
2. Structural roof and wall sheathing from each unit may fasten to the common wall framing.
3. Nonstructural wall coverings.
4. Flashing at termination of roof covering over common wall.
5. Townhouses separated by a common ~~1-hour fire-resistance-rated~~ wall as provided in Section R302.2.

Reason: Code change RB66-07/08 required townhouses constructed in accordance with the International Residential Code to be provided with automatic sprinkler protection. While this new requirement added a fire safety feature to townhouses the code change also reduced the level of fire safety that existed in the code by reducing the fire resistance rating required for the common wall separating dwelling units in townhouses. The first part of this code change to Section R302.2 will restore the previous IRC code requirement that the common wall separating dwelling units in townhouses shall have a minimum fire resistance rating of 2-hours. There are two reasons for this part of the change.

First, Code Change RB66-07/08 justified the addition of mandatory sprinkler protection for townhouses based on sprinklers being the best tool for providing additional fire safety in residential occupancies. Given that the 2006 IRC already had an established level of fire safety for residential occupancies utilizing townhouse construction with 2-hour fire rated construction for the common wall, the goal for improving fire safety with the addition of sprinkler protection was not fully achieved. The existing level of fire safety was diminished by the reduction in the fire resistance rating of the common wall from 2-hours to 1-hour.

Second, Code Change RB66-07/08 created an inconsistency in the IRC. If two separate one and two family dwellings are constructed on individual lots and each built less than 3 feet from the property line, Section R302.1 and Tables R302.1(1) and R302.1(2) will require the exterior wall of each dwelling to be built with a 1-hour fire resistance rating using a fire exposure from both sides. The net result is that both dwellings are separated from the other adjacent, closely located dwelling by wall construction with a total cumulative fire resistance of 2-hours. Yet, if these same two individual dwellings are physically connected at the property line by a common wall the code permits the fire resistance rating between the townhouse dwelling units to be reduced to 1-hour. The level of fire safety for dwellings with these two configurations is not consistent.

Part 2 of the change modifies Exception No. 5 to Section R302.2.4 by deleting any reference to an hourly fire resistance rating. Presently Exception No. 5 to Section 302.2.4 applies to the common walls between townhouses that have a 1-hour fire resistance rating as specified in R302.2. The exception permits these common walls to be shared by townhouses without having to provide structural independence. However, the wording in the exception also prevents a person who may want to use a common wall with a fire resistance rating that is more than 1-hour from applying the structural independence exemption. This proposal deletes the hourly fire resistance rating from Exception No. 5 so the "common wall" is only required to meet the provisions in accordance with Section R302.2, which includes the requirement for a fire resistance rating. The use of the term "common wall" in Exception No. 5 is also consistent with the "common wall" terminology in Exceptions 1, 2 and 4 to Section R302.2.4.

This code change achieves the full level of fire safety provided for in residential occupancies through the use of sprinkler protection and built-in fire resistant construction. It will also eliminate the fire safety inconsistency in the IRC between dwelling units built with small fire separation distances to property lines and dwelling units constructed as townhouses and connected at property lines by a common wall.

Cost Impact: This proposal will not increase the cost of construction.

RB82-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R302.2 #3-RB-THOMPSON

RB83 – 13

302.2.1

Proponent: C. Ray Allshouse AIA, CBO, City of Shoreline, WA, representing the Washington Association of Building Officials Technical Code Development Committee (rallshouse@shorelinewa.gov)

Revise as follows:

R302.2.1 Continuity. The fire-resistance-rated wall or assembly separating *townhouses* shall be continuous from the foundation to the underside of the roof sheathing, deck or slab. The fire-resistance rating shall extend the full length of the wall or assembly, including wall extensions through and separating attached enclosed *accessory structures*. Where a story extends beyond the exterior wall of a story below, one of the following shall apply:

1. The fire-resistance-rated wall or assembly shall extend to the outside edge of the upper story; or
2. The underside of the exposed floor-ceiling assembly shall be protected as required for projections in Section R302.

Reason: Current townhouse code language is vague regarding the continuity of fire-resistance-rated assemblies, specifically in those instances where an upper story extends beyond the face of the wall immediately below. This represents a potential breach in the integrity of the fire resistance rated construction deemed necessary to ensure full dwelling unit separation in townhouse configured construction. This change clarifies the needed protection requirements. It is not uncommon for local zoning ordinances to include provisions specifically intended to break up continuous building facades as well as the large scale presentation of multifamily buildings. Developers typically utilize offsets between units to achieve these building modulation requirements that frequently result in this configuration. This proposed change provides language to cover this condition thereby helping ensure that the required dwelling separation is achieved.

Cost Impact: The code change proposal will not increase the cost of construction.

RB83-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R302.2.1-RB-ALLSHOUSE

RB84 – 13

R302.1

Proponent: Steve Orlowski, representing National Association of Home Builders (NAHB)
(sorlowski@nahb.org)

Revise as follows:

R302.1 Exterior walls. Construction, projections, openings and penetrations of *exterior walls* of *dwelling*s and accessory buildings shall comply with Table R302.1(1); or *dwelling*s equipped throughout with an *automatic sprinkler system* installed in accordance with Section P2904 shall comply with Table R302.1(2).

Exceptions:

1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the *fire separation distance*.
2. Walls of *dwelling*s and *accessory structures* located on the same *lot*.
3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the *lot*. Projections beyond the *exterior wall* shall not extend over the *lot line*.
4. Detached garages accessory to a *dwelling* located within 2 feet (610 mm) of a *lot line* are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation and attic vents installed in compliance with this code are permitted.

Reason: After reviewing several UL listed fire-resistant rated assemblies, the NAHB discovered a problem between attempting to provide adequate attic ventilation to certain roof types (hip roofs, cathedral ceilings, etc) and achieving the one-hour fire resistance rating. The UL listed roof assemblies do not allow for any openings in the rated assembly for roofs, thereby creating a problem for proper roof ventilation as required in section R806. The NAHB proposes this code change to balance the needs of both adequate fire protection for exposure fires and proper ventilation of the attic. Under the 2012 IRC, projections are not permitted within two feet of the fire separation distance and the required ventilation opening for attics are minimal, 1/150 of the area of the vented space. The IRC also currently allows 25% of the wall space to be occupied by windows in exterior walls that are within 3'-0" of the fire separation distance. The IRC currently exempt foundation vents from being protected. NAHB suggest that due to the minimal openings required to provide ventilation in the attic, these openings should also be exempted.

Cost Impact: The code change proposal will not increase the cost of construction.

RB84-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R302.1-RB-ORLOWSKI

RB85 – 13

R302.2.2, R302.2.3

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials
(rdavidson@maplegrovern.gov)

Delete without substitution:

R302.2.2 Parapets. ~~Parapets constructed in accordance with Section R302.2.3 shall be constructed for townhouses as an extension of exterior walls or common walls in accordance with the following:~~

- ~~1. Where roof surfaces adjacent to the wall or walls are at the same elevation, the parapet shall extend not less than 30 inches (762 mm) above the roof surfaces.~~
- ~~2. Where roof surfaces adjacent to the wall or walls are at different elevations and the higher roof is not more than 30 inches (762 mm) above the lower roof, the parapet shall extend not less than 30 inches (762 mm) above the lower roof surface.~~

Exception: ~~A parapet is not required in the two cases above when the roof is covered with a minimum class C roof covering, and the roof decking or sheathing is of noncombustible materials or approved fire-retardant-treated wood for a distance of 4 feet (1219 mm) on each side of the wall or walls, or one layer of 5/8-inch (15.9 mm) Type X gypsum board is installed directly beneath the roof decking or sheathing, supported by a minimum of nominal 2-inch (51 mm) ledgers attached to the sides of the roof framing members, for a minimum distance of 4 feet (1219 mm) on each side of the wall or walls and there are no openings or penetrations in the roof within 4 feet (1219 mm) of the common walls.~~

- ~~3. A parapet is not required where roof surfaces adjacent to the wall or walls are at different elevations and the higher roof is more than 30 inches (762 mm) above the lower roof. The common wall construction from the lower roof to the underside of the higher roof deck shall have not less than a 1-hour fire-resistance rating. The wall shall be rated for exposure from both sides.~~

R302.2.3 Parapet construction. ~~Parapets shall have the same fire-resistance rating as that required for the supporting wall or walls. On any side adjacent to a roof surface, the parapet shall have noncombustible faces for the uppermost 18 inches (457 mm), to include counterflashing and coping materials. Where the roof slopes toward a parapet at slopes greater than 2 units vertical in 12 units horizontal (16.7-percent slope), the parapet shall extend to the same height as any portion of the roof within a distance of 3 feet (914 mm), but in no case shall the height be less than 30 inches (762 mm).~~

Reason: At first one might think of this as a huge leap in eliminating passive fire protection but it isn't. It is recognition of existing rules and the use of residential fire sprinklers. In fact, it is a "tradeoff" if you will.

There are two separate sections of the IRC dealing with buildings adjacent lot lines and the end result is two completely different sets of requirements. Section R302.1 and Table R302.1(1) provide requirements for all buildings regulated under the IRC including dwellings, accessory structures, and townhouses. There are no requirements for parapets for these structures and they apply to dwellings that may be permitted to be constructed to all four lot lines, be of unlimited area, be unlimited in number, and may be constructed side by side for miles.

But, R302.2.2 requires a parapet for a building defined by the building official as a townhouse at the very location where it is not required for any other structure. Townhouses are required to have sprinkler systems. Unlike dwellings, they are required to have open space on at least two sides. It is reasonable for some relaxation of passive fire protection when active fire protection systems are required. It is inconsistent to require parapets for townhouses and not for dwellings. The proposal is to delete the parapet requirements for townhouses to bring the rules in line with those for all other structures regulated in the IRC.

Cost Impact: None

RB85-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R302.2.2-RB-DAVIDSON

RB86 – 13

R302.2.2

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials
(rdavidson@maplegrovern.gov)

Revise as follows:

R302.2.2 Parapets. Parapets constructed in accordance with Section R302.2.3 shall be constructed for *townhouses* as an extension of exterior walls or common walls in accordance with the following:

1. Where roof surfaces adjacent to the wall or walls are at the same elevation, the parapet shall extend not less than 30 inches (762 mm) above the roof surfaces.
2. Where roof surfaces adjacent to the wall or walls are at different elevations and the higher roof is not more than 30 inches (762 mm) above the lower roof, the parapet shall extend not less than 30 inches (762 mm) above the lower roof surface.

Exception: A parapet is not required in the two cases above when the roof is covered with a minimum class C roof covering, and the roof decking or sheathing is of noncombustible materials or *approved* fire-retardant treated wood for a distance of 4 feet (1219 mm) on each side of the wall or walls, or one layer of 5/8-inch (15.9 mm) Type X gypsum board is installed directly beneath the roof decking or sheathing, supported by a minimum of nominal 2-inch (51 mm) ledgers attached to the sides of the roof framing members, for a minimum distance of 4 feet (1219 mm) on each side of the wall or walls ~~and there are no openings or penetrations in the roof within 4 feet (1219 mm) of the exterior or common walls.~~

3. A parapet is not required where roof surfaces adjacent to the wall or walls are at different elevations and the higher roof is more than 30 inches (762 mm) above the lower roof. The common wall construction from the lower roof to the underside of the higher roof deck shall have not less than a 1-hour fire-resistance rating. The wall shall be rated for exposure from both sides.

Reason: The language proposed to be deleted was added in last code cycle and it was argued by the proponent that the change put the IRC in sync with the IBC. That is, it was argued that openings were not permitted within a certain distance of a townhouse separation wall in the IBC and the proposal made the IRC consistent with the IBC. This proposal was disapproved by the ICC IRC Committee with the following comment: "**Committee Reason:** This change would impose severe restrictions on penetrations at the roof. This does not mirror the IBC requirement on this issue." The IRC Committee action was right. However the membership approved the code change anyway.

The result is a more restrictive requirement in the IRC than in the IBC for the exact same application. This proposal deletes the conflicting language so that the IRC and IBC rules are again the same.

This proposal is necessary to maintain equivalencies for the same type of structures regulated by the IBC and IRC. The following language is from the IBC for information only (note the bold italicized text). Note that there is no regulation of openings under method 5.

2012 IBC

705.11 Parapets. Parapets shall be provided on *exterior walls* of buildings.

Exceptions: A parapet need not be provided on an *exterior wall* where any of the following conditions exist:

1. The wall is not required to be fire-resistance rated in accordance with Table 602 because of *fire separation distance*.
2. The building has an area of not more than 1,000 square feet (93 m²) on any floor.
3. Walls that terminate at roofs of not less than 2-hour fire-resistance-rated construction or where the roof, including the deck or slab and supporting construction, is constructed entirely of noncombustible materials.
4. One-hour fire-resistance-rated *exterior walls* that terminate at the underside of the roof sheathing, deck or slab, provided:
 - 4.1. Where the roof/ceiling framing elements are parallel to the walls, such framing and elements supporting such framing shall not be of less than 1-hour fire-resistance-rated construction for a width of 4 feet (1220 mm) for Groups R and U and 10 feet (3048 mm) for other occupancies, measured from the interior side of the wall.

- 4.2. Where roof/ceiling framing elements are not parallel to the wall, the entire span of such framing and elements supporting such framing shall not be of less than 1-hour fire-resistance-rated construction.
- 4.3. Openings in the roof shall not be located within 5 feet (1524 mm) of the 1-hour fire resistance-rated exterior wall for Groups R and U and 10 feet (3048 mm) for other occupancies, measured from the interior side of the wall.
- 4.4. The entire building shall be provided with not less than a Class B roof covering.
5. *In Groups R-2 and R-3 where the entire building is provided with a Class C roof covering, the exterior wall shall be permitted to terminate at the underside of the roof sheathing or deck in Type III, IV and V construction, provided:*
 - 5.1. *The roof sheathing or deck is constructed of approved noncombustible materials or of fire-retardant-treated wood for a distance of 4 feet (1220 mm); or*
 - 5.2. *The roof is protected with 0.625-inch (16 mm) Type X gypsum board directly beneath the underside of the roof sheathing or deck, supported by a minimum of nominal 2-inch (51 mm) ledgers attached to the sides of the roof framing members for a minimum distance of 4 feet (1220 mm).*
6. Where the wall is permitted to have at least 25 percent of the exterior wall areas containing unprotected openings based on fire separation distance as determined in accordance with Section 705.8.

There are no restrictions on openings in the roof under item #5 in the IBC. The IRC should follow suit.

Cost Impact: None

RB86-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R302.2.2.2-RB-DAVIDSON

RB87 – 13

R302.3, R302.4, R302.7, R302.9, R302.11, R302.12, R310.1, R314.5

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials
(rdavidson@maplegrovern.gov)

Revise as follows:

R302.3 Two-family dwellings. *Dwelling units* in two-family dwellings shall be separated from each other by wall and/or floor assemblies having not less than a 1-hour fire-resistance rating when tested in accordance with ASTM E 119 or UL 263. Fire-resistance-rated floor-ceiling and wall assemblies shall extend to and be tight against the *exterior wall*, and wall assemblies shall extend from the foundation to the underside of the roof sheathing.

Exceptions:

1. ~~A fire-resistance rating of 1/2 hour shall be permitted in buildings equipped throughout with an automatic sprinkler system installed in accordance with NFPA 13.~~ Dwellings provided with an automatic fire sprinkler system complying with the requirements of Section R313.
2. Wall assemblies need not extend through *attic* spaces when the ceiling is protected by not less than 5/8-inch (15.9 mm) Type X gypsum board and an *attic* draft stop constructed as specified in Section R302.12.1 is provided above and along the wall assembly separating the *dwellings*. The structural framing supporting the ceiling shall also be protected by not less than 1/2-inch (12.7 mm) gypsum board or equivalent.

R302.4 Dwelling unit rated penetrations. Penetrations of wall or floor/ceiling assemblies required to be fire-resistance rated in accordance with Section R302.2 or R302.3 shall be protected in accordance with this section.

Exception: Dwellings provided with an automatic fire sprinkler system complying with the requirements of Section R313.

R302.7 Under-stair protection. Enclosed accessible space under stairs shall have walls, under-stair surface and any soffits protected on the enclosed side with 1/2-inch (12.7 mm) gypsum board.

Exception: Dwellings provided with an automatic fire sprinkler system complying with the requirements of Section R313 and a minimum of one sprinkler head is installed in the enclosed space.

R302.9 Flame spread index and smoke-developed index for wall and ceiling finishes. Flame spread and smoke index for wall and ceiling finishes shall be in accordance with Sections R302.9.1 through R302.9.4.

Exception: Dwellings provided with an automatic fire sprinkler system complying with the requirements of Section R313.

R302.11 Fireblocking. In combustible construction, fireblocking shall be provided to cut off all concealed draft openings (both vertical and horizontal) and to form an effective fire barrier between stories, and between a top *story* and the roof space.

Exception: Dwellings provided with an automatic fire sprinkler system complying with the requirements of Section R313 and a minimum of one sprinkler head is installed in the enclosed space.

Where required, fireblocking shall be provided in wood-frame construction in the following locations:

1. In concealed spaces of stud walls and partitions, including furred spaces and parallel rows of studs or staggered studs, as follows:
 - 1.1. Vertically at the ceiling and floor levels.
 - 1.2. Horizontally at intervals not exceeding 10 feet (3048 mm).
2. At all interconnections between concealed vertical and horizontal spaces such as occur at soffits, drop ceilings and cove ceilings.
3. In concealed spaces between stair stringers at the top and bottom of the run. Enclosed spaces under stairs shall comply with Section R302.7.
4. At openings around vents, pipes, ducts, cables and wires at ceiling and floor level, with an *approved* material to resist the free passage of flame and products of combustion. The material filling this annular space shall not be required to meet the ASTM E 136 requirements.
5. For the fireblocking of chimneys and fireplaces, see Section R1003.19.
6. Fireblocking of cornices of a two-family *dwelling* is required at the line of *dwelling unit* separation.

R302.12 Draftstopping. In combustible construction where there is usable space both above and below the concealed space of a floor/ceiling assembly, draftstops shall be installed so that the area of the concealed space does not exceed 1,000 square feet (92.9 m²). Draftstopping shall divide the concealed space into approximately equal areas.

Exception: Dwellings provided with an automatic fire sprinkler system complying with the requirements of Section R313.

Where draftstopping is required and where the assembly is enclosed by a floor membrane above and a ceiling membrane below, draftstopping shall be provided in floor/ceiling assemblies under the following circumstances:

1. Ceiling is suspended under the floor framing.
2. Floor framing is constructed of truss-type open-web or perforated members.

R310.1 Emergency escape and rescue required. *Basements*, habitable attics and every sleeping room shall have at least one operable emergency escape and rescue opening. Where *basements* contain one or more sleeping rooms, emergency egress and rescue openings shall be required in each sleeping room. Where emergency escape and rescue openings are provided they shall have a sill height of not more than 44 inches (1118 mm) measured from the finished floor to the bottom of the clear opening. Where a door opening having a threshold below the adjacent ground elevation serves as an emergency escape and rescue opening and is provided with a bulkhead enclosure, the bulkhead enclosure shall comply with section R310.3. The net clear opening dimensions required by this code shall be obtained by the normal operation of the emergency escape and rescue opening from the inside. Emergency escape and rescue openings with a finished sill height below the adjacent ground elevation shall be provided with a window well in accordance with Section R310.2. Emergency escape and rescue openings shall open directly into a public way, or to a yard or court that opens to a public way.

Exception Exceptions:

1. Basements used only to house mechanical equipment and not exceeding total floor area of 200 square feet (18.58 m²).
2. Dwellings provided with an automatic fire sprinkler system complying with the requirements of Section R313 shall not be required to comply with this section.

R314.5 Interconnection. Where more than one smoke alarm is required to be installed within an individual dwelling unit in accordance with Section R314.3, the alarm devices shall be interconnected in such a manner that the actuation of one alarm will activate all of the alarms in the individual unit. Physical interconnection shall not be required where listed wireless alarms are installed and all alarms sound upon activation of one alarm.

Exception Exceptions:

1. Interconnection of smoke alarms in existing areas shall not be required where alterations or repairs do not result in removal of interior wall or ceiling finishes exposing the structure, unless there is attic, crawl space or basement available which could provide access for interconnection without the removal of interior finishes.
2. Interconnection of smoke alarms shall not be required in dwellings provided with an automatic fire sprinkler system complying with the requirements of Section R313.

Reason: The purpose of this proposal is to provide reductions in code requirements related to fire protection for various components of a dwelling when fire sprinklers are installed, to offset costs created by the installation of fire sprinklers, and to fulfill the scoping provisions to maintain minimum code requirements.

Proponents of residential fire sprinklers have consistently touted the increased safety levels that sprinkler systems bring to new dwellings. That provides the opportunity to eliminate passive systems as unnecessarily redundant and costly. Many similar exceptions are granted buildings in the IBC for sprinkler installation (fire-resistive substitution, reductions in separation requirements, increased travel distance, reduction in exiting requirements, and exclusion of emergency exit windows) so there is ample justification for doing the same in dwellings. While not all of the exceptions granted to buildings constructed under the IBC have an application in residential construction, there are many that do. Similar additional reductions are proposed. Fire sprinkler advocates repeatedly touted the high degree of reliability and effectiveness of residential sprinklers during numerous hearings on sprinkler requirements for dwellings. Based on that testimony, fires will be extinguished when they are small and before they have an opportunity to spread

**TABLE R302.1(2)
EXTERIOR WALLS—DWELLINGS WITH FIRE SPRINKLERS**

EXTERIOR WALL ELEMENT		MINIMUM FIRE-RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE
Walls	Fire-resistance rated	1 hour—tested in accordance with ASTM E 119 or UL 263 with exposure from the outside	0 feet
	Not fire-resistance rated	0 hours	3 feet ^a
Projections	Fire-resistance rated	1 hour on the underside	2 feet ^a
	Not fire-resistance rated	0 hours	3 feet
Openings in walls	Not allowed	N/A	< 3 feet
	Unlimited	0 hours	3 feet ^a
Penetrations	All	Comply with Section R302.4	< 3 feet
		None required	3 feet ^a

For SI: 1 foot = 304.8 mm.

N/A = Not Applicable

- a. For residential subdivisions where all dwellings are equipped throughout with an automatic sprinkler systems installed in accordance with Section P2904, the fire separation distance for nonrated exterior walls and rated projections shall be permitted to be reduced to 0 feet, and unlimited unprotected openings and penetrations shall be permitted, where the adjoining lot provides an open setback yard that is 6 feet or more in width on the opposite side of the property line.

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and thereby further justifying the proposed tradeoffs.

There is precedent for reductions in code requirements related to fire protection in the IRC already so this is not something new to the IRC. Table R302.1(2) (provided below for information) provides reductions for exterior wall and opening protection for exterior walls required to have a fire protection rating due to proximity to a lot line for sprinklered buildings.

And, IRC Section 501.3 allows the fire resistive membrane for floors to be eliminated in sprinklered buildings.

There are a host of reductions in the IBC. The IBC permits sprinklers to be installed as a substitution for one-hour fire-resistive construction. Table 601 from the IBC is provided for information purposes. See Foot note D.

**TABLE 601
FIRE-RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS (HOURS)**

BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
	A	B	A ^d	B	A ^d	B	HT	A ^d	B
Primary structural frame ^e (see Section 202)	3 ^a	2 ^a	1	0	1	0	HT	1	0
Bearing walls									
Exterior ^{f, g}	3	2	1	0	2	2	2	1	0
Interior	3 ^a	2 ^a	1	0	1	0	1/HT	1	0
Nonbearing walls and partitions	See Table 602								
Exterior									
Nonbearing walls and partitions							See		
Interior ^c	0	0	0	0	0	0	Section	0	0
602.4.6									
Floor construction and associated secondary members (see Section 202)	2	2	1	0	1	0	HT	1	0
Roof construction and associated secondary members (see Section 202)	1 ^{1/2} ^b	1 ^{b, c}	1 ^{b, c}	0 ^c	1 ^{b, c}	0	HT	1 ^{b, c}	0

For SI: 1 foot = 304.8 mm.

- a. Roof supports: Fire-resistance ratings of primary structural frame and bearing walls are permitted to be reduced by 1 hour where supporting a roof only.
- b. Except in Group F-1, H, M and S-1 occupancies, fire protection of structural members shall not be required, including protection of roof framing and decking where every part of the roof construction is 20 feet or more above any floor immediately below. Fire-retardant-treated wood members shall be allowed to be used for such unprotected members.
- c. In all occupancies, heavy timber shall be allowed where a 1-hour or less fire-resistance rating is required.
- d. An approved automatic sprinkler system in accordance with Section 903.3.1.1 shall be allowed to be substituted for 1-hour fire-resistance-rated construction, provided such system is not otherwise required by other provisions of the code or used for an allowable area increase in accordance with Section 506.3 or an allowable height increase in accordance with Section 504.2. The 1-hour substitution for the fire resistance of exterior walls shall not be permitted.
- e. Not less than the fire-resistance rating required by other sections of this code.
- f. Not less than the fire-resistance rating based on fire separation distance (see Table 602).
- g. Not less than the fire-resistance rating as referenced in Section 704.10

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IBC Section 508.4 requires that separation of occupancy requirements may be reduced by one hour in buildings with sprinkler systems.

Table 803.9 permits the reduction in class of wall and ceiling finishes in sprinklered buildings.

IBC section 907.2.9 allows reductions in fire alarm systems in sprinklered buildings.

IBC Chapter 26 allows reductions in protection of plastics in sprinklered buildings.

IBC section 3004 exempts the venting of elevator hoistways in sprinklered buildings.

IBC Chapters 5 and 10 have literally dozens of reductions in construction and exiting requirements in sprinklered buildings.

It is reasonable to provide the same benefits that come with sprinkler systems to residential occupancies constructed under the IRC as similar occupancies would receive under the IBC.

This proposal eliminates a host of fire related requirements based on superior protection provided by fire sprinklers as stated by fire sprinkler proponents and on equivalencies currently afforded buildings built under the IBC.

Cost Impact: None

RB87-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R302.3-RB-DAVIDSON

RB88 – 13

R302.4.2

Proponent: Mark Nowak, M Nowak Consulting LLC, representing Steel Framing Alliance

Revise as follows:

R302.4.2 Membrane penetrations. Membrane penetrations shall comply with Section R302.4.1. Where walls are required to have a fire-resistance rating, recessed fixtures shall be installed so that the required fire-resistance rating will not be reduced.

Exceptions:

1. Membrane penetrations of maximum 2-hour fire-resistance-rated walls and partitions by steel electrical boxes that do not exceed 16 square inches (0.0103 m²) in area provided the aggregate area of the openings through the membrane does not exceed 100 square inches (0.0645 m²) in any 100 square feet (9.29 m)² of wall area. The annular space between the wall membrane and the box shall not exceed $\frac{1}{8}$ inch (3.1 mm). Such boxes on opposite sides of the wall shall be separated by one of the following:
 - 1.1. By a horizontal distance of not less than 24 inches (610 mm) where the wall or partition is constructed with individual noncommunicating stud cavities;
 - 1.2. By a horizontal distance of not less than the depth of the wall cavity when the wall cavity is filled with cellulose loose-fill, rockwool or slag mineral wool insulation;
 - 1.3. By solid fire blocking in accordance with Section R302.11;
 - 1.4. By protecting both boxes with listed putty pads; or
 - 1.5. By other listed materials and methods.
2. Membrane penetrations by listed electrical boxes of any materials provided the boxes have been tested for use in fire-resistance-rated assemblies and are installed in accordance with the instructions included in the listing. The annular space between the wall membrane and the box shall not exceed $\frac{1}{8}$ inch (3.1 mm) unless listed otherwise. Such boxes on opposite sides of the wall shall be separated by one of the following:
 - 2.1. By the horizontal distance specified in the listing of the electrical boxes;
 - 2.2. By solid fireblocking in accordance with Section R302.11;
 - 2.3. By protecting both boxes with listed putty pads; or
 - 2.4. By other listed materials and methods.
3. The annular space created by the penetration of a fire sprinkler provided it is covered by a metal escutcheon plate.
4. Ceiling membranes of 1- and 2-hour fire-resistant assemblies are permitted to be interrupted by wall assembly double wood top plates, or steel top tracks complying with Sections 702.3.3 or R603.2.1, where the wall assembly complies with all of the following:
 - 4.1 The wall assembly is sheathed with Type X gypsum board.
 - 4.2 All penetrations through the top plate or track are protected in accordance with Section R302.4.1 and
 - 4.3 The ceiling membrane is installed tight to the top plate or track.

Reason: This proposal is consistent with approved proposal FS76-12 for the 2015 IBC. However, it is inclusive of both wood top plates and steel top tracks. This proposal is needed only for the stacked duplex case in the IRC where the floor may be supported by a wall having at least equivalent fire resistance (R302.3.1) or where non-loadbearing walls are framed prior to installation of the membrane as is often necessary to route mechanical and electrical equipment. Thus, penetrations through the top plate or track are required to be protected per Section R302.4.1 to maintain the integrity and intent of the fire resistance requirement of floors separating stacked duplexes.

Cost Impact: The code change proposal will not increase the cost of construction.

RB88-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R302.4.2-RB-NOWAK

RB89 – 13

R302.4.3 (New)

Proponent: Larry Wainright, Qualtim, representing the Structural Building Components Association (lwainright@qualtim.com)

Add new text as follows:

R302.4.3 Penetration of fire-resistance rated wall assemblies by structural members. Penetration of wall assemblies required to be fire-resistance rated in accordance with sections R302.2 or R302.3, by roof and floor structural members shall be permitted, provided that the fire-resistance rating, the structural integrity of the wall, and structural independence is maintained.

Reason: The purpose of this code change proposal is to clarify that the fire-resistance rating and the structural integrity of wall assemblies separating townhouses and two family dwellings needs to be maintained when they are penetrated by other structural members. The most common application is where a floor or roof assembly is supported by the separation wall. The code is currently silent on this type of penetration while other types of penetrations are addressed in sections R302.4.1 and R302.4.2. This change makes it clear that when supporting these assemblies, some means of maintaining the fire-resistance and integrity of the separation wall is required.

Cost Impact: This code change will not increase the cost of construction.

RB89-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R302.4.3 (NEW)-RB-WAINRIGHT

RB90 – 13

R302.5.1

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials
(rdavidson@maplegrovern.gov)

Revise as follows:

R302.5.1 Opening protection. Openings from a private garage directly into a room used for sleeping purposes shall not be permitted. Other openings between the garage and residence shall be equipped with solid wood doors not less than 1-3/8 inches (35 mm) in thickness, solid or honeycomb core steel doors not less than 1-3/8 inches (35 mm) thick, or 20-minute fire-rated doors, ~~equipped with a self-closing device.~~

Reason: The IRC Committee and the ICC membership has consistently opposed closers on the door between a garage and dwelling in the past for a number of legitimate reasons not the least of which is the danger the closers pose to small children.

The effort to require closers on garage doors continued at the national level every year for perhaps fifteen years or more. Each year the membership denied the request because there was no statistical data to support the requirement and there had been no equivalent requirement in several of the legacy codes without an apparent problem.

During the last code cycle, this proposal was approved but again with erroneous and irrelevant arguments. There was no justification for the change and no evidence that a problem exists. Following is the justification from the fire service for the change published in the monograph during the last cycle.

***Reason:** There are times when proposed code submittals require a very lengthy substantiation, and then there are times when code change proposals just make sense. I would believe this is one of those times where a code change proposal makes a lot of sense. We are seeking a requirement to install items for very minimal costs yet great life saving potentials.*

If it "just makes sense", then there should be a justifiable reason for the requirement. If there is no reason, then it is overregulation. The presumption that the door between the house and garage will be left open is not rational. There is no evidence that the cost is minimal, that the benefit is real, or that any life saving would occur. Closers require maintenance and can easily be defeated by the homeowner. There is no standard specified in the code. It is obvious that there was no thought put into the proposal regarding the practicality, the need, or the ability to enforce. The closing force to engage the lock on a gasketed door can potentially be a hazard to young children who may get knocked over by the door or get fingers pinched in the closing side of the door or the latch side of the door upon closing. The vague language provides little guidance to install or approve these devices which can result in greater liability for the builder. Closers on these doors have not been required in many parts of the country for decades and there is no indication that it has created any hazard to life safety in those regions. This is a non-rated door in a non-rated frame in a non-rated wall.

Furthermore, there is no similar requirement for car ports. In fact, the code requires no protection of the wall between a dwelling and a carport. Windows are permitted. Hollow doors with glazing are permitted. Both structures house the same items including motor vehicles. A carport is enclosed on two or fewer sides. A garage is enclosed on more than two sides but one side can be completely open. And no vehicle door is required in either.

This amendment is necessary because it eliminates a potential for injury to small children, there is no data to support that there is a need for this rule, and it eliminates a source of potential liability for builders.

Cost Impact: None

RB90-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R302.5.1-RB-DAVIDSON

RB91 – 13

R302.6, Table 302.6

Proponent: Homer Maiel, PE, CBO, 4LEAF, Inc., representing self

Revise as follows:

R302.6 Dwelling/garage and dwelling/carport fire separation. The garage and carport shall be separated as required by Table R302.6. Openings in garage walls shall comply with Section R302.5.

Exceptions:

1. This provision does not apply to garage walls that are perpendicular to the adjacent dwelling unit wall.
2. A separation is not required between the dwelling and carport, provided the carport is entirely open on not less than two sides and there are not enclosed areas above.

TABLE R302.6
DWELLING/GARAGE AND DWELLING/ CARPORT SEPARATION

SEPARATION	MATERIAL
From the residence and attics	Not less than 1/2-inch gypsum board or equivalent applied to the garage side
From all habitable rooms above the garage or carport	Not less than 5/8-inch Type X gypsum board or equivalent
Structure(s) supporting floor/ceiling assemblies used for separation required by this section	Not less than 1/2-inch gypsum board or equivalent
Garages located less than 3 feet from a dwelling unit on the same lot	Not less than 1/2-inch gypsum board or equivalent applied to the interior side of exterior walls that are within this area

Reason: A carport usually poses the same level of hazard to a dwelling unit as a garage does. Currently the code is silent about carport. This revision addresses that deficiency.

Cost Impact: The code change proposal will increase the cost of construction.

RB91-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R302.6-RB-MAIEL

RB92 – 13

R302.10.1, R302.10.2, R302.10.3

Proponent: Rick Thornberry, P.E., representing Cellulose Insulation Manufacturers Association (CIMA)

Revise as follows:

R302.10.1 Insulation. Insulation materials, including facings, such as vapor retarders and vapor-permeable membranes, installed within floor-ceiling assemblies, roof-ceiling assemblies, wall assemblies, crawl spaces and attics shall have a flame spread index not to exceed 25 with an accompanying smoke-developed index not to exceed 450 when tested in accordance with ASTM E 84 or UL 723.

Exceptions:

1. When such materials are installed in concealed spaces, the flame spread index and smoke-developed index limitations do not apply to the facings, provided that the facing is installed in substantial contact with the unexposed surface of the ceiling, floor or wall finish.
2. ~~Cellulose~~ Cellulosic fiber loose-fill insulation, ~~which is not spray applied~~, complying with the requirements of Section R302.10.3, shall only be required to meet the smoke-developed index of not more than 450.
3. Foam plastic insulation shall comply with Section R316.

R302.10.2 Loose-fill insulation. Loose-fill insulation materials that cannot be mounted in the ASTM E 84 or UL 723 apparatus without a screen or artificial supports shall comply with the flame spread and smoke-developed limits of Section R302.10.1 when tested in accordance with CAN/ULC S102.2.

Exception: ~~Cellulose~~ Cellulosic fiber loose-fill insulation shall not be required to be tested in accordance with CAN/ULC S102.2, provided such insulation has a smoke-developed index of not more than 450 and complies with the requirements of ~~Section R302.10.1 and~~ Section R302.10.3.

R302.10.3 ~~Cellulose~~ Cellulosic fiber loose-fill insulation and self-supported spray applied cellulosic insulation. ~~Cellulose~~ Cellulosic fiber loose-fill insulation and self-supported spray applied cellulosic insulation shall comply with CPSC 16 CFR, Parts 1209 and 1404. Each package of such insulating material shall be clearly *labeled* in accordance with CPSC 16 CFR, Parts 1209 and 1404.

Reason: The purpose of this code change proposal is to clarify the requirements for cellulose insulation by substituting the industry terms for the two types of cellulose insulation commonly used: cellulosic fiber loose-fill insulation and self-supported spray applied cellulosic insulation. These two terms are taken from ASTM C 739, Standard Specification for Cellulosic Fiber Loose-Fill Thermal Insulation and ASTM C 1149, Standard Specification for Self-Supported Spray Applied Cellulosic Thermal Insulation, respectively. The application of the Exception to Section R302.10.2 is also simplified and made more user friendly by including the smoke-developed index requirement and deleting the reference to Section R302.10.1 where that requirement is specified by the Exceptions to those sections. This saves the code user a step in the process of applying Section R302.10.2 and avoids potential misapplications and misinterpretations that often occur when dealing with multiple Exceptions.

Cost Impact: This code change proposal will not increase the cost of construction.

RB92-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R302.10-RB-THORNBERRY

RB93 – 13

R302.11.1

Proponent: Tony Crimi, A.C. Consulting Solutions, Inc., representing North American Insulation Manufacturer's Association (NAIMA) (tcrimi@sympatico.ca)

Revise as follows:

R302.11.1 Fireblocking materials. Except as provided in Section R302.11, Item 4, fireblocking shall consist of the following materials.

1. Two-inch (51 mm) nominal lumber.
2. Two thicknesses of 1-inch (25.4 mm) nominal lumber with broken lap joints.
3. One thickness of 23/32-inch (18.3 mm) wood structural panels with joints backed by 23/32-inch (18.3 mm) wood structural panels.
4. One thickness of 3/4-inch (19.1 mm) particleboard with joints backed by 3/4-inch (19.1 mm) particleboard.
5. One-half-inch (12.7 mm) gypsum board.
6. One-quarter-inch (6.4 mm) cement-based millboard.
7. Batts or blankets of mineral wool or glass fiber or other *approved* materials installed in such a manner as to be securely retained in place.
8. Cellulose insulation installed as tested in accordance with ASTM E 119 or UL 263, for the specific application.

Reason: This proposal clarifies the code requirement and prevents potentially unintended test methods from being used for these purposes. The proposal aims to provide more detail to the requirement to test cellulose insulation in accordance with the appropriate fire test standards. During the last cycle, FS118-09/10 added spray-applied cellulose to the list of acceptable fireblocking materials. The proponent's statement does identify ASTM E119 as the test standard used by the Cellulose Insulation Manufacturers Association (CIMA) to conduct a variety of fireblocking fire tests.

Cost Impact: This code change proposal will not increase the cost of construction.

RB93-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R302.11.1-RB-CRIMI.doc

RB94 – 13

R 302.12, R302.12.2 (New)

Proponent: Sean DeCrane, Battalion Chief, representing Cleveland Division of Fire, International Association of Fire Fighters (rovloc93@aol.com)

Revise as follows:

R302.12 Draftstopping. Draftstopping shall be provided in construction in accordance with this section.

R302.12.1 Concealed spaces. In combustible construction where there is usable space both above and below the concealed space of a floor/ceiling assembly, draftstops shall be installed so that the area of the concealed space does not exceed 1,000 square feet (92.9 m²). Draftstopping shall divide the concealed space into approximately equal areas. Where the assembly is enclosed by a floor membrane above and a ceiling membrane below, draftstopping shall be provided in floor/ceiling assemblies under the following circumstances:

1. Ceiling is suspended under the floor framing.
2. Floor framing is constructed of truss-type open-web or perforated members.

R302.12.2. Attics. Draftstopping shall be provided in attics with an area that exceeds 1,500 square feet (92.9 m²). The draftstopping shall be installed such that each draftstopped area of the attic does not exceed 1,500 square feet (92.9 m²).

Reason: Void spaces, are areas of potentially large fire growth that can have explosive results for responding and operating fire fighters. We have seen multiple incidents where large single-family residences can simulate commercial size fires due to the large open areas. Modern construction techniques are providing home owners with a number of options including large open spaces. These large floor plans lead to increased amounts of void spaces in the attic and floor systems. When fire travels into these attic spaces, they are fuel enriched by the combustible wood truss and in many instances the sprayed insulation. With large amounts of oxygen the fire can grow unchecked and on many occasions showing very little evidence on the exterior of amount of fire present. One side discovery of the original Underwriters Laboratories studies on lightweight construction in 2006, was the performance of the plastic ridge vent which when subjected to elevated temperatures would melt and create a seal at the peak of the ridge causing the increased pressures from the fires to push downward on top of operating fire fighters. We have seen instances where fire fighters have been killed or injured. In 2010 Fire Fighter Kyle Wilson, of Price William County, was killed while performing Search and Rescue operations from a wind driven exterior fire that accumulated in the attic space until it exploded downward trapping Fire Fighter Wilson in the Master Bedroom causing him to burn to death. In 2012 in Huntington, MD, ten fire fighters were injured, two seriously, when they were investigating the smell of smoke on the second floor. The fire originated in the chimney and travelled into the attic space where it had plenty of air to grow uncontrolled until the building pressure caused the fire to explosively escape from the attic downward on the fire fighters. Fire fighters were forced to dive down the stairwell and out the second story windows causing one fire fighter to break his back. The author will acknowledge the lack of technical justification at the time of submission. There is current testing being conducted at Underwriters Laboratories and NIST and we hope to have additional test data available at the code hearing in Dallas.

Cost Impact: This proposal will increase the cost of construction

RB94-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R302.12-RB-DECRANE

RB95 – 13

R302.12

Proponent: Wesley Walters, Clark County Nevada Development Services, representing self

Revise as follows:

R502.12 Draftstopping. In combustible construction where there is ~~usable~~ occupied space both above and below the concealed space of a floor/ceiling assembly, draftstops shall be installed so that the area of the concealed space does not exceed 1,000 square feet (92.9 m²). Draftstopping shall divide the concealed space into approximately equal areas. Where the assembly is enclosed by a floor membrane above and a ceiling membrane below draftstopping shall be provided in floor/ceiling assemblies under the following circumstances:

1. Ceiling is suspended under the floor framing.
2. Floor framing is constructed of truss-type open-web or perforated members.

Reason: Usable is an undefined term within the code. The term occupied is defined and describes the whole area of the house.

Cost Impact: The code change proposal will not increase the cost of construction.

RB95-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R302.12-RB-WALTERS

RB96 – 13

R302.13 (New), Table N1102.4.1.1 (R402.4.1.1)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IRC COMMITTEE. PART II WILL BE HEARD BY THE IECC COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Duncan Prael, IBACOS Inc, representing self (dprahl@ibacos.com)

PART I - IRC-RB

Add new Text as follows:

R302.13 Sealants. In combustible construction, sealants that are used to limit air leakage in accordance with Section N1102.4 and Table N1102.4.1.1 shall not be required to comply with ASTM E 136 and shall not be required to be included in the fire tests required in association with the following:

1. Fire resistant assemblies where required by Sections R302.1, R302.2, R302.4, and R302.6;
 2. Fireblocking where required by Section R302.11 and
 3. Draftstopping where required by Section R302.12.
- (Existing Section R302.13 to be renumbered.)

PART II - IECC-RE

Revise as follows:

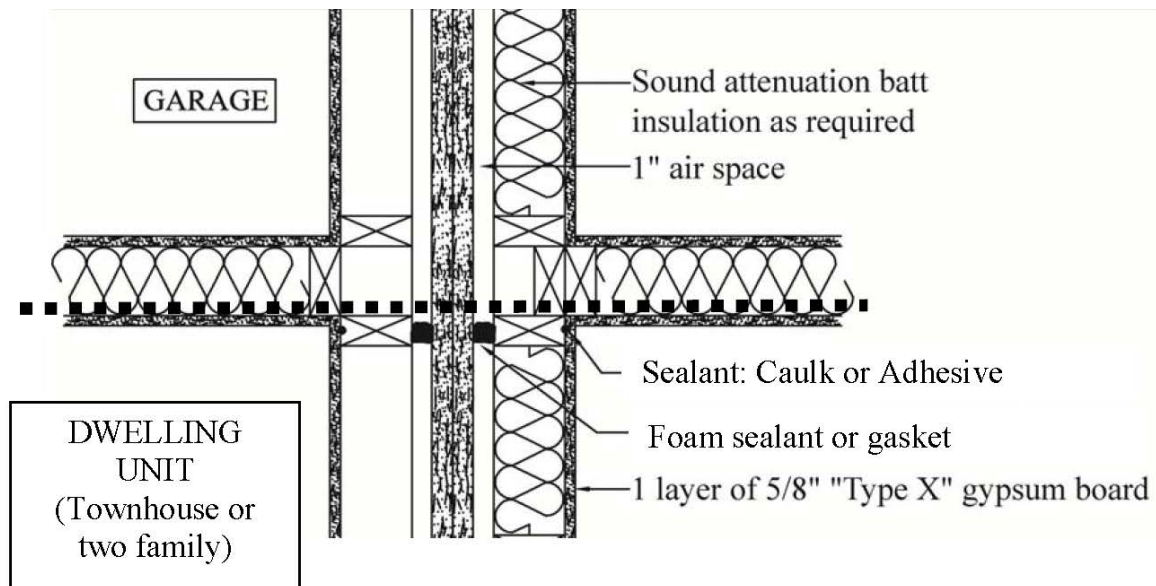
**TABLE R402.4.1.1
AIR BARRIER AND INSULATION INSTALLATION**

Fire separation assemblies in accordance with <i>International Residential Code</i> Sections R302.1, R302.2, R302.4, and R302.6, and fireblocking and draftstopping in accordance with <i>International Residential Code</i> Sections R302.11 and R302.12, respectively.	Air sealing shall be provided in all fire separation assemblies where the assembly, fireblocking or draftstopping is part of or intersects the thermal enclosure.
Garage separation	Air sealing shall be provided between the garage and conditioned spaces

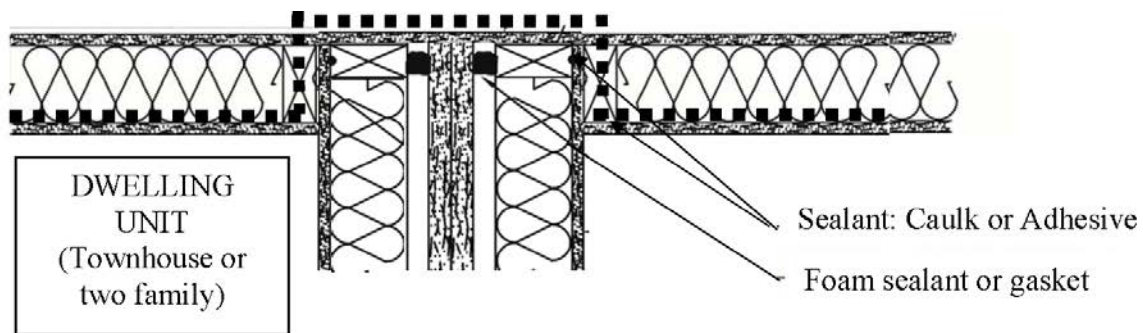
(Portions of table not shown to remain unchanged)

Reason: Many ASTM E119 tested assemblies do not include any sealant materials for airtightness at the location where the assembly intersects the thermal enclosure of the building in the real world. Builders and code officials should be guided specifically on the airsealing that should be included at these locations. The materials used for sealing this location fall under the same criteria as sealants that the committee approved in for sealants used to fireblock annular spaces per R302.11. Many common sealants have an auto ignition temperature that is the same as or higher than the wood framing within the assembly and, as such, would only burn if the wood in the assembly was already on fire.

Examples of locations that are indicative of the need for sealants within fire separation assemblies follow. The heavy dotted line indicated the desired location of the airtightness layer within the constructed assembly as it appears in some typical details:



Two hour separation, plan view at garage



Two hour separation, plan view at exterior wall

Cost Impact:

The code change proposal will not increase the cost of construction

RB96-13

PART I - IRC-RB

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II - IECC-RE

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R302.13 (NEW)-RB-PRAHL

RB97 – 13

R303.1, R303.4, M1507.1

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IRC-RB COMMITTEE. PART II WILL BE HEARD BY THE IRC-PM COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Joe Lstiburek, Building Science Corporation; Mike Moore, P.E., Newport Ventures, representing Broan-NuTone (mmoore@newportpartnersllc.com); Thomas D. Culp, Birch Point Consulting, representing the Glazing Industry Code Committee

PART I-IRC-RB

Revise as follows:

R303.1 Habitable rooms. All habitable rooms shall have an aggregate glazing area of not less than 8 percent of the floor area of such rooms. Natural *ventilation* shall be through windows, doors, louvers or other *approved* openings to the outdoor air. Such openings shall be provided with ready access or shall otherwise be readily controllable by the building occupants. The minimum openable area to the outdoors shall be 4 percent of the floor area being ventilated.

Exceptions:

- ~~1. The glazed areas need not be openable where the opening is not required by Section R310 and a whole-house mechanical ventilation system is installed in accordance with Section M1507.~~
21. The glazed areas need not be installed in habitable rooms without exterior walls, where an opening is not required by Section R310, mechanical ventilation is installed in accordance with Section M1507, and Exception 1 above is satisfied and artificial light is provided capable of producing an average illumination of 6 footcandles (65 lux) over the area of the room at a height of 30 inches (762 mm) above the floor level.
32. Use of sunroom and patio covers, as defined in Section R202, shall be permitted for natural *ventilation* if in excess of 40 percent of the exterior sunroom walls are open, or are enclosed only by insect screening.

PART II-IRC-RM

Revise as follows:

R303.4 Mechanical ventilation. ~~Where the air infiltration rate of a dwelling unit is less than 5 air changes per hour when tested with a blower door at a pressure of 0.2 inch w.c (50 Pa) in accordance with Section N1102.4.1.2, the dwelling units shall be provided with local exhaust and whole-house mechanical ventilation in accordance with Section M1507-3.~~

M1507.1 General. ~~Where Local exhaust or and whole-house mechanical ventilation is provided, the equipment systems shall be designed and installed in accordance with this section.~~

Reason: Experience from decades of work with builders confirms that achieving a home air tightness of around 3 to 5 ACH 50 is not difficult if the builder just addresses the “big holes” during construction.¹ The practice of addressing big holes was initially tackled by builders to reduce call backs associated with comfort complaints from homebuyers. Once builders figured out that plugging the big holes reduced callbacks, the practice went mainstream. In 2009, the steps required to plug the big holes were codified in the mandatory air barrier table (IRC Table N1102.4.2; IECC Table R402.4.1.1). At the end of 2012, 55% of the states had adopted the 2009 IECC or more stringent. Fast forward to 2015, and 76% of states (which accounted for 86% of the single family starts in 2011) are expected to have adopted the 2009 IECC or more stringent.²

This timeline shows that building tight (3 to 5 ACH 50) has become the new standard, regardless of whether or not a builder confirms the tightness with a blower door test. Of course, the one potential problem with building tight is the negative impact it can

have on indoor air quality if mechanical ventilation is not provided; and there is broad consensus that air quality begins to be compromised at or below 5 ACH 50 if mechanical ventilation is not provided. Without mechanical ventilation, tight homes can experience elevated humidity levels; increased condensation potential on windows; higher concentrations of dust mites and allergens; and higher concentrations of pollutants such as chloroform, formaldehyde, acetaldehyde, and other VOCs that have negative health impacts.

With today's typical, code-minimum construction resulting in homes that easily achieve 3 to 5 ACH 50, a blower door test is not needed to confirm that these homes are less than 5 ACH 50 and in need of mechanical ventilation. At this point, mechanical ventilation is needed to provide minimum acceptable air quality for code-minimum construction. This change will ensure that the comfortable, energy efficient homes that builders are now building are also provided with minimum indoor air quality.

At the same time, we do not want to discourage the use of operable windows, which offer natural ventilation in addition to daylight and egress. Even with mechanical ventilation, a home occupant needs to be able to control their own environment, particularly in the case of an emergency such as a power failure (e.g. being able to open windows for airflow in the aftermath of a storm or blackout). As such, this proposal deletes exception 1 and modifies exception 2 of R303.1 to ensure operable windows in habitable rooms are still installed even with mechanical ventilation, only keeping the exception for interior rooms with no exterior walls. Note that the IRC still permits bathrooms and water closets to use local exhaust instead of windows, as per the exception to R303.3.

References:

1. J.W. Lstiburek, "Just Right and Airtight" ASHRAE Journal, May 2011.
2. U.S. DOE Building Energy Codes Program, "Status of State Energy Code Adoption, Residential: Projected" accessed from <http://www.energycodes.gov/adoption/states> on Nov 29, 2012.

Cost Impact: Because new standard construction practices will typically result in building envelope tightness levels of 3 to 5 ACH 50, these dwellings should already be provided with mechanical ventilation (based on R303.4). So, no additional costs should be incurred for mechanical ventilation systems. Also, removing the loophole of trading off windows for mechanical ventilation in habitable rooms is not expected to affect the practice of the overwhelming majority of builders who tend towards more windows, versus less, based on consumer demand.

RB97-13

PART I

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R303.1-RB-CULP-LSTIBUREK-MOORE

RB98 – 13

R303.1

Proponent: Jeff Inks, representing the Window & Door Manufacturers Association.

Revise as follows:

R303.1 Habitable rooms. All habitable rooms shall have an aggregate glazing area of not less than 8 percent of the floor area of such rooms. Natural *ventilation* shall be through windows, skylights, doors, louvers or other *approved* openings to the outdoor air. Such openings shall be provided with ready access or shall otherwise be readily controllable by the building occupants. The minimum openable area to the outdoors shall be 4 percent of the floor area being ventilated.

Exceptions:

1. The glazed areas need not be openable where the opening is not required by Section R310 and a whole-house mechanical *ventilation* system is installed in accordance with Section M1507.
2. The glazed areas need not be installed in rooms where Exception 1 above is satisfied and artificial light is provided capable of producing an average illumination of 6 footcandles (65 lux) over the area of the room at a height of 30 inches (762 mm) above the floor level.
3. Use of sunroom and patio covers, as defined in Section R202, shall be permitted for natural *ventilation* if in excess of 40 percent of the exterior sunroom walls are open, or are enclosed only by insect screening.

Reason: Openable skylights are intended to provide natural ventilation and should also be expressly included with other fenestration approved for meeting this requirement.

Cost Impact: This code change will not increase the cost of construction.

RB98-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R303.1 #1-RB-INKS

RB99 – 13

R303.1

Proponent: Jeff Inks, representing the Window & Door Manufacturers Association.

Revise as follows:

R303.1 Habitable rooms. All habitable rooms shall have an aggregate glazing area of not less than 8 percent of the floor area of such rooms. Natural *ventilation* shall be through windows, doors, louvers or other *approved* openings to the outdoor air. Such openings shall be provided with ready access or shall otherwise be readily controllable by the building occupants. The minimum openable area to the outdoors shall be 4 percent of the floor area being ventilated.

Exceptions:

- ~~1. The glazed areas need not be openable where the opening is not required by Section R310 and a whole-house mechanical *ventilation* system is installed in accordance with Section M1507.~~
- ~~21. The glazed areas need not be installed in rooms where Exception 1 above is satisfied and without *exterior walls* where all of the following conditions are met:~~
 - ~~1.1 An opening is not required by Section R310.~~
 - ~~1.2 Artificial light is provided capable of producing an average illumination of 6 footcandles (65 lux) over the area of the room at a height of 30 inches (762 mm) above the floor level.~~
 - ~~1.3 A whole-house mechanical *ventilation* system is installed in accordance with Section M1507.~~
- ~~32. Use of sunroom and patio covers, as defined in Section R202, shall be permitted for natural *ventilation* if in excess of 40 percent of the exterior sunroom walls are open, or are enclosed only by insect screening.~~

Reason: While whole-house mechanical ventilation systems can provide adequate ventilation when in operation, natural ventilation should still be provided as an option and more importantly, needs to be provided as a back-up in the event of power outages, especially when power outages can be prolonged for many hours or many days, or for problems that may occur with the ventilation system, or for in-home events such as cooking or burning food when supplemental natural ventilation may be needed or desired. Therefore, a blanket exception should not be provided.

The amendment to Exception 2 is proposed to maintain an exception for providing glazed areas in rooms (such as certain basement rooms) with no *exterior walls* as defined by the IRC provided they meet all of the same conditions required by the current provisions in order for the exception to R303.1 to apply.

Cost Impact: This code change may increase the cost of construction in some cases where fixed glazing may have been used in lieu of openable glazing and then depending on the glazing options being considered.

RB99-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R303.1 #4-RB-INKS

RB100 – 13

R303.4

Proponent: Mike Moore, P.E., Newport Ventures, representing Broan-NuTone (mmoore@newportpartnersllc.com), Jeremiah Williams representing U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

THIS CODE CHANGE WILL BE HEARD BY THE IRC-PLUMBING/MECHANICAL COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

Revise as follows:

R303.4 Mechanical ventilation. Where the air infiltration rate of a dwelling unit is ~~less than~~ 5 air changes per hour or less when tested with a blower door at a pressure of 0.2 inch w.c (50 Pa) in accordance with Section N1102.4.1.2, the dwelling unit shall be provided with whole-house mechanical ventilation in accordance with Section M1507.3.

Reason (Moore): The current language is inconsistent with N1103.5, which requires mechanical ventilation for all dwellings, and also requires dwellings in climate zone 1 and 2 to have an air tightness "not exceeding" 5 ACH 50. By changing this language to 5 ACH or less, "the two sections are brought closer into alignment.

Reason (Williams) : Chapter R4 of the International Energy Conservation Code and Chapter 11 of the IRC require air leakage to be equal or less than 5 air changes per hour in climate zones 1 and 2, with lower rates required in other climate zones. This minor code change creates consistency where all buildings constructed to the air tightness levels of the IECC and IRC must have whole house mechanical ventilation systems.

Cost Impact (Moore): There is no additional cost, as mechanical ventilation is already required for these dwellings based on section N1103.5.

Cost Impact (Williams): The code change proposal will increase the cost of construction only if tested air leakage in climate zones 1 and 2 is exactly 5 air changes per hour.

RB100-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R303.4-RB-MOORE

RB101 – 13

R303.5.1

Proponent: David Hall, CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

THIS CODE CHANGE WILL BE HEARD BY THE IRC-PLUMBING/MECHANICAL COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

Revise text as follows:

R303.5.1 Intake openings. Mechanical and gravity outdoor air intake openings shall be located a minimum of 10 feet (3048 mm) from any hazardous or noxious contaminant, such as vents, chimneys, plumbing vents, streets, alleys, parking lots and loading docks, ~~except as otherwise specified in this code.~~ ~~Where a source of contaminant is located within 10 feet (3048 mm) of an intake opening, such opening shall be located a minimum of 3 feet (914 mm) below the contaminant source.~~

For the purpose of this section, the exhaust from *dwelling* unit toilet rooms, bathrooms and kitchens shall not be considered as hazardous or noxious.

Exceptions:

1. The 10 foot (3048 mm) separation is not required where the intake opening is located 3 feet (914 mm) or greater below the contaminant source.
2. Separation distances for appliance vents shall be as allowed in Chapters 18 and 24.

Reason: This proposal is text cleanup. The phrase “except as otherwise specified in this code” is not user-friendly since it offers no guidance as to where something else is specified. The new exception # 2 provides the exact text for what is otherwise specified. New exception # 1 is just the original last sentence of this section reworded into an exception format, because it is actually an exception to the 10 foot rule.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Cost Impact: The code change proposal will not increase the cost of construction.

RB101-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R303.5.1-RB-HALL-PMGCAC

RB102 – 13

R303.7, R303.7 (New), R303.7.1, R303.8 (New)

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials
(rdavidson@maplegrovern.gov)

Revise as follows:

~~R303.7 Stairway illumination.~~ All interior and exterior stairways shall be provided with a means to illuminate the stairs, including the landings and treads. Interior stairways shall be provided with an artificial light source located in the immediate vicinity of each landing of the stairway. For interior stairs the artificial light sources shall be capable of illuminating treads and landings to levels not less than 1 foot-candle (11 lux) measured at the center of treads and landings. Exterior stairways shall be provided with an artificial light source located in the immediate vicinity of the top landing of the stairway. Exterior stairways providing access to a ~~basement~~ from the outside grade level shall be provided with an artificial light source located in the immediate vicinity of the bottom landing of the stairway.

~~Exception:~~ An artificial light source is not required at the top and bottom landing, provided an artificial light source is located directly over each stairway section.

~~R303.7.1 Light activation.~~ Where lighting outlets are installed in interior stairways, there shall be a wall switch at each floor level to control the lighting outlet where the stairway has six or more risers. The illumination of exterior stairways shall be controlled from inside the ~~dwelling~~ unit.

~~Exception:~~ Lights that are continuously illuminated or automatically controlled.

R303.7 Interior stairway illumination. Interior stairways shall be provided with an artificial light source to illuminate the landings and treads. The light source shall be capable of illuminating treads and landings to levels of not less than 1 foot-candle (11 lux) as measured at the center of treads and landings. There shall be a wall switch at each floor level to control the light source where the stairway has six or more risers.

Exception: A switch is not required where remote, central, or automatic control of lighting is provided.

R303.8 Exterior door illumination. At least one wall-switch-controlled lighting outlet shall be installed to provide illumination on the exterior side of each exterior door having grade level access, including exterior stairways providing access to a basement.

Exception: A switch is not required where remote, central, or automatic control of lighting is provided.

(Renumber subsequent sections)

Reason: This section is proposed for revision for one reason – it is confusing. The first sentence says that all interior and exterior stairways, including treads and landings, shall be illuminated. The next two sentences state that interior stairs must have lights near the landings and provide a minimum of 1 foot-candle of light. Then the next sentence states that exterior stairs must be provided with a light source in the immediate vicinity of the top landing but seems to exclude treads and landings. So, going back to the first sentence, the code says exterior stairs need landings and tread illuminated. Now just the top landing is illuminated for exterior stairs. Which one is it? The reference to 1 foot-candle of light is only applicable to interior stairs. It seems there is no standard for exterior stairs. But some code officials apply the 1 foot-candle standard to exterior stairs and others do not. Some code officials require exterior stairs to be illuminated along their entire length. Others only require light at the top landing. Then there is the exception that appears to apply only to interior stairs but can be misconstrued to support the contention that exterior stairs must be lit for their entire length.

Furthermore, the code requires the light source be in specific locations and meet certain intensities. If the intensity is met, what difference does it make where the light source is? The text referencing the location of the light source for interior stairs is proposed for deletion since the interest is in the amount of light on the walking surface, not on the light location.

The electrical code will require a switched light at exterior doors but that may not illuminate exterior stairs. This proposal would not waive any requirement found in the electrical code but there seems to be a conflict between what could be argued is the intent of R303.7, which is to illuminate exterior stairs, and the electrical code which only requires illumination of the exterior side of exterior doors having access to grade.

E3903.3 Additional locations. *At least one wall-switch-controlled lighting outlet shall be installed in hallways, stairways, attached garages, and detached garages with electric power. At least one wall-switch-controlled lighting outlet shall be installed to provide illumination on the exterior side of each outdoor egress door having grade level access, including outdoor egress doors for attached garages and detached garages with electric power. A vehicle door in a garage shall not be considered as an outdoor egress door. Where one or more lighting outlets are installed for interior stairways, there shall be a wall switch at each floor level and landing level that includes an entryway to control the lighting outlets where the stairway between floor levels has six or more risers.*

Exception: *In hallways, stairways, and at outdoor egress doors, remote, central, or automatic control of lighting shall be permitted.*

The proposed revisions create separate sections for interior stairways and exterior doorways. It eliminates a term that is difficult to enforce - "immediate vicinity". It uses the same text found in the electrical code to identify the light location at exterior doors and the exception addressing controls. Some text is editorially revised to eliminate repetitive language but the basic intent is left unchanged. The light levels and exceptions are retained as they are in the current rule. It is believed that this change helps to eliminate some confusion and improve uniformity of application and creates consistency between the building and electrical portions of the IRC.

Cost Impact: None

RB102-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R303.7-RB-DAVIDSON

RB103 – 13

R303.7

Proponent: Wesley Walters, Clark County Nevada Development Services, representing self

Revise as follows:

R303.7 Stairway illumination. All interior and exterior stairways shall be provided with a means to illuminate the stairs, including the landings and treads. Interior stairways shall be provided with an artificial light source located in the immediate vicinity of each landing of the stairway. For interior stairs the artificial light sources shall be capable of illuminating treads and landings to levels not less than 1 footcandle (11 lux) measured at the center of treads and landings. Exterior stairways shall be provided with an artificial light source located in the immediate vicinity of the top landing of the stairway. Exterior stairways providing access to a *basement* from the outside *grade* level shall be provided with an artificial light source located in the immediate vicinity of the bottom landing of the stairway.

Exception: An artificial light source is not required at the top and bottom landing, provided an artificial light source is located directly over each ~~stairway~~ stair section.

Reason: Stairway defines the whole area including the landings. The commentary shows the light source centered over each flight of stairs so the proper definition word choice would be "stair" not stairway.

Cost Impact: The code change proposal will not increase the cost of construction.

RB103-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R303.7-RB-WALTERS

RB104 – 13

R202, R303.8

Proponent: Jonathan Siu, representing City of Seattle Department of Planning & Development
(jon.siu@seattle.gov)

Revise as follows:

SECTION R202 DEFINITIONS

COURT. A minimum 3-foot wide space on the lot on which a building is situated, open and unobstructed to the sky, located at or above grade level on a lot and bounded on three or more sides by walls or a building. The distance shall be measured at a right angle from the face of the walls.

YARD. A minimum 3-foot wide open space, other than a court, unobstructed from the ground to the sky, except where specifically provided by this code, on the lot on which a building is situated. The distance shall be measured at a right angle from the face of the wall.

Revise as follows:

R303.8 Required glazed openings. Required glazed openings shall open directly onto a street or public alley, or a yard or court ~~located on the same lot as the building.~~

Exceptions:

1. Required glazed openings may face into a roofed porch where the porch abuts a street, yard or court and the longer side of the porch is at least 65 percent unobstructed and the ceiling height is not less than 7 feet (2134 mm).
2. Eave projections shall not be considered as obstructing the clear open space of a yard or court.
3. Required glazed openings may face into the area under a deck, balcony, bay or floor cantilever provided a clear vertical space at least 36 inches (914 mm) in height is provided.

Reason:

1. The intent of the proposed change to the definition of "court" is to clarify that the court must be on the same property as the building under consideration. This aligns its definition with that for "yard", since "court" only appears in conjunction with "yard" in this code. This proposal also reinforces a general (but unstated) principle in all the I-codes that a building cannot rely on features on an adjacent property to demonstrate compliance with the code. That is, each building must demonstrate compliance within its own property lines unless specifically provided for in the code, such as in Footnote a to Table R302.1(2), or for spaces such as rights-of way.
2. The reason for adding the 3-foot dimension to the definitions for "yard" and "court" is that their minimum dimension is not defined. The 3-foot dimension was chosen because it is consistent with the requirements for minimum separation distance for walls (Table R302.1(2)) and for minimum width of a window well for emergency escape windows (Section R310.2). The requirement to measure the 3 feet perpendicular to the wall is copied from the definition for "Fire Separation Distance" in Chapter 2.

Such a minimum dimension is needed to define what size yard or court is eligible for consideration of:

- A. What can be called a townhouse. The definition for "townhouse" states the dwelling unit must have a yard or public way on at least two sides. However, because the code does not define a minimum dimension for the yard, a designer can argue that a 1-foot or even a 1-inch distance constitutes a yard, and therefore, dwelling units close to the property line may be considered townhouses. (See Figure 1 below.) That interpretation does not agree with the commonly understood concept of what constitutes a townhouse, so this proposal provides clear guidance to the designer and the building official.
- B. What can be used for light and ventilation. Section 303.8 requires that glazed openings used for light and ventilation open into a yard or court. Similar to the argument for "townhouse," a minimum dimension is necessary because the current code provisions could be construed to allow these openings to comply by receiving light and ventilation from a very small

space. It stands to reason that some minimum space is required in order to allow sufficient light and ventilation to enter through the opening.

- C. What can be used for a pathway to get to a right-of-way from an emergency escape and rescue opening. Section 310.1 requires emergency escape and rescue openings to open “directly into a public way, or to a yard or court that opens to a public way.” However, an inadequate width of yard or court would render the emergency escape opening useless. Section R310.2 requires a minimum 3-foot wide window well for below-grade emergency escape and rescue openings, and if at least 3 feet is required for a window well, it stands to reason a yard or court should be at least 3 feet wide as well, in order to provide an adequate pathway to the right-of-way.

It is to be noted that defining a yard as having a width of at least 3 feet will not adversely affect sections different from those mentioned above where “yard” is used (Table R302.1(2), Section R303.8.1, and in Appendix M, Sections AM103.1.1 and AM103.1.3). “Court” is not used in any sections other than those mentioned above.

3. The text being proposed for deletion in Section R303.8 is redundant with the proposed definition of “court” and the existing definition of “yard.”

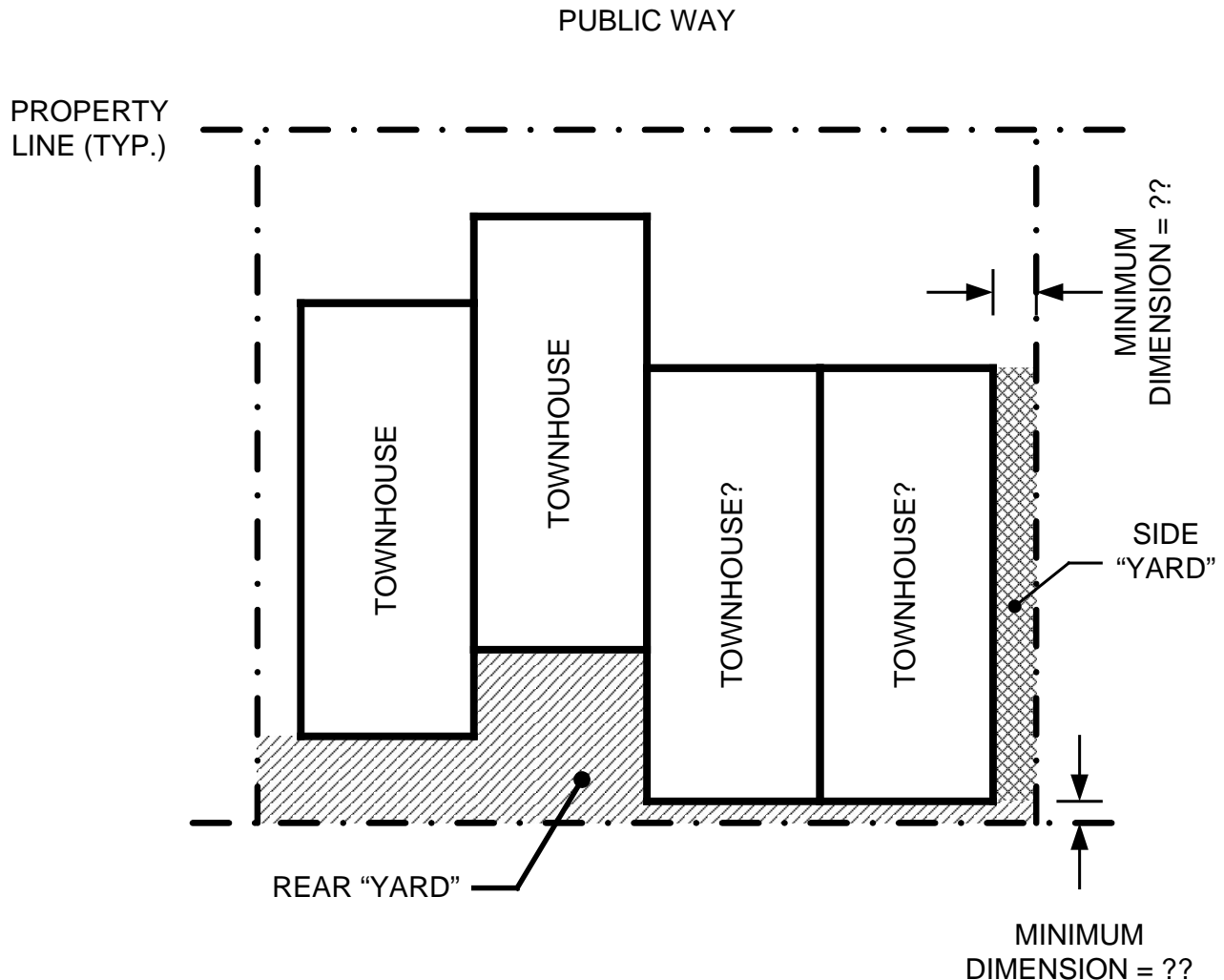


FIGURE 1 – PLAN VIEW

Cost Impact: Minimal, if any, increase to the cost of construction.

RB104-13

Public Hearing: Committee: AS AM D
 Assembly: ASF AMF DF

R303.8-RB-SIU

RB105 – 13

R304, R305.1, R202

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials
(rdavidson@maplegrovern.gov)

Revise as follows:

SECTION R202 DEFINITIONS

ATTIC, HABITABLE. A finished or unfinished area, not considered a *story*, complying with all of the following requirements:

- ~~1. The occupiable floor area is at least 70 square feet (17 m²), in accordance with Section R304,~~
- ~~1.2 The occupiable floor area has a ceiling height in accordance with Section R305, and~~
- ~~2.3 The occupiable space is enclosed by the roof assembly above, knee walls (if applicable) on the sides and the floor-ceiling assembly below.~~

SECTION R304 MINIMUM ROOM AREAS

~~**R304.1 Minimum area.** Every dwelling unit shall have at least one habitable room that shall have not less than 120 square feet (11 m²) of gross floor area.~~

~~**R304.2 Other rooms.** Other habitable rooms shall have a floor area of not less than 70 square feet (6.5 m²).~~

~~**Exception:** Kitchens.~~

~~**R304.3 Minimum dimensions.** Habitable rooms shall not be less than 7 feet (2134 mm) in any horizontal dimension.~~

~~**Exception:** Kitchens.~~

~~**R304.4 Height effect on room area.** Portions of a room with a sloping ceiling measuring less than 5 feet (1524 mm) or a furred ceiling measuring less than 7 feet (2134 mm) from the finished floor to the finished ceiling shall not be considered as contributing to the minimum required habitable area for that room.~~

SECTION R305 CEILING HEIGHT

R305.1 Minimum height. *Habitable space*, hallways, bathrooms, toilet rooms, laundry rooms and portions of *basements* containing these spaces shall have a ceiling height of not less than 7 feet (2134 mm).

Exceptions:

1. For rooms with sloped ceilings, at least ~~50 percent of the required floor area~~ 35 square feet of floor area of the room must have a ceiling height of at least 7 feet (2134 mm) and no portion of the required floor area may have a ceiling height of less than 5 feet (1524 mm).
2. Bathrooms shall have a minimum ceiling height of 6 feet 8 inches (2032 mm) at the center of the front clearance area for fixtures as shown in Figure R307.1. The ceiling height above fixtures shall be such that the fixture is capable of being used for its intended purpose. A shower or tub equipped with a showerhead shall have a minimum ceiling height of 6 feet 8

inches (2032 mm) above a minimum area 30 inches (762 mm) by 30 inches (762 mm) at the showerhead.

R305.1.1 Basements. Portions of *basements* that do not contain *habitable space*, hallways, bathrooms, toilet rooms and laundry rooms shall have a ceiling height of not less than 6 feet 8 inches (2032 mm).

Exception: Beams, girders, ducts or other obstructions may project to within 6 feet 4 inches (1931 mm) of the finished floor.

Reason: Minimum room sizes began to appear in model codes around the time of WWII. But their origin traces back to the tenement regulations in larger cities in the late 1800's. These room sizes are of necessity arbitrary because they were not based on any scientific studies. They are not based on the number of people who may safely occupy a space. The rules have outlived their usefulness and are no longer necessary. People occupy spaces considered small for all or portions of their day including work cubicles and vehicles. And, it isn't hard to find news articles about small trendy dwelling units that exist due to costs caused by both construction and demand. These are no longer considered unsafe.

The market drives room sizes in large part for new construction. It is unlikely that there are many homebuyers that would opt for a living room or bedroom of 50 square feet. But even if they did, would that create a hazardous, unhealthy, or dangerous situation?

Considering that required ceiling heights are only required in 35 square feet of a room with a sloped ceiling, one wonders if enforcing the rule is worth it. It is doubtful that plan reviewers ever calculate room sizes during a plan review.

And as the rule applies to existing dwellings, installation of rooms in unfinished basements (where this is most likely to come into play) will only result in rooms being identified as non-habitable or work will be done without permits. Then other safety features such as smoke alarms and egress windows may be avoided.

It is time to focus resources on requirements that are more beneficial to the public and eliminate the micromanaging.

Cost Impact: None

RB304-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R304-RB-DAVIDSON

RB106 – 13

R304.1, R304.2

Proponent: Thomas Meyers, CBO representing self (Codeconsultant@gmail.com)

Revise as follows:

R304.1 Minimum area. ~~Every dwelling unit shall have at least one habitable room that shall have not less than 120 square feet (11 m2) of gross floor area.~~

R304.2 Other rooms. ~~Other~~ Habitable rooms shall have a floor area of not less than 70 square feet (6.5 m2).

Exception: Kitchens.

Reason: The code has long provided a minimum room area that was historically accommodated by market expectation. Recently, proponents of minimalist living have advocated living in smaller dwellings to reduce environmental impact and provide for lower living costs through reduced mortgage and maintenance expenses. These dwellings are intended to allow for a minimalist lifestyle that doesn't demand large volumes of living space. Extreme examples of these "minimalist" dwellings may be found by using search engine term "tiny house".

During the past three years, I have attempted to research the basis of the requirement for the minimum room area. There is little, if any, documentation on the life safety benefit of having a certain area provided as a minimum. Logically, there is no real benefit to a minimum area provided that the activities necessary in "dwelling" may be accommodated within the space provided. The code has previously set a minimum of 70sf to perform any "habitable" use. Therefore, that is the value that should be applicable throughout.

Removal of this requirement may provide for a gain in overall life safety. My research indicates that a considerable number of these structures are purposefully built to evade building code oversight. The main reason cited is the minimum area provisions. If the code reduced the minimum area to 70sf, the main objective would be removed.

Consumers make a purposeful and informed decision as to the appropriateness of the housing they choose to live in. It isn't appropriate that the code place arbitrary restrictions that have no demonstrable life-safety benefit.

Cost Impact: Proposed change will reduce the cost of construction

RB106-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R304.1-RB-MEYERS

RB107 – 13

R305.1, R305.1.1

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee and Virginia Building and Code Officials Association (bajnaic@chesterfield.gov)

Revise as follows:

SECTION R305 CEILING HEIGHT

R305.1 Minimum height. *Habitable space*, hallways, bathrooms, toilet rooms, laundry rooms and portions of *basements* containing these spaces shall have a ceiling height of not less than 7 feet (2134 mm).

Exceptions:

1. For rooms with sloped ceilings, at least 50 percent of the required floor area of the room must have a ceiling height of at least 7 feet (2134 mm) and no portion of the required floor area may have a ceiling height of less than 5 feet (1524 mm).
2. Bathrooms shall have a minimum ceiling height of 6 feet 8 inches (2032 mm) at the center of the front clearance area for fixtures as shown in Figure R307.1. The ceiling height above fixtures shall be such that the fixture is capable of being used for its intended purpose. A shower or tub equipped with a showerhead shall have a minimum ceiling height of 6 feet 8 inches (2032 mm) above a minimum area 30 inches (762 mm) by 30 inches (762 mm) at the showerhead.
3. In portions of basements and detached accessory structures not containing habitable space, the spaces shall have a minimum headroom of 6 feet 8 inches (2032 mm). Beams, girders, ducts or other obstructions may project to within 6 feet 4 inches (1931 mm) of the finished floor.

~~**R305.1.1 Basements.** Portions of *basements* that do not contain *habitable space*, hallways, bathrooms, toilet rooms and laundry rooms shall have a ceiling height of not less than 6 feet 8 inches (2032 mm).~~

~~**Exception:** Beams, girders, ducts or other obstructions may project to within 6 feet 4 inches (1931 mm) of the finished floor.~~

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

The BCAC decided that the current language for basement ceiling heights created some confusion with the double negative. In addition, the BCAC decided that requiring a minimum 7 foot ceiling clearance in non-habitable portions of basements containing mechanical rooms, bathrooms and laundry rooms was overly restrictive.

Cost Impact: None

RB107-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

R305.1-RB-BAJNAI-BCAC

RB108 – 13

R305.1, R305.1.1

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials
(rdavidson@maplegrovern.gov)

Revise as follows:

SECTION R305 CEILING HEIGHT

R305.1 Minimum height. *Habitable space*, hallways, ~~bathrooms, toilet rooms, laundry rooms~~ and portions of *basements* containing these spaces shall have a ceiling height of not less than 7 feet (2134 mm). Bathrooms, toilet rooms and laundry rooms shall have a ceiling height of not less than 6 feet 8 inches (2032 mm).

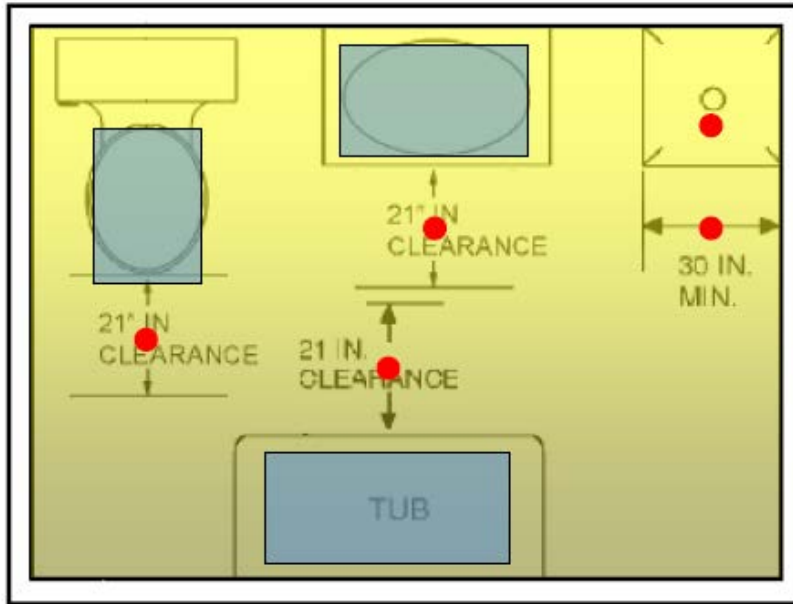
Exceptions:

1. For rooms with sloped ceilings, at least 50 percent of the required floor area of the room must have a ceiling height of at least 7 feet (2134 mm) and no portion of the required floor area may have a ceiling height of less than 5 feet (1524 mm).
2. ~~Bathrooms shall have a minimum ceiling height of 6 feet 8 inches (2032 mm) at the center of the front clearance area for fixtures as shown in Figure R307.1.~~ The ceiling height above bathroom and toilet room fixtures shall be such that the fixture is capable of being used for its intended purpose. A shower or tub equipped with a showerhead shall have a minimum ceiling height of 6 feet 8 inches (2032 mm) above a minimum area 30 inches (762 mm) by 30 inches (762 mm) at the showerhead.

R305.1.1 Basements. Portions of *basements* that do not contain *habitable space*, ~~or hallways, bathrooms, toilet rooms and laundry rooms~~ shall have a ceiling height of not less than 6 feet 8 inches (2032 mm).

Exception: Beams, girders, ducts or other obstructions may project to within 6 feet 4 inches (1931 mm) of the finished floor.

Reason: This proposal sets the required ceiling height for bathrooms, toilet rooms, and laundry rooms at 6 feet 8 inches. The current language requires ceiling heights in these spaces to be 7 feet. Then the exception allows the ceiling height to be 6 feet 8 inches in front of the fixtures (the most used area of the space) so the exception is really the rule. It only makes sense that the entire room be permitted to be 6 feet 8 inches, not just the most used areas of the room.



- 7" Ceiling height required.
- 6' 8" Ceiling height permitted.
- Fixture capable of being used.

Cost Impact: None

RB108-13

Public Hearing: Committee: AS AM D
 Assembly: ASF AMF DF

R305.1-RB-DAVIDSON

RB109 – 13

R307.2

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org); Roger Harper, Louisa County, VA, representing Virginia Plumbing and Mechanical Inspectors Association (VPMIA), Virginia Building Code Officials Association (VBCOA) and ICC Region 7 (sharper@louisa.org); Richard Grace of Fairfax County representing Virginia Plumbing and Mechanical Inspectors Association and Virginia Building and Code Officials Association (Richard.Grace@fairfaxcounty.gov)

Delete and substitute as follows:

~~**R307.2 Bathtub and shower spaces.** Bathtub and shower floors and walls above bathtubs with installed shower heads and in shower compartments shall be finished with a nonabsorbent surface. Such wall surfaces shall extend to a height of not less than 6 feet (1829 mm) above the floor.~~

R307.2 Bathtub and shower floors and walls. Bathtub floors, shower floors, wall areas above built-in tubs that have installed shower heads and walls in shower compartments shall be constructed of smooth, corrosion-resistant and nonabsorbent waterproof materials. Wall materials shall extend to a height of not less than 6 feet (1829 mm) above the room floor level and not less than 70 inches (1778 mm) above the drain of the tub or shower. Such walls shall form a water-tight joint with each other and with either the tub or shower floor.

Reason: This revised language was approved for the 2015 IPC. There is no reason for the two codes to have different language.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was Item no. X8 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP109-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

R307.2-RB-HALL-PMGCAC

RB110 – 13

R308.1, R308.1.1, R308.3, R308.4

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials
(rdavidson@maplegrovern.gov)

Revise as follows:

R308.1 Identification. ~~Except as indicated in Section R308.1.1 each~~ **Required.** Every pane of glazing installed in hazardous locations ~~as defined in Section R308.4~~ shall meet the requirements of R308.3.1 and shall be provided with a manufacturer's designation specifying who applied the designation, designating the type of glass and the safety glazing standard with which it complies, which is visible in the final installation. The designation shall be acid etched, sandblasted, ceramic-fired, laser etched, embossed, or be of a type which once applied cannot be removed without being destroyed. ~~A label shall be permitted in lieu of the manufacturer's designation.~~

Exceptions:

- ~~1. For other than tempered glass, manufacturer's designations are not required provided the building official approves the use of a certificate, affidavit or other evidence confirming compliance with this code.~~
2. Tempered spandrel glass is permitted to be identified by the manufacturer with a removable paper designation.

R308.1.1 Identification of multiple assemblies. ~~Multipane assemblies having individual panes not exceeding 1 square foot (0.09 m²) in exposed area shall have at least one pane in the assembly identified in accordance with Section R308.1. All other panes in the assembly shall be labeled "CPSC 16 CFR 1201" or "ANSI Z97.1" as appropriate.~~

R308.2 Louvered windows or жалousies. Regular, float, wired or patterned glass in жалousies and louvered windows shall be no thinner than nominal 3/16 inch (5 mm) and no longer than 48 inches (1219 mm). Exposed glass edges shall be smooth.

R308.2.1 Wired glass prohibited. Wired glass with wire exposed on longitudinal edges shall not be used in жалousies or louvered windows.

R308.3 Human impact loads. Individual glazed areas, including glass mirrors ~~in hazardous locations such as those indicated as defined in Section R308.4~~, shall pass the test requirements of Section R308.3.1.

Exceptions:

1. Louvered windows and жалousies shall comply with Section R308.2.
2. Mirrors and other glass panels mounted or hung on a surface that provides a continuous backing support.
3. Glass unit masonry complying with Section R610.

R308.3.1 Impact test. Where required by other sections of the code, glazing shall be tested in accordance with CPSC 16 CFR 1201. Glazing shall comply with the test criteria for Category I or II as indicated in Table R308.3.1(1).

Exception: Glazing not in doors or enclosures for hot tubs, whirlpools, saunas, steam rooms, bathtubs and showers shall be permitted to be tested in accordance with ANSI Z97.1. Glazing shall comply with the test criteria for Class A or B as indicated in Table R308.3.1 (2).

R308.4 Hazardous locations. The locations specified in Sections R308.4.1 through R308.4.7 shall be considered specific hazardous locations for the purposes of glazing.

R308.4.1 Glazing in doors. Glazing in all fixed and operable panels of swinging, sliding and bifold doors shall be considered a hazardous location.

Exceptions:

1. ~~Glazed openings of a size through which a 3-inch-diameter (76 mm) sphere is unable to pass.~~
2. ~~Decorative glazing.~~

R308.4.2 Glazing adjacent doors. Glazing in an individual fixed or operable panel adjacent to a door where the nearest vertical edge of the glazing is within a 24-inch (610 mm) arc of either vertical edge of the door in a closed position and where the bottom exposed edge of the glazing is less than 60 inches (1524 mm) above the floor or walking surface shall be considered a hazardous location.

Exceptions:

1. ~~Decorative glazing.~~
2. ~~When there is an intervening wall or other permanent barrier between the door and the glazing.~~
3. ~~Glazing in walls on the latch side of and perpendicular to the plane of the door in a closed position.~~
4. ~~Where access through the door is to a closet or storage area 3 feet (914 mm) or less in depth. Glazing in this application shall comply with section R308.4.3.~~
5. ~~Glazing that is adjacent to the fixed panel of patio doors.~~

R308.4.3 Glazing in windows. Glazing in an individual fixed or operable panel that meets all of the following conditions shall be considered a hazardous location:

1. ~~The exposed area of an individual pane is larger than 9 square feet (0.836 m²);~~
2. ~~The bottom edge of the glazing is less than 18 inches (457 mm) above the floor;~~
3. ~~The top edge of the glazing is more than 36 inches (914 mm) above the floor; and~~
4. ~~One or more walking surfaces are within 36 inches (914 mm), measured horizontally and in a straight line, of the glazing.~~

Exceptions:

1. ~~Decorative glazing.~~
2. ~~When a horizontal rail is installed on the accessible side(s) of the glazing 34 to 38 inches (864 to 965 mm) above the walking surface. The rail shall be capable of withstanding a horizontal load of 50 pounds per linear foot (730 N/m) without contacting the glass and be a minimum of 1¹/₂ inches (38 mm) in cross sectional height.~~
3. ~~Outboard panes in insulating glass units and other multiple glazed panels when the bottom edge of the glass is 25 feet (7620 mm) or more above grade, a roof, walking surfaces or other horizontal [within 45 degrees (0.79 rad) of horizontal] surface adjacent to the glass exterior.~~

R308.4.4 Glazing in guards and railings. Glazing in guards and railings, including structural baluster panels and nonstructural in-fill panels, regardless of area or height above a walking surface shall be considered a hazardous location.

R308.4.5 Glazing and wet surfaces. Glazing in walls, enclosures or fences containing or facing hot tubs, spas, whirlpools, saunas, steam rooms, bathtubs, showers and indoor or outdoor swimming pools where

~~the bottom exposed edge of the glazing is less than 60 inches (1524 mm) measured vertically above any standing or walking surface shall be considered a hazardous location. This shall apply to single glazing and all panes in multiple glazing.~~

Exception: ~~Glazing that is more than 60 inches (1524 mm), measured horizontally and in a straight line, from the water's edge of a bathtub, hot tub, spa, whirlpool, or swimming pool.~~

R308.4.6 Glazing adjacent stairs and ramps. ~~Glazing where the bottom exposed edge of the glazing is less than 36 inches (914 mm) above the plane of the adjacent walking surface of stairways, landings between flights of stairs and ramps shall be considered a hazardous location.~~

Exceptions:

- ~~1. When a rail is installed on the accessible side(s) of the glazing 34 to 38 inches (864 to 965 mm) above the walking surface. The rail shall be capable of withstanding a horizontal load of 50 pounds per linear foot (730 N/m) without contacting the glass and be a minimum of 1 1/2 inches (38 mm) in cross sectional height.~~
- ~~2. Glazing 36 inches (914 mm) or more measured horizontally from the walking surface.~~

R308.4.7 Glazing adjacent to the bottom stair landing. ~~Glazing adjacent to the landing at the bottom of a stairway where the glazing is less than 36 inches (914 mm) above the landing and within 60 inches (1524 mm) horizontally of the bottom tread shall be considered a hazardous location.~~

Exception: ~~The glazing is protected by a guard complying with Section R312 and the plane of the glass is more than 18 inches (457 mm) from the guard.~~

Reason: We have all heard the warnings from the media and the National Weather Service during certain weather events asking people to take shelter and "stay away from windows". Why? Windows are the weak link in protection from flying debris and hail. Windows allow debris to enter homes. Windows can be a danger in certain weather conditions and from certain common everyday events. Occupants are put at risk from this flying debris or from flying glass. Flying shards of glass can become deadly missiles. Homes with shattered windows are more susceptible to interior damage and greater wind damage increasing repair costs and insurance premiums.

Tempered glass is 4-5 times stronger than non-tempered glass. Using tempered glass or other safety glazing products will increase the safety of homes during certain weather events by reducing the amount of flying debris entering the home, reducing flying glass, and adding greater protection against the elements for the home.

But weather events aren't the only reason to require all glazing to be safety glazing. In earthquake prone areas, shattered glass is a reality and a safety hazard.

And, normal activities in the home can quickly turn tragic and involve serious injury. In the last code cycle, Thomas S. Zaremba, Roetzel & Andress, representing Glazing Industry Code Committee stated during the ICC hearings: "The assumption that people are familiar with their home environment does not take into consideration guests, rental units, or accidental impacts, for example, resulting from horseplay, that can result in human impact with glazing ..." Children playing in or about the home can come into contact with glazing that is not now required to be safety glazed resulting in serious injuries. Children and adults can accidentally fall into window wells contacting the glass in a downward fall. News reports periodically highlight these events such as the Oklahoma lady who was cut by flying glass when a neighbor child's baseball hit her window or of the children in Ohio that were cut by flying glass when a tree fell against their home in a storm.

Because of its added strength, safety glazing creates more of a barrier to intruders which in turn increases the personal safety level in the home.

There are significant benefits to be had by requiring all glass in a home to be safety glazed. They can reduce injuries and related health care costs and because of the increased strength, may help to reduce break-ins.

The rules themselves as they are currently written are full of arbitrary limitations. Consider this: A window that is at floor level and that is 8.9 square feet need not be safety glazed while a window that is .1 sq feet larger and 17 inches off the floor must be safety glazed. Children are just as likely to run into and be harmed regardless the size. Flying shards of glass are dangerous no matter what size window they come out of or no matter how high off the floor they fall from. Windows can be struck by flying debris at any height. The higher the glass is off the floor, the more dangerous it is when it falls.

Entire industries have popped up that provide various films for placement over windows to make the glass safer from the standpoint of intrusion, damage from weather, and other safety glazing reasons. Why not just require safety glazing to begin with. Tempered glass is even more resistant to breakage from fire in an adjoining building.

It is amazing that with all of the news articles written about the dangers of glass that industry hasn't taken on the responsibility of installing safety glazing in all of their products. The technology is there. The cost is minimal compared to the many code changes that have been approved in recent years to prevent incidents that by any means would be rare; the underfloor fire protection to protect fire fighters comes immediately to mind. Accidents related to breaking glass could occur at any time in any

dwelling with any occupant. And unlike a fire, are more likely to involve entire communities. It is time to make homes safer for the occupants.

Cost Impact: This proposal will increase the cost of construction.

RB110-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R308.1-RB-DAVIDSON

RB11 – 13

R308.4.2

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee and Virginia Building and Code Officials Association (bajnaic@chesterfield.gov)

Revise as follows:

R308.4.2 Glazing adjacent doors. Glazing in an individual fixed or operable panel adjacent to a door shall be considered a hazardous location ~~where the nearest vertical edge of the glazing is within a 24-inch (610 mm) arc of either vertical edge of the door in a closed position and where if the bottom exposed edge of the glazing is less than 60 inches (1524 mm) above the floor or walking surface shall be considered a hazardous location~~ and it meets either of the following conditions:

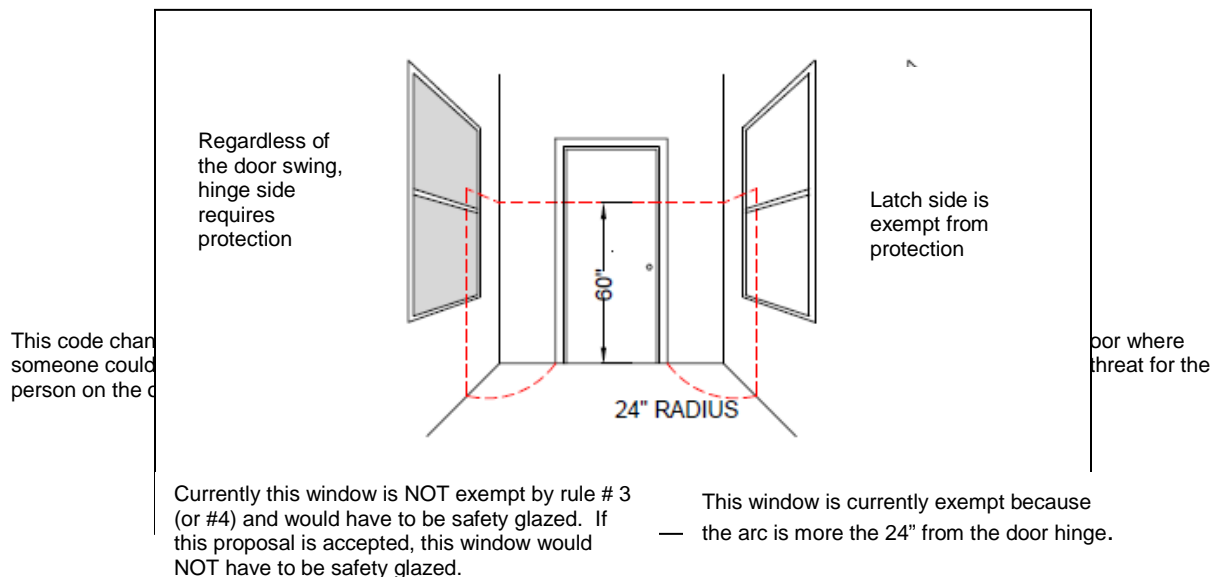
1. Where the glazing is within 24" of either side of the door in the plane of the door in a closed position.
2. Where the glazing is on a wall perpendicular to the plane of the door in a closed position and within 24" of the hinge side of an in-swinging door.

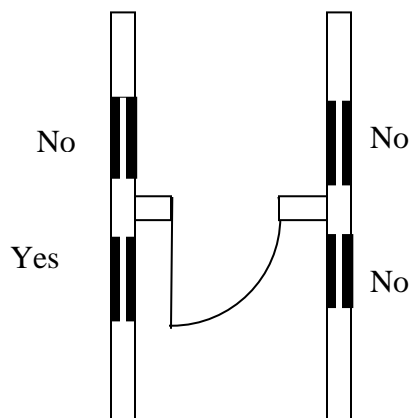
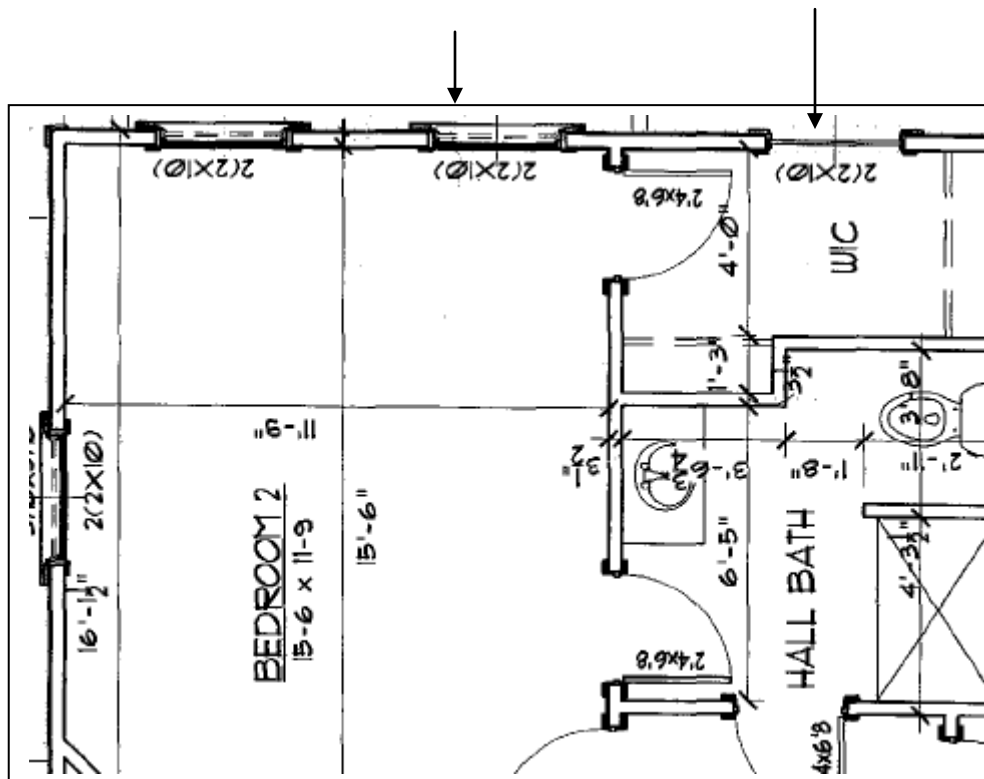
Exceptions:

1. Decorative glazing.
2. When there is an intervening wall or other permanent barrier between the door and the glazing.
3. ~~Glazing in walls on the latch side of and perpendicular to the plane of the door in a closed position~~
4. Where access through the door is to a closet or storage area 3 feet (914 mm) or less in depth. Glazing in this application shall comply with section R308.4.3.
5. Glazing that is adjacent to the fixed panel of patio doors.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

Exception 3: Currently the code requires safety glazing for windows on the hinge side of walls perpendicular to the door plane – regardless of the door swing. See sketch below.





These are the four possible configurations of windows adjacent/perpendicular to a door. Only the one with an in-swinging door on the hinge side would be required to be safety glazed.

Cost Impact: This proposal may decrease the cost of construction.

RB111-13

Public Hearing: Committee: AS AM D
 Assembly: ASF AMF DF

R308.4.2 #1-RB-BAJNAI-BCAC

RB112 – 13

R308.4.2

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee
(bajnaic@chesterfield.gov)

Revise as follows:

R308.4.2 Glazing adjacent doors. Glazing in an individual fixed or operable panel adjacent to a door where the nearest vertical edge of the glazing is within a 24-inch (610 mm) arc of either vertical edge of the door in a closed position and where the bottom exposed edge of the glazing is less than 60 inches (1524 mm) above the floor or walking surface shall be considered a hazardous location.

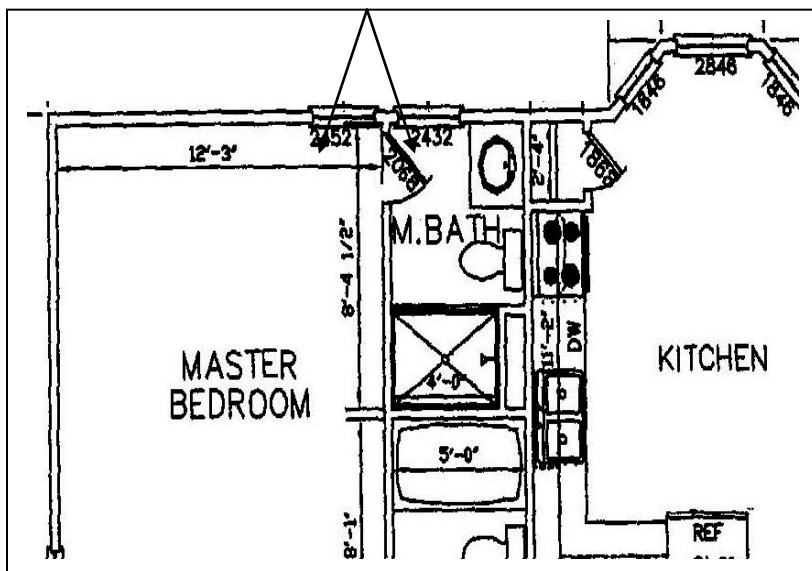
Exceptions:

1. Decorative glazing.
2. When there is an intervening wall or other permanent barrier between the door and the glazing.
3. Glazing in walls on the latch side of and perpendicular to the plane of the door in a closed position
4. Where access through the door is to a closet or bathroom or storage area 3 feet (914 mm) or less in depth. Glazing in this application shall comply with section R308.4.3.
5. Glazing that is adjacent to the fixed panel of patio doors.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

1. There is some confusing language in this section trying to acknowledge that the requirements in Section R308.4 may overlap and how to handle them. Adding this sentence in R308.4 says that you have to comply with all of the requirements in this section – even if you get an exception in one part, you might still have to comply by a different rule. That is what the second sentence in Exception 4 of R308.4.2 is trying to do.
2. Currently the code requires safety glazing in windows within 24" arc of the hinge side of a door for walls perpendicular to the door swing.

Currently both of these windows would have to be safety glazed. By this proposed code change, neither window would have to be safety glazed because the door is to a bathroom



Because the situation is familiar to the home occupants, and most of the time the bathroom or closet would be serving one or two people on a very limited basis, the threat of danger is not present.

Cost Impact: This proposal may decrease the cost of construction.

RB112-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

R308.4.2 #2-RB-BAJNAI-BCAC

RB113 – 13

R308.4.5

Proponent: Tim Pate, City and County of Broomfield, CO, representing the Colorado Chapter Code Change Committee

Revise as follows:

R308.4.5 Glazing and wet surfaces. Glazing in walls, enclosures or fences containing or facing hot tubs, spas, whirlpools, saunas, steam rooms, bathtubs, showers and indoor or outdoor swimming pools where the bottom exposed edge of the glazing is less than 60 inches (1524 mm) measured vertically above any standing or walking surface shall be considered a hazardous location. This shall apply to single glazing and all panes in multiple glazing.

Exception: Glazing that is more than 60 inches (1524 mm), measured horizontally and in a straight line, from the ~~water's~~ edge of a bathtub, hot tub, spa, whirlpool, or swimming pool or from the edge of a shower, sauna, or steam room.

Reason: This code change is proposing to add the language "shower, sauna, steam room" to the laundry list in the exception to require safety glazing in locations within and adjacent to areas with wet surfaces. The laundry list should match what is in the main section R308.4.5. This code change will also delete the word "water's" so that it will make sense with the added items. There will typically not be any depth of water in a shower, sauna, or steam room.

This will help provide clarity to the code user to show that if you have glazing at any height above floor and it is at least 60" away from edge of these items it would be exempt from the requirement to have glass be safety glazing. All of these items will potentially have very slippery floor surfaces and if one were to fall down the person would not extend out past 60" with their arms and hands or bodies when falling. This will match the requirements and concept for exception for safety glazing measured from bottom tread of stairs.

Cost Impact: This code change will not increase the cost of construction.

RB113-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R308.4.5-RB-PATE

RB114 – 13

R308.4.6, R308.4.7

Proponent: Tim Pate, City and County of Broomfield, CO representing Colorado Chapter Code Change Committee

Revise as follows:

R308.4.6 Glazing adjacent to stairs and ramps. Glazing where the bottom exposed edge of the glazing is less than ~~36 inches (914 mm)~~ 60 inches (1524 mm) above the plane of the adjacent walking surface of stairways, landings between flights of stairs and ramps shall be considered a hazardous location.

Exceptions:

1. When a rail is installed on the accessible side(s) of the glazing 34 to 38 inches (864 to 965 mm) above walking surface. The rail shall be capable of withstanding a horizontal load of 50 pounds per linear foot (730 N/m) without contacting the glass and be a minimum of 1 ½ inches (38 mm) in cross sectional height and the plane of glass is more than 18 inches (457 mm) horizontally from the rail.
2. Glazing 36 inches (914 mm) or more measured horizontally from the walking surface.

R308.4.7 Glazing adjacent to the bottom stair landing. Glazing adjacent to the landing at the bottom of a stairway where the glazing is less than ~~36 inches (914 mm)~~ 60 inches (1524 mm) above the landing and within 60 inches (1524 mm) horizontally of the bottom tread shall be considered a hazardous location.

Exception: The glazing is protected by a guard complying with Section 312 and the plane of the glass is more than 18 inches (457 mm) from the guard.

Reason: All of the previous editions of the IRC required glazing that was had bottom edge below 60 inches above the plane of walking surfaces of stairways, landings between flights of stairs and ramps, and adjacent to stair landings to be approved safety glazing. Code change was approved which changed the 36 inches back to 60 inches. There was a comprehensive code change (S218 09/10) that reformatted the entire safety glazing section and also changed the dimension from 60 inches down to 36 inches. This was approved and overrode my code change.

My reason statement for the code change during the 2009/2010 cycle was very clear in helping clean up the inconsistencies in the earlier codes. As you can see it specifically required the wall with glazing to be at least 18 inches away. The reason statement that the IRC change committee gave in approving the comprehensive change was that it should be lowered to 36" which would match the exception. I could never find a good reason as to why my code change that was approved by the IRC committee did not stand and get incorporated into the overall change also approved by the IRC code change committee.

I am copying my code change (RB40-09/10) and reason statement that the 2009/2010 IRC committee agreed with:

Revise as follows:

R308.4 The following shall be considered specific hazardous locations for the purposes of glazing:

Items 1 through 6 remain unchanged

7. Glazing adjacent to stairways, landings, and ramps within 36 inches (914 mm) horizontally of a walking surface when the exposed surface of the glazing is less than 60 inches (1524 mm) above the plane of the adjacent walking surface.

Exceptions:

1. ~~When a rail is installed on the accessible side(s) of the glazing 34 to 38 inches (864 to 965 mm) above the walking surface. The rail shall be capable of withstanding a horizontal load of 50 pounds per lineal foot (730 N/m) without contacting the glass and be a minimum of 1 ½ inches (38 mm) in cross sectional height.~~
2. The side of the stairway has a guardrail or handrail, including balusters or in-fill panels, complying with Sections R311.7.6 and R312 and the plane of the glazing is more than 18 inches (457 mm) from the railing; or
3. When a solid wall or panel extends from the plane of adjacent walking surface to 34 inches (863 mm) to 36 inches (914 mm) above the walking surface and the construction at the top of that wall or panel is capable of withstanding the same horizontal load as a guard and the plane of the glazing is more than 18 inches (457 mm) from the wall or panel.

8. Glazing adjacent to stairways within 60 inches (1524 mm) horizontally of the bottom tread of a stairway in any direction when the exposed surface of the glazing is less than 60 inches (1524 mm) above the nose of the tread.

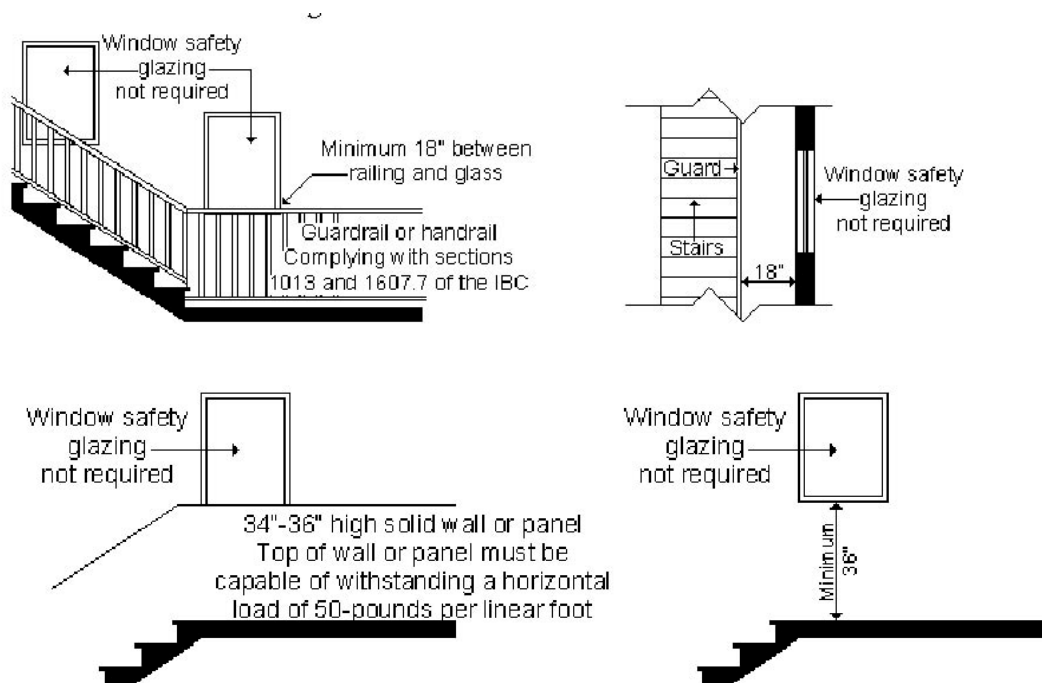
Exceptions:

1. The side of the stairway has a guardrail or handrail, including balusters or in-fill panels, complying with Sections R311.7.6 and R312 and the plane of the glazing is more than 18 inches (457 mm) from the railing; or
2. When a solid wall or panel extends from the plane of adjacent walking surface to 34 inches (863 mm) to 36 inches (914 mm) above the walking surface and the construction at the top of that wall or panel is capable of withstanding the same horizontal load as a guard and the plane of the glazing is more than 18 inches (457 mm) from the wall or panel.

Reason: Code change RB15-00 added exception 9 (9.1 and 9.2) which allowed the protective bar but also required the glazing to be at least 18" away from the stair and bar. Code change RB16-00 was also approved in the same code change cycle which added the reference in exception #5 which would allow the protective bar but not require the 18" separation. This created a direct conflict between the two exceptions in the 2003 IRC and the 2006 IRC. IRC Section R308.4 was modified for the 2009 IRC by reformatting the requirements and exceptions in order to make it more user friendly but no technical changes were made.

Stairs are inherently more dangerous for tripping hazards than normal walking surfaces. It does not make sense to allow a 1 1/2" wide bar or a solid wall directly adjacent to stairs and landings and think this gives adequate protection for someone falling into glazing that is not safety glazing. Requiring the glazing to be at least 18" away would provide better protection if someone trips and falls which is exactly what 2009 IRC section R308.4 #7 Exception 2 requires.

The following diagrams illustrate what R308.4 #7 exception 2 allows which is the guard or handrail but also the 18" separation which is in conflict with what is allowed in #7 exception 1 or 3 which allows a rail or solid wall but does not require the 18" separation.



I was also successful in having the IBC safety glazing section changed back to 60 inches during the past Code Change Hearing in Dallas for the 2015 IBC. Here is the code change (S297-12) to IBC along with the reason statement – this code change was approved by Structural Code Change Committee and was not challenged at Final Action Hearings and therefore was approved on the consent agenda:

Revise as follows:

2406.4.7 Glazing adjacent to the bottom stair landing. Glazing adjacent to the landing at the bottom of a stairway where the glazing is less than 36 inches (914 mm) 60 inches (1524 mm) above the landing and within a 60 inches (1524 mm) horizontally of the bottom tread shall be considered a hazardous location.

Reason: Previous editions of the IBC before the 2012 required glazing that is less than 60" above the landing to be approved safety glazing. It is not clear why this requirement was changed in the 2012. It does not make sense that section 2406.4.6 applies to glazing that is less than 60" above the stairs and intermediate landings but the glazing at bottom landing is treated differently – only when below 36" The potential for falling through the glazing at bottom landing is the same. This change will bring back the 60" height which will then match the requirement at intermediate landings and stairs.

Both 2012 IBC sections 2406.4.6 and 2406.4.7 have exceptions which allow a guard but require the plane of glass to be at least 18" away from the guard.

This code change should be approved in order to make sure that people who use stairs, ramps, and landings remain safe in case they trip and fall and potentially fall through windows adjacent to the stairs and ramps. I do not feel that only protecting glazing that is below 36" above walking surface is adequate but that all glazing below 60" should be protected. The vast majority of people will have their hands and arms outstretched if falling at 48" or so high and would be falling through glass at this height or somewhat higher. Approving this code change will get both the IRC and IBC to match which is extremely important.

Cost Impact: **Cost Impact:** This code change will increase the cost of construction.

RB114-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R308.4.6-RB-PATE

RB115 – 13

R308.4.7

Proponent: Tim Pate, City and County of Broomfield, CO representing Colorado Chapter Code Change Committee

Revise as follows:

R308.4.7 Glazing adjacent to the bottom stair landing. Glazing adjacent to the landing at the bottom of a stairway where the glazing is less than 36 inches (914 mm) above the landing and within a 60 inches (1524 mm) ~~horizontally of horizontal arc less than 180 degrees from the bottom tread nosing~~ shall be considered a hazardous location.

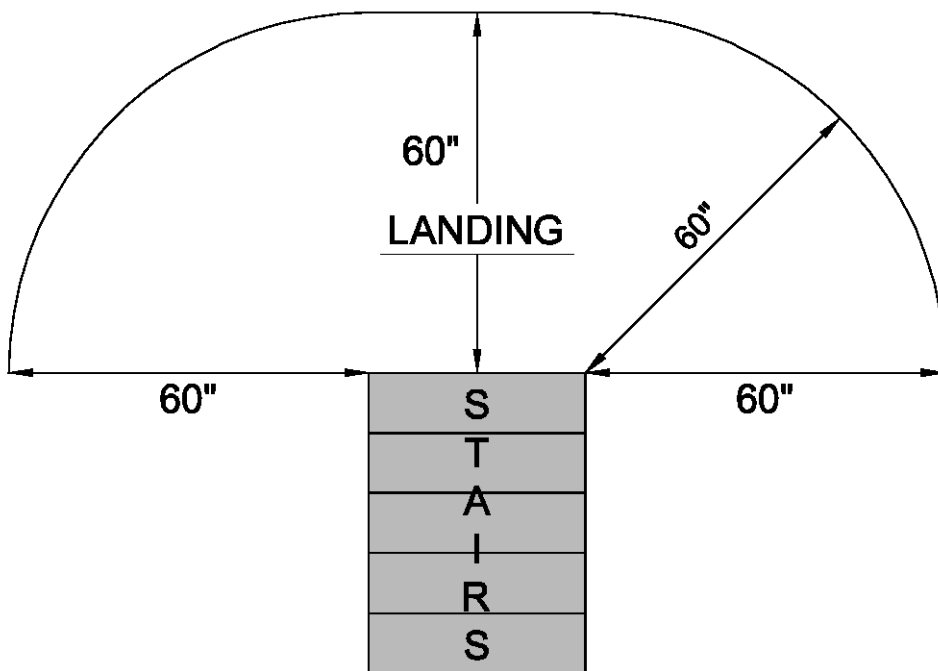
Exception: The glazing is protected by a guard complying with Section 312 and the plane of the glass is more than 18 inches (457 mm) from the guard.

Reason: Previous editions of the IRC before the 2012 required glazing that is 60" horizontally in any direction to be approved safety glazing. It is not clear why this requirement was changed in the 2012. The previous editions had the additional wording "in any direction" when applying the 60" horizontal rule. This is due to the "splay" factor for when someone gets to the last tread and falls. The tendency is for someone to flail out in any direction.

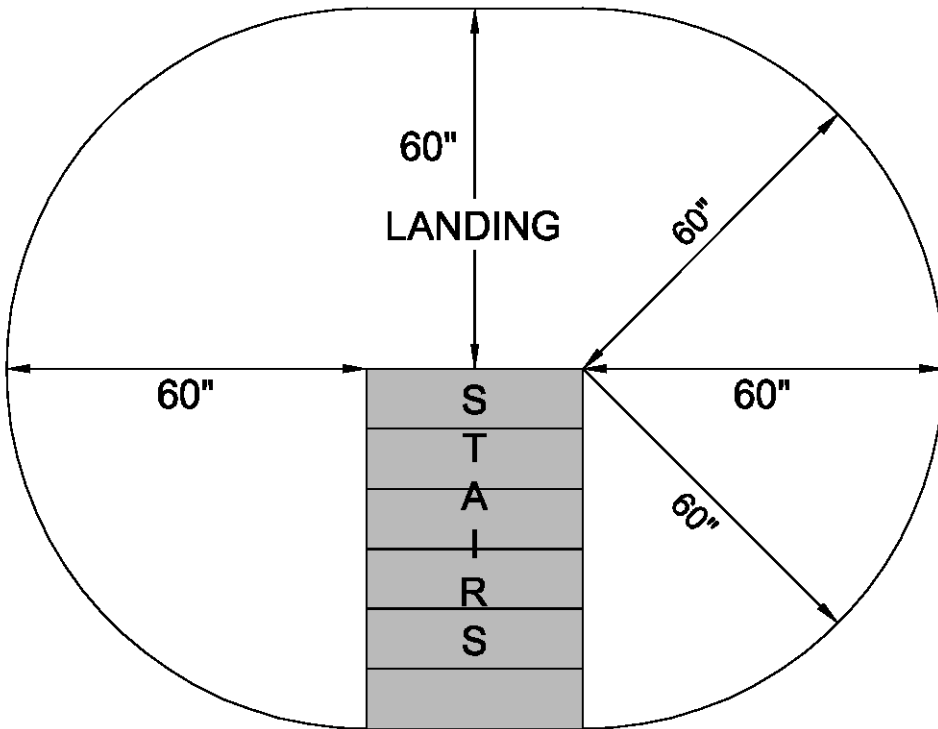
This added wording will make this section only apply to any glazing that is in a wall that is less than 180 degrees from the bottom tread nosing. I believe that adding the wording which would limit the area needing safety glazing to any glazing that falls within a 180 degree arc from bottom tread nosing and extending out 60" makes more sense since it is extremely unlikely that someone will fall out and backwards. I have added an illustration which should help everyone see what this changed wording will do.

Please note that there is still a requirement to provide approved safety glazing when located within 36" horizontally of the sides of the stairs.

The new code language will incorporate the areas shown in the following diagram:



The current code language incorporates the area shown below in the diagram:



This same code change proposal was reviewed and approved at the Final Action Hearings for the 2015 IBC – therefore this proposal for the IRC will get the two code sections to match which is important for consistency.

Cost Impact: This code change will reduce construction cost.

RB115-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R308.4.7-RB-PATE

RB116 – 13

R308.6.9.1 (New), Chapter 44

Proponent: Jeff Inks, Window and Door Manufacturers Association, representing the Window & Door Manufacturers Association.

Add new text as follows:

R308.6.9 Testing and labeling. Unit skylights and tubular daylighting devices shall be tested by an approved independent laboratory, and bear a label identifying manufacturer, performance grade rating and approved inspection agency to indicate compliance with the requirements of AAMA/WDMA/CSA 101/I.S.2/A440.

R308.6.9.1 Comparative analysis for glass-glazed unit skylights. Structural wind load design pressures for glass-glazed unit skylights different than the size tested in accordance with Section R308.6.9 shall be permitted to be different than the design value of the tested unit when determined in accordance with one of the following comparative analysis methods:

1. Structural wind load design pressures for glass-glazed unit skylights smaller than the size tested in accordance with Section 308.6.9 shall be permitted to be higher than the design value of the tested unit provided such higher pressures are determined by accepted engineering analysis. All components of the smaller unit shall be the same as those of the tested unit. Where such calculated design pressures are used, they shall be validated by an additional test of the glass-glazed unit skylight having the highest allowable design pressure.
2. In accordance with WDMA I.S. 11.

Add new standard to Chapter 44 as follows:

WDMA Window & Door manufacturers Association
1400 East Touhy Avenue, Suite 470
Des Plaines, IL 60018

WDMA I.S.11-13 Analytical Method for Design Pressure Rating of Fenestration Products.....R308.6.9.1

Reason: Comparative analysis based on accepted engineering methods provides a proven, accurate and reliable means for determining design pressures of different sized products within a fenestration product line based on testing of specimen unit/s from the respective line. This alleviates the need for costly testing of all sizes within the line saving considerable construction costs and providing greater design flexibility without incurring additional time and costs, especially for specialty/custom products, for testing that isn't necessary in order to determine the correct DP.

Currently the IRC only allows comparative analysis for windows and doors in Section 612.3.1 which has been and continues to be widely utilized for those products for the reasons stated above. Since comparative analysis as noted above is equally applicable to glass-glazed unit skylights, it should also be permitted by the IRC for them.

Proposed method #1 is taken verbatim from the existing comparative analysis provision in Section 612.3.1 except for substituting "glass-glazed unit skylights" for "windows and door units". However, the existing provision is limited only to allowing comparative analysis for units smaller than the unit tested, not larger. Because comparative analysis can also be effectively used to accurately determine DP ratings for fenestration products that are larger in width and/or height than the actual tested specimen/s provided proper analytical methods are followed, it should also be permitted by the IRC for glass-glazed unit skylights for that purpose as long as proper engineering analysis is required.

The intent of this proposal is to provide for that by allowing for comparative analysis to also be used on units larger than the tested unit if determined in accordance with proposed method #2 -- WDMA I.S. 11. WDMA I.S. 11 - *Industry Standard for Voluntary Analytical Method for Design Pressure (DP) Ratings of Fenestration Products*, provides more comprehensive alternative methods appropriate for using comparative analysis to determine DP of units different in size, both smaller and larger, than that of the tested unit/s within a product line. The comparative analysis methods included in WDMA I.S. 11 are based on accepted engineering analysis which must also be sealed by a licensed Professional Engineer (PE) making it technically sound for use in the IRC for this purpose. This same alternative method is also being proposed for Section 612.3.1 for windows and doors for the same reasons.

Copies of the standard are being submitted to ICC for ICC and IRC code committee review accordingly. The standard is also available on WDMA's website via the following link: <https://www.wdma.com/OnlineBookstore/tabid/61/pid/20/WDMA-I-S-11-09-Voluntary-Analytical-Method-for-Design-Pressure-Rating-of-Fenestration-Products-PDF-Download.aspx>

Cost Impact: This code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, [WDMA I.S.11-13] with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

RB116-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R308.6.9.1 (NEW)-RB-INKS

RB117 – 13

R310

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee
(bajnaic@chesterfield.gov)

Delete and substitute as follows:

R310 EMERGENCY ESCAPE AND RESCUE OPENINGS

~~R310.1 Emergency escape and rescue required.~~ Basements, habitable attics and every sleeping room shall have at least one operable emergency escape and rescue opening. ~~Where basements contain one or more sleeping rooms, emergency egress and rescue opening shall be required in each sleeping room. Where emergency escape and rescue openings are provided, they shall have a sill height of not more than 44 inches (1118 mm) measured from the finished floor to the bottom of the clear opening. Where a door opening having a threshold below the adjacent ground elevation serves as an emergency escape and rescue opening and is provided with a bulkhead enclosure, the bulkhead enclosure shall comply with Section R310.3. The net clear opening dimensions required by this section shall be obtained by the normal operation of the emergency escape and rescue opening from the inside. Emergency and escape rescue openings with a finished sill height below the adjacent ground elevation shall be provided with a window well in accordance with Section R310.2. Emergency escape and rescue openings shall open directly into a public way, or to a yard or court that opens to a public way.~~

~~Exception:~~ Storm shelters and basements used only to house mechanical equipment not exceeding total floor area of 200 square feet (18.58 m²)

~~R310.1.1 Minimum opening area.~~ All emergency and escape rescue openings shall have a minimum net clear opening of 5.7 square feet.

~~Exception:~~ Grade floor openings shall have a minimum net clear opening of 5 square feet.

~~R310.1.2 Minimum opening height.~~ The minimum net clear opening height shall be 24 inches.

~~R310.1.3 Minimum opening width.~~ The minimum net clear opening width shall be 20 inches (508 mm).

~~R310.1.4 Operational constraints.~~ Emergency escape and rescue openings shall be operational from the inside of the room without the use of keys, tools or special knowledge.

~~R310.2 Window wells.~~ The minimum horizontal area of the window well shall be 9 square feet (0.9 m²), with a minimum horizontal projection and width of 36 inches (914 mm). The area of the window well shall allow the emergency escape and rescue opening to be fully opened.

~~Exception:~~ The ladder or steps required by Section R310.2.1 shall be permitted to encroach a maximum of 6 inches (152mm) into the required dimensions of the window well.

~~R310.2.1 Ladder and steps.~~ Window wells with a vertical depth greater than 44 inches (1118 mm) shall be equipped with a permanently affixed ladder or steps usable with the window in the fully open position. Ladders or steps required by this section shall not be required to comply with Sections R311.7 and R311.8. Ladders or rungs shall have an inside width of at least 12 inches (305 mm), shall project at least 3 inches (76 mm) from the wall and shall be spaced not more than 18 inches (457mm) on center vertically for the full height of the window well.

R310.2.2 Drainage. Window wells shall be designed for proper drainage by connecting to the building's foundation drainage system required by Section R504.1 or by an approved alternative method.

Exception: A drainage system for window wells is not required when the foundation is on well-drained soil or sand-gravel mixture soils according to the United Soil Classification System, Group I Soils, as detailed in Table R405.1.

R310.3 Bulkhead enclosures. Bulkhead enclosures shall provide direct access to the basement. The bulkhead enclosure with the door panels in the fully open position shall provide the minimum net clear opening required by Section R310.1.1. Bulkhead enclosures shall also comply with Section R311.7.8.2.

R310.4 Bars, grilles, covers and screens. Bars, grilles, covers, screens or similar devices are permitted to be placed over emergency escape and rescue openings, bulkhead enclosures, or window wells that serve such openings, provided the minimum net clear opening size complies with Sections R310.1.1 to R310.1.3, and such devices shall be releasable or removable from the inside without the use of a key, tool, special knowledge or force greater than that which is required for normal operation of the escape and rescue opening.

R310.5 Emergency escape windows under decks and porches. Emergency escape windows are allowed to be installed under decks and porches provided the location of the deck allows the emergency escape window to be fully opened and provides a path not less than 36 inches (914 mm) in height to a yard or court.

R310.1 Emergency escape and rescue opening required. Basements, habitable attics and every sleeping room shall have at least one operable emergency escape and rescue opening. Where basements contain one or more sleeping rooms, an emergency escape and rescue opening shall be required in each sleeping room. Emergency escape and rescue openings shall open directly into a public way, or to a yard or court that opens to a public way.

Exception: Storm shelters and basements used only to house mechanical equipment not exceeding a total floor area of 200 square feet (18.58 m²)

R310. 1.1 Operational constraints. Emergency escape and rescue openings shall be operational from the inside of the room without the use of keys, tools or special knowledge.

R310.2 Emergency escape and rescue openings. Emergency and escape rescue openings shall have minimum dimensions as specified in this section.

R310.2.1 Minimum opening area. All emergency and escape rescue openings shall have a minimum net clear opening of 5.7 square feet. The net clear opening dimensions required by this section shall be obtained by the normal operation of the emergency escape and rescue opening from the inside. The minimum net clear height opening shall be 24" and the minimum net clear width shall be 20"

Exception: Grade floor or below-grade openings shall have a minimum net clear opening of 5 square feet.

R310.2.2 Window sill height. Where a window is provided as the emergency escape and rescue opening, it shall have a sill height of not more than 44 inches (1118 mm) above the floor; if the sill height is below-grade, it shall be provided with a window well in accordance with Section R310.2.3.

R310.2.3 Window wells. The minimum horizontal area of the window well shall be 9 square feet (0.9 m²), with a minimum horizontal projection and width of 36 inches (914 mm). The area of the window well shall allow the emergency escape and rescue opening to be fully opened.

Exception: The ladder or steps required by Section R310.2.1 shall be permitted to encroach a maximum of 6 inches (152mm) into the required dimensions of the window well.

R310.2.3.1 Ladder and steps. Window wells with a vertical depth greater than 44 inches (1118 mm) shall be equipped with a permanently affixed ladder or steps usable with the window in the fully open position. Ladders or steps required by this section shall not be required to comply with Sections R311.7 and R311.8. Ladders or rungs shall have an inside width of at least 12 inches (305 mm), shall project at least 3 inches (76 mm) from the wall and shall be spaced not more than 18 inches (457mm) on center vertically for the full height of the window well.

R310.2.3.2 Drainage. Window wells shall be designed for proper drainage by connecting to the building's foundation drainage system required by Section R504.1 or by an approved alternative method.

Exception: A drainage system for window wells is not required when the foundation is on well-drained soil or sand-gravel mixture soils according to the United Soil Classification System, Group I Soils, as detailed in Table R405.1.

R310.2.4 Emergency escape and rescue openings under decks and porches. Emergency escape and rescue openings shall be permitted to be installed under decks and porches provided the location of the deck allows the emergency escape and rescue openings to be fully opened and provides a path not less than 36 inches (914 mm) in height to a yard or court.

R310.3 Emergency escape and rescue doors. Where a door is provided as the required emergency escape and rescue opening, it shall be permitted to be a side hinged door or a slider. Where the opening is below the adjacent ground elevation, it shall be provided with a bulkhead enclosure.

R310.3.1 Minimum door opening size. The minimum net clear height opening for any door that serves as an emergency and escape rescue opening shall be in accordance with Section R310.2.1.

R310.3.2 Bulkhead enclosures. Bulkhead enclosures shall provide direct access from the basement. The bulkhead enclosure shall provide the minimum net clear opening equal to the door in the fully open position.

R310.3.2.1 Drainage. Bulkhead enclosures shall be designed for proper drainage by connecting to the building's foundation drainage system required by Section R504.1 or by an approved alternative method.

Exception: A drainage system for bulkhead enclosures is not required when the foundation is on well-drained soil or sand-gravel mixture soils according to the United Soil Classification System, Group I Soils, as detailed in Table R405.1.

R310.4 Bars, grilles, covers and screens. Bars, grilles, covers, screens or similar devices are permitted to be placed over emergency escape and rescue openings, bulkhead enclosures, or window wells that serve such openings, provided the minimum net clear opening size complies with Sections R310.1.1 to R310.1.3, and such devices shall be releasable or removable from the inside without the use of a key, tool, special knowledge or force greater than that which is required for normal operation of the escape and rescue opening.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

This code change is primarily for reorganizational purposes. It separates emergency escape and rescue openings (EERO) window and door provisions, which are currently intermingled. It also says that EERO doors do not have to be "egress" doors, that is, side hinged doors. The new code language allows sliders from basements.

Most people think of emergency escape and rescue openings as windows, and in fact, the current subsections in R310 all seem to define and quantify this type of application: minimum opening height, minimum opening width, window wells, ladders and steps from window wells, drainage from window wells, bars and grilles on windows, windows under decks.

However the most basic EERO is a door. In case of a fire, would prefer to exit through a door or a window? Will a fire fighter prefer to enter through a door or a window?

This revision acknowledges doors as a viable EERO and defines the minimum requirements for EERO doors. It allows side hinged doors or sliders to be used as EEROs.

An EERO door would not have to be an egress door but an egress door would automatically be an EERO door.

Cost Impact: None

RB117-13

Public Hearing:	Committee:	AS	A	M	D
	Assembly:	ASF		AMF	DF

R310.1-RB-BAJNAI-BCAC

RB118 – 13

R310.1

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials
(rdavidson@maplegrovern.gov)

Revise as follows:

R310.1 Emergency escape and rescue required. *Basements*, habitable attics and every sleeping room shall have at least one operable emergency escape and rescue opening. Where *basements* contain one or more sleeping rooms, emergency egress and rescue openings shall be required in each sleeping room. Where emergency escape and rescue openings are provided they shall have a sill height of not more than 44 inches (1118 mm) above the floor. Where a door opening having a threshold below the adjacent ground elevation serves as an emergency escape and rescue opening and is provided with a bulkhead enclosure, the bulkhead enclosure shall comply with Section R310.3. The net clear opening dimensions required by this section shall be obtained by the normal operation of the emergency escape and rescue opening from the inside. Emergency escape and rescue openings with a finished sill height below the adjacent ground elevation shall be provided with a window well in accordance with Section R310.2. Emergency escape and rescue openings shall open directly into a public way, or to a *yard* or court that opens to a public way.

Exception Exceptions:

1. *Basements* used only to house mechanical *equipment* and not exceeding total floor area of 200 square feet (18.58 m²).
2. Basements and habitable attics of buildings provided with sprinkler systems installed in accordance with Section R313.

Reason: Sprinkler systems are now required in dwellings including their basements. Sprinkler systems weren't required when basement and attic emergency escape and rescue openings went into the code. It is a reasonable trade-off to eliminate emergency escape and rescue openings in basements and attics when homes have sprinkler systems. In addition to sprinklers, new homes are now required to have numerous smoke alarms, carbon monoxide alarms, self-closing fire doors to garages, and under floor fire protection that makes the added expense of these openings unnecessary.

The addition of residential sprinkler requirements added unprecedented cost to the construction of a new home. Eliminating this unnecessary window requirement can help save money that was lost to the cost of sprinklers.

Basement emergency escape and rescue openings that must be installed below grade involve window wells. Window wells add additional cost and maintenance, pose a hazard from falling into the well by persons walking around the dwelling, and are a source of drainage problems during heavy rains. They fill with snow in winter climates and are difficult to clear. Window wells are an ideal hiding place for person's intent on breaking into a home for the purposes of burglary or bodily harm.

The code is silent on the location of basement emergency escape and rescue openings which can lead to their value as an exit being diminished, if nonexistent. The openings are intended to provide a second means of escape if the primary stairs are blocked. But there is no separation requirement for these openings and they could be located at the base of the stairway to the main floor rendering them useless. This can be particularly true in townhouses when there is only one exterior wall in which to locate the opening.

Last, elimination of emergency escape and rescue openings from basements eliminates easy potential entry points for person's intent on burglary, theft, and bodily harm. Statistics show that a person is much more likely to be the target of crime than they are of a fire. This changes even more when sprinklers are installed according to sprinkler advocates. As stated earlier, window wells provide an ideal access point for criminals to access a home. According to the US Justice Department, there are nearly 1 million victimizations of violent crime in a person's own dwelling and nearly 5 million victimizations of property crimes each year.

Cost Impact: None

RB118-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R310.1-RB-DAVIDSON

RB119 – 13

R310.1.1, R310.1.2, R310.1.3, R310.1.5 (NEW)

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials
(rdavidson@maplegrovern.gov)

Revise as follows:

R310.1.1 Minimum opening area unobstructed glass area for windows. All Where windows are used as emergency escape and rescue openings, they shall have a minimum ~~net clear opening~~ unobstructed glass area of 5.7 square feet (0.530 m²).

Exception: Grade floor openings windows shall have a minimum ~~net clear opening~~ unobstructed glass area of 5 square feet (0.465 m²).

R310.1.2 Minimum opening unobstructed glass height. ~~The minimum net clear opening height~~ The minimum unobstructed glass height shall be 24 inches (610 mm).

R310.1.3 Minimum opening unobstructed glass width. ~~The minimum net clear opening width~~ The minimum unobstructed glass width shall be 20 inches (508 mm).

R310.1.4 Operational constraints. Emergency escape and rescue openings shall be operational from the inside of the room without the use of keys, tools or special knowledge.

R310.1.5 Doors used as emergency escape and rescue openings. Where a door is used to meet the requirements of this section, it shall be of a size that is capable of being used for its intended purpose.

Reason: This is a different and more logical approach to dealing with the size of emergency escape and rescue openings.

The dimensions that are currently being used for egress windows have been cited in ICC Commentaries and in the UBC predecessors as being the result of a study by the San Diego Fire Department. That statement is false. The ICC offices have no copies of any study that was done by the San Diego Fire Department that establishes egress window dimensions nor is there any record of any such study existing nor is there any recollection by ICC staff that they have ever seen such a study. Discussions with long time members of the San Diego Fire Department reveal that the Department never took part in any study to determine the appropriate size of egress windows.

Therefore, it is safe to assume that the dimensions in the code for egress windows exist without any scientific basis.

However, if one is going to have emergency escape and rescue windows, one must have certain size requirements for those windows. But the rules should be reasonable and defensible.

It has been stated by some folks that the reason for the 20 inch width requirement is that it accommodates the width of a fire ladder (20 inches). The area is necessary because "the studies" indicated that such a size (5.7 square feet) is necessary to allow emergency personnel to enter the room through the window wearing necessary safety gear (24 inches of height and 5.7 square ft). I'm not sure how that justifies the 5.0 square foot openings permitted at grade.

I don't know if there is a standard width for ladders or not. But the fallacy that exists is the assumption that the window will be open when a rescue attempt is made. Isn't it more likely that the window will be closed? Isn't it more likely that the following photos depict actual conditions? Isn't it more likely that a rescue person would need to break the window to initiate a rescue? If the ladder is placed in the window opening, won't it impede access into the room, especially with a casement window? Isn't it more reasonable to regulate the rescue opening based on the glass size of the closed window rather than the openable size of the window since that is more than likely how rescue personnel will encounter the window? Won't rescue personnel break out any glass in an opening rather than try to open the window? Of course.

Therefore, it seems to make much more sense to base emergency escape and rescue window requirements on glass size rather than openable area. Even for occupants of the room, it may be more appropriate to break the glass rather than trying to reach operating hardware that may be located where the air is untenable.

Last, there is language proposed to address doors used as rescue and escape openings. The size of the door entering the room is unregulated. This is the primary exit from the room. If a door used as the primary exit is not regulated, why should a secondary door face stricter limits? The proposed language requires that the door be "capable of being used for its intended purpose". This is similar to language approved by the IRC committee in the past and gives the field inspector discretion over door sizes. The inspector may use location, size of the occupant, or whatever limitations seem reasonable to establish the opening size.







Cost Impact: None

RB119-13

Public Hearing: Committee:
Assembly:

AS
ASF

AM
AMF

D
DF

R310.1.1-RB-DAVIDSON

RB120 – 13

R310.1.4

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials
(rdavidson@maplegrovern.gov)

Revise as follows:

R310.1.4 Operational constraints. Emergency escape and rescue openings shall be operational from the inside of the room without the use of keys, tools or special knowledge. Hardware necessary to operate emergency escape and rescue openings shall not be located more than 48 inches above the floor and shall be operable with one hand. The force required to activate operable parts shall be not more than 5.0 pounds (22.2 N).

(Subsequent sections remain unchanged.)

Reason: The IRC goes to great lengths to regulate the size and location of emergency escape and rescue openings except for the location of operational hardware. There is nothing in the code to prevent operational hardware from being 6 feet above the floor. One of the purposes of the window is to permit emergency escape. But how do people of small stature escape through one of these openings if they cannot reach the operational hardware? This proposal places a modest and reasonable requirement in the code that operational hardware be located within 48 inches of the floor. This would apply to locks and operators. This is consistent with hardware requirements for windows required to be accessible by ANSI A117.1.

The lock location for some typical windows is about 68 inches above the floor. Physiological studies indicate that an average child would need to be at least 9 years old and 4 feet 6 inches in height to operate hardware at that height.

The proposal also includes language from ANSI A117.1 regarding the operation of the window. Difficulty in reaching and operating window hardware can prevent children from escaping a fire. A window that can't be open serves no purpose. The code should contain rules to help safeguard our children just as it has other members of society.

This should pose no hardship on window manufacturers as they are already required to produce such windows for accessibility purposes.

Cost Impact: None

RB120-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R310.1.4-RB-DAVIDSON

RB121 – 13

R310.1.5 (New)

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials
(rdavidson@maplegrovern.gov)

Revise as follows:

R310.1.5 Identification. Where windows are used to meet the requirements of this section, they shall be provided with a manufacturer's designation or mark that provides one of the following:

1. The net clear opening area, the net clear opening height, and the net clear opening width of the window or
2. Shall be identified as meeting emergency escape and rescue requirements with a manufacturer's designation or mark that reads "Emergency Escape and Rescue Opening 5.0 sq. ft" or "Emergency Escape and Rescue Opening 5.7 sq. ft." as applicable or similar language to indicate that the window meets the requirements of this section.

The manufacturer's designation or mark shall be affixed to the window so as to be visible for inspection and shall be of a type which once applied cannot be removed without being destroyed.

Reason: This proposal was submitted for the hearings in Baltimore. Prior to the proposal being heard, I was approached by representatives of several window manufacturers' about modifications to the proposal and a promise from them to work with me if I would request the proposal be disapproved. I made the request that the proposal be disapproved and the committee did so. That is a matter of public record.

Unfortunately, this appears to have been a delay tactic by the window manufacturers. There were never any offers of alternative language. It was suggested that perhaps inspectors should carry premeasured sticks or templates to determine compliance. Then, opponents of the proposal suggested that I requested the committee overturn the proposal to avoid any discussion before the committee! This is underhanded and deceitful.

The proposal is being brought back before the committee.

Several window manufacturers' already label their windows as meeting code requirements. Examples of the labeling follow. Requiring all window manufacturers' to label their windows levels the playing field for all manufacturers. Recall that during the discussion regarding fire protection of under floor spaces that it was argued that certain materials performed better in fire situations than others and that they shouldn't warrant the additional fire protection. But several speakers stated "cover 'em all, keep the playing field level", and we did. This proposal deserves the same consideration.

Window manufacturers' already have statements in their literature that clearly indicate which of their windows meet or exceed national egress requirement. They don't need to conduct any research to comply with the rules.

Please note that the information from the manufacturers clearly states that their windows meet or exceed national egress requirements. If there truly is a concern about liability, it isn't demonstrated by the information on the manufacturer's own websites and advertising information.

The proposed amendment provides two options for identifying that the window meets egress requirements. The designation or mark may either provide the height, width, and opening dimensions or a statement that it meets either the 5.0 or 5.7 square foot opening requirements. The designation or mark is not required to be a permanent label. The label may be a paper label but must be designed so that it cannot be transferred from one window to another. This will enable the field inspector the ability to approve windows without the need to measure them with the same accuracy as the manufacturer and without the need to perform multiplication of fractional numbers in the field. The terms "manufacturer's designation" and "mark" are defined in the code. The term "once applied cannot be removed without being destroyed" is already used in the code to describe other labels, designations, or marks.

MANUFACTURER'S DESIGNATION. An identification applied on a product by the manufacturer indicating that a product or material complies with a specified standard or set of rules. (See also "Mark" and "Label.")

MARK. An identification applied on a product by the manufacturer indicating the name of the manufacturer and the function of a product or material. (See also "Manufacturer's designation" and "Label.")

Why can't the field inspector measure the windows in the field? If you review the hundreds of sizes and styles of windows available from dozens of manufacturers, it is apparent that there are thousands of windows that meet or come close to meeting egress requirements. You will find that some windows are exactly 5.7 square feet or 5.0 square feet. And there are others that are just a few hundredths of a square foot more or less. Herein lays the problem. Could a field inspector carry a calculator in the field and a binder of window catalogs? Of course they could. But they aren't expected to do that for other building components. What makes windows so special? Why can't the manufacturer just put a simple label on their product?

Manufacturers measure window openings to the 1/16th or to the hundredths of an inch. This degree of accuracy cannot be achieved in the field. Windows often have gaskets or weather stripping that interferes with measurements and can cause variations during very hot or very cold weather. Incorrectly measuring the window size by even a 1/16th of an inch can give the impression that a window meets or fails to meet egress requirements when the opposite is true. Validating this takes time and can lead to unnecessary expense and delays. And if one window brand is approved that is just short of meeting minimum standards, the door is open for every other window manufacturer who has a window just slightly below minimum to request the same treatment.

For example, Andersen Windows advertises that their CW135 casement window has a clear opening of 22-9/16 inch by 36-3/8 inch. They state the net clear openable area is 5.7 square feet. Multiplying the width times the height (try doing that in your head) actually gives an area of 5.69938151 square feet. Setting aside the arguments related to rounding, it is easy to see that if a field inspector measured one of these windows at 22-7/16 inch by 36-1/4 inch that he would likely fail the window. This will delay the construction, increase costs, and provide no increase in safety.

◆ These units meet or exceed the following dimensions: Clear Openable Area of 5.7 sq. ft., Clear Openable Width of 20" and Clear Openable Height of 24", when appropriate hardware (straight arm or split arm) is specified.

Identifying windows as meeting egress requirements will also provide consumers, contractors, sales people and others concerned about a window used as an emergency escape and rescue opening the information they need to make informed decisions regarding the window without the need to search a catalog or website. It will also help to increase awareness of egress requirements. I'm sure every building department has stories they could tell about inspections of egress windows that failed to meet the required size and had to be removed and returned to the retailer at a loss and how the sales person either wasn't aware that egress requirements existed or didn't know the details of the rule.

Most window manufacturers *do not* provide any opening dimension information on the labeling of their windows. They are often shrink wrapped which prohibits them being measured at the store. There is no way for the purchaser of a window to know if the window meets emergency escape and rescue opening requirements. Most often, they will rely on the experience, or lack thereof, of the sales person they are dealing with. Sales people in big box home improvement stores are not trained and change frequently. Likely unintentionally, they frequently give homeowners the wrong information when purchasing windows that ends up being a costly mistake.

Casement Window Opening Specifications - Continued

Unit Number	Clear Opening Straight Arm		Clear Opening Split Arm		Clear Opening in Full Open Position						Crack Opening Vent Sash Only		Straight Arm Vent		Split Arm Vent		Top of Subfloor to Top of Inside Sill Stop		Overall Unit Area		
					Straight Arm Width		Split Arm Width		Height		Glass										
	Sq. Ft.	(m ²)	Sq. Ft.	(m ²)	Inches (mm)	(mm)	Inches (mm)	(mm)	Inches (mm)	(mm)	Sq. Ft.	(m ²)	Lineal Ft. (mm)	Sq. Ft.	(m ²)	Sq. Ft.	(m ²)	Inches (mm)	(mm)	Sq. Ft.	(m ²)
CW12	3.0	(0.279)	2.5	(0.232)	22 9/16" (573)		18 11/16" (475)		19 1/4" (489)		3.2	(0.297)	8'-3 9/16" (2529)	3.0	(0.279)	3.0	(0.279)	60 9/16" (1538)		4.8	(0.446)
CW125	3.7	(0.344)	3.0	(0.279)	22 9/16" (573)		18 11/16" (475)		23 1/16" (595)		3.9	(0.362)	8'-11 11/16" (2726)	3.7	(0.344)	3.6	(0.334)	56 7/8" (1432)		5.6	(0.520)
CW13	4.9	(0.455)	4.0	(0.372)	22 9/16" (573)		18 11/16" (475)		31 1/16" (789)		5.2	(0.483)	10'-3 3/16" (3129)	4.9	(0.455)	4.8	(0.446)	48 3/4" (1238)		7.1	(0.660)
CW135*	5.7	(0.530)	5.1	(0.474)	22 9/16" (573)		20" (508)		36 3/8" (924)		6.0	(0.557)	11'-0 11/16" (3377)	5.7	(0.530)	5.5	(0.511)	43 7/8" (1114)		8.0	(0.743)

At the hearings in Dallas, one window rep stated that most window buyers will have researched this information and know what size window they want before they ever get to the retailer. This is pure unfounded speculation. This presumes that untrained homeowners and others will be able to wade through the manufacturer's literature, know what the rules are, and how those rules apply to one of a myriad of window sizes. In the *real* world, this just doesn't happen. Window manufacturers do not work with homeowners and contractors on a daily basis. Building departments do.

Once a window is installed that is too small, it is expensive to replace and creates unnecessary conflict between the homeowner and building department.

The information that would go on the label is already in the manufacture's printed literature. It doesn't require the manufacturer to generate new information. The manufacturer need not indicate that the window complies with egress requirements if they so choose even though their catalogs may already state that certain windows meet national egress requirements. It just won't get accepted.

The code requires labels on windows for energy code compliance and compliance with safety glazing. Almost every building product used today is identified with labels, designations or marks in one way or another. Windows used for egress purposes should be no different.

What is so difficult about putting a small paper label on a window to identify if it meets opening requirements for emergencies? Nothing! Window manufacturers have objected to window fall protection requirements, flashing requirements, egress window tradeoffs for sprinkler systems, labeling requirements, and on and on. The committee needs to realize that the window industry opposes any attempt to regulate it and needs to take a hard line with respect to ignoring the needs of the public.

This proposal just asks that the information already provided in the sales brochure be transferred to the window so the purchaser of the window can make an informed decision.



Cost Impact: None

RB121-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R310.1.5 (NEW)-RB-DAVIDSON

RB122 – 13

R310.1.5 (New)

Proponent: Jeff Inks, Window and Door Manufacturers Association, representing the Window & Door Manufacturers Association.

Add new text as follows:

R310.1.5 Replacement windows. Replacement windows installed in buildings meeting the scope of this code shall be exempt from the maximum sill height requirements of Sections R310.1 and Sections R310.1.1, R310.1.2, and R310.1.3 provided the replacement window meets the following conditions:

1. The replacement window is the manufacturer's largest standard size window that will fit within the existing frame or existing rough opening. The replacement window shall be permitted to be of the same operating style as the existing window or a style that provides for an equal or greater window opening area than the existing window.
2. The replacement window is not part of a change of occupancy.

Reason: First, while this provision is applicable to existing construction (for the reasons stated below), it is being proposed for inclusion in the main body of the IRC because window replacements are more common than other significant changes made to existing one- or two-family homes and townhomes, and in addition, for consistency with what is being proposed for IRC Appendix J and IEBC Chap 7 by us and the ICC CTC.

The proposed provisions and language are also based on Minnesota's residential code which does effectively incorporate the provisions into the main body of the code in the same location (R310.1.5) being proposed above.

The provisions and language have also already been approved for IEBC Chap. 4 which occurred during the Group A proceedings. Most importantly, it's important to note that the provisions do not allow for any decrease in safety and rather will help ensure improvements in safety can be made.

More specifically, the intent of this proposal is to ensure that the IRC does not discourage or prevent improvements in emergency escape and rescue openings, especially for fire safety, in older residential occupancies by requiring replacement windows to meet all of the provisions of Section 310 when doing so can only be accomplished by increasing the size of the rough opening or altering the interior wall.

Because many of these older buildings were constructed under codes that did not include the same emergency escape and rescue opening provisions that the IRC now requires for new construction, the only way to fully meet all of the requirements of Section 310 for new construction if required when windows are replaced is to enlarge the rough opening and/or make significant alterations to the interior wall in order to accommodate any increase in window size or lowering of a sill.

At the very least, the significant cost and design challenges of altering the rough opening and/or interior wall can discourage or prevent window replacement and at worst can discourage or prevent the replacement of older windows that are harder to operate or are inoperable all together because of their age or poor maintenance and, that are significantly less energy efficient. When that happens, improvements to safety as well as energy efficiency are needlessly compromised.

Furthermore and on the whole, while some bedroom windows in older homes may not provide the full clear opening that is required for new construction or may have a sill height above 44 inches, they nonetheless still provide a viable emergency and escape rescue opening which is the primary intent of the code. Replacement of these windows with the same type of operating window or other type that can provide an equal or greater clear opening than the existing window -- even if they do not fully meet the clear opening or sill height requirements of Section 310 -- is always an improvement in safety, especially when a replacement opening can provide a larger clear opening than the existing window. Such improvements in safety should not be discouraged or prevented by overly onerous requirements for replacement windows.

This proposal will help ensure that doesn't happen by providing limited exceptions to the requirements of Section 310 that can only be applied when certain conditions are met and that as already noted, will not result in a decrease in safety.

The requirements for new construction that emergency escape and rescue openings be provided as well as the operational requirements of Section 310.1.4 are maintained and still applicable to replacement windows.

Cost Impact: This code change will not increase the cost of construction.

RB122-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R310.1.5 (NEW) #1-RB-INKS

RB123 – 13

310.1.5 (New)

Proponent: Jeff Inks, Window and Door Manufacturers Association, representing the Window & Door Manufacturers Association.

Add new text as follows:

R310.1.5 Window opening control devices. Window opening control devices complying with ASTM F 2090 shall be permitted for use on windows serving as a required *emergency escape and rescue opening*.

Reason: It has been brought to our attention that the IRC needs further clarity regarding the permitted installation of window opening control devices (wocd's) compliant with ASTM F2090 on EERO windows. While that is clearly implied and intended by Section 312 and the purpose of F2090 is specifically for wocd's with emergency release mechanisms for use on EERO windows, providing express language under Section 310.1 will provide further clarification that the installation of F2090 compliant devices is permitted on EERO windows.

Cost Impact: The code change proposal will not increase the cost of construction.

RB123-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R310.1.5 (NEW) #2-RB-INKS

RB124 – 13

R310.6 (New), R310.7 (New)

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials
(rdavidson@maplegrovern.gov)

Revise as follows:

R310.6 Dwelling additions. Where dwelling additions occur that contain sleeping rooms, an emergency escape and rescue opening shall be provided in each new sleeping room. Where dwelling additions occur that have basements, an emergency escape and rescue opening shall be provided in the new basement.

Exceptions:

1. An emergency escape and rescue opening is not required in a new basement that contains a sleeping room with an emergency escape and rescue opening.
2. An emergency escape and rescue opening is not required in a new basement where there is an emergency escape and rescue opening in an existing basement that is accessible from the new basement.

R310.7 Alterations or repairs of existing basements. An emergency escape and rescue opening is not required where existing basements undergo alterations or repairs.

Exception: New sleeping rooms created in an existing basement shall be provided with emergency escape and rescue openings in accordance with R310.1.

Reason: There continues to be confusion in the code enforcement community as to the requirements for emergency escape and rescue opening requirements as they apply to existing basements and additions. Hopefully this proposal will make it clearer that emergency escape and rescue openings are only required in additions if there are sleeping rooms and/or a basement and then only if the new basement does not have a sleeping room or access to an emergency escape and rescue opening in the existing basement. Furthermore, this amendment is intended to clarify that existing basements that do not undergo expansion and where no sleeping rooms are added need not have emergency escape and rescue openings installed when remodeling occurs. At least in our area, code officials sometimes require emergency escape and rescue openings be installed when basements are finished or remodeled even when no sleeping rooms occur. This was never the intent of the code.

Cost Impact: None

RB124-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R310.6 (NEW)-RB-DAVIDSON

RB125 – 13

R311.1

Proponent: Paul Armstrong, PE, CBO; Orange Empire Chapter – Code Committee; Orange Empire Chapter

Revise as follows:

R311.1 Means of egress. All dwellings shall be provided with a means of egress as provided in this section. The means of egress shall provide a continuous and unobstructed path of vertical and horizontal egress travel from all portions of the dwelling to the ~~exterior of the dwelling at the~~ required egress door without requiring travel through a garage. The required egress door shall open to a yard or court that leads to a public way.

Reason: The purpose of this change is to clarify the means of egress from dwellings under the IRC. The proposal attempts to split the egress path into two simpler sentences. The original sentence has been revised to address interior path of egress travel up to the required egress door. The new sentence addresses the exterior area from the required egress door and also clarifies that the required egress door opens to a yard or court that leads to a public way. The new text is consistent with the requirement for emergency escape and rescue openings in Section R310.1.

Cost Impact: The code change proposal will not increase the cost of construction.

RB125-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R311.1-RB-ARMSTRONG

RB126 – 13

R311.3.2

Proponent: Wesley Walters, Clark County Nevada Development Services, representing self

Revise as follows:

R311.3.2 Floor elevations for other exterior doors. Doors other than the required egress door shall be provided with landings or floors not more than 7 ¾ inches (196 mm) below the top of the threshold.

Exception: A top landing is not required where a stairway of two or fewer risers is located on the exterior side of the door, provided the door does not swing over the stairway.

Reason: The code does not define which landing is not required, this will clarify that it is only the top one being eliminated.

Cost Impact: The code change proposal will not increase the cost of construction.

RB126-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R311.3.2-RB-WALTERS

RB127 – 13

R311.4

Proponent: Homer Maiel, PE, CBO, 4LEAF, Inc., representing self

Revise as follows:

R311.4 Vertical egress. Egress from habitable levels including habitable attics and basements not provided with an egress door in accordance with Section R311.2 shall be by a one or more ramps in accordance with Section R311.8 or a one or more stairways in accordance with Section R311.7 or both. For habitable levels or basements located more than one story above or more than one story below an egress door, the maximum travel distance from any occupied point to a stairway or ramp that provides egress from such habitable level or basement, shall not exceed 50 feet (15 240 mm).

Reason: In the legacy codes, one exit from the third floor within an individual dwelling unit or a Group R, Division 3 congregate residence was allowed as long as the third story area did not exceed 500 square feet. Currently, IRC has no limitations on the stories above the second floor. This addition that limits the travel distance on the floors above the second floor to 50 feet or less addresses that concern. Same applies when there are more than one level of basement below the first floor.

Cost Impact: The code change proposal will not increase the cost of construction.

RB177-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R311.4-RB-MAIEL

RB128 – 13

R311. 6

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials
(rdavidson@maplegrovern.gov)

Revise as follows:

R311.6 Hallways. The minimum width of a hallway shall be not less than ~~3 feet (914 mm)~~ 32 inches (812 mm).

Reason: The International Residential Code Commentary states the following in regards to hallways:

R311.3 Hallways. The minimum width of a hallway shall be not less than 3 feet (914 mm).

❖ **Hallways must be a minimum of 3 feet (914 mm) wide to accommodate moving furniture into rooms off the hallway and for safe egress from the structure.**

So the hallway width is necessary to accommodate moving furniture and for safe egress. Why should the code be concerned about moving furniture? In fact the scoping and purpose of the code say nothing about moving furniture. And if the concern was genuine, hallways would need to be wider given the size of some furniture. Clearly, the width of a hallway is an arbitrary dimension not based on safety but likely based on convenience.

Regarding safe egress, if this were truly a concern about safe egress, why wouldn't we specify the minimum door sizes from bedrooms, bathrooms, and other occupied spaces? As it is, the only thing we have to hang out hats on is the 20 inch minimum openable width of an emergency escape and rescue opening.

This is one of those code requirements that people seem to think is necessary but when push comes to shove, it doesn't get enforced.

For example, a plan review is done on a new home and the hallway is noted to be 36 inches wide. The framer then either frames the hallway at 36 inches or works from the exterior walls in to frame the various rooms. In either case, the potential exists that the hallway may be something less than 36 inches. This isn't something that many field inspectors will check at the framing inspection. Then during the final inspection the hall is determined to be 35 inches wide. What do you do? You ignore it of course. The cost to correct it is much too high given the benefit.

In another example, we have a home built with an unfinished basement. There is a center bearing wall with the furnace located a short distance from the wall. The mechanical contractor does not check the distance from the furnace to the bearing wall when installing the furnace. The basement is unfinished so the field inspector doesn't anticipate future finishing problems. Then, when the homeowner finishes the basement, the location of the furnace results in a hallway that is only 32 inches wide. They can't move the bearing wall. The cost to move the furnace and alter the ductwork, gas piping, and wiring is expensive. And what is to be gained? If the building department denies the permit, the basement will be finished at some point without permits. Do we want to encourage this?

These circumstances do occur. They are dealt with by building departments all the time. It is necessary to provide a better and more reasonable solution for this problem.

Furthermore, this will be regulated by the market place in new construction. If a homeowner views a new home for sale and they wish the hallway to be wider, they can make the decision to buy or not to buy.

The basic stair width requirement is 36 inches. But that can be reduced by 4.5 inches on each side for handrails. And the code only requires that the width of stairways below the handrails be 27 inches. Spiral stairways are permitted to be 26 inches.

R311.7 Stairways.

R311.7.1 Width. Stairways shall not be less than 36 inches (914 mm) in clear width at all points above the permitted handrail height and below the required headroom height. Handrails shall not project more than 4.5 inches (114 mm) on either side of the stairway and the minimum clear width of the stairway at and below the handrail height, including treads and landings, shall not be less than 31½ inches (787 mm) where a handrail is installed on one side and 27 inches (698 mm) where handrails are provided on both sides.

Exception: The width of spiral stairways shall be in accordance with Section R311.7.9.1.

R311.7.10.1 Spiral stairways. Spiral stairways are permitted, provided the minimum clear width at and below the handrail shall be **26 inches** (660 mm) with each tread having a 7½-inch (190 mm) minimum tread depth at 12 inches (914 mm) from the narrower edge. All treads shall be identical, and the rise shall be no more than 9½ inches (241 mm). A minimum headroom of 6 feet 6 inches (1982 mm) shall be provided.

The only required egress door, need only provide 32 inches of clear width. A 36 inch wide hallway seems to be an anomaly.

R311.2 Egress door. At least one egress door shall be provided for each *dwelling* unit. The egress door shall be side hinged, and shall provide a minimum clear width of 32 inches (813 mm) when measured between the face of the door and the stop, with the door open 90 degrees (1.57 rad).

This proposal reduces the required hallway width to 32 inches consistent with the main egress door and wider than what is required for stairs. If 27 inches is safe for egress in a stair and if I can move furniture up and down a stair that is 27 inches wide, I should be able to do the same in a hall.

Cost Impact: None

RB128-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R311.6-RB-DAVIDSON

RB129 – 13

R311.7

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials
(rdavidson@maplegrovern.gov)

Add new text as follows:

R311.7 Stairways. Stairways serving a dwelling or accessory structure shall comply with this section. This shall include, but shall not be limited to, exterior stairs from a dwelling or garage to grade and those stairs serving decks, porches, balconies, sun rooms, and similar structures.

Exceptions:

1. Stairs serving attics or crawl spaces.
2. Stairs that only provide access to plumbing, mechanical, or electrical equipment.
3. Stairs that serve structures or spaces used by children as play areas.

Reason: When reading Section R311 of the IRC regarding stairs, the language supports only two interpretations on how stairs are regulated. Those two interpretations are that either all stairs must comply with the section or only those stairs that are a part of the means of egress should comply. There is no other language that allows vacillation between those interpretations.

The title of the section is "Means of Egress". R311.1 requires a means of egress from "all portions of the dwelling to the exterior of the dwelling..." R311.4 qualifies the charging language by stating that every habitable level including basements must either have an exterior exit door meeting the requirements of R311.2 or have a stair or ramp connecting that level to a level that has such a door. Note that it does not say "stairs" or "ramps" but "stair" or "ramp" (singular).

The text of the code does not support regulating stairs that are not a part of the "means of egress". This theory is apparently wide spread because many building officials are of the opinion that stairs used in landscaping are not regulated. Also, attempts to submit code changes to the ICC IRC Committee to give relief for stairs to attics and crawl spaces have been met with resistance from the Committee with the statement that they are already exempt. One can come to that conclusion only if you interpret the stair rules to apply to the means of egress and only one means of egress is required and that is only required from the dwelling, not attics, crawl spaces, and garages.

But if you take the position that the section only regulates those stairs that are part of the means of egress, stairways serving attics and crawl space and landscaping stairs would not be regulated but also stairs serving decks and the stairs commonly found serving as a path of travel from a dwelling to a garage would not be. In fact, R311.1 specifically prohibits a means of egress from traveling through a garage.

So there is confusion as to whether or not the code does regulate or intends to regulate certain stairs. This proposal makes it clear that all stairs are required to comply with the code unless specifically exempted. If this proposal is supported, stairs that are part of landscaping would be exempt unless they serve as a means of travel from a dwelling or accessory structure to grade. Stairs from a deck or from one level of a deck to another would be regulated. Stairs between a dwelling and garage would be regulated. Stairs serving an attic or crawl space would not be regulated. The current text already exempts stairs to crawl spaces by Section R311.4 but not directly. It exempts them because it does not list crawl spaces as a location where compliant stairs are required. But this also supports the possibility that the code does not regulate stairs serving a deck.

It is necessary to eliminate the confusion and inconsistency that exists in the enforcement of stair requirements that this language be approved. The proposal is reasonable because it puts into written format what is commonly accepted to be code language even if it cannot be supported by that text.

The following is for informational purposes only.

SECTION R311 MEANS OF EGRESS

R311.1 Means of egress. All *dwelling*s shall be provided with a means of egress as provided in this section. The means of egress shall provide a continuous and unobstructed path of vertical and horizontal egress travel from all portions of the *dwelling* to the exterior of the *dwelling* at the required egress door without requiring travel through a garage.

And,

R311.4 Vertical egress. Egress from habitable levels including habitable attics and *basements* not provided with an egress door in accordance with Section R311.2 shall be by a ramp in accordance with Section R311.8 or a stairway in accordance with Section R311.7.

Cost Impact: None

RB129-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R311.7-RB-DAVIDSON

RB130 – 13

R311.7.1

Proponent: David W. Cooper, Stair Manufacturing and Design Consultants, representing the Stairway Manufacturers' Association (sma@stairways.org)

Revise as follows:

R311.7.1 Width. *Stairways* shall not be less than 36 inches (914 mm) in clear width at all points above the permitted *handrail* height and below the required headroom height. *Handrails* shall not project more than ~~4.5~~ 6.5 inches (~~114~~165 mm) on either side of the *stairway* and the minimum clear width of the *stairway* at and below the *handrail* height, including treads and landings, shall not be less than 31½ inches (787 mm) where a *handrail* is installed on one side and 27 inches (698 mm) where *handrails* are provided on both sides.

Exception: The width of spiral *stairways* shall be in accordance with Section R311.7.10.1.

Reason: The required continuous handrail often needs to project an additional 2 inches from the side of the stairway to maintain the required finger clearance when passing nosing projections at a floor, landing, or return flight. This would not diminish the required width and would provide needed finger clearance to avoid nosing projections into the stairway.

Cost Impact: This code change will not increase the cost of construction

RB130-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R311,7.1-RB-COOPER

RB131 – 13

R311.7.2, R311.7.5.1, R311.7.5.2.1.

Proponent: David W. Cooper, Stair Manufacturing and Design Consultants, representing the Stairway Manufacturers' Association (sma@stairways.org)

Revise as follows:

R311.7.2 Headroom. The minimum headroom in all parts of the stairway shall not be less than 6 feet 8 inches (2032 mm) measured vertically from the sloped line adjoining the tread nosing or from the floor surface of the landing or platform on that portion of the stairway.

Exception- Exceptions:

1. Where the nosings of treads at the side of a flight extend under the edge of a floor opening through which the stair passes, the floor opening shall be allowed to project horizontally into the required headroom a maximum of 4¾ inches (121 mm).
2. The headroom for spiral stairways shall be in accordance with Section R311.7.10.1

R311.7.5.1 Risers. The maximum riser height shall be 7¾ inches (196 mm). The riser shall be measured vertically between leading edges of the adjacent treads. The greatest riser height within any flight of stairs shall not exceed the smallest by more than ¾ inch (9.5 mm). Risers shall be vertical or sloped from the underside of the nosing of the tread above at an angle not more than 30 degrees (0.51 rad) from the vertical. Open risers are permitted provided that the opening between treads does not permit the passage of a 4-inch-diameter (102 mm) sphere.

Exception- Exceptions:

1. The opening between adjacent treads is not limited on stairs with a total rise of 30 inches (762 mm) or less.
2. The opening between adjacent treads is not limited on spiral stairways.
3. The riser height of spiral stairways shall be in accordance with Section R311.7.10.1

R311.7.5.2.1 Winder treads. Winder treads shall have a minimum tread depth of 10 inches (254 mm) measured between the vertical planes of the foremost projection of adjacent treads at the intersections with the walkline. Winder treads shall have a minimum tread depth of 6 inches (152 mm) at any point within the clear width of the stair. Within any flight of stairs, the largest winder tread depth at the walkline shall not exceed the smallest winder tread by more than ¾ inch (9.5 mm). Consistently shaped winders at the walkline shall be allowed within the same flight of stairs as rectangular treads and do not have to be within ¾ inch (9.5 mm) of the rectangular tread depth.

Exception: The tread depth of spiral stair stairways shall be in accordance with Section R311.7.10.1

Reason: Exception 2 **Headroom** - The user of the code is currently only directed to R311.7.10.1 Spiral Stairways under R311.7.1 Width. Specific cross reference is needed under Headroom.

Exception 1 **Risers** – No change except numbering

Exception 2 **Risers** - Conformance with the IBC allowing open risers on spiral stairways.

Exception 3 **Risers** and new exception to **Winder treads** - The user of the code is currently only directed to R311.7.10.1 Spiral Stairways under R311.7.1 Width. Specific cross reference is needed under risers and winder treads.

Cost Impact: This code change will not increase the cost of construction

RB131-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R311.7.2-RB-COOPER

RB132– 13

R311.7.3

Proponent: David W. Cooper, Stair Manufacturing and Design Consultants, representing the Stairway Manufacturers' Association (sma@stairways.org)

Revise as follows:

R311.7.3 Vertical rise. A *flight of stairs* shall not have a vertical rise greater than ~~12 feet (3658 mm)~~ 147 inches (3734 mm) between floor levels or landings.

Reason: The elevation of 147 inches is a multiple of the maximum riser height of 7-3/4 inches (197 mm). (See Table 1) This minor change of just 3 inches (76 mm) in the total rise of the flight would in many cases eliminate the cost of incorporating a landing and the space required, reducing construction costs. As can be seen in the table below this change would require no additional steps in the stair than the current code requires and a change in riser height of just 5/32 inch (4 mm) or less when the minimum number of risers is desired. This represents no discernable difference consequential to the user.

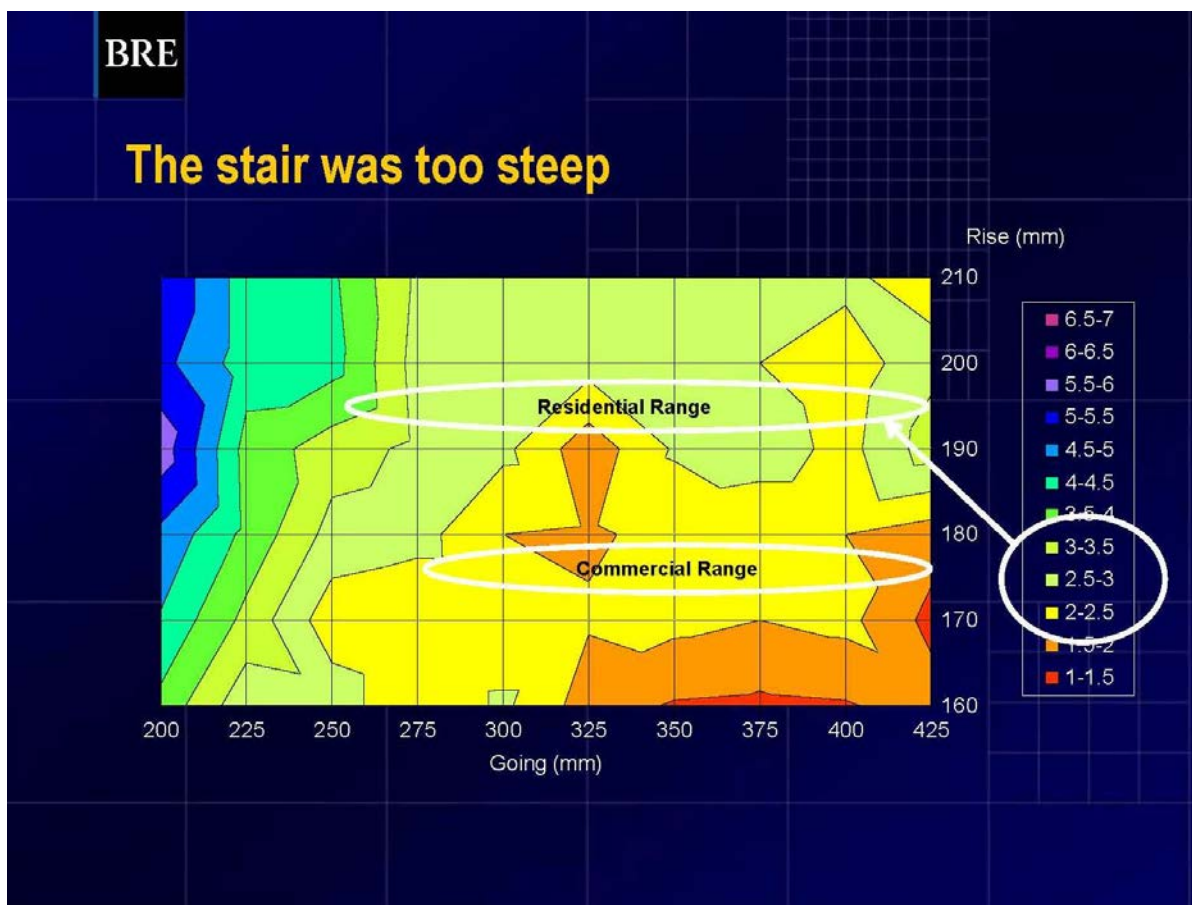


Figure 1 Residential Range = 7.58" (193mm) – 7.74" (197mm), Commercial Range = 6.84" (174mm) – 7" (178mm) see Table 1
Please note that the described circled ranges have been added to figures 1&2 by the proponent for the purpose of explanation.

I had to pull myself up the stair using the handrail

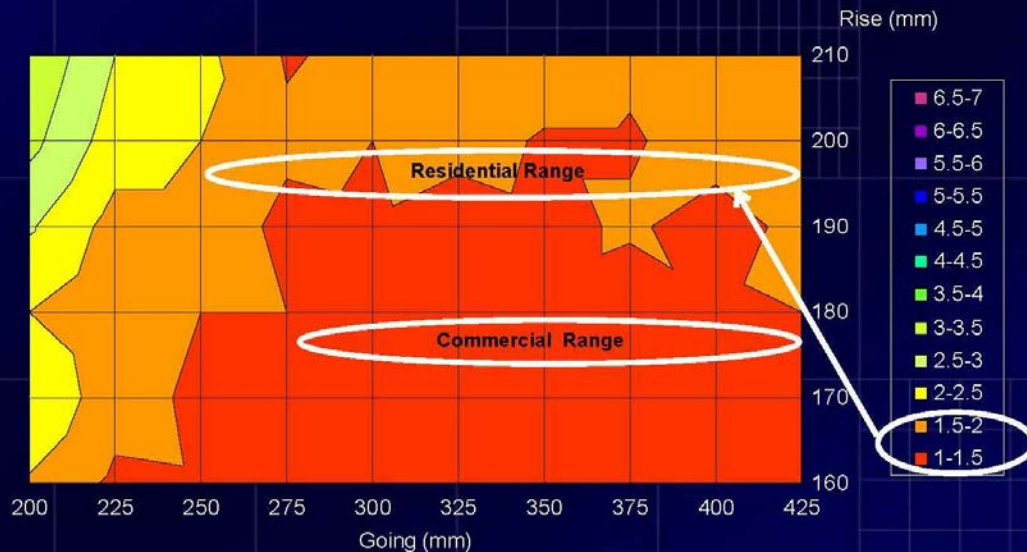


Figure 2 Residential Range = 7.58" (193mm) – 7.74" (197mm), Commercial Range = 6.84" (174mm) – 7" (178mm) see Table 1
Please note that the described circled ranges have been added to figures 1&2 by the proponent for the purpose of explanation.

	Vertical Rise	# Risers	Riser Height Inches	Change in Riser Height inches	Riser Height mm	Change in Riser Height mm
Most Occupancies	144	21	6.86		174	
	147	21	7.00	0.14	178	4
Dwelling Units	144	19	7.58		193	
	147	19	7.74	0.16	197	4

Table 1

Testing in support of this proposal, as shown in the data presentations (Figure 1 and 2) from; "The Influence of Rise and Going Combinations on Stair Safety" by M S Roys, June 2004, 7th World Conference on Injury Prevention and Safety Promotion, Vienna¹, the minor variation in rise does not produce any consequential effect that can be noticed by users when comparing riser heights within the range in question. *Please note that the circled ranges have been added to figure 1 & 2 by the proponent for the purpose of explanation.* Figures one and two can be related to the perceived energy required in ascent as described by the subjective rating of the steepness of the stair and the need to pull oneself up the stair using the handrail. In these figures the user's ratings are on a scale of 1-7 and color coded. The visual display of the data shows little difference in the users ratings over the range in question.

Additional testing data from this same study further illustrates little difference in the user's perception of riser height. When asked to rate descent of the stairway in response to the statement "I felt safe when walking down the stair" the risers heights of 6.69 inches, 7.09 inches, 7.48 inches (170 mm, 180 mm, 190 mm) all were rated the same with a tread depth of 10.83 inches (275 mm). Compared with the same tread depth the riser heights of 7.87 inches, 6.30 inches (200 mm, 160 mm) were within

approximately 0.5 points on a scale of 7 points further indicating little difference being perceived by the users. This provides further validation that the change proposed is reasonable and will not affect stair safety.

Construction cost reduction – It is common for the total rise to exceed 144 inches (3658 mm) with oversight of the requirement or minor changes in floor systems and finish flooring options. In particular new floor truss systems and engineered joist materials increase floor thickness and story height especially when added to older designs. This requires the addition of an intermediate landing. Adding a landing increases the footprint of the stairway and the cost if the space is available.

Understanding and Compliance – This change will not increase the number of risers needed in the stairway or make the stairway less safe, or add any significant or perceived increase in energy to climb the stairway. This needed change provides a direct relationship between the vertical rise requirement and the requirements for riser height that would assure better understanding and compliance.

Bibliography:

1. "The influence of rise and going combinations on stair safety"; M.S. Roys, 7th World Conference on Injury Prevention and Safety Promotion, Vienna, June 2004

Cost Impact: This will reduce the cost of construction.

RB132-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R311.7.3-RB-COOPER

RB133 – 13

R311.7.5.1

Proponent: David W. Cooper, Stair Manufacturing and Design Consultants, representing the Stairway Manufacturers' Association (sma@stairways.org)

Revise as follows:

R311.7.5.1 Risers. The maximum riser height shall be 7¾ inches (196 mm). The riser shall be measured vertically between leading edges of the adjacent treads. The greatest riser height within any *flight of stairs* shall not exceed the smallest by more than ¾ inch (9.5 mm). Risers shall be vertical or sloped from the underside of the nosing of the tread above at an angle not more than 30 degrees (0.51 rad) from the vertical. Open risers are permitted provided that ~~the opening between treads does not permit the passage of a 4-inch diameter (102 mm) sphere.~~ riser openings between treads located more than 30 inches (762 mm) measured vertically to the floor or grade below at any point within 36 inches (914 mm) horizontally to the lower edge of the riser do not permit the passage of a 4 inch diameter (102 mm) sphere.

Exception: ~~The opening between adjacent treads is not limited on stairs with total rise of 30 inches (762 mm) or less.~~

Reason: The exception allows unrestricted openings in risers if the stair has a 30" total rise. This is a flawed requirement. Flights stacked in a well could have a total rise of 30 inches and an exposure to a much greater fall distance to the next level or flight below. This change correctly identifies the hazard and the needed requirement applies the language found in section R312, Guard and window fall protection.

Cost Impact: This code change would not increase the cost of construction.

RB133-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R311.7.5.1-RB-COOPER

RB134 – 13

R311.7.5.1, R312.1.3

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials
(rdavidson@maplegrovern.gov)

Revise as follows:

R311.7.5.1 Risers. The maximum riser height shall be $7\frac{3}{4}$ inches (196 mm). The riser shall be measured vertically between leading edges of the adjacent treads. The greatest riser height within any flight of stairs shall not exceed the smallest by more than $\frac{3}{8}$ inch (9.5 mm). Risers shall be vertical or sloped from the underside of the nosing of the tread above at an angle not more than 30 degrees (0.51 rad) from the vertical. Open risers are permitted provided that the opening between treads does not permit the passage of a ~~4-inch diameter (102 mm) sphere~~ 6 inch diameter (153 mm) sphere.

Exception: The opening between adjacent treads is not limited on stairs with a total rise of 30 inches (762 mm) or less.

R312.1.3 Opening limitations. Required *guards* shall not have openings from the walking surface to the required *guard* height which allow passage of a sphere ~~4 inches (102 mm)~~ $4\frac{3}{8}$ (111 mm) in diameter.

Exceptions Exception:

4. The triangular openings at the open side of stair, formed by the riser, tread and bottom rail of a guard, shall not allow passage of a sphere 6 inches (153 mm) in diameter.
2. ~~Guards on the open side of stairs shall not have openings which allow passage of a sphere $4\frac{3}{8}$ inches (111 mm) in diameter.~~

Reason: Currently the code has three different limitations on openings in guards that could occur within inches of each other. Clearly something is amiss. It is impossible to offer a rational explanation to the public why there are three different opening limitations that are all intended to prevent children from falling through them. Let's put **some** meaningful uniformity in the code by allowing spacing on all guards to be $4\frac{3}{8}$ inches and six inches when it comes to riser openings. The proposal increases the spacing on all guards to the $4\frac{3}{8}$ inch standard allowed on guards on stairs and increases the openings on risers to 6 inches which is the standard permitted for the triangular space formed by the riser and the tread.

Cost Impact: None

RB134-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	D

R311.7.5.1-RB-DAVIDSON

RB135 – 13

R311.7.5.3

Proponent: David W. Cooper, Stair Manufacturing and Design Consultants, representing the Stairway Manufacturers' Association (sma@stairways.org)

Revise as follows:

R311.7.5.3 Nosings. The radius of curvature at the nosing shall be no greater than 9/16 inch (14 mm). A nosing projection not less than $\frac{3}{4}$ inch (19 mm) but not more than 1 $\frac{1}{4}$ inches (32 mm) shall be provided on stairways with solid risers. The greatest nosing projection shall not exceed the smallest nosing projection by more than $\frac{3}{8}$ inch (9.5 mm) between two stories, including the nosing at the level of floors and landings. Beveling of nosings shall not exceed $\frac{1}{2}$ inch (12.7 mm).

Exceptions: A nosing projection is not required where the tread depth is a minimum of 11 inches (279 mm).

Reason: The addition of the word "projection" corrects and clarifies the intent of the requirement and exception.

Cost Impact: This code change does not increase the cost of construction.

RB135-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R311.7.5.3-RB-COOPER

RB136 – 13

R311.7.8.2

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials
(rdavidson@maplegrovern.gov)

Revise as follows:

R311.7.8.2 Continuity. Handrails for stairways shall be continuous for the full length of the flight, from a point directly above the top riser of the flight to a point directly above the lowest riser of the flight. Handrail ends shall be returned or shall terminate in newel posts or safety terminals. Handrails adjacent to a wall shall have a space of not less than 1½ inch (38 mm) between the wall and the handrails.

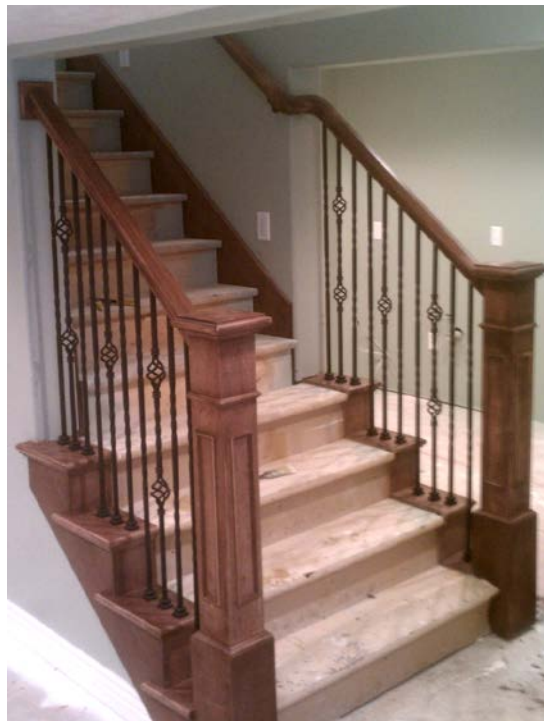
Exceptions:

1. Handrails shall be permitted to be interrupted ~~by a newel posts at the turn.~~
2. The use of a volute, turnout, starting easing or starting newel shall be allowed over the lowest tread.
3. Handrails shall be permitted to be interrupted at the transition from a wall to a guard.
4. Handrails shall be permitted to be interrupted where a flight changes direction.

Reason: Handrails are required by the IRC to be continuous with two exceptions. The first allows the rail to be interrupted by a newel post “at a turn”. The term “at a turn” can be interpreted in different ways. Does this mean a ninety degree turn, a 180 degree turn, or perhaps a 45 degree turn? Does it apply only when flights are interrupted by a landing or does it also apply to winder stairs? But let’s face it. These rails are in dwellings, not public settings. These rails are often installed by homeowners who lack even simple joinery skills. The users of the stairs are familiar with their surroundings. The rails are not required for accessibility purposes. Yet they are required to meet the same standard that applies to high occupant load commercial applications. That is overkill.

If it is safe to remove one’s hand when maneuvering around a newel post “at a turn”, why is it not safe to do the same on a straight run of a stair, or when negotiating a turn on a winder stair, or when transitioning from a stair enclosed on both sides to open on both sides? Following are some attempts at compliance with current code





Does anyone really believe that the user of any of these stairs would maintain contact between their hand and the railing during the complete traverse of the stair? Likely not, because it requires twisting the wrist and hand in ways that are uncomfortable if not impossible.

Let's be realistic. For dwelling applications, it is reasonable to allow greater leeway in handrail designs. Following are some examples of railings designs that are no more hazardous than the ones deemed 100% compliant. The last example is commonly found by field inspectors on owner (and sometimes contractor) constructed deck stairs. Intermediate posts are necessary to stabilize the guard. But the post interrupts the handrail and results in a correction notice to install a continuous rail. This is usually met by complaints by the homeowner that no unsafe condition exists and many people would agree. Installing an additional railing on this type of stair "just to meet the code" smacks of over-regulation, generates complaints about the unsightly finished product, and adds unnecessary cost to the construction of the stair not to mention the ill will created between building departments and taxpaying homeowners.

It is time to add some reasonableness to the handrail requirements for dwellings. This proposal adds a number of changes. First, it allows the rail to be discontinued whenever a newel post occurs. It deletes the ambiguous term "at the turn" and allows the newel post be placed at any change of direction or at mid flight if desired. Either the interruption of a rail by a newel post is a hazard all of the time or none of the time. This proposal takes the position that a newel post poses no hazard. The second change allows the handrail to be discontinued where the stair makes a change from having walls on the side of the stair to having guards as is illustrated below. The basis for the argument is that creating a turn in the handrail that may cause the wrist to make a full ninety degree turn at this transition is not reasonable and that the average individual will take their hand off the rail anyway to make this transition. Furthermore, this situation, oft encountered when basements are finished, is difficult for most homeowners to overcome. The last change adds an exception allowing the handrail to be discontinued when the stair makes a change in direction as may occur with a winder stair. The following pictures illustrate some of those applications.

This proposal will not lessen the safety of stairs. In some cases it may enhance the safety by creating handrails that are more ergonomically useable. It will enable homeowners to comply with the rules and stay within their skill levels thus keeping costs reasonable.





Cost Impact: None

RB136-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R311.7.8.2-RB-DAVIDSON

RB137 – 13

R311.7.9

Proponent: Wesley Walters, Clark County Nevada Development Services, representing self

Revise as follows:

R311.7.9 Illumination. All ~~stairs~~ stairways shall be provided with illumination in accordance with Section R303.6 7.

Reason: Section R303.7 heading is Stairways not stairs. Stairs are a component of a stairway.

Cost Impact: The code change proposal will not increase the cost of construction.

RB137-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R311.7.9-RB-WALTERS

RB138 – 13

R311.7.10.1

Proponent: David W. Cooper, Stair Manufacturing and Design Consultants, representing the Stairway Manufacturers' Association (sma@stairways.org)

Revise as follows:

R311.7.10.1 Spiral stairways. Spiral *stairways* are permitted, provided the minimum clear width at and below the *handrail* shall be 26 inches (660 mm) ~~with and the walkline radius is not greater than 24½ inches (622 mm). Each tread having shall have a minimum tread depth not less than 7½ inch (190 mm) minimum tread depth at 12 inches (914 mm) from the narrower edge the walkline.~~ All treads shall be identical, and the rise riser height shall be no more than 9½ inches (241 mm). ~~A minimum headroom shall be not less than 6 feet 6 inches (1982 mm) shall be provided.~~

Reason: The difference between Spiral Stairways and Curved Stairways is subject to interpretation. Spiral stairways provide a space saving alternative and by their nature are safely used with taller risers and treads that are narrower at the walkline. Currently spiral stairways may be of unrestricted size. This change defines a reasonable limit for the design of spiral stairways with the allowed "exceptions" for headroom, riser height and tread depth.

Stairs beyond the limit stated would be considered a curved stair. A 24½ inches maximum walkline radius dimension effectively provides a minimum radius no greater than 12½ inches at the inside of the turn. It represents that point at which the 6 inches minimum tread width of winder treads can be achieved with 13 treads in one revolution a typical and common manufacturing standard. Beyond this point curved stairways complying with **R311.7.5 Stair treads and risers** and **R311.7.2 Headroom** would be required. This change is meant to correlate with the newly proposed IRC definition of spiral stairway and eliminating the reference to a supporting column as found in the IBC.

We have also made editorial changes and substituted the code section title terms "walkline" and "riser height" to clarify and provide for more consistent interpretation.

Cost Impact: This code change will not increase the cost of construction.

RB138-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R311.7.10.1 #1-RB-COOPER

RB139 – 13

R311.7.10.1

Proponent: David W. Cooper, Stair Manufacturing and Design Consultants, representing the Stairway Manufacturers' Association (sma@stairways.org)

Revise as follows:

R311.7.10.1 Spiral stairways. Spiral stairways are permitted, provided the minimum clear width at and below the *handrail* shall be 26 inches (660 mm) with each tread having a ~~7½~~ 6¾ inch (490 171 mm) minimum tread depth at 12 inches (914 mm) from the narrower edge. All treads shall be identical, and the rise shall be no more than 9½ inches (241 mm). A minimum headroom of 6 feet 6 inches (1982 mm) shall be provided.

Reason: This change is largely editorial. Treads within Spiral Stairways meet the definition of winder treads and are sometimes interpreted to be measured for tread depth in the same fashion. This change simply adjusts the spiral stair tread depth in conformance with the 2009 change in the method of measuring for winder tread depth at the intersections of the walkline with the nosings instead of the prior method which was square to the leading edge. The effective tread depth remains unchanged as can be seen in figure one.

The intent of the 2009 change in measuring methods was to provide for consistent tread depth measurements conforming with stair design methodology not to change or increase tread depth.

The long accepted 7½ inches tread depth was based on the typical spiral layout with 13 treads per revolution or 27.692 degrees per tread. Figure one illustrates the 7½ inches measurement made square to the leading edge of the tread, and also shows the tread depth when measured at the intersections of the walkline and nosings. For the ease of enforcement we have rounded the required tread depth to 6¾ inches.

This change is necessary to allow long accepted manufacturing, material and design standards to continue to meet the requirement and does not change the effective depth of the tread.

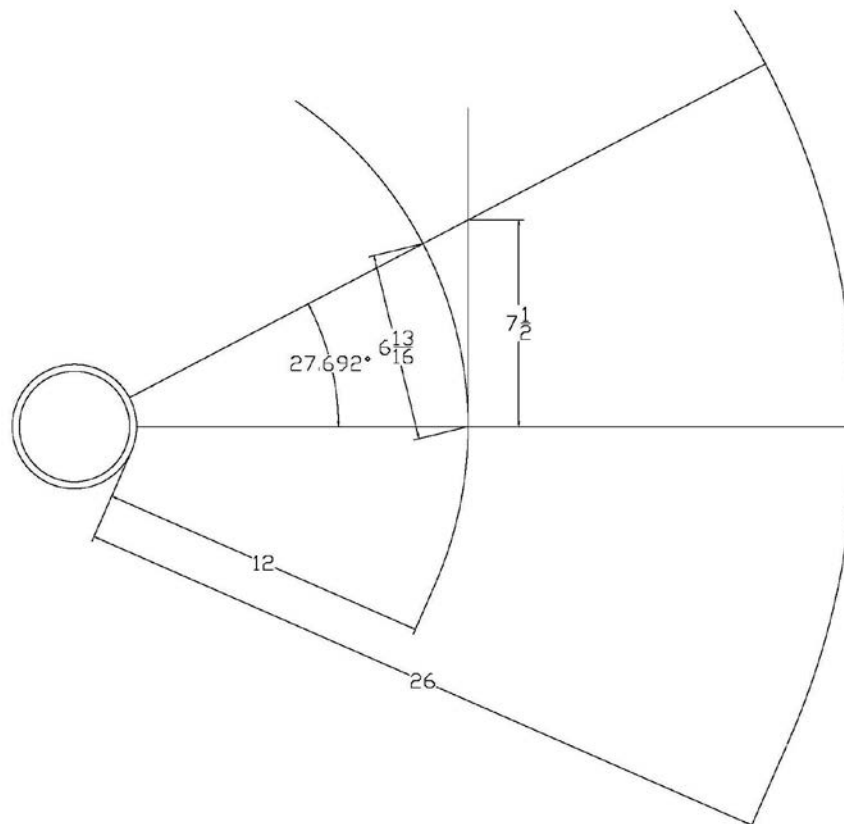


FIGURE ONE illustrates a winder tread from a typical spiral stairway with 13 treads per revolution. The dimensions shown allow comparison of the tread depth when measured square to the leading edge and when measured at the intersection of the walkline with the nosings. This simply shows that the old requirement of 7½ inches needs to change to accommodate the new measuring method cited in **R311.7.5.2.1 Winder Treads.**

Cost Impact: This change will eliminate unintended increases in the cost of construction.

RB139-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R311.7.10.1 *2-RB-COOPER

RB140 – 13

R202, R311.7.11 (New)

Proponent: David W. Cooper, Stair Manufacturing and Design Consultants, representing the Stairway Manufacturers' Association (sma@stairways.org)

Add new definition as follows:

SECTION R202 DEFINITIONS

ALTERNATING TREAD DEVICE. A device that has a series of steps between 50 and 70 degrees (0.87 and 1.22 rad) from horizontal, usually attached to a center support rail in an alternating manner so that the user does not have both feet on the same level at the same time.

Add new text as follows:

R311.7.11 Alternating tread devices. *Alternating tread devices* shall not be used as an element of a means of egress. *Alternating tread devices* shall be permitted provided the required means of egress stairway or ramp serves the same space at each adjoining level or where a means of egress is not required. The clear width at and below the handrails shall be not less than 20 inches (508 mm).

R311.7.11.1 Treads of alternating tread devices. *Alternating tread devices* shall have a tread depth of not less than 5 inches (127 mm), a projected tread depth of not less than 8 1/2 inches (216 mm), a tread width of not less than 7 inches (178 mm) and a riser height of not more than 9 1/2 inches (241 mm). The tread depth shall be measured horizontally between the vertical planes of the foremost projections of adjacent treads. The riser height shall be measured vertically between the leading edges of adjacent treads. The riser height and tread depth provided shall result in an angle of ascent from the horizontal of between 50 and 70 degrees (0.87 and 1.22 rad). The initial tread of the device shall begin at the same elevation as the platform, landing or floor surface.

R311.7.11.2 Handrails of alternating tread devices. *Handrails* shall be provided on both sides of *alternating tread devices* and shall comply with R311.7.8.2 thru R311.7.8.4. Handrail height shall be uniform, not less than 30 inches (762 mm) and not more than 34 inches (864 mm).

R311.7.12 Ship ladders. Ship ladders shall not be used as an element of a means of egress. Ship ladders shall be permitted provided a required means of egress stairway or ramp serves the same space at each adjoining level or where a means of egress is not required. The clear width at and below the handrails shall be not less than 20 inches.

R311.7.12.1 Treads of ship ladders. Treads shall have a tread depth of not less than 5 inches (127 mm). The tread shall be projected such that the total of the tread depth plus the *nosing* projection is not less than 8 1/2 inches (216 mm). The riser height shall be not more than 9 1/2 inches (241 mm).

R311.7.12.2 Handrails of ship ladders. *Handrails* shall be provided on both sides of ship ladders and shall comply with R311.7.8.2 thru R311.7.8.4. Handrail height shall be uniform, not less than 30 inches (762 mm) and not more than 34 inches (864 mm).

Reason: Alternating tread devices and ship ladders are used in residential applications but are not regulated. This language adopts the specifications from the IBC providing the needed guidance when they are used. This further clarifies that an Alternating Tread Device and or Ship Ladder cannot be used as an element of a means of egress, and can only be used when a means of egress is not required or when the required means of egress stairway or ramp is provided to serve the same spaces at each level.

Cost Impact: This code change will not increase the cost of construction.

RB140-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R311.7.11 (NEW)-RB-COOPER

RB141 – 13

R311.8.1

Proponent: Rick Davidson, City of Maple Grove Association of Minnesota Building Officials
(rdavidson@maplegrovern.gov)

Revise as follows:

R311.8.1 Maximum slope. Ramps serving the egress door required by section R311.2 shall have a maximum slope of 1 unit vertical in 12 units horizontal (8.3-percent slope). All other ramps shall have a maximum slope of 1 unit vertical to 8 units horizontal (12.5-percent slope).

Exception: Where it is technically infeasible to comply because of site constraints, ramps may have a maximum slope of one unit vertical in eight horizontal (12.5-percent slope).

Reason: When ramp slope requirements were changed a few years back, the reason stated was to enable persons with disabilities to stay in their homes. However, the scope of the proposal included all ramps, even those that could not be used by persons with disabilities. For example, dwelling additions to older homes sometimes have new basements at a deeper level and the owner wishes to make the transition by ramp. A 1:12 slope can sometimes be difficult to achieve and absorbs much more space than need be. Media rooms are often designed to have sloping floors with ramps serving the seating and again the 1:12 slope is problematic. This proposal gives some relief for those situations where accessibility may not be an issue. This also is consistent with section 1010.3 of the IBC which allows a 1:8 slope for pedestrian ramps not used as a means of egress.

IBC SECTION 1010 RAMPS

1010.3 Slope. Ramps used as part of a *means of egress* shall have a running slope not steeper than one unit vertical in 12 units horizontal (8-percent slope). The slope of other pedestrian ramps shall not be steeper than one unit vertical in eight units horizontal (12.5-percent slope).

Cost Impact: None

RB141-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R311.8.1-RB-DAVIDSON

RB142 – 13

R311.8.1, R311.8.2

Proponent: Glenn Mathewson, MCP., representing self (GlennMathewson@nadra.org)

Revise as follows:

R311.8.1 Maximum slope. Ramps shall have a maximum slope of 1 unit vertical in 12 units horizontal (8.3-percent slope).

Exception: Where it is technically infeasible to comply because of site constraints, ramps shall ~~may~~ have a maximum slope of ~~one~~ 1 unit vertical in ~~eight~~ 8 units horizontal (12.5-percent slope).

R311.8.2 Landings required. There shall be a floor or landing at the top and bottom of each ramp, where doors open onto ramps, and where ramps change directions. The width of the landing perpendicular to the ramp slope shall be not less than the width of the ramp. The depth of the landing in the direction of the ramp slope shall be not less than 36-inches. A minimum 3 foot by 3 foot (914 mm by 914 mm) landing shall be provided:

- ~~1. At the top and bottoms of ramps.~~
- ~~2. Where doors open onto ramps.~~
- ~~3. Where ramps change directions.~~

Reason: -It is inconsistent to present slope in one section using numerical symbols, and then in the exception use textual language. It appears to be more common in the IRC to use numerical symbols, thus the choice to modify the exception.

-Use of the word "may" is in appropriate when referring to a maximum value. "Shall" is clearer that the maximum value is the undisputable limit.

All other landings in the IRC (doors/stairs) reference the width of the feature they serve, as this is sensible. Currently ramp provisions refer to a specific geometric width, and would not properly and safely accommodate a ramp that was wider than the minimum 36 inches. Likely...landings are already built to the width of the ramps they serve.

-The use of a list of landing locations is not consistent with other similar IRC sections. The proposed language is more similar to that used to describe landings on stairs...a very similar feature.

Cost Impact: The code change proposal will not increase the cost of construction.

RB142-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R311.8.1-RB-MATHEWSON

RB143 – 13

R312.1.1

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials
(rdavidson@maplegrovern.gov)

Revise as follows:

R312.1.1 Where required. *Guards shall be located along open-sided walking surfaces, including the open sides of floors, stairs, ramps and landings that are located more than 30 inches (762 mm) measured vertically to the floor or grade below at any point within 36 inches (914 mm) horizontally to the edge of the open side.* Insect screening shall not be considered as a *guard*.

Reason: The first portion of the proposal deletes the requirement that guards be located along open sided walking surfaces and replaces it with the same language found in the previous IRC. This is necessary because the term “open sided walking surfaces” is so broad in scope that it could be and is being applied to almost any surface on or in a building or a lot. It could be interpreted to require guards being installed around window wells, on the top of retaining walls, along driveways and sidewalks, on landings near window wells, at the edge of swimming pools, and even at the edge of flat roofs. The definitions for floors, stairs, ramps, and landings are well established. Everyone understands the application with these terms. It is reasonable to use terms that are understandable to all.

The second part of the proposal deletes the reference to measuring the height of the walking surface three feet from the edge of the walking surface and returns it to the language that existed in the IRC since its inception and in the previous model codes for decades.

It seems to be a widely held belief that the Uniform Building Code required that a measurement from floor to grade be taken at a point five feet from the floor to determine if a guard was required.

But, the Uniform Building Code never said that is how the distance should be measured nor did the BOCA National Building Code or the Southern Building Code. They all stated that the 30 inch height (15 ½ inches in the National Building Code and 30 inches in the Southern Building Code) be measured to the floor or grade below or very similar language.

Then where did the five foot measuring requirement come from? It came from the definition of “grade”. For years, ICBO staff taught that the use of the term “grade” in the phrase “30 inches above floor or grade below” was defined and that the definition in the UBC required that grade be measured five feet from the building or if the property line was less than five feet from the building then it would be measured from a point between the building and the property line.

This creates at least two inconsistencies if the argument was that the five foot distance was safety oriented. First, you only measured five feet over if what was below the walking surface was “grade”. If it were a floor, you just measured straight down. Second, if the building was near a property line, you only measured to the property line even if there were a severe drop at the property line. Theoretically under the UBC, one could have a walking surface that was adjacent to a property line with a 30 foot drop at the property line and no guard.

The idea that one should measure the 30 inch distance at some point other than the base of the walking surface was strictly an ICBO opinion and not binding on any building official. Based on the inconsistencies cited, there is certainly room for other opinions. Because a portion of the language in the UBC definition that stated that grade was between the building and the property line did not make it into the IRC, the IRC version requires that the measurement extend to adjoining lots in some cases.

But there is more.

The BOCA National Building Code required guards be provided when the walking surface was more than 15 ½ inches above the floor or grade below. But the BOCA code did not define “grade”, only “grade plane”. And the definition of “grade plane” was used exclusively to determine the reference point for the height and number of stories of a building for purposes of determining compliance with height and number of stories limitations based on use and type of construction. It is not known how BOCA staff taught how to measure for guards but the language in the BOCA code is the same as it has been in the IRC since its inception.

The Southern Building Code provided a definition for “grade” but the method of measuring the height of a floor surface was stated to be “30 inches above *finished ground level* or a floor below”. While grade required measuring a distance of six feet away, that term was not used in defining when a guard was required. It is not known how SBCCI staff taught how to measure guards but it doesn't appear the Southern Building Code provided any means to take the measurement at any location but straight down from the edge of the walking surface.

More about the UBC. Was it really intended that the measurement requiring guards be taken five feet from the walking surface or was that just happenstance and poor choices of terms in the code sections?

I would argue that it was never intended that the method used to determine whether or not a guard was required be five feet from the walking surface. Besides the inconsistencies above, the UBC definition of “grade” states that it is the distance “between the *building* and the property line”. The term “building” does not appear to mean a floor or walking surface that could be used to determine guard requirements.

And then there is more. The UBC contained references to measuring grade at a distance away from the building dating back at least into the 1930's. Apparently the game of piling dirt next to a building to reduce the height or number of stories is not new. Grade was always about height and number of stories of the building, not as a means to require a guard.

An explanation of the term "grade" from the "*Design Guide – 1988 UBC*" by Alfred Goldberg is provided below. Mr. Goldberg states that the "determination of the grade level is important to the designer for several reasons, including the qualification of a level as a basement and the measurement of the allowable overall height of the building." Mr. Goldberg goes on to explain the nuances of application of the term "grade" and cautions on the "repercussions" of errors in applying the rules. Not once in Mr. Goldberg's book does he reference that "grade" has anything to do with guards.

In the "*Handbook to the Uniform Building Code, An Illustrative Commentary*" published by ICBO, the statement is made in regards to "grade" that "This definition is important in determining the number of stories within a building as well as its height in feet." There is also a discussion on the issue of guards but never once is there a reference to how one determines whether a guard is required. One would think it is important to create the link because the section regarding guards only states measuring to the floor or grade below.

That brings us to today. Given that the Southern Building Code, the National Building Code, the CABO One and Two Family Dwelling Code, and possibly the Uniform Building Code (depending on how it was interpreted) all directed that the measurement used to determine whether or not a guard was required be taken by measuring to the area below the edge of the walking surface, did an unsafe condition exist? No evidence has been submitted with any prior code change to suggest that it did.

Then there are the practical aspects. What distance should a "landing area" be if one were to create one? Should that landing area extend onto another property? The code has always regulated building construction based on situations on the lot in question and given no credence to what occurs on an adjoining lot.

And there are other practicality issues. Permits are not required for a host of "walking surfaces". How does one enforce a guard requirement for things like concrete sidewalks? Do we really see sharp drops or cliffs adjoining low decks or are we more likely to see a gently sloping hill and are they a hazard? And suppose I create a floor or walking surface adjacent my property line and the land on the other side slopes sufficiently that a guard would be required but my neighbor has a fence at the top of the slope on his side of the property line. Do I still need to put up a guard right next to his fence? And if I can use the fence for the guard, does it need to meet the load requirement of 200 pounds at the top? And if I have a walking surface that doesn't require a guard but at a later date the neighboring property owner installs a retaining wall that places my walking surface in violation, is he required to install the guard? He was the one who created the hazard! Will the timing of events result in one situation requiring a guard and another not? How does one explain this to a homeowner and make sense of it?

And last is the issue of permitting of decks, porches, balconies, landings and other low floor surfaces. Low decks were exempted from permits in large part because guards were not required, and they might still not be required. One can only guess that proposals are being drafted to require permits for decks requiring guards. But the inquiry that comes into the building department regarding the need for a guard will go something like this. Q. "Do I need a permit for a deck that will be 28 inches above the ground?" A. "You will need a permit if the ground within X feet of the deck will be more than 30 inches below the floor of the deck at any point around the deck." Q. "I'm a homeowner. I know it will be less than 30 inches above grade around the perimeter of the deck but I don't know about X feet out. So do I need a permit or not? And if I take out a permit and it turns out I didn't need one, I will get my money back, right?"

Homeowners don't have access to sophisticated equipment. They will be dependent on string levels and garden hoses. Accuracy may not be a strong suit. Where will this place the building department?

It is necessary that there be clarity in where a guard is required so that there is uniformity of application and that intended safeguards are in place. It is also necessary that those requirements achieve in all cases what they set out to do. Because most, if not all, of the national model codes did not require that the determining factor of when a guard was required was anything but a direct measurement from the edge of the floor to the ground or floor directly below.

tion) to circulate the heated air to and from the unit. In the context of the code, the primary use of the term "furnace" refers to heating appliance units that combine a combustion chamber with related components, one or more heat exchangers and an air-handling system.

GLAZING AREA. The interior surface area of all glazed fenestration, including the area of sash, curbing or other framing elements, that enclose conditioned space. Includes the area of glazed fenestration assemblies in walls bounding conditioned basements.

❖ The glazing area includes not only the surface area of the exposed glazing but also the framing elements, including the sash and curbing. The amount of glazing area is regulated for natural light by Section R303; however, this definition applies to the energy efficiency provisions of Chapter 11.

GRADE. The finished ground level adjoining the building at all exterior walls.

❖ This is the point at which the finished exterior ground level intersects the exterior wall of the building. The grade around a building may remain relatively constant, such as on a flat site, or may change dramatically from one point to the next if the site is steeply sloping.

GRADE FLOOR OPENING. A window or other opening located such that the sill height of the opening is not more than 44 inches (1118 mm) above or below the finished ground level adjacent to the opening.

❖ In the requirements for emergency escape and rescue openings found in Section R310, the size of the openings may be reduced if they are grade floor openings. These are windows or other openings that are located within close proximity to the finished ground level. The sill of a grade floor opening may be located either above or below the adjacent ground level, provided it is located no more than 44 inches (1118 mm) vertically from the level of the ground.

GRADE, PIPING. See "Slope."

GRADE PLANE. A reference plane representing the average of the finished ground level adjoining the building at all exterior walls. Where the finished ground level slopes away from the exterior walls, the reference plane shall be established by the lowest points within the area between the building and the lot line or, where the lot line is more than 6 ft (1829 mm) from the building between the structure and a point 6 ft (1829 mm) from the building.

❖ This definition can be important in determining the number of stories within a building as well as its height in feet. In some cases, the finished surface of the ground may be artificially raised with imported fill to create a higher grade plane around a building to decrease the number of stories or height. The definition requires that the lowest elevation within 6 feet (1829 mm) of the exterior wall be used to determine the grade plane.

GRIDDED WATER DISTRIBUTION SYSTEM. A water distribution system where every water distribution pipe is

interconnected so as to provide two or more paths to each fixture supply pipe.

❖ These systems offer the advantage of a simplistic design, typically smaller sized distribution lines and aid water conservation. In a traditional water distribution system, the water contained in the larger diameter piping is wasted when the line is opened and the user has to wait until the water reaches the desired temperature.

Parallel or gridded water distribution systems differ from branch systems which have individual supply pipes that extend to each fixture or outlet from a central supply point [see Commentary Figure R202(1)]. The central supply point is a multiple-outlet manifold to which the distribution lines connect [see Commentary Figure R202(2)].

GROSS AREA OF EXTERIOR WALLS. The normal projection of all exterior walls, including the area of all windows and doors installed therein.

❖ The calculation for determining the gross area of exterior walls for energy efficiency purposes is based on the total area of the entire exterior surface, including openings such as windows and doors.

GROUND-SOURCE HEAT PUMP LOOP SYSTEM. Piping buried in horizontal or vertical excavations or placed in a body of water for the purpose of transporting heat transfer liquid to and from a heat pump. Included in this definition are closed loop systems in which the liquid is recirculated and open loop systems in which the liquid is drawn from a well or other source.

❖ This definition assists the user with a ready means of distinguishing ground-source heat pump loop systems from other hydronic systems.

GUARD. A building component or a system of building components located near the open sides of elevated walking surfaces that minimizes the possibility of a fall from the walking surface to the lower level.

❖ A guard is a component or system of components whose function is the prevention of falls from an elevated area. Placed adjacent to an elevation change, a guard must be of adequate height, strength and configuration to help prevent people, especially small children, from falling over or through the guard to the area below.

HABITABLE SPACE. A space in a building for living, sleeping, eating or cooking. Bathrooms, toilet rooms, closets, halls, storage or utility spaces and similar areas are not considered habitable spaces.

❖ An area within a building used for living, sleeping, dining or cooking is a habitable space. Those areas not meeting this definition include bathrooms, closets, hallways and utility rooms. Habitable spaces are typically occupied, and as such they are more highly regulated than accessory use areas.

HANDRAIL. A horizontal or sloping rail intended for grasping by the hand for guidance or support.

to assist ramp users. This provision differs from that of the IBC, where a slope of one unit vertical in 20 units horizontal (5-percent slope) and a ramp rise of 6 inches (152 mm) establishes the limits.

R311.6.3.1 Height. Handrail height, measured above the finished surface of the ramp slope, shall be not less than 34 inches (864 mm) and not more than 38 inches (965 mm).

❖ Where handrails are required, they must be installed at a height of at least 34 inches (864 mm) and not more than 38 inches (965 mm), measured vertically from the finished surface of the ramp slope. This height should be measured to the top of the handrail.

R311.6.3.2 Handrail grip size. Handrails on ramps shall comply with Section R311.5.6.3.

❖ See the commentary for Section R311.5.6.3.

R311.6.3.3 Continuity. Handrails where required on ramps shall be continuous for the full length of the ramp. Handrail ends shall be returned or shall terminate in newel posts or safety terminals. Handrails adjacent to a wall shall have a space of not less than 1.5 inches (38 mm) between the wall and the handrails.

❖ The continuity requirement for the ramp handrail is similar to the continuity requirement for the stair handrail. See the commentary for Section R311.5.6.2

guards not less than 34 inches (864 mm) in height measured vertically from the nosing of the treads.

Porches and decks which are enclosed with insect screening shall be equipped with guards where the walking surface is located more than 30 inches (762 mm) above the floor or grade below.

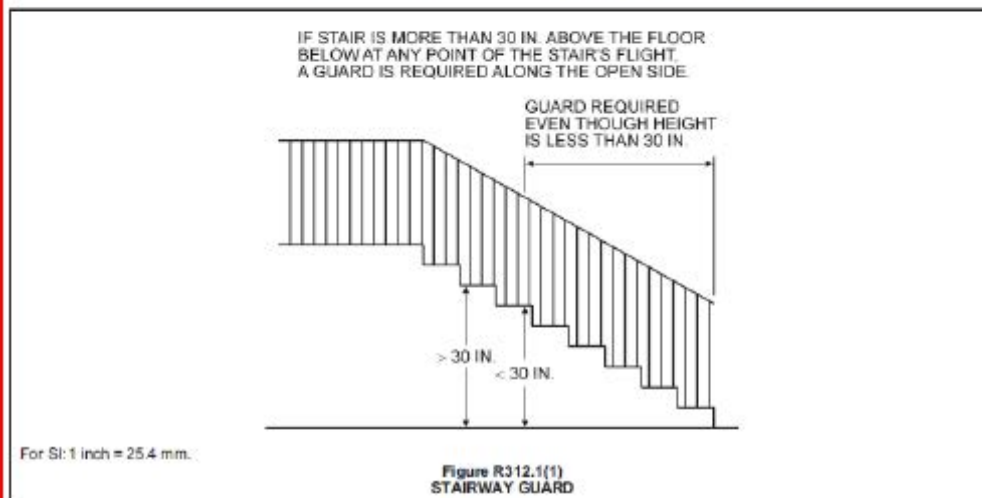
❖ The guard provisions of the IRC address the issue of protecting occupants from falling from any type of elevated walking surface. The provisions in Section R312 provide the scoping requirements as well as the general construction requirements for the guards. Besides this section, code users should be aware that Section R301.5 contains the design load criteria for guards.

Section R312.1 of the code establishes the requirement for and the minimum height requirements for guards. The code provides for guard protection at open sides along raised floor or walking surfaces such as those at balconies, mezzanines, stairways, ramps, porches and landings that are more than 30 inches (762 mm) above the grade or floor surface below.

The requirements for guards on stairs are different from other guard requirements in two ways. The first is the scoping requirements that establish the need for the guard, and the second is the required height of the guard. The scoping requirement for guards along open sides of stairs not only applies to the portion of a stairway that is more than 30 inches (762 mm) above the floor, but it will also apply to the entire open side of the stair, including the parts that are less than 30 inches (762 mm) above the floor. This requirement applies to the entire "open side" of the stairway, if any point of the open side is more than 30 inches (762 mm) high. See Commentary Figures R312.1(1) and (2) for examples of how this provision is applied.

SECTION R312 GUARDS

R312.1 Guards. Porches, balconies, ramps or raised floor surfaces located more than 30 inches (762 mm) above the floor or grade below shall have guards not less than 36 inches (914 mm) in height. Open sides of stairs with a total rise of more than 30 inches (762 mm) above the floor or grade below shall have



FIRE RESISTANCE or FIRE-RESISTIVE CONSTRUCTION is construction to resist the spread of fire, details of which are specified in this code.

FIRE-RETARDANT-TREATED WOOD is any wood product impregnated with chemicals by a pressure process or other means during manufacture, and which, when tested in accordance with UBC Standard 8-1 for a period of 30 minutes, shall have a flame spread of not over 25 and show no evidence of progressive combustion. In addition, the flame front shall not progress more than 10 1/2 feet (3200 mm) beyond the center line of the burner at any time during the test. Materials that may be exposed to the weather shall pass the accelerated weathering test and be identified as Exterior type, in accordance with UBC Standard 23-4. Where material is not directly exposed to rainfall but exposed to high humidity conditions, it shall be subjected to the hygroscopic test and identified as Interior Type A in accordance with UBC Standard 23-4.

All materials shall bear identification showing the fire performance rating thereof. Such identifications shall be issued by an approved agency having a service for inspection of materials at the factory.

FLAMMABLE LIQUID. See the Fire Code.

FLOOR AREA is the area included that the surrounding exterior walls of a building or portion thereof, exclusive of vent shafts and courts. The floor area of a building, or portion thereof, not provided with surrounding exterior walls shall be the usable area under the horizontal projection of the roof or floor above.

FM is Factory Mutual Engineering and Research, 1151 Boston-Providence Turnpike, Norwood, Massachusetts 02062.

FOAM PLASTIC INSULATION is a plastic that is intentionally expanded by the use of a foaming agent to produce a reduced-density plastic containing voids consisting of hollow spheres or interconnected cells distributed throughout the plastic for thermal insulating or acoustical purposes and that has a density less than 20 pounds per cubic foot (320 kg/m³).

FOOTING is that portion of the foundation of a structure that spreads and transmits loads directly to the soil or the piles.

FRONT OF LOT is the front boundary line of a lot bordering on the street and, in the case of a corner lot, may be either frontage.

SECTION 208 — G

GARAGE is a building or portion thereof in which a motor vehicle containing flammable or combustible liquids or gas in its tank is stored, repaired or kept.

GARAGE, PRIVATE, is a building or a portion of a building, not more than 1,000 square feet (93 m²) in area, in which only motor vehicles used by the tenants of the building or buildings on the premises are stored or kept. (See Section 312.)

GARAGE, PUBLIC, is any garage other than a private garage.

GAS ROOM is a separately ventilated, fully enclosed room in which only toxic and highly toxic compressed gases and associated equipment and supplies are stored or used.

GRADE (Adjacent Ground Elevation) is the lowest point of elevation of the finished surface of the ground, paving or sidewalk within the area between the building and the property line or, when the property line is more than 5 feet (1524 mm) from the building, between the building and a line 5 feet (1524 mm) from the building.

GRADE (Lumber) is the classification of lumber in regard to strength and utility.

GUARDRAIL is a system of building components located near the open sides of elevated walking surfaces for the purpose of minimizing the possibility of an accidental fall from the walking surface to the lower level.

GUEST is any person hiring or occupying a room for living or sleeping purposes.

GUEST ROOM is any room or rooms used or intended to be used by a guest for sleeping purposes. Every 100 square feet (9.3 m²) of superficial floor area in a dormitory shall be considered to be a guest room.

SECTION 209 — H

HABITABLE SPACE (ROOM) is space in a structure for living, sleeping, eating or cooking. Bathrooms, toilet compartments, closets, halls, storage or utility space, and similar areas, are not considered habitable space.

HANDLING is the deliberate movement of material by any means to a point of storage or use.

HANDRAIL is a railing provided for grasping with the hand for support. See also "guardrail."

HAZARDOUS PRODUCTION MATERIAL (HPM) is a solid, liquid or gas that has a degree of hazard rating in health, flammability or reactivity of 3 or 4 and that is used directly in research, laboratory or production processes that have, as their end product, materials that are not hazardous.

HEALTH HAZARD is a classification of a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed persons. The term "health hazard" includes chemicals that are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents that act on the hematopoietic system, and agents that damage the lungs, skin, eyes or mucous membranes.

HEIGHT OF BUILDING is the vertical distance above a reference datum measured to the highest point of the coping of a flat roof or to the deck line of a mansard roof or to the average height of the highest gable of a pitched or hipped roof. The reference datum shall be selected by either of the following, whichever yields a greater height of building:

1. The elevation of the highest adjoining sidewalk or ground surface within a 5-foot (1524 mm) horizontal distance of the exterior wall of the building when such sidewalk or ground surface is not more than 10 feet (3048 mm) above lowest grade.

2. An elevation 10 feet (3048 mm) higher than the lowest grade when the sidewalk or ground surface described in Item 1 is more than 10 feet (3048 mm) above lowest grade.

The height of a stepped or terraced building is the maximum height of any segment of the building.

HELIPORT is an area of land or water or a structural surface that is used, or intended for use, for the landing and take-off of helicopters, and any appurtenant areas that are used, or intended for use, for heliport buildings and other heliport facilities.

HELISTOP is the same as a heliport, except that no refueling, maintenance, repairs or storage of helicopters is permitted.

HIGHLY TOXIC MATERIAL is a material that produces a lethal dose or a lethal concentration that falls within any of the following categories:

hour for unenclosed mezzanines. The clear height above and below the mezzanine floor construction shall not be less than 7 feet (2134 mm).

2. There shall not be more than two levels of mezzanines in a room. However, there is no limitation on the number of mezzanines within a room.

3. The aggregate area of mezzanines within a room shall not exceed one third of the area of the room in which they are located.

4. All portions of a mezzanine shall be open and unobstructed to the room in which they are located, except for columns and posts and protective walls or railings not more than 44 inches (1118 mm) in height.

EXCEPTIONS: 1. Partitions may be installed if either of the following conditions exist:

- 1.1 The aggregate floor area of the enclosed space does not exceed 10 percent of the mezzanine area, or
- 1.2 The occupant load of the enclosed area of the mezzanine does not exceed 10.

2. A mezzanine having two or more means of egress need not be open into the room in which it is located, provided at least one of the means of egress gives direct access to a protected corridor, exit court or exit.

3. In industry facilities, mezzanines used for control equipment may be glazed on all sides.

5. Two means of egress shall be provided from a mezzanine when two are required by Table 10-A.

6. If any required means of egress enters the room below, the occupant load of the mezzanine shall be added to the occupant load of the room in which it is located.

SECTION 508 — FIRE-RESISTIVE SUBSTITUTION

When an approved automatic sprinkler system is not required throughout a building by other sections of this code, it may be used in a building of Type II One-hour, Type III One-hour and Type V One-hour construction to substitute for the one-hour fire-resistive construction. Such substitution shall not waive or reduce the required fire-resistive construction for:

1. Occupancy separations (Section 302.3).
2. Exterior wall protection due to proximity of property lines (Section 503.2).
3. Area separations (Section 504.6).
4. Dwelling unit separations (Section 310.2.2).
5. Shaft enclosures (Section 711).
6. Corridors (Sections 1004.3.4.3.1 and 1004.3.4.3.2).
7. Stair enclosures (Section 1005.3.3).
8. Exit passageways (Section 1005.3.4).
9. Type of construction separation (Section 601.1).
10. Boiler, central heating plant or hot-water supply boiler room enclosures (Section 302.5).

SECTION 509 — GUARDRAILS

509.1 Where Required. Unenclosed floor and roof openings, open and glazed sides of stairways, aisles, landings and ramps, balconies or porches, which are more than 30 inches (762 mm) above grade or floor below, and roofs used for other than service of the building shall be protected by a guardrail. Guardrails shall be provided at the ends of aisles where they terminate at a fascia of boxes, balconies and galleries.

EXCEPTION: Guardrails need not be provided at the following locations:

1. On the loading side of loading docks.
2. On the auditorium side of a stage, raised platforms and other raised floor areas such as runways, ramps and side stages used for entertainment or presentation. Along the side of an elevated walking surface when used for the normal functioning of special lighting or for access and use of other special equipment. At vertical openings in the performance area of stages.
3. Along vehicle service pits not accessible to the public.

509.2 Height. The top of guardrails shall not be less than 42 inches (1067 mm) in height.

EXCEPTIONS: 1. The top of guardrails for Group R, Division 3 and Group U, Division 1 Occupancies and interior guardrails within individual dwelling units, Group R, Division 3 congregate residences and guest rooms of Group R, Division 1 Occupancies may be 36 inches (914 mm) in height.

2. The top of guardrails on a balcony immediately in front of the first row of fixed seats and that are not at the end of an aisle may be 26 inches (660 mm) in height.

3. The top of guardrails for stairways, exclusive of their landings, may have a height as specified in Section 1003.3.3.6 for handrails.

Where an elevation change of 30 inches (762 mm) or less occurs between an aisle parallel to the seats (cross aisle) and the adjacent floor or grade below, guardrails not less than 26 inches (660 mm) above the aisle floor shall be provided.

EXCEPTION: Where the backs of seats on the front of the cross aisle project 24 inches (610 mm) or more above the adjacent floor of the aisle, a guardrail need not be provided.

The top of guardrails at the ends of aisles terminating at the fascia of boxes, balconies and galleries shall extend for the width of the aisle and be no closer than 42 inches (1067 mm) to the closest surface of the aisle where there are steps and 36 inches (914 mm) otherwise.

509.3 Openings. Open guardrails shall have intermediate rails or an ornamental pattern such that a sphere 4 inches (102 mm) in diameter cannot pass through.

EXCEPTIONS: 1. The open space between the intermediate rails or ornamental pattern of guardrails in areas of commercial and industrial-type occupancies which are not accessible to the public may be such that a sphere 12 inches (305 mm) in diameter cannot pass through.

2. The triangular openings formed by the riser, tread and bottom element of a guardrail at the open side of a stairway may be of such size that a sphere 6 inches (152 mm) in diameter cannot pass through.

For guardrail requirements at grandstands, bleachers or other elevated seating facilities, see Section 1008.3.7.

The floor area calculation is of such importance that the designer should establish this figure early in the preliminary discussions with the local enforcement agency.

Sec. 408. GARAGE is a building or portion thereof in which a motor vehicle containing flammable or combustible liquids or gas in its tank, is stored, repaired or kept.

GARAGE, PRIVATE, is a building or a portion of a building, not more than 1000 square feet in area, in which only motor vehicles used by the tenants of the building or buildings on the premises are stored or kept. (See Section 1101.)

GARAGE, PUBLIC, is any garage other than a private garage.

There are several definitions, and three different classifications, of garages. The least restrictive definition refers to a garage in conjunction with a dwelling or a small office building: a "private garage." It is classified as a Group M Occupancy.

When the garage is larger, or if it is in a larger building or serves occupants other than those in the building, it is called a "public garage." This garage is classified as a Group B, Division 1 Occupancy.

The third class of garage is a "repair garage" classed as a Group H, Division 4 Occupancy.

The reason for the three different garage classes is illustrated in Table No. 5-C. In a Type III-N building, a Group B, Division 1 Occupancy allows a floor area of 12,000 square feet. In a similar building, a Group H, Division 4 Occupancy limits the floor area to 7,500 square feet. The smaller allowable area is due to the presence of repair equipment, including torches and flammable liquids (oil and gasoline) which may permeate the area when repairs are made.

On the other hand, the Group M private garage is limited to 1,000 square feet with a maximum of 3,000 square feet in any one building. The provisions in Chapter 11 enable the private garage to reach the maximum of 3,000 square feet in the building provided each 1,000 square foot area is separated from another by a one-hour area separation wall.

GRADE (Adjacent Ground Elevation) is the lowest point of elevation of the finished surface of the ground, paving or sidewalk within the area between the building and the property line or, when the property line is more than 5 feet from the building, between the building and a line 5 feet from the building.

This definition requires that the elevation of the ground surface to be used be either:

- the level between the building and the property line, or
- where the property line is more than five feet from the building, the lowest point within a distance of five feet from the building.

The code intent is to establish what would be a "natural" ground line and to prevent someone from piling soil up against the foundation of the building and claiming that it represents the grade. By requiring the measurement to be the lowest elevation within five feet of the building, the code establishes a five-foot width to represent grade and not simply a mound of earth against the foundation. A retaining wall can be used to establish this five-foot level width.

The determination of the grade level is important to the designer for several reasons, including the qualification of a level as a basement and the measurement of the allowable overall height of the building. (See Figure 4-2.)

HEIGHT OF BUILDING is the vertical distance above a reference datum measured to the highest point of the coping of a flat roof or to the deck line of a mansard roof or to the average height of the highest gable of a pitched or hipped roof. The reference datum shall be selected by either of the following, whichever yields a greater height of building:

1. The elevation of the highest adjoining sidewalk or ground surface within a five-foot horizontal distance of the exterior wall of the building when such sidewalk or ground surface is not more than 10 feet above lowest grade.
2. An elevation 10 feet higher than the lowest grade when the sidewalk or ground surface described in Item 1 above is more than 10 feet above lowest grade.

The height of a stepped or terraced building is the maximum height of any segment of the building.

Height of building discussed in this definition relates to the provisions in Chapter 5 for considering the maximum height for a given type of construction and number of stories in a building.

Height and stories are interdependent in Table No. 5-D wherein the limitations for the height in feet and the number of stories are established. The provisions for measuring the height require reference to the ground surface. The five-foot horizontal width in Item 1 is comparable to the five-foot width measurement for determining "grade."

The concern with the method of height measurement is based on the fire and panic hazards presented by taller structures or those with more levels of occupancy. Many times the misinterpretation or misapplication of the height and story measurement has been the result of a desire to

avoid the added exit and fire protection requirements that apply when a building is three or more stories in height.

The designer is cautioned that any error in this part of the design can produce considerable repercussions; hence, the designer should use a conservative approach to the height measurement.

HOTEL is any building containing six or more guest rooms intended or designed to be used, or which are used, rented or hired out to be occupied, or which are occupied for sleeping purposes by guests.

The hotel is another sub-group of the R-1 Occupancy, multi-family usage. The controlling criterion is the number of guest rooms rather than dwelling units (as is used in the apartment house definition).

MECHANICAL CODE is the Uniform Mechanical Code promulgated jointly by the International Conference of Building Officials and the International Association of Plumbing and Mechanical Officials, as adopted by this jurisdiction.

One of the codes referenced in the UBC provisions is the Mechanical Code, in particular the Uniform Mechanical Code (UMC). It is adopted by a jurisdiction in a similar manner as is the UBC.

MEZZANINE OR MEZZANINE FLOOR is an intermediate floor placed within a room.

The construction provisions for mezzanines are contained in Section 1716. The key determinant in whether a level qualifies as a mezzanine is stated in Item 3 of that section, which reads:

3. The aggregate area of mezzanines within a room shall not exceed one third the area of the room in which it is located. Intermediate floor levels that are 6 or more feet above grade shall be considered a story when the area of such level exceeds one third the area of the room in which it is located.

Sec. 415. **NONCOMBUSTIBLE** as applied to building construction material means a material which, in the form in which it is used, is either one of the following:

1. Material of which no part will ignite and burn when subjected to fire. Any material conforming to U.B.C. Standard No. 4-1 shall be considered noncombustible within the meaning of this section.
2. Material having a structural base of noncombustible material as defined in Item No. 1 above, with a surfacing material not over 1/8 inch thick which has a flame-spread rating of 50 or less.

"Noncombustible" does not apply to surface finish materials. Material required to be noncombustible for reduced clearances to flues, heating appliances or other sources of high temperature shall refer to material conforming to Item No. 1. No material shall be classed as noncombustible which is subject to increase in combustibility or flame-spread rating, beyond the limits herein established,

HANDBOOK

TO THE

UNIFORM BUILDING CODE

An illustrative commentary

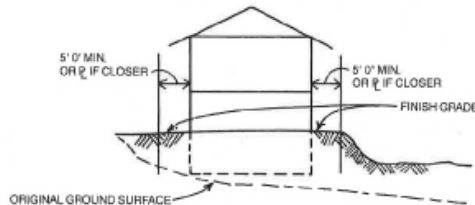


International Conference of Building Officials

SECTION 208 — G

GRADE (Adjacent Ground Elevation). The code indicates that grade is the lowest point of elevation of the finished surface of the ground within an area between the building and property line or where the property line is more than 5 feet (1524 mm) from the building between the building and a line 5 feet (1524 mm) from the building.

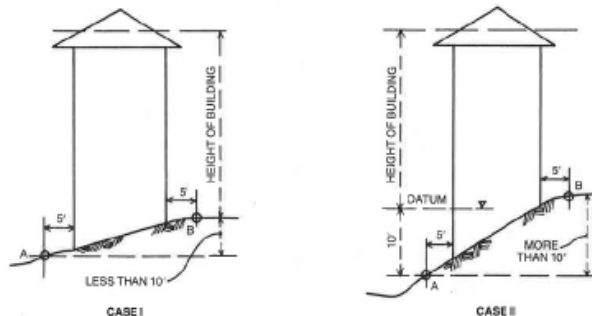
This definition is important in determining the number of stories within a building as well as its height in feet. In some cases the finished surface of the ground may be artificially raised with imported fill to create a higher grade around a building so as to decrease the number of stories or height in feet. The code does not prohibit this practice, and as long as a building meets the code definition and restrictions for height or number of stories, the intent of the code is met. See Figure 208-1.



For SI: 1 foot = 304.8 mm.

USE OF BUILT-UP SOIL TO RAISE FINISH GRADE

Figure 208-1



For SI: 1 foot = 304.8 mm.

DETERMINATION OF BUILDING HEIGHT IN FEET (mm)

Figure 209-1

Application Example 508-1

GIVEN: One-story building of Type V-N construction with an automatic fire-sprinkler system installed throughout. The building has no yards.

DETERMINE: Maximum allowable floor area for the building housing either a Group B Occupancy or a Group A, Division 2.1 Occupancy.

SOLUTION: Case I—Group B Occupancy:

The building can be evaluated with the automatic fire sprinklers used either to increase area according to Section 505.3 or to substitute for one-hour construction according to Section 508, thus upgrading the construction from Type V-N to Type V One-hour.

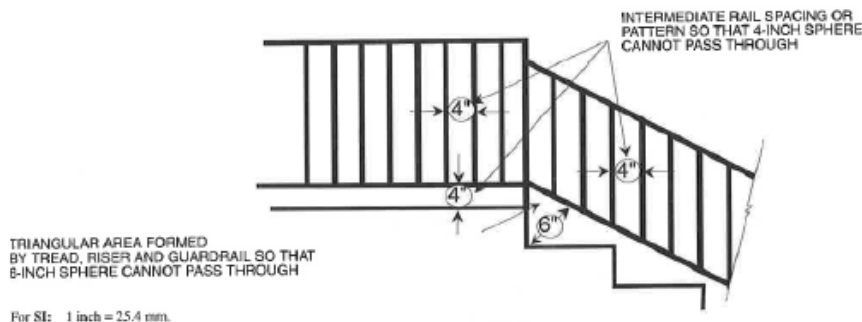
A. Section 505.3. Basic allowable area according to Table 5-B is 8,000 square feet for Type V-N construction.

Allowable Area = $8,000 \times 3 = 24,000$ square feet.

B. Section 508. Basic allowable area according to Table 5-B is 14,000 square feet for Type V One-hour. Obviously, it is more advantageous to use the provisions of Section 505.3.

Case II—Group A, Division 2.1 Occupancy:

Referring to Table 5-B, it is seen that a Group A, Division 2.1 Occupancy is not permitted to be of Type V-N construction. Thus, the automatic fire-sprinkler system must be used as a substitute for one-hour construction in order that the building will qualify as Type V One-hour construction. The allowable area for this type of construction is 10,500 square feet housing a Group A, Division 2.1 Occupancy.



GUARDRAILS

Figure 509-1

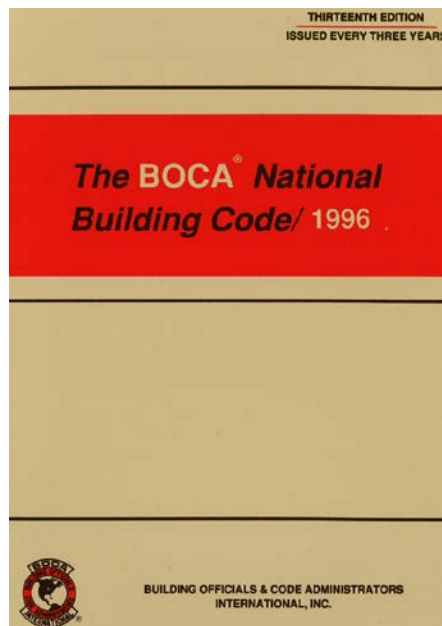
SECTION 509 — GUARDRAILS

In this section, the code provides for guardrail protection for unenclosed floor and roof openings, open and glazed sides of stairways, landings and ramps, and porches, which are more than 30 inches (762 mm) above grade or a floor or other surface below. Also, the protection is required for roofs which are used other than for service of the building and thus are subject to use by individuals walking on the roof. The need for guardrails in these circumstances is evident, although the arbitrary limit of 30 inches (762 mm) above grade or floor below is subject to conjecture. Nonetheless, in the case of the U.B.C., it is assumed that the height of 30 inches (762 mm) does not create a significant safety hazard.⁵

The guardrail must be of adequate height to prevent someone from falling over the edge of the protected areas and be designed to prevent someone, including small children, from falling through under the top rail. Therefore, the code establishes 42 inches (1067 mm) as the minimum height which is recognized nationally as the proper height for guardrail protection. The code also requires that for open-type rails, intermediate members be provided so that a sphere 4 inches (102 mm) in diameter cannot pass through between the intermediate members, a requirement which prevents small children from falling through the guardrail assembly. See Figure 509-1. The code also lessens the height for open sides of stairs; they may be protected with a guardrail hav-

ing a height the same as for stair railings as provided for in Section 1006.9. There are several more exceptions to the requirements for guardrails, as follows:

- Guardrails are not required on the loading side of docks or along vehicle service pits not accessible to the public for obvious reasons.
- Guardrails are required to be only 36 inches (914 mm) high in dwellings, Group U Occupancies, and within individual apartments or guest rooms in Group R, Division 1 Occupancies. This lower height is based on the good experience that has been exhibited in these uses; for several decades, the guardrail height in them has been no higher than 36 inches (914 mm).
- In commercial and industrial uses where the public is not invited (therefore, the guardrail is not subject to small children falling through), guardrails may have intermediate members spaced so that a 12-inch (305 mm) diameter sphere cannot pass through.
- In order to provide for proper viewing in theaters, a guardrail in front of the first row of fixed seats, and which is not at the end of an aisle, may be 26 inches (660 mm) in height.
- Again for obvious reasons, guardrails are not required on the auditorium side of a stage or enclosed platform.



1020.2 Vestibule: Where an *exit* discharges into an interior vestibule, the vestibule shall be used for ingress and means of egress only, and the vestibule shall comply with Sections 1020.2.1 and 1020.2.2.

1020.2.1 Depth and width: The vestibule depth from the exterior of the building shall not be greater than 10 feet (3048 mm) and the width shall not be greater than 20 feet (6096 mm).

1020.2.2 Separation: The vestibule shall be separated from the remainder of the level of *exit discharge* by self-closing doors and the equivalent of ¼-inch-thick wired glass in steel frames.

1020.3 Lobby: Where an *exit* discharges into an interior lobby located at the level of *exit discharge*, the lobby containing the lobby shall be equipped throughout with an automatic sprinkler system installed in accordance with Section 906.2.1 or 906.2.2. Opening protectives shall be required in accordance with Table 717.1 at the point in which an enclosed *exit stairway* discharges into a lobby.

Exception: An automatic sprinkler system is not required in areas that are separated from the lobby by fire separation assemblies (see Section 709.0) having a fire-resistance rating of not less than that required for *exit* enclosures.

1020.4 Width and height: The clear width of the passageway shall not be less than the width required for the capacity of the *exit stairways* leading thereto and all required *exit* doorways opening into the passageway. Such passageway shall have a minimum width of 44 inches (1118 mm) and a minimum clear ceiling height of 8 feet (2343 mm).

1020.5 Maximum stairway limitations: Not more than 50 percent of the required *stairways* shall discharge through the same passageway. Multiple lobbies constructed in accordance with Section 1020.3 located adjacent to one another shall be separated from each other in accordance with the requirements for enclosure of *exits*.

SECTION 1021.0 GUARDS

1021.1 Design and construction: Where required by the provisions of Sections 406.5, 408.3.2, 1005.5, 1014.7, 1016.5 and 825.5, guards shall be designed and constructed in accordance with the requirements of this section and Section 1606.4.

1021.2 Height: The guards shall be at least 42 inches (1067 mm) in height measured vertically above the leading edge of the tread or adjacent walking surface.

Exceptions

1. In other than occupancies in Use Group E, guards shall not be less than 36 inches (914 mm) in height above the leading edge of the tread along stairs which are not more than 20 feet (6096 mm) in height or which reverse direction at an intermediate landing with 12 inches (305 mm) or less measured horizontally between successive flights.
2. Guards along open-sided floor areas, *mezzanines* and landings within a single dwelling unit in Use Group R-2 and serving a single dwelling unit in Use Group R-3 shall not be less than 36 inches (914 mm) in height.

3. Guards along open-sided floor areas located less than 30 inches (762 mm) above the floor or grade below shall not be less than 36 inches (914 mm) in height.

1021.3 Opening limitations: In occupancies in Use Groups A, B, E, H-4, I-1, I-2, M and R, and in *public garages* and open parking structures, open guards shall have balusters or be of solid material such that a sphere with a diameter of 4 inches (102 mm) cannot pass through any opening. Guards shall not have an ornamental pattern that would provide a ladder effect.

Exceptions

1. The triangular openings formed by the riser, tread and bottom rail at the open side of a *stairway* shall be of a maximum size such that a sphere 6 inches (152 mm) in diameter cannot pass through the opening.
2. At elevated walking surfaces for access to and utilization of electrical, mechanical, or plumbing systems or equipment, guards shall have balusters or be of solid materials such that a sphere with a diameter of 21 inches (533 mm) cannot pass through any opening.

In occupancies in Use Groups I-3, F, H-1, H-2, H-3, S, (other than *public garages* and open parking structures), and along open-sided floor areas located less than 30 inches (762 mm) above the floor or grade below, balusters, horizontal intermediate rails or other construction shall not permit a sphere with a diameter of 21 inches (533 mm) to pass through any opening.

1021.4 Railings: Metal or other approved noncombustible railings shall be provided on balconies and galleries as prescribed in Sections 1021.4.1 through 1021.4.3.

1021.4.1 At fascia: Railings shall be provided at the fascia of boxes, balconies and galleries and shall not be less than 26 inches (660 mm) in height; at the end of aisles extending to the fascia for the full width of the aisle and shall not be less than 36 inches (914 mm) in height; and at the foot of steps for the full width of the steps and shall not be less than 42 inches (1067 mm) in height.

1021.4.2 At cross aisles: Railings shall be provided along cross aisles, and shall not be less than 26 inches (660 mm) in height except that railings are not required where the backs of the seats along the front of the aisles project 24 inches (610 mm) or more above the floor of the aisle.

1021.4.3 Successive tiers: Where seatings are arranged in successive tiers, and where the height of rise between platforms exceeds 18 inches (457 mm), railings not less than 26 inches (660 mm) in height shall be provided along the entire row of seats at the edge of the platform.

SECTION 1022.0 HANDRAILS

1022.1 General: Where required by the provisions of Sections 1012.5, 1013.0, 1014.6.6.1, 1014.7 and 1016.5, handrails shall be designed and constructed in accordance with this section and Section 1606.4.

1022.2 Handrail details: Handrails shall be continuous, without interruption by newel posts, other structure elements or obstructions. A handrail and any wall or other surface adjacent to the handrail shall be free of any sharp or abrasive elements. The clear space between the handrail and the adjacent wall or surface shall

SECTION 502.0 DEFINITIONS

502.1 General: The following words and terms shall, for the purposes of this chapter and as used elsewhere in this code, have the meanings shown herein.

Area, building: The area included within surrounding exterior walls (or exterior walls and fire walls) exclusive of vent shafts and courts. Areas of the building not provided with surrounding walls shall be included in the building area if such areas are included within the horizontal projection of the roof or floor above.

Basement: That portion of a building which is partly or completely below grade (see "Story above grade").

Grade plane: A reference plane representing the average of finished ground level adjoining the building at all exterior walls. Where the finished ground level slopes away from the exterior walls, the reference plane shall be established by the lowest points within the area between the building and the lot line or, where the lot line is more than 6 feet (1829 mm) from the building, between the building and a point 6 feet (1829 mm) from the building.

Height

Building: The vertical distance from grade plane to the average height of the highest roof surface.

1005.5 Open-sided walking areas: Guards shall be located along open-sided walking surfaces, mezzanines, stairways, ramps and landings which are located more than 15½ inches (394 mm) above the floor or grade below. The guards shall be constructed in accordance with Section 1021.0.

Exception: Guards are not required for the following locations:

1. On the loading side of loading docks.
2. On the auditorium side of stages and raised platforms.
3. On raised stage and platform floor areas such as runways, ramps and side stages utilized for entertainment or presentations.
4. At vertical openings in the performance area of stages and platforms.
5. At elevated walking surfaces appurtenant to stages and platforms for access to and utilization of special lighting or equipment.

GALLERY: That portion of the seating space of an assembly room having a seating capacity of more than ten located above a balcony.

GRADE: a reference plane representing the average of finished ground level adjoining the building at all exterior walls. When the finished ground level slopes away from the exterior walls, the reference plane shall be established by the lowest points within the area between the building and the lot line or between the building and a point 6 ft (1829 mm) from the building, whichever is closer to the building.

GRADE LUMBER: the division of sawn lumber into quality classes with respect to its physical

SOUTHERN BUILDING CODE

1015 GUARDRAILS

1015.1 General

All unenclosed floor and roof openings, open and glazed sides of landings and ramps, balconies or porches which are more than 30 inches (762 mm) above finished ground level or a floor below shall be protected by a guardrail. Guardrails shall form a vertical protective barrier not less than 42 inches (1067 mm) high. Open guardrails shall have intermediate rails or ornamental pattern such that a 6-inch (152 mm) diameter sphere cannot pass through any opening. A bottom rail or curb shall be provided that will reject the passage of a 2-inch (51 mm) diameter sphere. Construction of guardrails shall be adequate in strength, durability and attachment for their purpose as described in 1608.2.

EXCEPTIONS:

1. Guardrails are not required on the loading side of loading docks.
2. Guardrails shall be permitted in conformance with requirements for specific occupancies in 1018.

1015.3 Glass

Cost Impact: None

RB143-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R312.1-RB-DAVIDSON

RB144 – 13

R312.1.1, Chapter 44

Proponent: Mitch Markham, representing Ascend Restoration Services

Revise as follows:

R312.1.1 Where Required. *Guards* shall be located along open-sided walking surfaces, including stairs, ramps and landings that are located more than 30 inches (762 mm) measured vertically to the floor or *grade* below at any point within 36 inches (914 mm) horizontally to the edge of the open side. Insect screening shall not be considered as a *guard*.

Exception: Permanent fall arrest and restraint anchorage connector devices meeting ANSI/ASSE Z359.1 affixed for use during the entire roof covering lifetime shall be permitted where mechanical equipment, systems, devices and various components that require service are located on roof surfaces. Fall arrest/restraint devices shall be reevaluated for possible replacement when the entire roof covering is replaced. The devices shall be placed no more than 10 feet (3048 mm) on center along hip and ridge lines and placed not less than 10 feet (3048 mm) from the roof edge or open side of the walking surface.

Add new standards to Chapter 44 as follows:

ANSI American National Standards Institute
25 West 43rd Street, Fourth Floor
New York, NY 10036

Z359.1-07 Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components

ASSE American Society of Sanitary Engineering
901 Canterbury, Suite A
Westlake, OH 44145

Z359.1-2007 Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components

Reason: This proposal is intended to correlate with E108-12 which was approved at the 2012 FAH as a consent agenda item during the code Group A process. This proposal is needed so there is consistency and correlation between the ICC codes. E108-12 added clarity to IBC sections 1013.6 and 1013.7, IFC sections 1013.6 and 1013.7, and IMC section 304.11. The existing code provisions requiring the construction of guards do not adequately address the expanding list of equipment, assemblies, systems, devices and items that are now commonly being placed on roof tops and elevated walking surfaces that require routine maintenance. The current requirement needs clarification and a cost effective alternative to constructing a guard on a roof since a guard is a method of fall protection required at the edge of elevated surfaces where people will walk and will provide service to roof-located equipment and other systems or devices. The code change proposal adds clarity to the current code language by identifying items within the exception that are now typical placements on roofs and elevated walking surfaces. This expands the fall protection, life-safety provisions to a growing number of trades and service workers that are working on elevated surfaces. The proposal also provides an alternate method of compliance with the inclusion of an exception which allows for the installation of fall arrest/restraint anchorage connector devices meeting ANSI Z359.1 which is the nationally recognized consensus general industry standard in use across the country. The proposed exception is a choice made by the designer and building owner that provides design flexibility and the opportunity to lower construction cost associated with building guards. The proposal will increase the uniform application of this section of the code. The Bureau of Labor Statistics, US Department of Labor reports the fatalities due to falls for the years from 1998 to 2010 are second to only highway incidents, with an average of 743 fatalities each year over this 12 year period. Of the 635 fatal falls in 2010, one third is from falls from ladders or roofs. In 2010 the construction industry had the highest number of fatal occupational injuries. In 2010 for nonfatal falls the median number of days away from work due to falls to a lower level was 14 days. Clearly the code needs to be improved to provide fall protection where mechanical equipment, appliances, equipment, fans, roof hatch openings, solar arrays, solar water heaters, photovoltaic panels, skylights, chimneys, attic vents, and ventilators, satellite dishes, antennas, television/radio/internet and other communication equipment and all other machinery and other components that require service are located on elevated surfaces more than 30 inches above a lower level.

Cost Impact: The code change proposal will not increase the cost of construction because the current code provisions can be interpreted to have the intent to require guards at all elevated working level more than 30 inches above a floor, roof or grade. The inclusion of an exception provides a choice to the builder and homeowner to lower the cost of construction.

Analysis: A review of the standards proposed for inclusion in the code, [ANSI/ASSE Z359.1-2007] with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

RB144-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R312.1.1-RB-MARKHAM

RB145 – 13

R312.1.2

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials (rdavidson@maplegrovern.gov); Steve Thomas, Colorado Code Consulting, LLC representing the Colorado Chapter ICC (sthomas@coloradocode.net)

Revise as follows:

R312.1.2 Height. Required *guards* at open-sided walking surfaces, including stairs, porches, balconies or landings, shall be not less than 36 inches (914 mm) high measured vertically above the adjacent walking surface, ~~adjacent fixed seating~~ or the line connecting the leading edges of the treads.

Exceptions:

1. *Guards* on the open sides of stairs shall have a height not less than 34 inches (864 mm) measured vertically from a line connecting the leading edges of the treads.
2. Where the top of the *guard* also serves as a handrail on the open sides of stairs, the top of the *guard* shall not be less than 34 inches (864 mm) and not more than 38 inches (965 mm) measured vertically from a line connecting the leading edges of the treads.

Reasons:

Davidson: This proposal deletes the term “adjacent fixed seating” from the rules on guards. The term “fixed seating” is not defined. This makes the intent ambiguous and unclear. This will result in a lack of uniformity. There is no evidence to suggest that this rule serves any purpose or that it corrects any problems. There was never any evidence submitted that there is a problem.

The intent of the current language could result in guards being five or six feet in height. Designing a guard to meet the load requirements at the top of such a guard will result in significant attachment concerns because the current load requirements were based on the assumption that the guard would only be 36 inches high and the code requires that the design load for guards be at the top. This code requirement is unreasonable because compliance with the rule will be extremely expensive yet provide little increase in safety over the previous rules.

Furthermore, it penalizes designs using fixed seating all the while ignoring chairs and other furniture than can be easily pushed next to a guard creating the same potential circumstances. If we really wanted to address a safety hazard, we would require self closing gates be installed across all stairways to prevent children from falling down stairs which is a much more frequent occurrence.

To avoid expensive and unintended design costs and to avoid confusion and a lack of uniformity of enforcement, this term must be deleted. It is reasonable to delete the term because the current language in the code has not been shown to cause unsafe conditions.

Thomas: This change is to delete the requirement to extend a guard 36 inches above the surface of fixed seating. The same requirement was deleted out of the 2012 IBC. Subsequent attempts to put it back in the 2015 IBC failed in Portland. This proposal will make the two codes consistent with each other in this area.

The original requirement was lumped in a larger change that was made to the guard provisions in the code. There was no technical justification to raise the height of the guard at the back of fixed seating. There was also no definition of what fixed seating is. This should never have been put in the IRC in the first place.

We feel that this requirement is over-restrictive. The responsibility of keeping children from climbing on the back of a deck bench or some type of landscape wall should not be placed on the code. At some point, parents need to be responsible for their children. Raising the height of the bench back rest to a height of 54 inches above the deck will not prevent children from climbing over and falling.

Cost Impacts :

Davidson: None

Thomas: This will reduce the cost of construction.

RB145-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R31.1.2-RB-DAVIDSON-THOMAS

RB146 – 13

R312.2.1

Proponent: Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee
(cbaldassarra@rjagroup.com)

Revise as follows:

R312.2 Window fall protection. Window fall protection shall be provided in accordance with Sections R312.2.1 and R312.2.2.

R312.2.1 Window sills. In dwelling units, where the opening of an operable window is located more than 72 inches (1829 mm) above the finished grade or surface below, the lowest part of the clear opening of the window shall be a minimum of 24 inches (610 mm) above the finished floor of the room in which the window is located. Operable sections of windows shall not permit openings that allow passage of a 4-inch-diameter (102 mm) sphere where such openings are located within 24 inches (610 mm) of the finished floor. the top of the sill of an operable window opening is located less than 24 inches above the finished floor and greater than 72 inches (1829 mm) above the finished grade or other surface below on the exterior of the building, the operable window shall comply with one of the following:

Exceptions:

1. Operable windows whose openings will not allow a 4-inch-diameter (102 mm) sphere to pass through the opening when the opening is in its largest opened position.
2. Operable windows Openings that are provided with window fall prevention devices that comply with ASTM F 2090.
3. Operable windows that are provided with window opening control devices that comply with Section R312.2.2.

Reason: This proposed change is a result of the CTC's investigation of the area of study entitled "Child Window Safety". The scope of the activity is noted as:

To evaluate the necessity of developing code proposals for the inclusion of requirements dealing with the conditions, circumstances and devices for window safety which could reduce the number of falls by children to surfaces below.

The purpose of this proposal is to coordinate the IRC with the changes approved to the IBC in the 2012 Group A cycle. Specifically, Code change E109-12 was approved as submitted to revise Section 1013.8 of the IBC (see below).

The CTC examined the IBC provisions during the preparation of the code changes for existing buildings and several questions came up regarding the original intent and the scope of what was being regulated. The IBC language was clarified to specify that the hazard exists with all windows in a dwelling unit and the height is to be measured to the top of the sill of an operable window. Additionally, the exceptions aren't actually exceptions, but conditions where various devices and their standards are allowed to be used. It should be noted that the minimum sill height in the IBC is 36 inches and this proposal retains the current 24 inch minimum sill height in the IRC.

For reference, the approved IBC text is as follows:

IBC 1013.8 Window openings. All windows in Groups R-2 and R-3 buildings including dwellings units, where the top of the sill of an operable window opening is located less than 36 inches above the finished floor and greater than 72 inches (1829 mm) above the finished grade or other surface below on the exterior of the building, shall comply with one of the following:

1. Operable windows where the top of the sill of the opening is located more than 75 feet (22 860 mm) above the finished grade or other surface below and that are provided with window fall prevention devices that comply with ASTM F 2006.
2. Operable windows whose openings will not allow a 4-inch-diameter (102 mm) sphere to pass through the opening when the window is in its largest opened position.
3. Operable windows whose openings that are provided with window fall prevention devices that comply with ASTM F 2090.
4. Operable windows that are provided with window opening control devices that comply with Section 1013.8.1.

1013.8.1 Window opening control devices. Window opening control devices shall comply with ASTM F 2090. The window opening control device, after operation to release the control device allowing the window to fully open, shall not reduce the minimum net clear opening area of the window unit to less than the area required by Section 1029.2.

This proposal is submitted by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty-five meetings - all open to the public. In 2012, three of the 25 face-to face meetings were held. In addition to the CTC meetings, the CTC established Study Groups (SG) of interested parties for each of the areas of study. These SG's are responsible for reviewing the available information and making recommendations to the CTC. All totaled, the SG's held over 70 conference calls in 2012.

Cost Impact: This code change proposal will not increase the cost of construction.

RB146-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R312.2.1-RB-BALDASSARRA-CTC

RB147 – 13

R312.2.1

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials
(rdavidson@maplegrovern.gov)

Revise as follows:

R312.2 Window fall protection. Window fall protection shall be provided in accordance with Sections R312.2.1 and R312.2.2.

R312.2.1 Window sills. In dwelling units, where the opening of an operable window is located more than 72 inches (1829 mm) above the finished grade or surface below, the lowest part of the clear opening of the window shall be a minimum of 24 36 inches (610 mm) above the finished floor of the room in which the window is located or above window seats or other adjacent fixed seating. Operable sections of windows shall not permit openings that allow passage of a 4-inch-diameter (102 mm) sphere where such openings are located within 24 36 inches (610 mm) of the finished floor or above window seats or other adjacent fixed seating.

Exceptions:

1. Windows whose openings will not allow a 4-inch-diameter (102 mm) sphere to pass through the opening when the opening is in its largest opened position.
2. Openings that are provided with window fall prevention devices that comply with ASTM F 2090.
3. Windows that are provided with window opening control devices that comply with Section R312.2.2.

Reason: It has been pointed out at recent hearings that the minimum sill height for child fall protection was set at 24 inches as a compromise. It is time to face reality and raise the sill height requirements to a justifiable level. This is a child safety issue and should be given a high priority. Children continue to fall out of windows resulting in serious injuries and deaths.

We require smoke alarms in bedrooms. The reason – adults smoke in bed and set themselves on fire.

We require Carbon Monoxide alarms in homes when the incidence of CO poisoning is rare. The reason – an adult might use their charcoal grill in their living room.

We require ramps to be flatter for single family dwellings than other buildings. The reason – adults need to be told what slope is best for them.

We require fire protection of floors in dwellings. The reason – fire fighters are entering buildings that have active fires below the floors of entry.

We require sprinklers in dwellings. The reason – smoking and cooking fires, the biggest cause of residential fires, occur because of inattention by adults.

We require large window wells for basement windows and then debate the need for guards to keep people from falling in them. We can't even agree on where guards should be placed or when they should be required to protect adults!

We have approved code changes to protect fire fighters, older people, younger people, smokers, and people who use charcoal grills in their living rooms. Yet children seem to be left out and when something is proposed to make things safer for children the events are said to be a parenting issue! Are the examples above also "parenting issues"? At least in my area of the country, it seems hardly a week goes by without the report of another child falling out of a window and being seriously injured or killed. And these events are occurring in single family homes. The fact of the matter is that children cannot be watched all of the time. Children falling out of windows is not a parenting issue, it is a poor design issue.

Guards are required to be not less than 36 inches in height and opening protection to prevent a 4 inch sphere from passing through the guard extends to the full height of the guard, not just the first 24 inches. The same should hold true for window openings because the risk is the same.

In the past you have heard a number of absurd arguments against proposals to increase sill heights and window fall protection in general. One argument is that a 24 inch sill height is safer than a 36 inch sill height because it is less likely that furniture will be placed in front of a window with a 24 inch sill. There have never been any scientific studies to support such a brainchild. And taken to an extreme, if 24 inches is safer than 36 inches, then 12 inches should be safer yet and if we really want to be safe we would mandate window openings start at the floor! Seriously, the studies that are out there contradict the claims that lower windows are safer. The vast majority of children fall out of windows with no furniture in front of them and that are located close to the floor. Toddlers are particularly susceptible and the lower sill heights act as a pivot for children of this age. Being top heavy, children simply leaning out a window can cause a fall. The average height of a two-year old is 31 inches. The average height of a four-year

old is 37 inches. It doesn't take a rocket scientist to see that children of these ages and these heights and lower window sill are a recipe for disaster and that is exactly what is happening.

There are numerous solutions available that would allow windows with to extend all the way to the floor if the designer wishes. And if the membership agrees to eliminate the need for emergency escape windows in sprinklered homes, that eliminates another concern.

Numerous requirements without substantiated need have been placed in the code in recent years that, at best, will provide limited benefit to a very small handful of individuals. Here we have an opportunity to provide increased levels of safety for children. This should be the proverbial "no-brainer".

Cost Impact: None

RB147-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R312.2.1-RB-DAVIDSON

RB148 – 13

R313.1 (New), R313.1.1, R313.2, R313.2.1, R313.4 (New), R302.2

Proponent: Matt Archer, Douglas County, CO, representing self (marcher@douglas.co.us)

Revise as follows:

R313.1 General. The design, installation, inspection, maintenance, repair and replacement of residential automatic fire sprinkler systems and components shall comply with the manufacturer's instructions and Section P2904.

R313.4 ~~2~~ Townhouse automatic fire sprinkler systems. An automatic residential fire sprinkler system shall be installed in *townhouses*.

Exception: An automatic residential fire sprinkler system shall not be required when ~~additions or alterations are made to existing townhouses that do not have an automatic residential fire sprinkler system installed.~~ Townhouses separated by a fire rated wall assembly totaling 2 hours in accordance with Section R302.2 and fire protected floors complying with Section R501.3 shall not be required to have an automatic residential fire sprinkler system.

R313.1.1 ~~Design and installation.~~ Automatic residential fire sprinkler systems for ~~townhouses~~ shall be designed and installed in accordance with Section P2904.

R313.2 ~~R313.3~~ One- and two-family dwellings automatic fire systems. An automatic residential fire sprinkler system shall be installed in one- and two-family *dwellings*.

Exception: One- and two-family dwellings complying with the exterior wall construction of Table 302.1(1) and fire protected floors complying with Section R501.3 shall not be required to have an automatic residential fire sprinkler system.

Exception: R313.4 Additions and alterations. An automatic residential fire sprinkler system shall not be required for *additions* or *alterations* to existing buildings that are not already provided with an automatic residential sprinkler system.

R313.2.1 ~~Design and installation.~~ Automatic residential fire sprinkler systems shall be designed and installed in accordance with Section P2904 or NFPA 13D.

R302.2 Townhouses. Each *townhouse* shall be considered a separate building and shall be separated by fire-resistance-rated wall assemblies meeting the requirements of Section R302.1 for exterior walls.

Exception Exceptions:

1. Townhouses with an automatic residential fire sprinkler system are permitted to have a common 1-hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263, ~~is permitted for townhouses if such walls do.~~ The common wall shall not contain plumbing or mechanical equipment, ducts or vents in the cavity of the common wall. The wall shall be rated for fire exposure from both sides and shall extend to and be tight against exterior walls and the underside of the roof sheathing. Electrical installations shall be installed in accordance with Chapters 34 through 43. Penetrations of electrical outlet boxes shall be in accordance with Section R302.4.
2. A common 2 hour fire-resistance-rated wall assembly tested in accordance with ASTM E 119 or UL 263 is permitted for townhouses where such walls do not contain plumbing or mechanical equipment, ducts or vents in the cavity of the common wall.

Reason: Creating a general section (R313.1 General) gives us a place to put all the design and installation charging language and alleviates the need for repetitive language in each section.

Creating an addition and alteration section (R313.4 Additions and alterations) puts all the information in one place and alleviates the need for repetitive exception language in each section.

Adding an exception (R302.2 Townhouses) for a common 2 hour fire-resistive-rated wall assembly give the builders the option to increase the separation requirements between dwelling units to avoid the installation of fire sprinklers.

Adding the fire-resistive language for townhouses and one- and two-family dwellings gives the builder an option to meet higher construction standards for compartmentalization or the option to sprinkler the structures to reduce the construction ratings.

Ultimately this brings the IRC back to being more of a performance code verses a prescriptive code. Fire sprinklers have proven to be an effective active system for life safety as much as compartmentalization has proven to be an effective passive system for life safety. Giving the designer or builder the option to choose which system works best for their product is what we want the code to do.

Fire sprinklers for several jurisdictions are an effective alternative to mitigate other conditions that may exist, such as: inadequate or no fire flow, steeply sloping access roads or driveways, long dead-end roads or driveways and areas that have volunteer fire departments or longer response times. Giving the building official the ability to use an alternative means to mitigate extenuating circumstances in rural or difficult areas with fire sprinklers is a great tool to have at our disposal.

Requiring fire sprinklers as a one size fits all approach is not right for the IRC to do, that's like requiring all windows in a home to have fall protection regardless of its height above grade or size. The requirement of fire sprinklers should be based on a risk assessment profile that balances the variables mentioned, plus staffing levels, response times, apparatus types etc. This is a decision that needs to be made at a local level where they have an understanding of their risk profile, not by a one size fits all national mandate.

The benefit of any code change needs to consider not only life safety but cost as well. The expense of sprinklers cannot be ignored. According to NFPA and an article by Marshall Klein and Julius Ballanco, the cost of a residential sprinkler system can range from \$0.05 – \$ 3.66 per square foot. Both documents indicate "the typical installation will be closer to the middle or higher end of the price range". This is a significant cost, a 2400 sqft, 1 story home with a full basement, pricing could range from \$8784.00 - \$17568.00. Since 2009 many jurisdictions have been reluctant to adopt this requirement as written because it drives up the cost of building new homes. The jurisdictions that choose to adopt the sprinkler mandate may put themselves at a competitive disadvantage as homebuilders may choose to develop in areas that do not require the sprinklers.

I do not believe a home with:

- fire roads designed to the IFC for access,
- hydrants spaced as required by code,
- the ability to provide a required fire flow,
- homes spaced with the required fire separation distance,
- code required egress through doors and windows,
- protected means of egress by rating basement stairs and all floor assemblies,
- compartmentalization of garages and Dwellings,
- active warning systems like smoke and CO detectors, are unsafe and the over regulation of requiring fire sprinklers, will now make a home safe to occupy.

NFPA article:

<http://www.firesprinklerinitiative.org/~media/Fire%20Sprinkler%20Initiative/Files/Reports/FireSprinklerCostAssessment.pdf>

P2904 article: <http://www.ircfiresprinkler.org/docs/Klein-Ballanco%20Residential%20Sprinkler%20Design%20Made%20Easy%20-%20Plumbing%20Systems%20and%20Design%20Mag.%20Sept%202008.pdf>

Cost Impact: None.

RB148-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R313.1 (NEW)-RB-ARCHER

RB149 – 13

R313.1.1

Proponent: Rita Neiderheiser, representing Road Sprinkler Fitters Local Union 669 (4ritan@gmail.com)

Revise as follows:

R313.1.1 Design and installation. Automatic residential fire sprinkler systems for townhouses shall be designed and installed in accordance with Section P2904 or NFPA 13D.

Reason: The current language is unclear as to whether National Fire Protection Association (NFPA) 13D designed and installed systems are allowed to be used in townhouses. Adding "NFPA 13D" to Section R313.1.1 will make it clear that either a NFPA 13D system or a system that complies with Section P2904 of the IRC may be installed in townhouses.

Cost Impact: The code change proposal will not increase the cost of construction.

RB149-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R313.1.1-RB-NEIDERHEISER

RB150 – 13

R313.1

Proponent: Kirk Nagle, City of Arvada, representing self (knagle@arvada.org)

Revise as follows:

R313.1 Townhouse automatic fire sprinkler systems. An automatic residential fire sprinkler system shall be installed in townhouses.

Exception: An automatic residential fire sprinkler shall not be required when a fire extinguisher has been installed in the kitchen and the separation for the townhouses is two 1-hour walls or a 2- hour common wall between units is provided or where additions or alterations are made to existing townhouse that do not have an automatic residential fire sprinkler system installed.

Reason: Residential fire sprinkler systems are not accepted by all the state legislatures in single family homes and have been written out of the adoption process by 30 of the 50 states in the US. This creates a code issue with the way states use the code adoption process and has elected officials writing or rewriting the codes we use. We do not want the state legislative system to make the code adoption process useless if the states then rewrite or prevent the use of codes that are decided through the consensus process that the ICC uses to validate and promote the codes. The process currently used by the ICC is, in my opinion the best in the world. Sometimes there a codes that are approved and they need to be cared for. I believe that showing the state legislatures that we hear them and understand what happened is very important, I strongly believe that sprinklers have a place but should not be mandated.

Fire sprinklers, as good as they are, do not provide a substantial saving of lives when you add that we already have smoke alarms in all buildings and that we require fire alarms be put into each home even with a very small remodel. Smoke alarms have a 99.45% life safety rating and where adding a fire sprinkler the, lifesaving rate only goes up to 99.87% as stated by the NFPA. The cost to have every new home put in fire sprinklers is very expensive and cost prohibitive in a fragile economy compared to the life safety that fire sprinklers will bring to building construction. Fire sprinklers should be voluntary for each home owner to choose, if they wish. Educating the public and state legislatures would be the first step to all-around acceptance. If we put fire sprinklers in the code they need to be understood so the legislative actions taken against fire sprinklers can be reversed so the codes can be enforced as they were meant to be and not changed by elected officials. The prohibition of fire sprinklers has made some situations where fire sprinklers are needed impossible because of the legislative actions against their use and this is a huge problem in rural areas where there is little or no fire protection at all.

Adopting codes where the controversy is to volatile is not a good thing, but I do believe that leaving the code adoption up to the local jurisdictions is important, plus it promotes stronger codes. I am not, I repeat not, against fire sprinklers in any way. The interested parties with political clout in the US have spoken and we need to address their concerns by showing that we listen. Our process should not become a point of contention where there are attacks of the process outside the code hearings. I feel very strongly that in order to gain acceptance we need to show we will work to get fire sprinklers accepted by the public and state legislatures before we require them in one- and two-family homes. We have an obligation to make the codes strong and acceptable to the populations they will serve. If we have a problem with acceptance, we need to make corrections to the written code. We want the people and the elected officials to see the codes as not only the standard of safety, but realize that adoption is for their safety and the safety of others and the most cost effective way to protect people's lives.

Cost Impact: This proposal will decrease the cost of townhouse construction.

RB150-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R313.1-RB-NAGLE

RB151 – 13

R313.2

Proponent: Ali M. Fattah, P.E., City of San Diego, representing the San Diego Area Chapter of ICC
(afattah@sandiego.gov)

Revise as follows:

R313.2 One- and two-family dwellings automatic fire systems. An automatic residential fire sprinkler system shall be installed in new dwelling units and new one- and two-family dwellings.

Exception: An automatic residential fire sprinkler system shall not be required for *additions or alterations* to existing ~~buildings-dwellings or dwelling units~~ that are not already provided with an automatic residential sprinkler system.

Reason: The 2009 IRC adopted fire sprinkler regulations that continue in the 2012 IRC. However upon implementation of the regulations it is apparent that an inconsistency appears in Section R313.2 when compared with Section R313.1. Section R313.1 in its exception exempts additions and alterations to townhouses that are not already protected with fire sprinklers. The exception does not exempt new townhouses added adjacent to existing townhouses from protection. Section R202 defines a townhouse as **"TOWNHOUSE.** A single-family *dwelling unit* constructed in a group..." and as a consequence R313.1 will require the new townhouse to be protected since it is a "single family dwelling unit".

Section R313.2 address a second configuration of dwelling that may be one dwelling or two attached dwelling units. It is not uncommon in more urban environments for a new dwelling unit to be added and attached to an existing dwelling and as a consequence the new dwelling unit should be protected as would a townhouse added adjacent to another townhouse dwelling unit.

The term building is not defined in the IRC and is not consistent with the heading of Section R313.2 and therefore the terms dwelling and dwelling unit are more appropriate.

Cost Impact: This code change will minimally increase the valuation of construction by less than 1 %.

RB151-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R313.2-RB-FATTAH

RB152 – 13

R313.2

Proponent: Kirk Nagle, City of Arvada, Co, representing self. (knagle@arvada.org)

Revise as follows:

R313.2 One and Two-family dwelling automatic fire systems. An automatic residential fire sprinkler system shall be installed in one-and two-family dwellings.

Exception: An automatic residential fire sprinkler system shall not be required where a fire extinguisher has been installed in the kitchen and the separation for a two-family dwelling is two 1-hour walls or a 2-hour common wall between units is provided or for additions or alterations in existing buildings that are not already provided with an automatic residential sprinkler system.

Reason: Residential fire sprinkler systems are not accepted by all the state legislatures in single family homes and have been written out of the adoption process by 30 of the 50 states in the US. This creates a code issue with the way states use the code adoption process and has elected officials writing or rewriting the codes we use. We do not want the state legislative system to make the code adoption process useless if the states then rewrite or prevent the use of codes that are decided through the consensus process that the ICC uses to validate and promote the codes. The code process currently used by the ICC is, in my opinion the best in the world. Sometimes there are codes that are approved and they need to be changed but rarely has the code process been challenged on such a scale. The code is not infallible but the process needs to be protected and cared for. I believe that showing the states legislatures that we hear them and understand what happened is very important. I strongly believe that sprinklers have a place but should not be mandated.

Fire sprinklers, as good as they are, do not provide a substantial saving of lives when you add that we already have fire alarms in all buildings and that we require fire alarms be put into each home even with a very small remodel. Fire alarms have a 99.46% life safety rating and adding a fire sprinklers the lifesaving rate only goes up to 99.86%. The cost to have every new home put in fire sprinklers is very expensive and cost prohibitive in a fragile economy compared to the life safety that fire sprinklers will bring to building construction. Fire sprinklers should be voluntary for each home owner to choose, if they wish. Educating the public and state legislatures would be the first step to all around acceptance. If we put fire sprinklers in the code they need to be understood so the legislative actions taken against fire sprinklers can be reversed so the codes can be enforced as they were meant to be and not changed by elected officials. The prohibition of fire sprinklers has made some situations where fire sprinklers are needed impossible because of the legislative actions against their use and this is a huge problem in rural areas where there is little or no fire protection at all.

Adopting codes where the controversy is too volatile is not a good thing but I do believe that leaving the code adoption up to the local jurisdictions is important plus it promotes stronger codes. I am not I repeat not against fire sprinklers in any way. The interested parties with political clout in the US have spoken and we need to address their concerns by showing that we listen. Our process should not become a point of contention where there are attacks of the process outside the code hearings. I feel very strongly that in order to gain acceptance we need to show we will work to get fire sprinklers accepted by the public and state legislatures before we require them in one- and two-single family homes. We have an obligation to make codes strong and acceptable to the populations they will serve, if we have a problem with acceptance, we need to make corrections to the written code. We want the people and the elected officials to see the codes as, not only the standard of safety but adoption is for their safety and the safety of others and the most cost effective way to protect peoples lives.

Cost Impact: This code change will reduce the cost of one- and two-family dwelling construction.

RB152-13

Public Hearing:	AS	AM	D
Committee:			
Assembly:	ASF	AMF	DF

R313.2-RB-NAGEL

RB153 – 13

R313.2.1

Proponent: Tim Swanson, City of Greeley, representing Colorado Chapter of the International Code Council (tim.swanson@greeleygov.com)

Revise as follows:

R313.2.1 Design and installation. Automatic residential fire sprinkler systems shall be designed and installed in accordance with Section P2904, ~~or NFPA 13D.~~

Reason: The 2012 IRC specifies that the sprinkler system that is required by Section R313.1.1 for Townhouse applications comply with the requirements of P2904. In Section P2904.1, either the requirements of Section P2904, or the requirements of NFPA 13D are allowed for the installation of residential fire sprinklers. In Section R313.2.1, the code specifies that the NFPA 13D system may also be used. This is redundant, as it is already stated in P2904.1. It also does not mirror the language in 313.1.1, which could cause confusion, as both sections are addressing residential fire sprinkler applications required by the IRC. This change would now mirror IRC 313.1.1 and clear up any confusion and redundancy.

Cost Impact: None

RB153-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R313.2.1-RB-SWANSON

RB154 – 13

R314

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee (bajnaic@chesterfield.gov), and Adolf Zubia, Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee

Delete and substitute as follows:

SECTION R314 SMOKE ALARMS

~~R314.1 Smoke detection and notification.~~ All smoke alarms shall be listed and labeled in accordance with UL 217 and installed in accordance with the provisions of this code and the household fire warning equipment provisions of NFPA 72.

~~R314.2 Smoke detection systems.~~ Household fire alarm systems installed in accordance with NFPA 72 that include smoke alarms, or a combination of smoke detector and audible notification device installed as required by this section for smoke alarms, shall be permitted. The household fire alarm system shall provide the same level of smoke detection and alarm as required by this section for smoke alarms. Where a household fire warning system is installed using a combination of smoke detector and audible notification device(s), it shall become a permanent fixture of the occupancy and owned by the homeowner. The system shall be monitored by an *approved* supervising station and be maintained in accordance with NFPA 72.

Exception: Where smoke alarms are provided meeting the requirements of Section R314.4.

~~R314.3 Location.~~ Smoke alarms shall be installed in the following locations:

- ~~1. In each sleeping room.~~
- ~~2. Outside each separate sleeping area in the immediate vicinity of the bedrooms.~~
- ~~3. On each additional story of the dwelling, including basements and habitable attics but not including crawl spaces and uninhabitable attics. In dwellings or dwelling units with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full story below the upper level.~~

~~R314.3.1 Alterations, repairs and additions.~~ When *alterations, repairs or additions* requiring a permit occur, or when one or more sleeping rooms are added or created in existing *dwellings*, the individual *dwelling unit* shall be equipped with smoke alarms located as required for new *dwellings*.

Exceptions:

- ~~1. Work involving the exterior surfaces of dwellings, such as the replacement of roofing or siding, or the addition or replacement of windows or doors, or the addition of a porch or deck, are exempt from the requirements of this section.~~
- ~~2. Installation, alteration or repairs of plumbing or mechanical systems are exempt from the requirements of this section.~~

~~R314.4 Power source.~~ Smoke alarms shall receive their primary power from the building wiring when such wiring is served from a commercial source, and when primary power is interrupted, shall receive power from a battery. Wiring shall be permanent and without a disconnecting switch other than those required for overcurrent protection.

Exceptions:

1. ~~Smoke alarms shall be permitted to be battery operated when installed in buildings without commercial power.~~
2. ~~Hard wiring of smoke alarms in existing areas shall not be required where the alterations or repairs do not result in the removal of interior wall or ceiling finishes exposing the structure, unless there is an attic, crawl space or basement available which could provide access for hard wiring without the removal of interior finishes.~~

~~**R314.5 Interconnection.** Where more than one smoke alarm is required to be installed within an individual dwelling unit in accordance with Section R314.3, the alarm devices shall be interconnected in such a manner that the actuation of one alarm will activate all of the alarms in the individual unit. Physical interconnection of smoke alarms shall not be required where listed wireless alarms are installed and all alarms sound upon activation of one alarm.~~

Exception: Interconnection of smoke alarms in existing areas shall not be required where alterations or repairs do not result in removal of interior wall or ceiling finishes exposing the structure, unless there is an attic, crawl space or basement available which could provide access for interconnection without the removal of interior finishes.

R314.1 General. Smoke alarms shall comply with NFPA 72 and Section R314.

R314.1.1 Listings. Smoke alarms shall be listed in accordance with UL 217. Combination smoke/carbon monoxide alarms shall be listed in accordance with UL 217 and UL 2034.

R314.2 Where required. Smoke alarms shall be provided in accordance with this section.

R314.2.1 New construction. Smoke alarms shall be provided in dwelling units.

R314.2.2 Alterations, repairs and additions. When alterations, repairs or additions requiring a permit occur, or when one or more sleeping rooms are added or created in existing dwellings, the individual dwelling unit shall be equipped with smoke alarms located as required for new dwellings.

Exceptions:

1. Work involving the exterior surfaces of dwellings, such as the replacement of roofing or siding, or the addition or replacement of windows or doors, or the addition of a porch or deck, are exempt from the requirements of this section.
2. Installation, alteration or repairs of plumbing or mechanical systems are exempt from the requirements of this section.

R314.3 Location. Smoke alarms shall be installed in the following locations:

1. In each sleeping room.
2. Outside each separate sleeping area in the immediate vicinity of the bedrooms.
3. On each additional story of the dwelling, including basements and habitable attics but not including crawl spaces and uninhabitable attics. In dwellings or dwelling units with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full story below the upper level.

R314.4 Interconnection. Where more than one smoke alarm is required to be installed within an individual dwelling unit in accordance with Section R314.3, the alarm devices shall be interconnected in such a manner that the actuation of one alarm will activate all of the alarms in the individual dwelling unit. Physical interconnection of smoke alarms shall not be required where listed wireless alarms are installed and all alarms sound upon activation of one alarm.

Exception: Interconnection of smoke alarms in existing areas shall not be required where alterations or repairs do not result in removal of interior wall or ceiling finishes exposing the structure, unless there is an attic, crawl space or basement available which could provide access for interconnection without the removal of interior finishes.

R314.5 Combination alarms. Combination smoke/carbon monoxide alarms shall be permitted to be used in lieu of smoke alarms.

R314.6 Power source. Smoke alarms shall receive their primary power from the building wiring where such wiring is served from a commercial source, and when primary power is interrupted, shall receive power from a battery. Wiring shall be permanent and without a disconnecting switch other than those required for overcurrent protection.

Exceptions:

1. Smoke alarms shall be permitted to be battery operated when installed in buildings without commercial power.
2. Smoke alarms installed in accordance with Section R314.2.2 shall be permitted to be battery powered.

R314.7 Fire alarm systems. Fire alarm systems shall be permitted to be used in lieu of smoke alarms and shall comply with Sections R314.7.1 through R315.7.4.

R314.7.1 General. Fire alarm systems shall comply with the provisions of this code and the household fire warning equipment provisions of NFPA 72. Smoke detectors shall be listed in accordance with UL 268.

R314.7.2 Location. Smoke detectors shall be installed in the locations specified in Section R314.3.

R314.7.3 Permanent fixture. Where a household fire alarm system is installed, it shall become a permanent fixture of the occupancy, owned by the homeowner and shall be monitored by an approved supervising station.

R314.7.4 Combination detectors. Combination smoke/carbon monoxide detectors shall be permitted to be installed in fire alarm systems in lieu of smoke detectors, provided they are listed in accordance with UL 268 and UL 2075.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC) and the ICC Fire Code Action Committee (FCAC). These ICC committees were established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the these committees have held 6 open meetings and numerous workgroup meetings which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the CAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

This proposal reformats the Section R314 smoke alarm requirements in a more logical order. It is not the intent of this proposal to increase or lessen the overall smoke alarm requirements. The format for this section is similar to one used on a companion proposal to the Section R315 carbon monoxide alarm requirements. Comments on the origin of specific requirements in this proposal are as follows:

1. R314.1 is a new simplified charging paragraph for the section. The UL 217 Listing requirement was moved to R314.1.1. The reference to NFPA 72 was moved to R314.7.1.
2. R314.1.1 includes new provisions to allow combination smoke/carbon monoxide alarms, if they are provided, to be listed in accordance with UL 217 and UL 2034.
3. R314.2 includes requirements for new construction and alterations and repairs. The section includes editorial revisions, but no substantive changes to existing requirements. R314.2.1 requirements are identical to existing R314.3.1 requirements.
4. The R314.3 location requirements are unchanged.
5. R314.4 requirements for interconnection are identical to the existing requirements in R314.5.
6. R314.5 allows listed combination smoke/carbon monoxide alarms to be used in lieu of smoke alarms. A companion change to allow these units to be used in lieu of carbon monoxide alarms is also being proposed for Section R315. If both

of these proposals are accepted, a single combination unit can be installed outside of each separate sleeping area in the immediate vicinity of the bedrooms and comply with R314 and R315 requirements.

7. R314.6 includes power supply requirements that are equivalent to the current power supply requirements in R314.4. There should be no changes for the applications under which permanently connected or battery operated smoke alarms are required.
8. R314.7 includes revised requirements for smoke detection systems. Sections R314.7.1 through R314.7.3 include requirements that are equivalent to existing R314.2 requirements.
9. R314.7.4 includes new requirements that allow the option to use combination smoke/carbon monoxide detectors.

Cost Impact: These revisions have the potential to reduce the cost of construction.

RB154-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

R314.1-RB-BAJNAI-ZUBIA-BCAC

RB155 – 13

R314.2, R315.2

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee and Virginia Building and Code Officials Association (bajnaic@chesterfield.gov), and Adolf Zubia, Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee

Revise as follows:

R314.2 Smoke detection systems. Household fire alarm systems installed in accordance with NFPA 72 that include smoke alarms, or a combination of smoke detector and audible notification device installed as required by this section for smoke alarms, shall be permitted. The household fire alarm system shall provide the same level of smoke detection and alarm as required by this section for smoke alarms. Where a household fire warning system is installed using a combination of smoke detector and audible notification device(s), it shall become a permanent fixture of the occupancy and owned by the homeowner. ~~The system shall be monitored by an approved supervising station and be maintained in accordance with NFPA 72.~~

Exception: Where smoke alarms are provided meeting the requirements of Section R314.4.

R315.2 Carbon monoxide detection systems. Carbon monoxide detection systems that include carbon monoxide detectors and audible notification appliances, installed and maintained in accordance with this section for carbon monoxide alarms and NFPA 720, shall be permitted. The carbon monoxide detectors shall be listed as complying with UL 2075. Where a household carbon monoxide detection system is installed, it shall become a permanent fixture of the occupancy, and owned by the homeowner. ~~and shall be monitored by an approved supervising station.~~

Exception: Where carbon monoxide alarms are installed meeting the requirements of Section R315.1, compliance with Section 315.2 is not required.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC) and the ICC Fire Code Action Committee (FCAC). These ICC committees were established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the these committees have held 6 open meetings and numerous workgroup meetings which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the CAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

The code requires smoke alarms and carbon monoxide alarms to be installed in the dwelling, or allows smoke detection systems and carbon monoxide detection systems to be provided in lieu of individual alarms to provide the desired protection. These systems need to be a permanent fixture of the occupancy and owned by the homeowner. This is because the systems could be leased to the homeowner by an alarm company. If the homeowner discontinued service with the alarm company there is nothing to prevent them from removing the system from the premise. Then the home would be left with no protection.

It is difficult to justify requiring these systems to be monitored by an approved supervising station, as long as they provide local alarm notification. In addition Section 907.7.5 does not require monitoring of an automatic sprinkler system in one- and two-family dwellings. However there is nothing that prohibits these systems from being monitored.

In addition the reference in R314.2 to systems being maintained in accordance with NFPA 72 is being removed since the scope of the IRC does not cover maintenance of systems.

Cost Impact: The proposal has the potential to reduce costs.

RB155-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

R314.2-RB-BAJNAI-ZUBIZ-BCAC

RB156 – 13

R314.3.1 (New) and R314.3.2 (New)

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee (bajnaic@chesterfield.gov), and Adolf Zubia, Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee

Add new text as follows:

R314.3.1 Installation near cooking appliances. Smoke alarms shall not be installed in the following locations unless this would prevent placement of a smoke alarm in a location required by Section R314.3.

1. Ionization smoke alarms shall not be installed less than 20 feet (6.1 m) horizontally from a permanently installed cooking appliance.
2. Ionization smoke alarms with an alarm-silencing switch shall not be installed less than 10 feet (3 m) horizontally from a permanently installed cooking appliance.
3. Photoelectric smoke alarms shall not be installed less than 6 feet (1.8 m) horizontally from a permanently installed cooking appliance.

R314.3.2 Installation near bathrooms. Smoke alarms shall be installed not less than 3 feet (0.91 m) horizontally from the door or opening of a bathroom that contains a bathtub or shower unless this would prevent placement of a smoke alarm required by Section R314.3.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC) and the ICC Fire Code Action Committee (FCAC). These ICC committees were established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the these committees have held 6 open meetings and numerous workgroup meetings which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the CAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>

This proposal is intended to reduce nuisance alarms attributed to locating smoke alarms in close proximity to cooking appliances and bathrooms in which steam is produced. The proposed provisions are based on the findings in the Task Group Report - Minimum Performance Requirements for Smoke Alarm Detection Technology - February 22, 2008, and are consistent with similar requirements included in Section 29.8.3.4 of the 2010 and 2013 editions of NFPA 72.

Cost Impact: None.

RB156-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

R314.3.1 (NEW)-RB-BAJNAI-ZUBIA

RB157 – 13

R314.3.1

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials
(rdavidson@maplegrovern.gov)

Revise as follows:

R314.3.1 Alterations, repairs and additions. When *alterations*, repairs or *additions* requiring a *permit* occur, or when one or more sleeping rooms are added or created in existing *dwellings*, the individual *dwelling unit* shall be equipped with smoke alarms located as required for new *dwellings*.

Exceptions:

- ~~1. Work involving the exterior surfaces of *dwellings*, such as the replacement of roofing or siding, or the *addition* or replacement of windows or doors, or the *addition* of a porch or deck, are exempt from the requirements of this section.~~
- ~~2. Installation, *alteration* or repairs of plumbing or mechanical systems are exempt from the requirements of this section.~~
 1. Addition, replacement or repair of windows or doors.
 2. Replacement or repair of roofing, siding, masonry, stucco, or other exterior surfaces.
 3. Additions of or repairs to porches, decks, or balconies.
 4. Work involving detached accessory structures.
 5. Installation of retaining walls or fences.
 6. Installation, repair, or alteration of plumbing, mechanical, or electrical systems that occurs on the exterior of the dwelling or in an accessory structure.
 7. Installation, alteration or repairs of plumbing or mechanical systems within a dwelling unit.

Reason: It is necessary to more definitively identify those circumstances when smoke alarms are not required when alterations, repairs and additions occur because of confusion within the code enforcement community over the current language. The same revision is proposed for the CO alarm section.

For example, if smoke alarms need not be installed when a home is reroofed, are they required when someone builds a storage shed in their back yard? Current language does not seem to exempt such work.

Cost Impact: None

RB157-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R314.3.1-RB-DAVIDSON

RB158 – 13

R314.3.1

Proponent: Tim Pate, City and County of Broomfield, CO representing the Colorado Chapter Code Change Committee

Revise as follows:

R314.3.1 Alterations, repairs and additions. When alterations, repairs or additions requiring a permit occur, or when one or more sleeping rooms are added or created in existing dwellings, the individual dwelling unit shall be equipped with smoke alarms located as required for new dwellings.

Exceptions:

1. Work involving the exterior surfaces of dwellings, such as the replacement of roofing or siding, ~~or the addition or replacement of windows or doors~~, or the addition of a porch or deck, are exempt from the requirements of this section.
2. Installation, *alteration* or repairs of plumbing or mechanical systems are exempt from the requirements of this section.

Reason: This code change will effectively require that smoke alarms be installed for all permits for window changeouts and for permits to add windows or doors. These two types of permits actually require part of the work to be done on both the exterior and the interior and therefore should be classified as an interior alteration. Adding smoke alarms to existing houses is a relatively inexpensive task considering that section R314 for the most part allows these smoke alarms to be battery operated. There is considerable evidence that houses with smoke alarms save lives in the cases of fire.

Cost Impact: This code change will increase the cost of construction.

RB158-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R314.3.1-RB-PATE

RB159 – 13

R314.5 (New)

Proponent: Thomas P. Hammerberg, representing Automatic Fire Alarm Association
(TomHammerberg@afaa.org)

Add new text as follows:

R314.5. Residential Sprinkler Monitoring. Where a Residential Sprinkler System is installed, a sprinkler waterflow alarm-initiating device shall be permitted to be connected to the multiple-station alarm or household fire alarm system to activate an alarm signal.

Reason: This language is currently used in NFPA-72-2013, 29.7.7.7.3. The purpose is to provide notification to occupants of waterflow activation. If a sprinkler activates in another part of the dwelling unit, this provides earlier warning of the fire situation and will allow additional time to leave the premises. Since the time to escape has reduced significantly in recent years, this will improve fire safety for the occupants.

Cost Impact: Minimal

RB159-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R314.5 (NEW)-RB-HAMMERBERG

RB160 – 13

R315

Proponent: Charles S. Bajnai, Chesterfield County, VA, ICC Building Code Action Committee (bajnaic@chesterfield.gov), and Adolf Zubia, Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee

Delete and substitute as follows:

SECTION R315 CARBON MONOXIDE ALARMS

~~R315.1 Carbon monoxide alarms.~~ For new construction, an approved carbon monoxide alarm shall be installed outside of each separate sleeping area in the immediate vicinity of the bedrooms in *dwelling units* within which fuel-fired *appliances* are installed and in dwelling units that have attached garages.

~~R315.2 Carbon monoxide detection systems.~~ Carbon monoxide detection systems that include carbon monoxide detectors and audible notification appliances, installed and maintained in accordance with this section for carbon monoxide alarms and NFPA 720, shall be permitted. The carbon monoxide detectors shall be listed as complying with UL 2075. Where a household carbon monoxide detection system is installed, it shall become a permanent fixture of the occupancy, owned by the homeowner and shall be monitored by an approved supervising station.

~~Exception:~~ Where carbon monoxide alarms are installed meeting the requirements of Section R315.1, compliance with Section 315.2 is not required.

~~R315.3 Where required in existing dwellings.~~ Where work requiring a *permit* occurs in existing *dwellings* that have attached garages or in existing dwellings within which fuel-fired *appliances* exist, carbon monoxide alarms shall be provided in accordance with Section R315.1.

~~R315.4 Alarm requirements.~~ Single-station carbon monoxide alarms shall be listed as complying with UL 2034 and shall be installed in accordance with this code and the manufacturer's installation instructions.

R315.1 General. Carbon monoxide alarms shall comply with Section R315.

R315.1.1 Listings. Carbon monoxide alarms shall be listed in accordance with UL 2034. Combination carbon monoxide/smoke alarms shall be listed in accordance with UL 2034 and UL 217.

R315.2 Where required. Carbon monoxide alarms shall be provided in accordance with this section.

R315.2.1 New construction. Carbon monoxide alarms shall be provided in dwelling units when either or both of the following conditions exist.

1. The dwelling unit contains a fuel-fired appliance.
2. The dwelling unit has an attached garage with an opening that communicates with the dwelling unit.

R315.2.2 Alterations, repairs and additions. When alterations, repairs or additions requiring a permit occur, or when one or more sleeping rooms are added or created in existing dwellings, the individual dwelling unit shall be equipped with carbon monoxide alarms located as required for new dwellings.

Exceptions:

1. Work involving the exterior surfaces of dwellings, such as the replacement of roofing or siding, or the addition or replacement of windows or doors, or the addition of a porch or deck, are exempt from the requirements of this section.
2. Installation, alteration or repairs of plumbing or mechanical systems are exempt from the requirements of this section.

R315.3 Location. Carbon monoxide alarms in dwelling units shall be installed outside of each separate sleeping area in the immediate vicinity of the bedrooms. When a fuel-burning appliance is located within a bedroom or its attached bathroom, a carbon monoxide alarm shall be installed within the bedroom.

R315.4 Combination alarms. Combination carbon monoxide/smoke alarms shall be permitted to be used in lieu of carbon monoxide alarms.

R315.5 Power source. Carbon monoxide alarms shall receive their primary power from the building wiring when such wiring is served from a commercial source, and when primary power is interrupted, shall receive power from a battery. Wiring shall be permanent and without a disconnecting switch other than those required for overcurrent protection.

Exceptions:

1. Carbon monoxide alarms shall be permitted to be battery operated when installed in buildings without commercial power.
2. Carbon monoxide alarms installed in accordance with Section R315.2.2 shall be permitted to be battery powered.

R315.6 Carbon monoxide detection systems. Carbon monoxide detection systems shall be permitted to be used in lieu of carbon monoxide alarms and shall comply with Sections R315.6.1 to R315.6.4.

R315.6.1 General. Household carbon monoxide detection systems shall comply with NFPA 720. Carbon monoxide detectors shall be listed in accordance with UL 2075.

R315.6.2 Location. Carbon monoxide detectors shall be installed in the locations specified in Section R315.3. These locations supersede the locations specified in NFPA 720.

R315.6.3 Permanent fixture. Where a household carbon monoxide detection system is installed, it shall become a permanent fixture of the occupancy, owned by the homeowner and shall be monitored by an approved supervising station.

R315.6.4 Combination detectors. Combination carbon monoxide/smoke detectors shall be permitted to be installed in carbon monoxide detection systems in lieu of carbon monoxide detectors, provided they are listed in accordance with UL 2075 and UL 268.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC) and the ICC Fire Code Action Committee (FCAC). These ICC committees were established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the these committees have held 6 open meetings and numerous workgroup meetings which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the CAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

This proposal clarifies requirements for the installation of CO alarm and CO detection systems as follows:

1. Section R315 was reorganized to provide requirements in a more logical location. Except as noted below no technical changes were made to the existing requirements.
2. Listed combination carbon monoxide/smoke alarms, and combination carbon monoxide /smoke detectors are readily available on the market. This proposal identifies the UL standards used to List these products, and allows them to be used in lieu of carbon monoxide alarms and detectors. A companion change to allow these units to be used in lieu of

smoke alarms and smoke detectors is being proposed for Section R314. If both of these proposals are accepted, a single combination unit can be installed outside of each separate sleeping area in the immediate vicinity of the bedrooms and comply with R314.3 (2) and R315.3 (above).

3. Current Section R315.1 requires carbon monoxide alarms to be provided in dwelling units with attached garages. Carbon monoxide is most likely to enter a dwelling from an attached garage if there is a communicating opening between the garage and dwelling. Some homes with attached garages do not have a communicating opening. Accordingly, proposed Section R315.2.1, item 2, only requires carbon monoxide alarms when the dwelling unit has an attached garage with an opening that communicates with the dwelling unit.
4. Current Section R315.3 requires CO alarms to be installed in existing dwellings whenever any kind of work that requires a permit is conducted, such as reroofing or adding a deck. Proposed section R315.2.2 reflects the more realistic requirements for providing carbon monoxide alarms in existing dwelling units to match the triggers used to require smoke alarms in existing dwelling units that are included in Section R314.3.1. In addition Section R315.5(2) only requires these alarms to be battery powered.
5. The IRC allows fuel burning appliances to be installed in bedrooms and bathrooms, but this is not a common practice. Section R315.3 requires carbon monoxide alarms to be installed in a bedroom when it or its attached bathroom contains a fuel burning appliance. This protects occupants who sleep with their bedroom door closed.
6. R315.5 clarifies the requirements for powering CO alarms that is consistent with R314.4 smoke alarm requirements.
7. The carbon monoxide detection system requirements have been moved from Section R315.2 to proposed Sections R315.6 through R315.6.2. The basic requirements for these systems are unchanged, but additional language was added to clarify that:
 - a. These systems can be used in lieu of carbon monoxide alarms.
 - b. All devices and equipment in the system must be listed for their intended purpose (see NFPA 720, section 9.3.1)
 - c. Combination carbon monoxide/smoke detectors can be used.
 - d. Detectors only need to be installed in locations specified in section R315.3, not in all locations specified in NFPA 720.

The code requires smoke alarms and carbon monoxide alarms to be installed in the dwelling, but allows smoke detection systems and carbon monoxide detection systems to be provided in lieu of individual alarms to provide the desired protection. These systems need to be a permanent fixture of the occupancy and owned by the homeowner. This is because the systems could be leased to the homeowner by an alarm company. If the homeowner discontinued service with the alarm company there is nothing to prevent them from removing the system from the premise. Then the home would be left with no protection.

It is difficult to justify requiring these systems to be monitored by an approved supervising station, provided they provide local alarm notification. In addition Section 907.7.5 does not require monitoring of an automatic sprinkler system in one- and two-family dwellings. However there is nothing that prohibits these systems from being monitored.

In addition the reference in R314.2 to systems being maintained in accordance with NFPA 72 is being removed since the scope of the IRC does not cover maintenance of systems.

Cost Impact: These revisions have the potential to reduce the cost of construction.

RB160-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R315.1-RB-BAJNAI-ZUBIA-BCAC

RB161 – 13

R315.3

Proponent: Jerry Anderson, City of Overland Park, Ks, representing self (jerry.anderson@opkansas.org)

Revise as follows:

R315.3 Where required in existing dwellings. Where work requiring a permit occurs in existing dwellings that have attached garages or in existing dwellings within which fuel fired appliances exist, carbon monoxide alarms shall be provided in accordance with Section R315.1.

Exceptions:

1. Work involving the exterior surfaces of dwellings, such as the replacement of roofing or siding, or the addition or replacement of windows or doors, or the addition of a porch or deck, are exempt from the requirements of this section.
2. Installation, alteration or repairs of plumbing or mechanical systems are exempt from the requirements of this section.

Reason: The purpose of the code change is to exempt some minor work from triggering carbon monoxide detectors. The exceptions to the base requirement for installing carbon monoxide detectors in existing dwellings are exactly the same as found in section R314.3.1 for smoke detectors. This change will make the code consistent in its approach in providing early warning detection devices in dwellings. It is unreasonable require the installation of carbon monoxide detectors for any work that is done on an existing dwelling.

Cost Impact: No cost associated with this change

RB161-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R315.3-RB-ANDERSON

RB162 – 13

R315.3

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials
(rdavidson@maplegrovern.gov)

Revise as follows:

R315.3 Where required in existing dwellings. Where work requiring a *permit* occurs in an existing *dwellings* that ~~have~~ has an attached garages or in an existing dwellings within which fuel fired *appliances* exist, carbon monoxide alarms shall be provided in accordance with Section R315.1.

Exceptions:

1. Addition, replacement or repair of windows or doors.
2. Replacement or repair of roofing, siding, masonry, stucco, or other exterior surfaces.
3. Additions of or repairs to porches, decks, or balconies.
4. Work involving detached accessory structures.
5. Installation of retaining walls or fences.
6. Installation, repair, or alteration of plumbing, mechanical, or electrical systems that occurs on the exterior of the dwelling or in an accessory structure.
7. Installation, alteration, or repairs of plumbing, mechanical, or electrical systems not involving a fuel fired appliance.

Reason: Given the low number of deaths caused by CO poisoning compared to injuries and deaths caused by falls, fires, and other household accidents, the current rules regarding CO alarms are overly restrictive. Without exception, the code requires CO alarms be installed in a dwelling even when a permit is issued for a such mundane exterior work as retaining wall! This means homeowners must provide access to the interior of their homes to contractors and inspectors to install and inspect CO alarms (but not smoke alarms). Bluntly, this is ridiculous. The proposed revisions create a number of exceptions when CO alarms need not be installed. Unless some relief is given for exterior and other work that does not involve directly the ability to install CO alarms, permits will never get final inspections completed in a timely manner and building departments will be faced with a huge backlog of open permits.

Some folks will argue that the text says CO alarms are only required when work occurs "in" existing dwellings meaning exterior work is exempt. I might agree except the language used for CO alarms is the same used for smoke alarms and we seem to agree, based on exceptions in the code, that exterior work would trigger the smoke alarm requirements unless we have the exceptions. So if the text means one thing in one section, we conclude the same text means the same thing in another section.

R314.3.1 Alterations, repairs and additions. When *alterations, repairs or additions* requiring a *permit* occur, or when one or more sleeping rooms are added or created in existing *dwellings*, the individual *dwelling unit* shall be equipped with smoke alarms located as required for new *dwellings*.

Exceptions:

1. Work involving the exterior surfaces of *dwell-ings*, such as the replacement of roofing or siding, or the *addition* or replacement of windows or

Cost Impact: None

RB162-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R315.3-RB-DAVIDSON

RB163 – 13

R316.3

Proponent: Vytenis Babrauskas, PhD, Fire Science & Technology Inc., representing The American Institute of Architects, Cascadia Green Building Council, Development Center for Appropriate Technology, Green Science Policy Institute, Hammond Fine Homes, International Living Future Institute, Perkins + Will, San Francisco Firefighters Cancer Prevention Foundation and the United States Green Building Council of California

Revise as follows:

R316.3 Surface burning characteristics. Unless otherwise allowed in R316.5 or 316.6, all foam plastic or foam plastic cores used as a component in manufactured assemblies used in building construction shall have a flame spread index of not more than 75 and shall have a smoke-developed index of not more than 450 when tested in the maximum thickness intended for use in accordance with ASTM E 84 or UL 723. Loose-fill-type foam plastic insulation shall be tested as board stock for the flame spread index and smoke-developed index.

Exception Exceptions:

1. Foam plastic insulation more than 4 inches (102 mm) thick shall have a maximum flame spread index of 75 and a smoke-developed index of 450 where tested at a minimum thickness of 4 inches (102 mm), provided the end use is *approved* in accordance with Sections R316.6 using the thickness and density intended for use.
2. Foam plastic insulation shall not be subject to this requirement where installed with a thermal barrier in accordance with Section R316.4.

Reason: This proposal addresses a material performance requirement currently in the code which is not supported by available evidence from fire science research. Removal of the performance requirement as proposed would provide choice for manufacturers and consumers by allowing foam plastic insulation materials without flame retardants to be used in compliance with the code in a fire safe way. This would result in a healthier product at a lower cost.

The proposed change considers fire safety, public health, fire fighter and emergency responder safety, and energy efficiency. It is not a tradeoff among them, and improves them in many ways relevant to the current code requirements as described below and in the Substantiation Section.

For applications in which foam plastics are required to meet flame spread and smoke developed requirements of R316.3 and to be separated from interior spaces by an approved thermal barrier per R316.4, research and testing conducted over many years demonstrate the following:

It is the approved thermal barrier and the fireblocking required by the code that provide the fire safety related to foam plastic insulation, not its meeting the required flame spread and smoke developed ratings of R316.3. Even when foam plastic insulation meets the requirements of R316.3, if it is not protected by a thermal barrier it still poses an unacceptable level of fire hazard (Babrauskas et al., 2012).

In order to meet the flame spread and smoke developed requirements of R316.3, flame retardant chemicals are added to foam plastic insulations.

The two most common flame retardants used, hexabromocyclododecane (HBCD or HBCDD) and Tris (1-chloro-2-propyl) phosphate (TCPP), add potential risks throughout the product life cycle. These include environmental pollution, fire toxicity and possible adverse health effects for building occupants, fire service professionals, and the general public (Babrauskas et al., 2012). These chemicals are added only to meet flame spread and smoke developed requirements; they do not prevent foam plastics from burning.

Thermal barriers prevent temperature rise and adequately protect foam plastic insulation from igniting during a fire. Fire statistics show very few fires, no fire deaths and very few injuries attributable to fire started or spread by insulation within structural areas (Ahrens, 2011).

A precedent for a similar approach exists in Sweden where foam plastic insulation without flame retardants is used with code mandated protection by fire safe materials and construction (Blomqvist, McNamee, & Thureson, 2011; Lassen, Maag, Høibye, Vesterlykke, & Lundegaard, 2011; POPRC, 2011; Posner, Roos, & Olsson, 2010). Since the transition to non-flame retardant foam, there has been no detrimental impact on fire safety statistics in Sweden (Harrami & McIntyre, 2006; Lundqvist, McIntyre, & Hedman, 2008; Remberger et al., 2004).

In light of the available evidence, changing the code as proposed could:

- reduce and prevent harm from flame retardants without resulting in a reduction in fire safety,
- better align with the intent of the codes to establish "minimum requirements to safeguard the public safety, health and general welfare" and to provide "safety to fire fighters and emergency responders during emergency operations (R101.3)," and
- increase use of foam plastic insulations which are important for building energy efficiency by decreasing cost and by allowing flame-retardant free materials to be used in a code-compliant way for those concerned about flame retardant chemicals.

Substantiation: A thermal barrier meets the criteria of NFPA 275 by preventing the energy of a fire from reaching the foam. Specifically, NFPA 275 states that after 15 minutes of a post-flashover fire, the temperature at the interface of the thermal barrier and foam cannot exceed 121°C average with 163°C at one peak value thermocouple. This is substantially below the auto-ignition temperature of plastic foams, which are in excess of 400°C for polystyrene and polyurethane (Babrauskas, 2003).

Due to protection by thermal barriers, fire statistics show that insulation very rarely starts or spreads home fires. Insulation within a structural area was the item first ignited in 2% of US home structure fires, resulting in 10 civilian deaths and 90 civilian injuries (0% and 1% of the death and injury totals for the whole US, respectively). Insulation within a structural area was the primary item contributing to flame spread in 2% of US home structure fires, resulting in 0 civilian deaths and 40 injuries (0% and 1% of the death and injury totals for the whole US, respectively) (Ahrens, 2011).

HBCD and TCPP are added to foam plastics to meet flame spread and smoke developed requirements. 90% percent of HBCD and 86% of TCPP produced is used for building insulation (EC, 2008; Env Can, 2012; US EPA, 2010). Both chemicals are now widespread global contaminants (Covaci et al., 2006; Marvin et al., 2011; Van der Veen & de Boer, 2012). The presence of flame retardant chemicals can significantly increase the toxicity of fires when materials burn (Stec & Hull, 2011). Materials with flame retardants can produce greater amounts of carbon monoxide, smoke, and soot, compared to non-flame retardant materials (Babrauskas, 1992; Purser, 2000; Schnipper, Smith-Hansen, & Thomsen, 1995; Wichman, 2003). When HBCD burns, it produces dioxins, which are potentially carcinogenic (Birnbaum, Staskal, & Diliberto, 2003; Desmet, Schelfaut, & Sandra, 2005; Ebert & Bahadir, 2003). Firefighters have higher rates of cancers associated with dioxin exposure (IARC, 2010; LeMasters et al., 2006).

Canada and the European Union have scheduled HBCD to be phased out in the next 3-4 years (EC, 2011; Env Can, 2012). The US Environmental Protection Agency states that the chemical is

“...persistent in the environment, bioaccumulative in living organisms, and highly toxic to aquatic organisms.”
and

“Human exposure is evidenced by the presence of HBCD in breast milk, adipose tissue, and blood, and it biomagnifies in the food chain. HBCD presents human health concerns based on animal test results indicating potential reproductive, developmental, and neurological effects. People may be exposed to HBCD from products and dust in the home and workplace, as well as its presence in the environment.”
(US EPA, 2012)

Less is known about TCPP but concerns include its persistence in the environment, human exposure, and the potential to cause cancer (Van der Veen & De Boer, 2012).

Sweden uses the Eurocode classification system to rate the combustibility of building components including foam plastic insulation. Foam plastics are classified as combustible, and thus building codes specify how these materials can be used in fire safe ways, such as behind thermal barriers, concrete or masonry, and with other construction techniques (Blomqvist et al., 2011; Lassen et al., 2011; POPRC, 2011; Posner et al., 2010). Since non-flame retardant foam plastics have been used in Sweden, building fires and deaths from building fires have not increased, indicating that fire safety is maintained by the code mandated measures (Harrami & McIntyre, 2006; Lundqvist et al., 2008; Remberger et al., 2004).

From IRC Section R101.3 Intent:

The purpose of this code is to establish minimum requirements to safeguard the public safety, health and general welfare through affordability, structural strength, means of egress facilities, stability, sanitation, light and ventilation, energy conservation and safety to life and property from fire and other hazards attributed to the built environment and to provide safety to fire fighters and emergency responders during emergency operations.

From IRC Section R316.4 Thermal Barrier:

Unless otherwise allowed in Section R316.5 or Section R316.6, foam plastic shall be separated from the interior of a building by an *approved* thermal barrier of minimum 1/2 inch (12.7 mm) gypsum wallboard or a material that is tested in accordance with and meets the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test of NFPA 275.

Bibliography:

Links to the following research reports, and other supporting documentation are available for viewing and download at:
<http://saferinsulation.greensciencepolicy.org/code-change-proposal/>

Ahrens, M. (2011). Home structure fires. Quincy, MA: National Fire Protection Association.

Babrauskas, V. (1992). Plastics, part B, The effect of FR agents on polymer performance. In V. Babrauskas & S. J. Grayson (Eds.), *Heat release in fires* (pp. 423–46). London: Elsevier Applied Science Publishers.

Babrauskas, V. (2003). *Ignition Handbook*. Issaquah, WA: Fire Science Publishers and Society of Fire Protection Engineers.

Babrauskas, V., Lucas, D., Eisenberg, D., Singla, V., Dedeo, M., & Blum, A. (2012). Flame retardants in building insulation: a case for re-evaluating building codes. *Building Research & Information*, 40(6), 738–755. doi:10.1080/09613218.2012.744533

Birnbaum, L. S., Staskal, D. F., & Diliberto, J. J. (2003). Health effects of polybrominated dibenzo-p-dioxins (PBDDs) and dibenzofurans (PBDFs). *Environment international*, 29(6), 855–60. doi:10.1016/S0160-4120(03)00106-5

Blomqvist, P., McNamee, M. S., & Thureson, P. (2011). Compilation of International Building Regulations (Fire) Relevant for EPS/XPS: SP Technical Note 2010:10, revised 2011-11-30. Borås, Sweden: SP Technical Institute.

Covaci, A., Gerecke, A. C., Law, R. J., Voorspoels, S., Kohler, M., Heeb, N. V., Leslie, H., et al. (2006). Hexabromocyclododecanes (HBCDs) in the environment and humans: a review. *Environmental science & technology*, 40(12), 3679–88.

Desmet, K., Schelfaut, M., & Sandra, P. (2005). Determination of bromophenols as dioxin precursors in combustion gases of fire retarded extruded polystyrene by sorptive sampling-capillary gas chromatography–mass spectrometry. *Journal of Chromatography A*, 1071(1-2), 125–129. doi:10.1016/j.chroma.2004.12.019

Ebert, J., & Bahadir, M. (2003). Formation of PBDD/F from flame-retarded plastic materials under thermal stress. *Environment international*, 29(6), 711–6. doi:10.1016/S0160-4120(03)00117-X

EC. (2008). European Union Risk Assessment Report: Tris (2-Chloro-1-methylethyl) phosphate TCPP. Luxembourg: European Commission, Ireland Chemicals Policy and Services.

EC. (2011). Commission Regulation (EU) No 143/2011 of 17 February 2011. *Official Journal of the European Union*, L44(54), 2–6.

Env Can. (2012). Proposed Risk Management Measure for Hexabromocyclododecane (HBCD). Gatineau, Quebec: Environment Canada, Health Canada, Chemicals Management Division.

Harrami, O., & McIntyre, C. (2006). Fire and fire protection in homes and public buildings: An analysis of Swedish fire statistics. Stockholm, Sweden: Swedish Chemicals Inspectorate (KEMI).

IARC. (2010). IARC Monographs on the Evaluation of Carcinogenic Risks to Humans: FIREFIGHTING. Lyon: International Agency for Research on Cancer.

Lassen, C., Maag, J., Høiby, L., Vesterlykke, M., & Lundegaard, T. (2011). Alternatives to the use of flame retarded EPS in buildings. Oslo, Norway: Norwegian Climate and Pollution Agency (KLIF) and COWI A/S.

LeMasters, G. K., Genaidy, A. M., Succop, P., Deddens, J., Sobeh, T., Barrera-Viruet, H., Dunning, K., et al. (2006). Cancer risk among firefighters: a review and meta-analysis of 32 studies. *Journal of occupational and environmental medicine / American College of Occupational and Environmental Medicine*, 48(11), 1189–202.

Lundqvist, M., McIntyre, C., & Hedman, U. (2008). The Swedish Rescue Services in Figures. Karlstad, Sweden: Swedish Civil Contingencies Agency (MSB).

Marvin, C. H., Tomy, G. T., Armitage, J. M., Arnot, J. A., McCarty, L., Covaci, A., & Palace, V. (2011). Hexabromocyclododecane: current understanding of chemistry, environmental fate and toxicology and implications for global management. *Environmental science & technology*, 45(20), 8613–23.

POPRC. (2011). UNEP/POPS/POPRC.7/19/Add.1 Addendum: Risk management evaluation on hexabromocyclododecane. Geneva, Switzerland: United Nations Environment Programme Persistent Organic Pollutants Review Committee.

Posner, S., Roos, S., & Olsson, E. (2010). Exploration of Management options for HBCD. Molndal, Sweden: Swerea IVF.

Purser, D. A. (2000). The performance of fire retardants in relation to toxicity, toxic hazard, and risk in fires. In A. Grand & C. Wilkie (Eds.), *Fire retardancy of polymeric materials*. (pp. 449–99). New York: Marcel Dekker, Inc.

Remberger, M., Sternbeck, J., Palm, A., Kaj, L., Strömberg, K., & Brorström-Lundén, E. (2004). The environmental occurrence of hexabromocyclododecane in Sweden. *Chemosphere*, 54(1), 9–21. doi:10.1016/S0045-6535(03)00758-6

Schnipper, A., Smith-Hansen, L., & Thomsen, E. S. (1995). Reduced combustion efficiency of chlorinated compounds, resulting in higher yields of carbon monoxide. *Fire and Materials*, 19(2), 61–64.

Stec, A. A., & Hull, T. R. (2011). Assessment of the fire toxicity of building insulation materials. *Energy and Buildings*, 43(2-3), 498–506. doi:10.1016/j.enbuild.2010.10.015

US EPA. (2010). Hexabromocyclododecane (HBCD) action Plan. US Environmental Protection Agency.

US EPA. (2012). Partnership on Flame Retardant Alternatives for Hexabromocyclododecane (HBCD). Retrieved December 16, 2012, from <http://www.epa.gov/dfe/pubs/projects/hbcd/index.htm>

Van der Veen, I., & De Boer, J. (2012). Phosphorus flame retardants: Properties, production, environmental occurrence, toxicity and analysis. *Chemosphere*, 88(10), 1119–53.

Wichman, I. S. (2003). Material flammability, combustion, toxicity and fire hazard in transportation. *Progress in Energy and Combustion Science*, 29(3), 247–299.

Cost Impact: The code change proposal will not increase the cost of construction.

RB163-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R316.3 #1-RB-BABRAUSKAS

RB164 – 13

R316.3

Proponent: Vytenis Babrauskas, PhD, Fire Science & Technology Inc., representing The American Institute of Architects, Cascadia Green Building Council, Development Center for Appropriate Technology, Green Science Policy Institute, Hammond Fine Homes, International Living Future Institute, Perkins + Will, San Francisco Firefighters Cancer Prevention Foundation, the United States Green Building Council of California

Revise as follows:

R316.3 Surface burning characteristics. Unless otherwise allowed in R316.5 or 316.6, all foam plastic or foam plastic cores used as a component in manufactured assemblies used in building construction shall have a flame spread index of not more than 75 and shall have a smoke-developed index of not more than 450 when tested in the maximum thickness intended for use in accordance with ASTM E 84 or UL 723. Loose-fill-type foam plastic insulation shall be tested as board stock for the flame spread index and smoke-developed index.

Exception Exceptions:

1. Foam plastic insulation more than 4 inches (102 mm) thick shall have a maximum flame spread index of 75 and a smoke-developed index of 450 where tested at a minimum thickness of 4 inches (102 mm), provided the end use is *approved* in accordance with Sections R316.6 using the thickness and density intended for use.
2. Foam plastic insulation shall not be subject to this requirement when used in a wall, floor, foundation or roof assembly where the foam plastic insulation is separated from the interior of the building by a minimum 1-inch (25 mm) thickness of masonry or concrete.

Reason: This proposal addresses a material performance requirement currently in the code which is not supported by available evidence from fire science research. Removal of the performance requirement as proposed would provide choice for manufacturers and consumers by allowing foam plastic insulation materials without flame retardants to be used in compliance with the code in a fire safe way. This would result in a healthier product at a lower cost.

The proposed change considers fire safety, public health, fire fighter and emergency responder safety, and energy efficiency. It is not a tradeoff among them, and improves them in many ways relevant to the current code requirements as described below and in the Substantiation Section.

For applications in which foam plastics are required to meet flame spread and smoke developed requirements of R316.3 and to be separated from interior spaces by an approved thermal barrier per R316.4, research and testing conducted over many years demonstrate the following:

It is the thermal barrier and the fireblocking required by the code that provide the fire safety related to foam plastic insulation, not its meeting the required flame spread and smoke developed ratings of R316.3. Even when foam plastic insulation meets the requirements of R316.3, if it is not protected by a thermal barrier it still poses an unacceptable level of fire hazard (Babrauskas et al., 2012).

In order to meet the flame spread and smoke developed requirements of R316.3, flame retardant chemicals are added to foam plastic insulations.

The two most common flame retardants used, hexabromocyclododecane (HBCD or HBCDD) and Tris (1-chloro-2-propyl) phosphate (TCPP), add potential risks throughout the product life cycle. These include environmental pollution, fire toxicity and possible adverse health effects for building occupants, fire service professionals, and the general public (Babrauskas et al., 2012). These chemicals are added only to meet flame spread and smoke developed requirements; they do not prevent foam plastics from burning.

Thermal barriers prevent temperature rise and adequately protect foam plastic insulation from igniting during a fire. Fire statistics show very few fires, no fire deaths and very few injuries attributable to fire started or spread by insulation within structural areas (Ahrens, 2011).

The Commentary for the 2012 IRC for Section R316.5.1 Masonry or concrete construction states: "No thermal barrier is required when 1 inch (25 mm) or more of masonry or concrete is placed between the foam plastic and the interior of the building. The intent is to accept 1-inch (25 mm) of masonry or concrete as adequate protection against ignition, even though the concrete does not necessarily meet the performance criteria for thermal barriers."

This suggests that when foam plastic is separated from the interior of a building by minimum 1-inch (25mm) concrete or masonry, the flame spread and smoke developed requirements are not needed.

A precedent for a similar approach exists in Sweden where foam plastic insulation without flame retardants is used with code mandated protection by fire safe materials and construction (Blomqvist, McNamee, & Thureson, 2011; Lassen, Maag, Høiby, Vesterlykke, & Lundegaard, 2011; POPRC, 2011; Posner, Roos, & Olsson, 2010). Since the transition to non-flame retardant foam,

there has been no detrimental impact on fire safety statistics in Sweden (Harrami & McIntyre, 2006; Lundqvist, McIntyre, & Hedman, 2008; Remberger et al., 2004).

In light of the available evidence, changing the code as proposed could:

- reduce and prevent harm from flame retardants without resulting in a reduction in fire safety,
- better align with the intent of the codes to establish "minimum requirements to safeguard the public safety, health and general welfare" and to provide "safety to fire fighters and emergency responders during emergency operations (R101.3)," and
- increase use of foam plastic insulations which are important for building energy efficiency by decreasing cost and by allowing flame-retardant free materials to be used in a code-compliant way for those concerned about flame retardant chemicals.

Substantiation: 1 inch (25 mm) or greater of concrete or masonry protects foam plastic from ignition in the same way as a thermal barrier which meets the criteria of NFPA 275- by preventing the energy of a fire from reaching the foam. Specifically, NFPA 275 states that after 15 minutes of a post-flashover fire, the temperature at the interface of the thermal barrier and foam cannot exceed 121°C average with 163°C at one peak value thermocouple. This is substantially below the auto-ignition temperature of plastic foams, which are in excess of 400°C for polystyrene and polyurethane (Babrauskas, 2003). As stated in the Commentary, concrete or masonry also has these characteristics.

Due to protection by thermal barriers, fire statistics show that insulation very rarely starts or spreads home fires. Insulation within a structural area was the item first ignited in 2% of US home structure fires, resulting in 10 civilian deaths and 90 civilian injuries (0% and 1% of the death and injury totals for the whole US, respectively). Insulation within a structural area was the primary item contributing to flame spread in 2% of US home structure fires, resulting in 0 civilian deaths and 40 injuries (0% and 1% of the death and injury totals for the whole US, respectively) (Ahrens, 2011).

HBCD and TCPP are added to foam plastics to meet flame spread and smoke developed requirements. 90% percent of HBCD and 86% of TCPP produced is used for building insulation (EC, 2008; Env Can, 2012; US EPA, 2010). Both chemicals are now widespread global contaminants (Covaci et al., 2006; Marvin et al., 2011; Van der Veen & de Boer, 2012). The presence of flame retardant chemicals can significantly increase the toxicity of fires when materials burn (Stec & Hull, 2011). Materials with flame retardants can produce greater amounts of carbon monoxide, smoke, and soot, compared to non-flame retardant materials (Babrauskas, 1992; Purser, 2000; Schnipper, Smith-Hansen, & Thomsen, 1995; Wichman, 2003). When HBCD burns, it produces dioxins, which are potentially carcinogenic (Birnbaum, Staskal, & Diliberto, 2003; Desmet, Schelfaut, & Sandra, 2005; Ebert & Bahadir, 2003). Firefighters have higher rates of cancers associated with dioxin exposure (IARC, 2010; LeMasters et al., 2006).

Canada and the European Union have scheduled HBCD to be phased out in the next 3-4 years (EC, 2011; Env Can, 2012). The US Environmental Protection Agency states that the chemical is

"...persistent in the environment, bioaccumulative in living organisms, and highly toxic to aquatic organisms."

and

"Human exposure is evidenced by the presence of HBCD in breast milk, adipose tissue, and blood, and it biomagnifies in the food chain. HBCD presents human health concerns based on animal test results indicating potential reproductive, developmental, and neurological effects. People may be exposed to HBCD from products and dust in the home and workplace, as well as its presence in the environment."

(US EPA, 2012)

Less is known about TCPP but concerns include its persistence in the environment, human exposure, and the potential to cause cancer (Van der Veen & De Boer, 2012).

Sweden uses the Eurocode classification system to rate the combustibility of building components including foam plastic insulation. Foam plastics are classified as combustible, and thus building codes specify how these materials can be used in fire safe ways, such as behind thermal barriers, concrete or masonry, and with other construction techniques (Blomqvist et al., 2011; Lassen et al., 2011; POPRC, 2011; Posner et al., 2010). Since non-flame retardant foam plastics have been used in Sweden, building fires and deaths from building fires have not increased, indicating that fire safety is maintained by the code mandated measures (Harrami & McIntyre, 2006; Lundqvist et al., 2008; Remberger et al., 2004).

From IRC Section 316.5.1 Commentary:

No thermal barrier is required when 1 inch (25 mm) or more of masonry or concrete is placed between the foam plastic and the interior of the building. The intent is to accept 1-inch (25 mm) of masonry or concrete as adequate protection against ignition, even though the concrete does not necessarily meet the performance criteria for thermal barriers. This condition can arise when foam plastics are installed either within a wall or on one side of a wall. Some common examples are when foam plastics are installed:

- In the cavity of a hollow masonry wall,
- As the core of a concrete-faced panel,
- On the exterior face of a masonry wall and covered with an exterior finish, or
- Within the cores of hollow masonry units.
- Encapsulated within a minimum of 1 inch (25 mm) concrete or masonry wall, floor or roof system, as in insulated tilt-up or pour-in-place

Also, the flame spread rating of the foam plastic used must comply with the requirements of Section R316.3, but the smoke-developed rating of the foam plastic is not limited.

From IRC Section R101.3 Intent:

The purpose of this code is to establish minimum requirements to safeguard the public safety, health and general welfare through affordability, structural strength, means of egress facilities, stability, sanitation, light and ventilation, energy conservation and safety to life and property from fire and other hazards attributed to the built environment and to provide safety to fire fighters and emergency responders during emergency operations.

Bibliography:

Links to the following research reports, and other supporting documentation are available for viewing and download at:

<http://saferinsulation.greensciencepolicy.org/code-change-proposal/>

Ahrens, M. (2011). Home structure fires. Quincy, MA: National Fire Protection Association.

Babrauskas, V. (1992). Plastics, part B, The effect of FR agents on polymer performance. In V. Babrauskas & S. J. Grayson (Eds.), *Heat release in fires* (pp. 423–46). London: Elsevier Applied Science Publishers.

Babrauskas, V. (2003). *Ignition Handbook*. Issaquah, WA: Fire Science Publishers and Society of Fire Protection Engineers.

Babrauskas, V., Lucas, D., Eisenberg, D., Singla, V., Dedeo, M., & Blum, A. (2012). Flame retardants in building insulation: a case for re-evaluating building codes. *Building Research & Information*, 40(6), 738–755. doi:10.1080/09613218.2012.744533

Birnbaum, L. S., Staskal, D. F., & Diliberto, J. J. (2003). Health effects of polybrominated dibenzo-p-dioxins (PBDDs) and dibenzofurans (PDBFs). *Environment international*, 29(6), 855–60. doi:10.1016/S0160-4120(03)00106-5

Blomqvist, P., McNamee, M. S., & Thureson, P. (2011). Compilation of International Building Regulations (Fire) Relevant for EPS/XPS: SP Technical Note 2010:10, revised 2011-11-30. Borås, Sweden: SP Technical Institute.

Covaci, A., Gerecke, A. C., Law, R. J., Voorspoels, S., Kohler, M., Heeb, N. V., Leslie, H., et al. (2006). Hexabromocyclododecanes (HBCDs) in the environment and humans: a review. *Environmental science & technology*, 40(12), 3679–88.

Desmet, K., Schelfaut, M., & Sandra, P. (2005). Determination of bromophenols as dioxin precursors in combustion gases of fire retarded extruded polystyrene by sorptive sampling-capillary gas chromatography–mass spectrometry. *Journal of Chromatography A*, 1071(1-2), 125–129. doi:10.1016/j.chroma.2004.12.019

Ebert, J., & Bahadir, M. (2003). Formation of PBDD/F from flame-retarded plastic materials under thermal stress. *Environment international*, 29(6), 711–6. doi:10.1016/S0160-4120(03)00117-X

EC. (2008). European Union Risk Assessment Report: Tris (2-Chloro-1-methylethyl) phosphate TCPP. Luxembourg: European Commission, Ireland Chemicals Policy and Services.

EC. (2011). Commission Regulation (EU) No 143/2011 of 17 February 2011. *Official Journal of the European Union*, L44(54), 2–6.

Env Can. (2012). Proposed Risk Management Measure for Hexabromocyclododecane (HBCD). Gatineau, Quebec: Environment Canada, Health Canada, Chemicals Management Division.

Harrami, O., & McIntyre, C. (2006). Fire and fire protection in homes and public buildings: An analysis of Swedish fire statistics. Stockholm, Sweden: Swedish Chemicals Inspectorate (KEMI).

IARC. (2010). IARC Monographs on the Evaluation of Carcinogenic Risks to Humans: FIREFIGHTING. Lyon: International Agency for Research on Cancer.

Lassen, C., Maag, J., Høiby, L., Vesterlykke, M., & Lundegaard, T. (2011). Alternatives to the use of flame retarded EPS in buildings. Oslo, Norway: Norwegian Climate and Pollution Agency (KLIF) and COWI A/S.

LeMasters, G. K., Genaidy, A. M., Succop, P., Deddens, J., Sobeih, T., Barriera-Viruet, H., Dunning, K., et al. (2006). Cancer risk among firefighters: a review and meta-analysis of 32 studies. *Journal of occupational and environmental medicine / American College of Occupational and Environmental Medicine*, 48(11), 1189–202.

Lundqvist, M., McIntyre, C., & Hedman, U. (2008). The Swedish Rescue Services in Figures. Karlstad, Sweden: Swedish Civil Contingencies Agency (MSB).

Marvin, C. H., Tomy, G. T., Armitage, J. M., Arnot, J. A., McCarty, L., Covaci, A., & Palace, V. (2011). Hexabromocyclododecane: current understanding of chemistry, environmental fate and toxicology and implications for global management. *Environmental science & technology*, 45(20), 8613–23.

POPRC. (2011). UNEP/POPS/POPRC.7/19/Add.1 Addendum: Risk management evaluation on hexabromocyclododecane. Geneva, Switzerland: United Nations Environment Programme Persistent Organic Pollutants Review Committee.

Posner, S., Roos, S., & Olsson, E. (2010). Exploration of Management options for HBCD. Molndal, Sweden: Swerea IVF.

Purser, D. A. (2000). The performance of fire retardants in relation to toxicity, toxic hazard, and risk in fires. In A. Grand & C. Wilkie (Eds.), *Fire retardancy of polymeric materials*. (pp. 449–99). New York: Marcel Dekker, Inc.

Remberger, M., Sternbeck, J., Palm, A., Kaj, L., Strömberg, K., & Brorström-Lundén, E. (2004). The environmental occurrence of hexabromocyclododecane in Sweden. *Chemosphere*, 54(1), 9–21. doi:10.1016/S0045-6535(03)00758-6

Schnipper, A., Smith-Hansen, L., & Thomsen, E. S. (1995). Reduced combustion efficiency of chlorinated compounds, resulting in higher yields of carbon monoxide. *Fire and Materials*, 19(2), 61–64.

Stec, A. A., & Hull, T. R. (2011). Assessment of the fire toxicity of building insulation materials. *Energy and Buildings*, 43(2-3), 498–506. doi:10.1016/j.enbuild.2010.10.015

US EPA. (2010). Hexabromocyclododecane (HBCD) action Plan. US Environmental Protection Agency.

US EPA. (2012). Partnership on Flame Retardant Alternatives for Hexabromocyclododecane (HBCD). Retrieved December 16, 2012, from <http://www.epa.gov/dfe/pubs/projects/hbcd/index.htm>

Van der Veen, I., & De Boer, J. (2012). Phosphorus flame retardants: Properties, production, environmental occurrence, toxicity and analysis. *Chemosphere*, 88(10), 1119–53.

Wichman, I. S. (2003). Material flammability, combustion, toxicity and fire hazard in transportation. *Progress in Energy and Combustion Science*, 29(3), 247–299.

Cost Impact: The code change proposal will not increase the cost of construction.

RB164-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R316.3 #2-RB-BABRAUSKAS

RB165 – 13

R316.3

Proponent: Michael D. Fischer, Kellen Company, representing the Center for the Polyurethanes Industry (mfischer@kellencompany.com)

Revise as follows:

R316.3 Surface burning characteristics. Unless otherwise allowed in Section R316.5 or R316.6, all foam plastic or foam plastic cores used as a component in manufactured assemblies used in building construction shall have a flame spread index of not more than 75 and shall have a smoke developed index of not more than 450 when tested in the maximum thickness and density intended for use in accordance with ASTM E 84 or UL 723. Loose-fill-type foam plastic insulation shall be tested as board stock for the flame spread index and smoke-developed index.

Exception: Foam plastic insulation more than 4 inches (102 mm) thick shall have a maximum flame spread index of 75 and a smoke-developed index of 450 where tested at a minimum thickness of 4 inches (102 mm), provided the end use is *approved* in accordance with Section R316.6 using the thickness and density intended for use.

Reason: As applied to foam plastics, performance certifications (i.e. *approvals*) based on results for tests in accordance to ASTM E84 are limited to the maximum (nominal) thickness and density of the materials tested. Adding language with regard to density to R316.3 serves to more fully clarify and communicate the application of ASTM E84 test results to foam plastics.

Cost Impact: None.

RB165-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R316.3-RB-FISCHER

RB166 – 13

R316.4, R316.5.1, R316.5.2, R316.5.3, R316.5.7, R316.5.8

Proponent: Sean DeCrane, Battalion Chief, representing Cleveland Division of Fire, International Association of Fire Fighters (rovloc93@aol.com)

Revise as follows:

R316.4 Thermal barrier. Unless otherwise allowed in Section R316.5 or Section R316.6, foam plastic shall be separated from the interior of a building and the exterior of the building when installed within ten feet of a property line by an *approved* thermal barrier of minimum 1/2 inch (12.7 mm) gypsum wallboard or a material that is tested in accordance with and meets the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test of NFPA 275.

R316.5 Specific requirements. The following requirements shall apply to these uses of foam plastic unless specifically *approved* in accordance with Section R316.6 or by other sections of the code or the requirements of Sections R316.2 through R316.4 have been met.

R316.5.1 Masonry or concrete construction. The thermal barrier specified in Section R316.4 is not required in a masonry or concrete wall, floor or roof when the foam plastic insulation is separated from the interior of the building and the exterior of the building where installed within ten feet of a property line by a minimum 1-inch (25 mm) thickness of masonry or concrete.

R316.5.2 Roofing. The thermal barrier specified in Section R316.4 is not required when the foam plastic in a roof assembly or under a roof covering is installed in accordance with the code and the manufacturer's installation instructions and is separated from the interior of the building by tongue-and-groove wood planks or wood structural panel sheathing in accordance with Section R803, not less than 15/32 inch (11.9 mm) thick bonded with exterior glue and identified as Exposure 1, with edges supported by blocking or tongue-and-groove joints or an equivalent material. The smoke-developed index for roof applications shall not be limited. A thermal barrier meeting the requirements of R316.4 is required where foam plastic in a roof assembly is installed within 10 feet of a property line.

R316.5.3 Attics. The thermal barrier specified in Section R316.4 is not required in attics where all of the following apply:

1. *Attic* access is required by Section R807.1.
2. The space is entered only for purposes of repairs or maintenance.
3. The foam plastic insulation is protected against ignition using one of the following ignition barrier materials:
 - 3.1. 1 1/2-inch-thick (38 mm) mineral fiber insulation;
 - 3.2. 1/4-inch-thick (6.4 mm) wood structural panels;
 - 3.3. 3/8-inch (9.5 mm) particleboard;
 - 3.4. 1/4-inch (6.4 mm) hardboard;
 - 3.5. 3/8-inch (9.5 mm) gypsum board; or
 - 3.6. Corrosion-resistant steel having a base metal thickness of 0.016 inch (0.406 mm);
 - 3.7. 1 1/2-inch-thick (38 mm) cellulose insulation.

The above ignition barrier is not required where the foam plastic insulation has been tested in accordance with Section R316.6.

R316.5.4 Crawl spaces. The thermal barrier specified in Section R316.4 is not required where all of the following apply:

1. Crawlspace access is required by Section R408.4

2. Entry is made only for purposes of repairs or maintenance.
3. The foam plastic insulation is protected against ignition using one of the following ignition barrier materials:
 - 3.1. 1 1/2-inch-thick (38 mm) mineral fiber insulation;
 - 3.2. 1/4-inch-thick (6.4 mm) wood structural panels
 - 3.3. 3/8-inch (9.5 mm) particleboard;
 - 3.4. 1/4-inch (6.4 mm) hardboard;
 - 3.5. 3/8-inch (9.5 mm) gypsum board; or
 - 3.6. Corrosion-resistant steel having a base metal thickness of 0.016 inch (0.406 mm). The above ignition barrier is not required where the foam plastic insulation has been tested in accordance with Section R316.6.

The above ignition barrier is not required where the foam plastic insulation has been tested in accordance with Section R316.6.

R316.5.5 Foam-filled exterior doors. Foam-filled exterior doors are exempt from the requirements of Sections R316.3 and R316.4.

R316.5.6 Foam-filled garage doors. Foam-filled garage doors in attached or detached garages are exempt from the requirements of Sections R316.3 and R316.4.

R316.5.7 Foam backer board. ~~The thermal barrier specified in Section R316.4 is not required where siding backer board foam plastic insulation has a maximum thickness of 0.5 inch (12.7 mm) and a potential heat of not more than 2000 Btu per square foot (22 720 kJ/m²) when tested in accordance with NFPA 259 provided that:~~

- ~~1. The foam plastic insulation is separated from the interior of the building by not less than 2 inches (51mm) of mineral fiber insulation;~~
- ~~2. The foam plastic insulation is installed over existing exterior wall finish in conjunction with re-siding; or~~
- ~~3. The foam plastic insulation has been tested in accordance with Section R316.6.~~

R316.5.8 Re-siding. ~~The thermal barrier specified in Section R316.4 is not required where the foam plastic insulation is installed over existing exterior wall finish in conjunction with re-siding provided the foam plastic has a maximum thickness of 0.5 inch (12.7 mm) and a potential heat of not more than 2000 Btu per square foot (22 720 kJ/m²) when tested in accordance with NFPA 259.~~

R316.5.9 Interior trim. The thermal barrier specified in Section R316.4 is not required for exposed foam plastic interior trim, provided all of the following are met:

1. The minimum density is 20 pounds per cubic foot (320 kg/m³).
2. The maximum thickness of the trim is 0.5 inch (12.7 mm) and the maximum width is 8 inches (204 mm).
3. The interior trim shall not constitute more than 10 percent of the aggregate wall and ceiling area of any room or space.
4. The flame spread index does not exceed 75 when tested per ASTM E 84 or UL 723. The smoke-developed index is not limited.

R316.5.10 Interior finish. Foam plastics shall be permitted as interior finish where *approved* in accordance with Section R316.6 Foam plastics that are used as interior finish shall also meet the flame spread index and smoke developed index requirements of Sections R302.9.1 and R302.9.2.

R316.5.11 Sill plates and headers. Foam plastic shall be permitted to be spray applied to a sill plate and header without the thermal barrier specified in Section R316.4 subject to all of the following:

1. The maximum thickness of the foam plastic shall be 3 1/4 inches (83 mm).

2. The density of the foam plastic shall be in the range of 0.5 to 2.0 pounds per cubic foot (8 to 32 kg/m3).
3. The foam plastic shall have a flame spread index of 25 or less and an accompanying smoke-developed index of 450 or less when tested in accordance with ASTM E 84 or UL 723.

R316.5.12 Sheathing. Foam plastic insulation used as sheathing shall comply with Section R316.3 and Section R316.4. Where the foam plastic sheathing is exposed to the *attic* space at a gable or kneewall, the provisions of Section R316.5.3 shall apply.

R316.5.13 Floors. The thermal barrier specified in Section R316.4 is not required to be installed on the walking surface of a structural floor system that contains foam plastic insulation when the foam plastic is covered by a minimum nominal 1/2-inch-thick (12.7 mm) wood structural panel or equivalent. The thermal barrier specified in Section R316.4 is required on the underside of the structural floor system that contains foam plastic insulation when the underside of the structural floor system is exposed to the interior of the building.

R316.6 Specific approval. Foam plastic not meeting the requirements of Sections R316.3 through R316.5 shall be specifically *approved* on the basis of one of the following *approved* tests: NFPA 286 with the acceptance criteria of Section R302.9.4, FM4880, UL 1040, or UL 1715, or fire tests related to actual end-use configurations. Approval shall be based on the actual end use configuration and shall be performed on the finished foam plastic assembly in the maximum thickness intended for use. Assemblies tested shall include seams, joints and other typical details used in the installation of the assembly and shall be tested in the manner intended for use.

R316.7 Termite damage. The use of foam plastics in areas of “very heavy” termite infestation probability shall be in accordance with Section R318.4.

Reason: One of the main challenges the fire service is encountering in today's environment is a pressing need of resources. Across the United States we are experiencing the loss of structures due to exterior exposures. These exposure fires can have devastating effects on an individual's home and also place responding fire fighters at risk for rapidly spreading fires.

As the Fire Service encounters the economic realities of smaller budgets and increased demand we are continuously being asked to do more with less. Responding units many times must address growing exposure fires due to the narrow property lines.

In today's environment there is a growing trend to promote energy conservation. While this is widely supported, and a worthy goal, we must also factor in a level of safety. As with most things in life there must be a balance between efficiency and safety.

A search of the Vinyl Siding Institute's website www.vinylsiding.org produces a great deal of information on the R-Values and potential cost benefits of increasing the use of foam backing on the vinyl siding. There is little information on the fire performance of these products. It is true many of the foam insulation products are given a Class A flame spread rating in an ASTM E 84 Test Standard. That is one of the problems, the E 84 is a horizontal test standard yet we install the foam insulation products vertically drastically impacting the true fire performance in the field. In fact to demonstrate the safety of vinyl siding it is compared to the performance of vinyl sheathed wiring: *“Additionally, vinyl meets the stringent National Fire Protection Association (NFPA) requirements. The NFPA Electrical Code recognizes the strong fire-safe characteristics of vinyl through its approved use as a residential wiring insulator. Millions of homes have been wired using safe vinyl-sheathed electrical systems for decades.”*¹

They further state; *Safe homes use fire-safe claddings, which include vinyl siding. Why does vinyl siding provide good fire performance? It is composed mainly of polyvinyl chloride, more commonly known as vinyl or PVC. Due to its chlorine base, vinyl siding does not ignite quickly and is inherently flame-retardant. Read on to discover more facts on vinyl siding's fire performance.....All organic materials (that is, anything containing carbon) will ignite. But the higher the temperature a material has to reach before it flames, the safer it is. PVC won't ignite, even from another flame, until it reaches about 730°F (387°C) and won't self-ignite until about 850°F (454°C).* ¹ Fire doesn't propagate until 750°F, what is the temperature of flame? Again, our issue isn't necessarily the siding it is the foam backing behind it as the siding when exposed to high temperatures will begin to melt and fall away exposing the increasing amounts of foam insulation.

Current tests are being conducted by UL and NIST and additional testimony and data will be presented during the code development process.

1. 2005 National Electrical Code, NFPA 70, Article 334.

Cost Impact: Will not increase the cost of construction

RB166-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R316.4-RB-DECRANE

RB167 – 13

R316.4

Proponent: Dennis Pitts, American Wood Council, representing American Wood Council
(dpitts@awc.org)

Revise as follows:

R316.4 Thermal barrier. Unless otherwise allowed in Section R316.5 or Section R316.6, foam plastic shall be separated from the interior of a building by an *approved* thermal barrier of minimum 1/2 inch (12.7 mm) gypsum wallboard, 23/32 inch (18.2 mm) wood structural panel or a material that is tested in accordance with and meets the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test of NFPA 275.

Reason: Wood structural panels are permitted prescriptively as a thermal barrier in various thicknesses in subsections of R316.5. R316.5.2 allows 15/32" WSP as a thermal barrier in roofs, R316.5.3 allows 1/4" WSP for attics, and R316.5.4 allows 1/4" WSP for crawlspaces. This proposal would prescriptively allow a thicker WSP to be used as a thermal barrier in other applications that might arise.

Prior to a recent change in NFPA 275 that essentially requires a Class A flame spread rating for materials used as thermal barriers, 23/32" WSP complied with NFPA 275. This proposal prescriptively recognizes a history of satisfactory service as a thermal barrier, even for thinner panels, although the material isn't a Class A material.

Cost Impact: No increase in cost of construction.

RB167-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R316.4-RB-PITTS

RB168 – 13

R316.5.3

Proponent: John Mulder, Intertek Testing Services NA, Inc., representing International Standards Organization Technical Committee 77, *Products in Fibre-reinforced Cement*, James Hardie Building Products, and Self

Revise as follows:

R316.5.3 Attics. The thermal barrier specified in Section R316.4 is not required where all of the following apply:

1. *Attic* access is required by Section R807.1.
2. The space is entered only for purposes of repairs or maintenance.
3. The foam plastic insulation is protected against ignition using one of the following ignition barrier materials:
 - 3.1. 1½-inch-thick (38 mm) mineral fiber insulation;
 - 3.2. 1/4-inch-thick (6.4 mm) wood structural panels;
 - 3.3. 3/8-inch (9.5 mm) particleboard;
 - 3.4. 1/4-inch (6.4 mm) hardboard;
 - 3.5. 3/8-inch (9.5 mm) gypsum board; **or**
 - 3.6. Corrosion-resistant steel having a base metal thickness of 0.016 inch (0.406 mm);
 - 3.7. 1½-inch-thick (38 mm) cellulose insulation; **or**
 - 3.8. 1/4-inch (6.4 mm) fiber-cement panel, soffit or backer board.

The above ignition barrier is not required where the foam plastic insulation has been tested in accordance with Section R316.6.

Reason: 1/4-inch fiber-cement panel complying with ASTM C1186, Type A, or ASTM C1288, or ISO 8336, Category C, has a flame spread of 0 and smoke developed index of 5 or less. The proposed fiber-cement is also classed as noncombustible in accordance with ASTM E 136 (see attached ICC-ES ESR-1381[reference Section 3.0], ESR-1572[reference Section 3.0], ESR-1844[reference Section 3.1], ESR-2290[reference Section 3.1], and ESR-2894[reference Section 3.2]) documenting these claims. The fiber-cement panel has also been tested in accordance with NFPA 268 (see attached test reports) for compliance with the provisions of IBC Section 2603.5.7 "Exceptions" for "Ignition".

IBC Section 2603.5.7 has, as a result of the Group A IBC Code Hearings, been revised to add fiber-cement when tested in accordance with both ASTM E84 and NFPA 268. This proposed revision brings the two building codes (IBC & IRC) and the applicable code sections and standards references into general alignment.

Performance requirements of ISO 8336, *Fibre-cement flat sheets – Product specification and test methods*, have been harmonized with the performance requirements of ASTM C1288, *Standard Specification for Discrete Non-Asbestos Fiber-Cement Interior Substrate Sheets*. Fiber-cement producers in Mexico, Central and South America, Europe, Asia, Australia and New Zealand currently manufacture and test their fiber-cement products for compliance with ISO 8336. The inclusion of this Standard reference in the IRC will permit manufacturers worldwide to demonstrate product compliance to IBC requirements. The addition of a reference to ISO 8336 in the Code removes a barrier to trade.

Cost Impact: The code change proposal will not increase the cost of construction because the proposed code change is editorial in nature to better clarify and present the backer board products currently recognized in the Code.

RB168-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R316.5.3-RB-MULDER

RB169 – 13

R316.5.3, R316.5.4

Proponent: Rick Thornberry, P.E., representing Cellulose Insulation Manufacturers Association (CIMA)

Revise as follows:

R316.5.3 Attics. The thermal barrier specified in Section R316.4 is not required where all of the following apply:

1. *Attic* access is required by Section R807.1.
2. The space is entered only for purposes of repairs or maintenance.
3. The foam plastic insulation is protected against ignition using one of the following ignition barrier materials:
 - 3.1. 1 1/2-inch-thick (38 mm) mineral fiber insulation;
 - 3.2. 1/4-inch-thick (6.4 mm) wood structural panels;
 - 3.3. 3/8-inch-thick (9.5 mm) particleboard;
 - 3.4. 1/4-inch-thick (6.4 mm) hardboard;
 - 3.5. 3/8-inch-thick (9.5 mm) gypsum wallboard; ~~or~~
 - 3.6. Corrosion-resistant steel having a base metal thickness of 0.016 inch (0.406 mm);
 - 3.7. 1.5-inch thick (38 mm) cellulose insulation; ~~or~~
 - 3.8. Other approved material installed in such a manner that the foam plastic insulation is not exposed.

The above ignition barrier is not required where the foam plastic insulation has been tested in accordance with Section R316.6.

R316.5.4 Crawl spaces. The thermal barrier specified in Section R316.4 is not required where all of the following apply:

1. Crawlspace access is required by Section R408.4
2. ~~Entry is made~~ The space is entered only for purposes of repairs or maintenance.
3. The foam plastic insulation is protected against ignition using one of the following ignition barrier materials:
 - 3.1. 1 1/2-inch-thick (38 mm) mineral fiber insulation;
 - 3.2. 1/4-inch-thick (6.4 mm) wood structural panels;
 - 3.3. 3/8-inch-thick (9.5 mm) particleboard;
 - 3.4. 1/4-inch-thick (6.4 mm) hardboard;
 - 3.5. 3/8-inch-thick (9.5 mm) gypsum wallboard; ~~or~~
 - 3.6. Corrosion-resistant steel having a base metal thickness of 0.016 inch (0.406 mm); ~~or~~
 - 3.7. Other approved material installed in such a manner that the foam plastic insulation is not exposed

The above ignition barrier is not required where the foam plastic insulation has been tested in accordance with Section R316.6.

Reason: The purpose of this code change proposal is to make Sections R316.5.3 and R316.5.4 in the IRC more consistent with Section 2603.1.4.6 in the IBC. This should help to avoid possible misapplications of these sections and make the code more user friendly.

Cost Impact: This code change proposal will not increase the cost of construction.

RB169-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R316.5.3-RB-THORNBERRY.doc

RB170– 13

R316.5.3

Proponent: John Woestman, Kellen Company, representing Extruded
(jwoestman@kellencompany.com)

Revise as follows:

R316.5.3 Attics. The thermal barrier specified in Section R316.4 is not required where the foam plastic insulation has been tested in accordance with R316.6 or where all of the following apply:

1. *Attic* access is required by Section R807.1.
2. The space is entered only for purposes of repairs or maintenance.
3. The foam plastic insulation is protected against ignition using one of the following ignition barrier materials:
 - 3.1. 11/2-inch-thick (38 mm) mineral fiber insulation;
 - 3.2. 1/4-inch-thick (6.4 mm) wood structural panels;
 - 3.3. 3/8-inch (9.5 mm) particleboard;
 - 3.4. 1/4-inch (6.4 mm) hardboard;
 - 3.5. 3/8-inch (9.5 mm) gypsum board; or
 - 3.6. Corrosion-resistant steel having a base metal thickness of 0.016 inch (0.406 mm);
 - 3.7. 11/2-inch-thick (38 mm) cellulose insulation.

~~The above ignition barrier is not required where the foam plastic insulation has been tested in accordance with Section R316.6.~~

Reason: This proposal is an attempt to clarify requirements of the IRC in Section R316.5.3. Section R316.6 specifically allows foam plastic insulation meeting one of the tests specified in R316.6 to not be required to meet the prescriptive requirements of Sections R316.3 through R316.5. This proposal makes it explicitly clear Items 1 and 2 (and Item 3) of R316.5.3 are not a requirement for foam plastic insulation that complies with R316.6.

Cost Impact: None

RB170-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R316.5.3-RB-WOESTMAN

RB171 – 13

R316.5.4

Proponent: John Woestman, Kellen Company, Representing Extruded Polystyrene Foam Association (XPSA) (jwoestman@kellencompany.com)

Revise as follows:

R316.5.4 Crawl spaces. The thermal barrier specified in Section R316.4 is not required where the foam plastic insulation has been tested in accordance with Section R316.6 or where all of the following apply:

1. Crawlspace access is required by Section R408.4
2. Entry is made only for purposes of repairs or maintenance.
3. The foam plastic insulation is protected against ignition using one of the following ignition barrier materials:
 - 3.1. 1 1/2-inch-thick (38 mm) mineral fiber insulation;
 - 3.2. 1/4-inch-thick (6.4 mm) wood structural panels;
 - 3.3. 3/8-inch (9.5 mm) particleboard;
 - 3.4. 1/4-inch (6.4 mm) hardboard;
 - 3.5. 3/8-inch (9.5 mm) gypsum board; or
 - 3.6. Corrosion-resistant steel having a base metal thickness of 0.016 inch (0.406 mm).

~~The above ignition barrier is not required where the foam plastic insulation has been tested in accordance with Section R316.6.~~

Reason: This proposal is an attempt to clarify requirements of the IRC in Section R316.5.4. Section R316.6 specifically allows foam plastic insulation meeting one of the tests specified in R316.6 to not be required to meet the prescriptive requirements of Sections R316.3 through R316.5. This proposal makes it explicitly clear Items 1 and 2 (and Item 3) of R316.5.4 are not a requirement for foam plastic insulation that complies with R316.6.

Cost Impact: None

RB171-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R316.5.4-RB-WOESTMAN

RB172 – 13

R316.5.11

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials
(rdavidson@maplegrovern.gov)

Revise as follows:

R316.5.11 Sill plates and headers. Foam plastic shall be permitted to be ~~spray~~ applied to a sill plates and headers ~~or installed in the perimeter joist space~~ without the thermal barrier specified in Section R316.4 subject to all of the following:

1. The maximum thickness of the foam plastic shall be 3 1/4 inches (83 mm).
2. The density of the foam plastic shall be in the range of 0.5 to 2.0 pounds per cubic foot (8 to 32 kg/m³).
3. The foam plastic shall have a flame spread index of 25 or less and an accompanying smoke-developed index of 450 or less when tested in accordance with ASTM E 84 or UL 723.

Reason: This proposal extends the same liberties to rigid foam that are currently enjoyed by spray foam products provided they meet the same criteria. Also, the language is tweaked to make clear that the application includes the rim joist area.

Cost Impact: None

RB172-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R316.5.11-RB-DAVIDSON

RB173 – 13

R316.5.11

Proponent: Michael D. Fischer, Kellen Company, representing the Center for the Polyurethanes Industry (mfischer@kellencompany.com)

Revise as follows:

R316.5.11 Sill plates and headers. Foam plastic shall be permitted to be spray applied to a sill plate and header without the thermal barrier specified in Section R316.4 ~~subject to all of the following:~~ when

- ~~1. The maximum thickness of the foam plastic shall be 3-1/4 inches (83 mm).~~
- ~~2. The density of the foam plastic shall be in the range of 0.5 to 2.0 pounds per cubic foot (8 to 32 kg/m³).~~
3. The foam plastic shall have has a flame spread index of 25 or less and an accompanying smoke-developed index of 450 or less, at the maximum thickness and density intended for use, when tested in accordance with ASTM E 84 or UL723.

Reason: The two, main applications for spray-applied foam plastic in sill plate and joist header areas are insulation and air sealing. Sill plates and joist headers (a.k.a. rim joists or band joists), by virtue of their location and function, exist in attics, crawl spaces, concealed spaces between floors and / or basements. In addition to location limitations, the relative volume available in these locations (into which the spray-applied foam plastic will be installed) is small and highly compartmentalized due to the floor / ceiling joists (see Commentary Figure R316.5.11). The intent of this section is to waive the prescriptive thermal barrier requirement for very limited amounts of foam plastic insulation in very specific and compartmentalized locations.

Although originally based on industry testing, the current limitations of 3-1/4 inches thickness and a density range of 0.5 to 2.0 lbs/cu-ft appear somewhat arbitrary and unnecessarily restrictive to products that provide flame spread index \leq 25 and smoke developed index \leq 450; for example 4 inches thickness and 2.2 lbs/cu-ft or 6-inches thickness at 0.5 lbs/cu-ft.

The intent of this proposal is not to circumvent provisions for interior finishes or plastic trim.

Cost Impact: None.

RB173-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R316.5.11-RB-FISCHER

RB174 – 13

R316.6

Proponent: Tony Crimi, A.C. Consulting Solutions, Inc., representing North American Insulation Manufacturers Association (NAIMA) (tcrimi@sympatico.ca)

Revise as follows:

R316.6 Specific approval. Foam plastic not meeting the requirements of Sections R316.3 through R316.5 shall be specifically *approved* on the basis of one of the following *approved* tests: NFPA 286 with the acceptance criteria of Section R302.9.4, FM4880, UL 1040, or UL 1715, or fire tests related to actual end-use configurations. Approval shall be based on the actual end use configuration and shall be performed on the finished foam plastic assembly in the maximum thickness intended for use. Foam plastics that are used as an interior finish on the basis of special tests shall also conform to the smoke-developed requirements of Section R302.9.4 or Section R316.3. Assemblies tested shall include seams, joints and other typical details used in the installation of the assembly and shall be tested in the manner intended for use.

Reason: At a minimum, the provision for special approvals for foamed plastics, which waives other requirements of the IRC for foamed plastics needs to provide a comparable level of performance and safety to the existing provisions. The exception for foamed plastics in R316.6 does not adequately cover smoke developed performance of foamed plastics. Current requirements for glass fiber, mineral fiber, cellulose and reflective plastic core insulation all require both flame spread and smoke development requirements either based on ASTM E84 or UL 723 or R302.10. Alternative methods are acceptable for use, however, their performance level needs to address the same hazards as the base requirement, plus any additional hazards that might arise as a result of a specific material. This proposal makes the section more consistent with the parallel provision in the IBC.

Justification: For all other thermal and sound insulating materials within the IRC, including non-combustible insulation materials, the minimum performance level for materials permitted to be used includes at least some requirements for both flame spread (fire growth) and smoke production. These requirements are primarily based on either ASTM E84 testing or alternative methods such as NFPA 286 and CAN/ULC-S102.2. However, in the case of foamed plastics, of the four alternative test methods permitted by 2603.9, only NFPA 286 contains any limits on smoke developed for any foamed plastics by virtue of the inclusion of a reference to section R302.9.4.

Room corner tests such as FM 4880, UL 1040, NFPA 286 or UL 1715 do evaluate fire growth and flashover. However, with the exception of the criteria for NFPA 286 in R302.9.4, the pass/fail criteria proposed for the room corner tests in the proposed acceptance criteria do not include quantitative evaluation of smoke density. Criteria for fire and smoke performance of building materials are based as much on issues arising from smoke production from burning materials, and smoke migration within the occupied spaces. It is not reasonable to provide an exception to the basic ASTM E84 flame spread and smoke developed requirements which apply to all other types of insulations, even non-combustible insulations, for foamed plastics based on room corner tests unless the limits on smoke production are applied to all of the room corner tests.

There are numerous reported instances of the hazards associated with smoke production from building materials. One is the tragic fire at the Greenwood Health Center in Hartford, CT on Feb 26 2003. The New York Times quoted Chief Charles A. Teale of the Hartford Fire Department as stating that "Most of the 10 residents killed, ranging in ages from 27 to 76, died of smoke inhalation". The same article further goes on to quote officials as saying: "The nursing home itself suffered little damage, though, and the fire was put out in about 15 minutes. Most of the residents were then led back inside, and by midday, 84 of the 148 residents remained at the center".

It is reasonable to allow alternative methods of testing materials to determine their acceptability for use, however, their performance criteria needs to address the same hazards as the base requirement, plus any additional hazards that might arise as a result of a specific material.

Cost Impact: This code change proposal will not increase the cost of construction.

RB174-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R316.6-RB-CRIMI.doc

RB175 – 13

R316.5.12, R316.8 (New), Chapter 44

Proponent: Jay Crandell, P.E., ARES Consulting, representing Foam Sheathing Committee of the American Chemistry Council – Plastics Division (Jcrandell@aresconsulting.biz)

Revise as follows:

R316.5.12 Sheathing. Foam plastic insulation used as sheathing shall comply with Section R316.3 and Section R316.4. Where the foam plastic sheathing is exposed to the *attic* space at a gable or knee wall, the provisions of Section R316.5.3 shall apply. Where foam plastic insulation is used as exterior wall sheathing on framed wall assemblies, it shall comply with Section R316.8.

R316.8 Wind Resistance. Foam plastic insulation complying with ASTM C 578 and ASTM C 1289 and used as exterior wall sheathing on framed wall assemblies shall comply with SBCA FS 100 for wind pressure resistance unless installed directly over a sheathing material that is separately capable of resisting the wind load or otherwise exempted from the scope of SBCA FS 100.

Add new standards to Chapter 44 as follows:

SBCA

Standard Reference	Title	Referenced in code section number
FS 100-12	<u>Standard Requirements for Wind Pressure Resistance of Foam Plastic Insulating Sheathing Used in Exterior Wall Covering Assemblies</u> R316.8

Reason: This ANSI standard (FS 100-12) was approved for the 2015 IBC. It also is needed in the IRC to address the use of foam plastic insulating sheathing in exterior wall covering assemblies where resistance to wind pressure is required. This standard provides a methodology by which a manufacturer can qualify their product, through testing, to meet the requirements of the I-codes in establishing the wind pressure resistance of the product. It also provides for on-going quality control procedures to ensure that the product continues to meet its qualified wind pressure resistance. The ANSI standard supplements the applicable ASTM materials standards also referenced in the code change proposal. The current version of the standard is available at www.sbcindustry.com/fs100.php

Cost Impact: The code change proposal will increase the cost of construction.

Analysis: A review of the standards proposed for inclusion in the code, [SBCA FS 100-12] with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

RB175-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R316.8 (NEW)-RB-CRANDELL

RB176 – 13

R317.3

Proponent: Randall Shackelford, P.E., representing Simpson Strong-Tie Co., Inc.
(rshackelford@strongtie.com)

Revise Sections as follows:

R317.3 Fasteners and connectors in contact with preservative-treated and fire-retardant-treated wood. Fasteners, including nuts and washers, and connectors in contact with preservative-treated wood and fire-retardant-treated wood shall be in accordance with this section. The coating weights for zinc-coated fasteners shall be in accordance with ASTM A 153. Stainless steel driven fasteners shall be in accordance with the material requirements of ASTM F 1667.

Reason: The reason for this proposal is to specify the permissible types of stainless steel that driven fasteners used with treated wood can be manufactured from.

ASTM F 1667 reads as follows:

6. Material Requirements

- 6.1 Steel wire used in the manufacture of driven fasteners shall be of low carbon, medium-low carbon, or medium-high carbon.
- 6.2 Stainless steel wire used in the manufacture of driven fasteners shall be of Types 302, 304, 305, or 316.
So the intent here is to require fasteners used with treated wood to be manufactured from Types 302, 304, 305, or 316 stainless steel.

There has been a lot of work done on fasteners and connectors in contact with treated wood in the last 8-10 years. All the testing and historical performance of stainless steel were based on the traditional use of 300 series stainless steel. Yet there are many types of stainless steel, and some are much less corrosion resistant than others. By limiting the types of stainless steel to these specific series, it ensures that the stainless steel fasteners will be corrosion resistant when exposed to treated wood.

There is precedent for this. Section 402.1.1 specifies that for wood foundations stainless steel fasteners must be "of Type 304 or 316 stainless steel". Section R905.10.4 states "Copper, brass, bronze, copper alloy and 300-series stainless steel fasteners shall be used for copper roofs." Further, ASTM F 1667 is already specified for several different types of fasteners in the IRC. The result of this proposal is not to require the exclusive use of 300-series stainless steel fasteners. This section permits hot-dipped, zinc-coated galvanized steel, stainless steel, silicon bronze, or copper fasteners. The existing sentence before the added one is meant to specify a minimum coating weight for the galvanized fasteners so they perform as expected. The new proposed sentence does the same thing for stainless steel fasteners.

Cost Impact: The vast majority of driven stainless steel fasteners are manufactured from 300 series stainless steel. However, if a manufacturer were supplying the lesser-performing (and lower cost) stainless steel types and a builder had to use the standard 300 series stainless steel instead, there could be a cost increase. But the increase in performance would justify the additional cost. However, the use of the stainless steel fastener is not required anyway, as stated in the reason statement.

RB176-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R317.3-RB-SHACKELFORD

RB177 – 13

R320.1, R320.1.1 (New)

Proponent: Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee
(cbaldassarra@rjagroup.com)

Revise as follows:

R320.1 Scope. Where there are four or more *dwelling units* ~~or sleeping units~~ in a single structure, the provisions of Chapter 11 of the *International Building Code* for Group R-3 shall apply.

R320.1.1 Guest rooms. A dwelling with guestrooms shall comply with the provisions of Chapter 11 of the *International Building Code* for Group R-3. For the purpose of applying the requirements of IBC chapter 11, *guestrooms* shall be considered sleeping units.

Exception: Lodging houses.

Reason: Residential and institutional occupancies with 6 or more residents are within the scope of the IRC only and cannot be constructed under the IRC. This is based on both the scope of the IRC and IBC. Scoping provisions of the IRC and IBC, and code provisions within the IBC permit some residential and institutional occupancies with 5 or fewer occupants to be constructed in accordance with the IRC as an alternative to compliance with the IBC. The IBC occupancies that allow use of the IRC for five or fewer guests are: Group R-3 lodging houses (see G40-13), lodging houses are also in the scope of the IRC in section 101.2 #2; section 308.3.1 for Group I-1 and 308.4.1 for Group I-2.

Per the 2010 ADA Standard for Accessible Design and the IBC 1103.2.11 owner occupied lodging houses with 5 or fewer guests are not required to be accessible. So compliance with the IRC works for this condition without causing any conflicts with the IBC. If the lodging house is not owner occupied or accommodates more than 5 guests the building is outside of the scope of the IRC and accessibility is addressed since the building will be constructed per the IBC.

The issue addressed by this code change is how to handle 2012 IBC Sections 308.3.1 for I-1 and 308.4.1 for I-2. These sections classify the building as Group R-3 or allow use of the IRC for these institutional uses that have 5 or fewer care recipients. If it is classified as Group R-3 then IBC section 1107.6.3 provides requirements for accessibility of the building. Clearly the intent of Section 1107.6.3 is that if you have 4 or 5 care recipients the "sleeping units" must be Type B (subject to Section 1107.7 exceptions). The problem is that IRC structures by scope and definition do not have sleeping units:

R101.2 Scope. The provisions of the *International Residential Code for One- and Two-family Dwellings* shall apply to the construction, *alteration*, movement, enlargement, replacement, repair, equipment, use and occupancy, location, removal and demolition of detached one- and two-family dwellings and townhouses not more than three stories above *grade plane* in height with a separate means of egress and their *accessory structures*.

DWELLING. Any building that contains one or two *dwelling units* used, intended, or designed to be built, used, rented, leased, let or hired out to be occupied, or that are occupied for living purposes.

Adding the IBC definition of sleeping units to the IRC does not work because IBC sleeping units are not part of a dwelling unit. The current IBC definition of sleeping units states that "Such rooms and spaces that are also part of a dwelling unit are not sleeping units". Having a building constructed under the IRC that is not a dwelling unit, but a building with multiple sleeping units, is outside of the scope of the IRC.

Any of the Group I uses for 5 and under that are built to the IRC should have the same accessibility requirements as a Group R-3 constructed building. The IRC does not have sleeping units. Under the IRC such facilities are a dwelling unit with guest rooms. While the IRC contains a definition for guestroom, it is not clear on how the guestrooms should be counted for accessibility. Since the resident rooms are not sleeping units but guest rooms the current Section R320.1 does not require accessibility per Chapter 11 of the IBC for any IRC structures that have multiple guest rooms in one dwelling unit. The solution proposed here is to delete sleeping units from Section R320.1 to remove the confusion about the scope of sleeping units in the IRC and to add new Section R320.1.1 to address guestrooms. The statement that guestrooms shall be considered sleeping units for the purpose of applying IBC Chapter 11 is necessary because we cannot change the IBC language until the 2018 cycle. We plan to propose a more coordinated change for both the IBC and IRC to address this issue in the 2018 cycle. The exception for lodging houses is to maintain the exemption from accessibility requirements for lodging houses consistent with IBC Section 1103.2.11.

The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty five meetings - all open to the public.

Cost Impact: None

RB177-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R320.1-RB-BALDASSARRA

RB178 – 13

R320.1

Proponent: Steve Orlowski, representing National Association of Home Builders (NAHB)
(sorlowski@nahb.org)

Add new text as follows:

R320.1 Scope. Where there are four or more *dwelling* units or sleeping units in a single structure, the provisions of Chapter 11 of the *International Building Code* for Group R-3 shall apply.

Exception: Owner-occupied lodging houses with five or fewer guestrooms or sleeping units constructed in accordance with the *International Residential Code* are not required to be accessible.

Reason: Based on the action taken during the Group A Hearings, Lodging houses are now referenced in the IBC. It was noted during the hearings, that lodging houses with five or fewer guest rooms or sleeping units are not required to be accessible under the 2010 ADA Guidelines. This proposal simply clarifies that lodging houses are not subject to the provisions of Chapter 11 of the IBC if they contain five or fewer guest rooms or sleeping units.

Cost Impact: The code change proposal will not increase the cost of construction.

RB178-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

R320.1-RB-ORLOWSKI

RB179– 13

R320.2 (New)

Proponent: Dominic Marinelli, representing United Spinal Association (dmarinelli@accessibility-services.com)

Revise as follows:

R320.2 Type C units. Dwelling units and townhouses shall be provided with the accessible features for Type C units in accordance with the applicable portions of Chapter 10 of ICC A117.1. Type C units are permitted to be designed and constructed as accessible units, Type A units or Type B units.

Exception: An exterior circulation path is not required where site constraints beyond the control of the owner prevent its installation.

Reason: As the Type C dwelling unit technical criteria are now included in the 2009 ANSI A117.1 Standard (Section 1005) we would like to insert A117.1 as a reference standard in the IRC to make it clear for jurisdictions that wish to adopt Section 1005 of ANSI A117.1 through legislative scoping amendments to the IRC, that A117.1 is indeed a reference standard applicable for the IRC. The scoping in R320.2 will trigger compliance with Type C unit criteria, while the exception permits a reduction in Type C criteria based on site impracticality or other restrictions outside the owner's control.

Type C units are representative of the term also known as "Visitability" . Visitability is a growing trend nationwide that refers to single-family or owner-occupied housing designed in such a way that it can be lived in or visited by people who have trouble with steps or who use wheelchairs or walkers. The visitability criteria are intended to ensure that in new construction, certain basic accessible features are included at the time of construction, including a unit entrance located on a circulation path complying with Type C criteria, an accessible circulation path that connects the entrance of the unit with one toilet or bathroom, one habitable space with an area 70 square feet minimum, and if a food preparation area is provided on the entrance level, the circulation path shall connect to the food preparation area. There are also features for the bathroom that include reinforcements for grab bars and clearances similar to those required by the Fair Housing Act at the toilet room or bathroom on the entrance level of the unit. Doors along the unit interior circulation path shall have a clear width of 31 ¾ inches – the same as required by FHA.

As stated on Concrete Change's website by Eleanor Smith, a leading advocate for visitability, "First, the spirit of Visitability is as important as the list of features. That spirit says it's not just unwise, but unacceptable that new homes continue to be built with gross barriers — given the how easy it is to build basic access in the great majority of new homes, and given the harsh effects major barriers have on so many people's lives. These easily-avoided barriers cause daily drudgery; unsafe living conditions; social isolation; and forced institutionalization. Visitability is a movement to change home construction practices so that virtually all new homes — not merely those custom-built for occupants who currently have disabilities — offer a few specific features making the home easier for mobility-impaired people to live in and visit. Several people have asked for a more detailed definition, noting that the list of required features has not been identical in all Visitability-type legislation, handouts and other materials."

The inclusion of the Type C criteria in the A117.1 standard was the culmination of a task group that worked to take the various visitability ordinances in place throughout the country and incorporate visitability criteria into A117.1, which designers and builders were familiar with, so that when Visitability was presented to them, they could look to a familiar "standard" to understand what "Visitability" means in terms of design and construction.

Cost Impact: Indicate whether or not this proposal will impact construction costs.

RB179-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R320.2-RB-MARINELLI

RB180 – 13

R322.1, R322.1.6, R322.1.8, R322.1.9, R322.2, R322.2.1, R322.3, R322.3.2, R322.3.3, R322.3.4, and R106.1.3

Proponent: Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency (Gregory.wilson2@fema.dhs.gov; Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency (rcquinn@earthlink.net).

Revise as follows:

R322.1 General. Buildings and structures constructed in whole or in part in flood hazard areas (including A or V Zones and Coastal A Zones) as established in Table R301.2(1) shall be designed and constructed in accordance with the provisions contained in this section. Buildings and structures located in whole or in part in identified floodways shall be designed and constructed in accordance with ASCE 24.

R322.1.6 Protection of mechanical and electrical systems. Electrical systems, equipment and components; heating, ventilating, air conditioning; plumbing appliances and plumbing fixtures; duct systems; and other service equipment shall be located at or above the elevation required in Section R322.2 (flood hazard areas including A Zones) or R322.3 (coastal high-hazard areas including V Zones and Coastal A Zones). If replaced as part of a substantial improvement, electrical systems, equipment and components; heating, ventilation, air conditioning and plumbing appliances and plumbing fixtures; duct systems; and other service equipment shall meet the requirements of this section. Systems, fixtures, and equipment and components shall not be mounted on or penetrate through walls intended to break away under flood loads.

Exception: Locating electrical systems, equipment and components; heating, ventilating, air conditioning; plumbing appliances and plumbing fixtures; duct systems; and other service equipment is permitted below the elevation required in Section R322.2 (flood hazard areas including A Zones) or R322.3 (coastal high-hazard areas including V Zones and Coastal A Zones) provided that they are designed and installed to prevent water from entering or accumulating within the components and to resist hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to the design flood elevation in accordance with ASCE 24. Electrical wiring systems are permitted to be located below the required elevation provided they conform to the provisions of the electrical part of this code for wet locations.

R322.1.8 Flood-resistant materials. Building materials used below the elevation required in Section R322.2 (flood hazard areas including A Zones) or R322.3 (coastal high-hazard areas including V Zones and Coastal A Zones) shall comply with the following:

1. All wood, including floor sheathing, shall be pressure-preservative-treated in accordance with AWP A U1 for the species, product, preservative and end use or be the decay-resistant heartwood of redwood, black locust or cedars. Preservatives shall be listed in Section 4 of AWP A U1.
2. Materials and installation methods used for flooring and interior and exterior walls and wall coverings shall conform to the provisions of FEMA-TB-2.

R322.1.9 Manufactured homes. New or replacement manufactured homes shall be elevated in accordance with Section R322.2 (flood hazard areas including A Zones) or Section R322.3 in coastal high-hazard areas (V Zones and Coastal A Zones). The anchor and tie-down requirements of Sections AE604 and AE605 of Appendix E shall apply. The foundation and anchorage of manufactured homes to be located in identified floodways shall be designed and constructed in accordance with ASCE 24.

R322.2 Flood hazard areas (including A Zones). All areas that have been determined to be prone to flooding but not subject to high-velocity wave action shall be designated as flood hazard areas. Flood hazard areas that have been delineated as subject to wave heights between 1.5 feet and 3 feet or otherwise designated by the jurisdiction shall be designated as Coastal A Zones and are subject to the requirements in Section R322.3. All buildings and structures constructed in whole or in part in flood hazard areas shall be designed and constructed in accordance with Sections R322.2.1 through R322.2.3.

R322.2.1 Elevation requirements.

1. Buildings and structures in flood hazard areas not designated as Coastal A Zones shall have the lowest floors elevated to or above the design flood elevation.
- ~~2. Buildings and structures in flood hazard areas designated as Coastal A Zones shall have the lowest floors elevated to or above the base flood elevation plus 1 foot (305 mm), or to the design flood elevation, whichever is higher.~~
- ~~2.3~~ In areas of shallow flooding (AO Zones), buildings and structures shall have the lowest floor (including basement) elevated at least as high above the highest adjacent grade as the depth number specified in feet (mm) on the FIRM, or at least 2 feet (610 mm) if a depth number is not specified.
- ~~3.4~~ Basement floors that are below grade on all sides shall be elevated to or above the design flood elevation.

Exception: Enclosed areas below the design flood elevation, including basements whose floors are not below grade on all sides, shall meet the requirements of Section R322.2.2.

R322.3 Coastal high-hazard areas (including V Zones and Coastal A Zones, where designated).

Areas that have been determined to be subject to wave heights in excess of 3 feet (914 mm) or subject to high-velocity wave action or wave-induced erosion shall be designated as coastal high-hazard areas. Flood hazard areas that have been delineated as subject to wave heights between 1.5 feet and 3 feet or otherwise designated by the jurisdiction shall be designated as Coastal A Zones. All buildings and structures constructed in whole or in part in coastal high-hazard areas and in Coastal A Zones, where designated, shall be designed and constructed in accordance with Sections R322.3.1 through R322.3.6.

R322.3.2 Elevation requirements.

1. All buildings and structures erected within coastal high-hazard areas and Coastal A Zones, shall be elevated so that the lowest portion of all structural members supporting the lowest floor, with the exception of mat or raft foundations, piling, pile caps, columns, grade beams and bracing, is:
 - 1.1 Located at or above the design flood elevation, if the lowest horizontal structural member is oriented parallel to the direction of wave approach, where parallel shall mean less than or equal to 20 degrees from the direction of approach, or
 - 1.2 Located at the base flood elevation plus one foot (305 mm), or the design flood elevation, whichever is higher, if the lowest horizontal structural member is oriented perpendicular to the direction of wave approach, where perpendicular shall mean greater than 20 degrees from the direction of approach.
2. Basement floors that are below grade on all sides are prohibited.
3. The use of fill for structural support is prohibited.
4. Minor grading, and the placement of minor quantities of fill, shall be permitted for landscaping and for drainage purposes under and around buildings, and for support of parking slabs, pool decks, patios, and walkways.

Exception: Walls and partitions enclosing areas below the design flood elevation shall meet the requirements of Sections R322.3.4 and R322.3.5.

R322.3.3 Foundations. All buildings and structures erected in coastal high-hazard areas and Coastal A Zones, shall be supported on pilings or columns and shall be adequately anchored to such pilings or columns. The space below the elevated building shall be either free of obstruction or, if enclosed with

walls, the walls shall meet the requirements of Section R322.3.4. Piling shall have adequate soil penetrations to resist the combined wave and wind loads (lateral and uplift). Water loading values used shall be those associated with the design flood. Wind loading values shall be those required by this code. Pile embedment shall include consideration of decreased resistance capacity caused by scour of soil strata surrounding the piling. Pile systems design and installation shall be certified in accordance with Section R322.3.6. Spread footing, mat, raft or other foundations that support columns shall not be permitted where soil investigations that are required in accordance with Section R401.4 indicate that soil material under the spread footing, mat, raft or other foundation is subject to scour or erosion from wave-velocity flow conditions. If permitted, spread footing, mat, raft or other foundations that support columns shall be designed in accordance with ASCE 24. Slabs, pools, pool decks and walkways shall be located and constructed to be structurally independent of buildings and structures and their foundations to prevent transfer of flood loads to the buildings and structures during conditions of flooding, scour or erosion from wave-velocity flow conditions, unless the buildings and structures and their foundation are designed to resist the additional flood load.

Exception: In Coastal A Zones, stem wall foundations supporting a floor system above and backfilled with soil or gravel to the underside of the floor system shall be permitted provided the foundations are designed to account for wave action, debris impact, erosion, and local scour. Where soils are susceptible to erosion and local scour, stem wall foundations shall have deep footings to account for the loss of soil.

R322.3.4 Walls below design flood elevation. Walls and partitions are permitted below the elevated floor, provided that such walls and partitions are not part of the structural support of the building or structure and:

1. Electrical, mechanical, and plumbing system components are not to be mounted on or penetrate through walls that are designed to break away under flood loads; and
2. Are constructed with insect screening or open lattice; or
3. Are designed to break away or collapse without causing collapse, displacement or other structural damage to the elevated portion of the building or supporting foundation system. Such walls, framing and connections shall have a design safe loading resistance of not less than 10 (479 Pa) and no more than 20 pounds per square foot (958 Pa); or
4. Where wind loading values of this code exceed 20 pounds per square foot (958 Pa), the construction documents shall include documentation prepared and sealed by a registered design professional that:
 - 4.1. The walls and partitions below the design flood elevation have been designed to collapse from a water load less than that which would occur during the design flood.
 - 4.2. The elevated portion of the building and supporting foundation system have been designed to withstand the effects of wind and flood loads acting simultaneously on all building components (structural and nonstructural). Water loading values used shall be those associated with the design flood. Wind loading values used shall be those required by this code.
5. In Coastal A Zones walls shall be provided with flood openings that meet the criteria of Section 322.2.2.

Add new text as follows:

R106.1.3 Information for construction in flood hazard areas. For buildings and structures located in whole or in part in flood hazard areas as established by Table R301.2(1), construction documents shall include:

1. Delineation of flood hazard areas, floodway boundaries and flood zones and the design flood elevation, as appropriate;
2. The elevation of the proposed lowest floor, including basement; in areas of shallow flooding (AO zones), the height of the proposed lowest floor, including basement, above the highest adjacent finished grade; and

3. The elevation of the bottom of the lowest horizontal structural member in coastal high hazard areas (V Zone) and in Coastal A Zones where such zones are delineated on flood hazard maps identified in Table R301.2(1) or otherwise designated by the jurisdiction; and
4. If design flood elevations are not included on the community's Flood Insurance Rate Map (FIRM), the building official and the applicant shall obtain and reasonably utilize any design flood elevation and floodway data available from other sources.

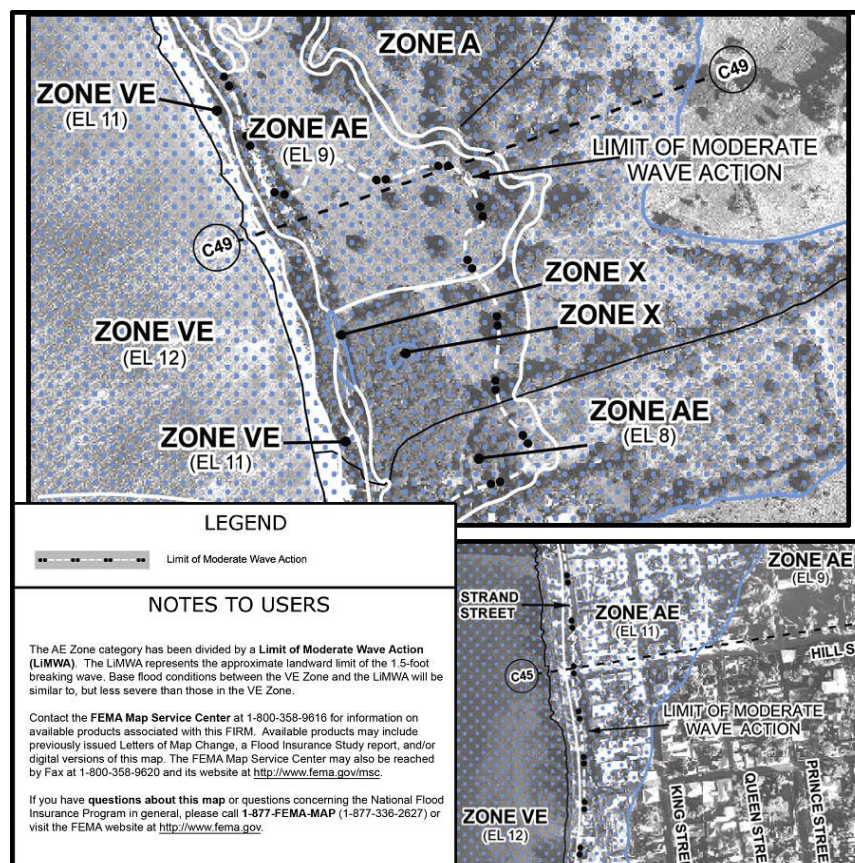
Reason: This proposal would require that dwellings in areas designated as "Coastal A Zones" meet the requirements of Section 322.3 for dwellings in coastal high hazard areas (Zone V), including open foundations (pilings or columns) with an exception that permits filled stemwalls.

The Coastal A Zone (CAZ) has been in ASCE 7 since the late '90s and in ASCE 24 since its initial publication in 1998. Recognition of CAZ was added to the 2009 edition of IRC Section R322.2, with the only requirement that if the area subject to waves between 1.5 ft and 3 ft is delineated, then the area is designated a Coastal A Zone and lowest floors shall be at least one-foot above the design flood elevation (i.e., in all other respects, the 2009 and 2012 IRC requires dwellings in Coastal A Zones to comply with the requirements for Zone A).

The inland boundary of the coastal high hazard area (Zone V) is drawn by FEMA where breaking wave heights are expected to drop below 3.0 ft during base flood conditions. The requirements for foundations of dwellings that are located just landward of the Zone V boundary are predicated on the assumption that hydrodynamic loads associated with waves – even waves that are 2.9-ft – are not significant and that conventional foundations such as perimeter walls can resist those loads and associated erosion and local scour.

FEMA's many post-disaster investigations after severe coastal storms have long recommended application of coastal high hazard area (Zone V) requirements to areas inland of the Zone V/Zone A boundary – in the area subject to waves between 1.5 ft and 3 ft – the area now referred to as "Coastal A Zone". Starting in fiscal year 2009, all coastal flood studies by FEMA will include analyses of moderate wave action and FIRMs will show the Limit of Moderate Wave Action (LiMWA).

The total land area that is likely to be designated as CAZ is small. FEMA has estimated that less than 3 percent of all mapped flood hazard areas are Zone V and the LiMWA generally is determined to be a relatively short distance inland from the Zone V boundary. The graphic below is from the December 2008 Procedure Memorandum No. 50 which established FEMA's policy to delineate the LiMWA on FIRMs



Every FEMA publication on coastal construction since mid-2000 has recommended the use of Zone V construction requirements in Coastal A Zones. As early as 1979 some communities were augmenting the minimum NFIP requirements because of observed wave damage to conventional, closed foundations (Santa Rosa Island Authority, Florida, 1979). FEMA's first Coastal Construction Manual, published in 1981, recognized that "high velocity water may be experienced due to the forward momentum of

breaking waves, especially in the vicinity of the V zone/A zone interface.” The defined term “Coastal A Zone” is used in the 1986 revision of the Coastal Construction Manual, and numerous papers and investigations have followed. Research performed in 1992 for the U.S. Army Corps of Engineers demonstrated that buildings on typical Zone A foundations (masonry walls, masonry piers, shallow piles, and slabs) “would be subject to failure for shallow erosion and /or wave heights less than 2-3 feet.”

Observations after Superstorm Sandy continue to reinforce the damage potential in areas just inland of the Zone V boundary. FEMA’s report based on field investigations will be completed mid-2013. Given that open foundations (piles and columns) perform well under velocity and wave conditions, FEMA believes it is time for the IRC to acknowledge that dwellings in Coastal A Zones should meet the same requirements as dwellings in coastal high hazard areas – with the exception of filled stemwalls that account for the potential for scour and erosion. Surveys and press reports after major coastal events such as Superstorm Sandy regularly report that citizens support stricter requirements (see www.reuters.com/article/2012/11/27/us-storm-sandy-newjersey-idUSBRE8AQ0V620121127, http://blog.nj.com/njv_editorial_page/2012/11/editorial_rebuild_carefully.html).

Cost Impact: This proposal will increase the cost of construction in areas shown on Flood Insurance Rate Maps as seaward of the Limit of Moderate Wave Action (or if a community elects to designate areas as “Coastal A Zones”). However, the risk of wave-induced damage or damage due to erosion and local scour is significantly reduced.

RB180-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R322.1-RB-QUINN-WILSON

RB181 – 13

R322.1.4.2

Proponent: Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency (Gregory.wilson2@fema.dhs.gov); Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency (rcquinn@earthlink.net).

Revise as follows:

R322.1.4.2 Determination of impacts. In riverine flood hazard areas where design flood elevations are specified but floodways have not been designated, the applicant shall demonstrate with hydrologic and hydraulic analyses that the effect of the proposed buildings and structures on design flood elevations, including fill, when combined with all other existing and anticipated flood hazard area encroachments, will not increase the design flood elevation more than one foot (305 mm) at any point within the jurisdiction.

Reason: The existing language simply requires applicants to demonstrate the effect of proposed buildings and structures on DFEs, without saying how it should be accomplished. This places an undue burden on the building official. The added phrase clarifies that analyses are required, specifically hydrologic and hydraulic analyses that are common terms in civil and water resources engineering. FEMA uses those terms to broadly refer to the study methods used to delineate flood hazard areas and to model the floodway.

Cost Impact: None

RB181-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R322.1.4.2-RB-QUINN-WILSON

RB182 – 13

R322.1.5

Proponent: Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency (Gregory.wilson2@fema.dhs.gov); Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency (rcquinn@earthlink.net).

Revise as follows:

R322.1.5 Lowest floor. The lowest floor shall be the lowest floor of the lowest enclosed area, including basement, but excluding any unfinished flood-resistant enclosure that is useable solely for vehicle parking, building access or limited storage provided that such enclosure is not built so as to render the building or structure in violation of this section.

Reason: The addition makes this provision match the definition in the NFIP regulations at 44 CFR 59.1 which is shown below (bold emphasis added to show where in the federal definition the word appears):

"Lowest Floor means the **lowest** floor of the lowest enclosed area (including basement). An unfinished or flood resistant enclosure, usable solely for parking of vehicles, building access or storage in an area other than a basement area is not considered a building's lowest floor; provided, that such enclosure is not built so as to render the structure in violation of the applicable non-elevation design requirements of Sec. 60.3."

Cost Impact: None

RB182-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R322.1.5-RB-QUINN-WILSON

RB183 – 13

R322.1.8

Proponent: Dennis Pitts, American Wood Council, representing American Wood Council
(dpitts@awc.org)

Revise as follows:

R322.1.8 Flood damage-resistant materials. Building materials and installation methods used below the elevation required in Section R322.2 (flood hazard areas including A Zones) or R322.3 (coastal high-hazard areas including V Zones) shall be flood damage-resistant materials that conform to the provisions of FEMA TB-2. ~~comply with the following:~~

- ~~1. All wood, including floor sheathing, shall be pressure-preservative-treated in accordance with AWWA U1 for the species, product, preservative and end use or be the decay-resistant heartwood of redwood, black locust or cedars. Preservatives shall be listed in Section 4 of AWWA U1.~~
- ~~2. Materials and installation methods used for flooring and interior and exterior walls and wall coverings shall conform to the provisions of FEMA TB-2.~~

Reason: This proposal reflects changes approved to the IBC in FS150-12. Adoption of this change will make the IBC and IRC consistent. The specific requirement for preservative-treated wood or naturally decay-resistant wood below the elevation required in Section R322.2 is deleted because wood products such as plywood sheathing, plywood panel siding, and stud walls have been shown to be resistant to the effects of flood exposure without the aid of preservatives or the use of naturally durable wood.

Primary considerations for material performance and use in flood hazard areas are outlined in FEMA TB2, *Flood Resistant Materials Requirements for Buildings Located in Special Flood Hazard Areas*, which is already referenced in the IRC. A flood damage resistant material is one that is "... capable of withstanding direct and prolonged contact with floodwaters without sustaining significant damage." Evaluation consists of consideration of material performance following 72 hour immersion and presence of only limited damage requiring no more than cosmetic repair (i.e. cleaning, sanitizing and resurfacing such as sanding, repair of joints, repainting). Research conducted by Oak Ridge National Laboratory and Tuskegee University (ORNL/TM-2005/34 *Field Testing of Energy-Efficient Flood-Damage-Resistant Residential Envelope Systems Summary Report*, June 2004) and field observations of material performance from actual floods were considerations in the update of FEMA TB2-2008. Within TB2 examples of wood that are not required to be preservative treated for flood damage resistance that may form a part of exterior walls and floors include studs and Exterior and Marine plywood used as wall sheathing. While preservative treated studs and preservative treated exterior plywood sheathing were not tested in the ORNL/Tuskegee study, it is not expected that presence of preservative treatment would improve the already acceptable performance of these materials.

General requirements for preservative treated or naturally durable wood for protection from decay and termites are addressed elsewhere in the IRC, and those applications will continue to be in effect, including in flood hazard areas.

Cost Impact: No increase in the cost of construction.

RB183-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R322.1.8-RB-PITTS

RB184 – 13

R322.1.8, R322.2.2, R322.3.2, R322.3.4, and R322.3.5

Proponent: Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency (Gregory.wilson2@fema.dhs.gov); Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency (rcquinn@earthlink.net).

Revise as follows:

R322.1.8 Flood-resistant materials. Building materials used below the elevation of the lowest floor required in Section R322.2 (flood hazard areas including A Zones) or R322.3 (coastal high-hazard areas including V Zones) shall comply with the following:

1. All wood, including floor sheathing, shall be pressure-preservative-treated in accordance with AWPA U1 for the species, product, preservative and end use or be the decay-resistant heartwood of redwood, black locust or cedars. Preservatives shall be listed in Section 4 of AWPA U1.
2. Materials and installation methods used for flooring and interior and exterior walls and wall coverings shall conform to the provisions of FEMA-TB-2.

R322.2.2 Enclosed area below lowest floor design flood elevation. Enclosed areas, including crawl spaces, that are below the lowest floor design flood elevation shall:

1. Be used solely for parking of vehicles, building access or storage.
2. Be provided with flood openings that meet the following criteria:
 - 2.1. There shall be a minimum of two openings on different sides of each enclosed area; if a building has more than one enclosed area below the design flood elevation, each area shall have openings on exterior walls.
 - 2.2. The total net area of all openings shall be at least 1 square inch (645 mm²) for each square foot (0.093 m²) of enclosed area, or the openings shall be designed and the construction documents shall include a statement by a registered design professional that the design of the openings will provide for equalization of hydrostatic flood forces on exterior walls by allowing for the automatic entry and exit of floodwaters as specified in Section 2.6.2.2 of ASCE 24.
 - 2.3. The bottom of each opening shall be 1 foot (305 mm) or less above the adjacent ground level.
 - 2.4. Openings shall be not less than 3 inches (76 mm) in any direction in the plane of the wall.
 - 2.5. Any louvers, screens or other opening covers shall allow the automatic flow of floodwaters into and out of the enclosed area.
 - 2.6. Openings installed in doors and windows, that meet requirements 2.1 through 2.5, are acceptable; however, doors and windows without installed openings do not meet the requirements of this section.

R322.3.2 Elevation requirements.

1. All buildings and structures erected within coastal high-hazard areas shall be elevated so that the lowest portion of all structural members supporting the lowest floor, with the exception of piling, pile caps, columns, grade beams and bracing, is:
 - 1.1 Located at or above the design flood elevation, if the lowest horizontal structural member is oriented parallel to the direction of wave approach, where parallel shall mean less than or equal to 20 degrees (0.35 rad) from the direction of approach, or
 - 1.2 Located at the base flood elevation plus 1 foot (305 mm), or the design flood elevation, whichever is higher, if the lowest horizontal structural member is oriented perpendicular to the direction of wave approach, where perpendicular shall mean greater than 20 degrees (0.35

- rad) from the direction of approach.
2. Basement floors that are below grade on all sides are prohibited.
3. The use of fill for structural support is prohibited.
4. Minor grading, and the placement of minor quantities of fill, shall be permitted for landscaping and for drainage purposes under and around buildings and for support of parking slabs, pool decks, patios and walkways.

Exception: Walls and partitions enclosing areas below the lowest floor design flood elevation shall meet the requirements of Sections R322.3.4 and R322.3.5.

R322.3.4 Walls below lowest floor design flood elevation. Walls and partitions are permitted below the lowest elevated floor, provided that such walls and partitions are not part of the structural support of the building or structure and:

1. Electrical, mechanical, and plumbing system components are not to be mounted on or penetrate through walls that are designed to break away under flood loads; and
2. Are constructed with insect screening or open lattice; or
3. Are designed to break away or collapse without causing collapse, displacement or other structural damage to the elevated portion of the building or supporting foundation system. Such walls, framing and connections shall have a design safe loading resistance of not less than 10 (479 Pa) and no more than 20 pounds per square foot (958 Pa); or
4. Where wind loading values of this code exceed 20 pounds per square foot (958 Pa), the construction documents shall include documentation prepared and sealed by a registered design professional that:
 - 4.1. The walls and partitions below the lowest floor design flood elevation have been designed to collapse from a water load less than that which would occur during the design flood.
 - 4.2. The elevated portion of the building and supporting foundation system have been designed to withstand the effects of wind and flood loads acting simultaneously on all building components (structural and nonstructural). Water-loading values used shall be those associated with the design flood. Wind-loading values shall be those required by this code.

R322.3.5 Enclosed areas below lowest floor design flood elevation. Enclosed areas below the lowest floor design flood elevation shall be used solely for parking of vehicles, building access or storage.

Reason: The lowest floor, as defined in R322.1.5, may be required to be above the design flood elevation (e.g., if a Coastal A Zone is designated or in a coastal high hazard area depending on orientation of the lowest horizontal structural member). Also, owners and builders may elect to elevate the lowest floor higher than the minimum required elevation. Whether lowest floors are higher by choice or by the code, the walls that enclose areas below the lowest floors should meet the requirements. Floodwaters can and do rise higher than the elevations specified on flood maps, which show the elevation of the base flood (the 1 percent-annual chance (100-year) flood).

FEMA has observed enclosures where breakaway walls have a horizontal failure joint precisely at the base flood elevation, and enclosures where flood damage-resistant materials are used only below the base flood elevation. When floodwaters rise even a slightly higher, damage results. This does not meet the overall intent nor the letter of the NFIP regulations.

Cost Impact: There is no cost increase for the majority of dwellings; there may be a small increase for those where walls would be built to have different characteristics above and below the design flood elevation (e.g., a failure joint or different materials above and below the required elevation).

RB184-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R322.1.8 #1-RB-QUINN-WILSON

RB185 – 13

R322.1.9

Proponent: Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency (Gregory.wilson2@fema.dhs.gov); Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency (rcquinn@earthlink.net).

Revise as follows:

R322.1.9 Manufactured homes. New or replacement *manufactured homes* shall be elevated in accordance with Section R322.2 (flood hazard areas including A Zones) or Section R322.3 in coastal high-hazard areas (V Zones). The anchor and tie-down requirements of the applicable state or federal requirements ~~Sections AE604 and AE605 of Appendix E~~ shall apply. The foundation and anchorage of *manufactured homes* to be located in identified floodways shall be designed and constructed in accordance with ASCE 24.

Reason: Many states and local jurisdictions do not adopt IRC Appendix E. Rather than point to an appendix that is rarely adopted, this proposal replaces the requirement for anchor and tie-downs with a general reference to state or federal requirements. This permits compliance with state manufactured home installation standards or HUD's installation standards, whichever is required. HUD's regulations at CFR § 3285.302 specifies that "foundations, anchoring, and support systems must be capable of resisting loads associated with design flood and wind events or combined wind and flood events, and homes must be installed on foundation supports that are designed and anchored to prevent floatation, collapse, or lateral movement of the structure."

Cost Impact: None; no change in requirements for anchoring and tie-down, just change to citation to the requirements.

RB185-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R322.1.9 #1-RB-QUINN-WILSON

RB186 – 13

R322.1.9

Proponent: Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency (Gregory.wilson2@fema.dhs.gov); Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency (rcquinn@earthlink.net).

Revise as follows:

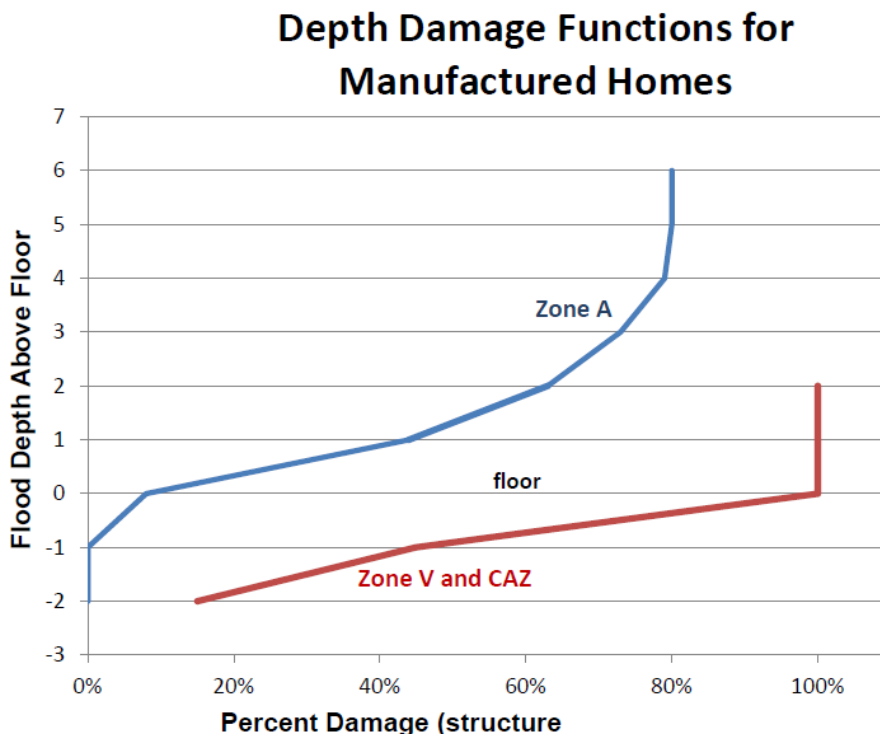
R322.1.9 Manufactured homes. The bottom of the frame of new and ~~New or~~ replacement manufactured homes ~~on foundations that conform to the requirements of Section R322.2 or Section R322.3, as applicable,~~ shall be elevated ~~to or above the elevations specified in accordance with~~ Section R322.2 (flood hazard areas including A Zones) or Section R322.3 in coastal high-hazard areas (V Zones). The anchor and tie-down requirements of Sections AE604 and AE605 of Appendix E shall apply. The foundation and anchorage of manufactured homes to be located in identified floodways shall be designed and constructed in accordance with ASCE 24

Reason: This proposal is based on the fact that manufactured homes are the most vulnerable type of structures in terms of risk of flood damage. The figures below illustrate how damage increases dramatically for just one foot of water above the lowest floor (walking surface). Requiring the bottom of the frame to be the reference point means the homes will be approximately one foot above the base flood elevation. Not only will the homes be less vulnerable to damage, owners will have lower flood insurance premiums.

The figure below is based on the data found in Table B-10 (Coastal A Zones and V Zones) and Table B-17 (all other SFHAs) *FEMA Benefit-Cost Analysis Re-engineering (BCAR), Flood Module Revision: Updates to Residential Depth Damage Functions (DDFs) and Guidance for Coastal Flooding* (January 2011; version 4.5.5). The riverine depth damage function curves for manufactured homes were originally developed by the NFIP many years ago and been used in FEMA's Benefit-Cost Analysis (BCA) software for years. FEMA convened an expert panel in 2010 to develop updated DDFs coastal high hazard areas and Coastal A Zones for various residential structures including manufactured homes.

The depth-damage functions show that a manufactured home in a Zone A will sustain more about 8% structure damage if floodwaters rise just to the elevation of the lowest floor (the walking surface), and more than 40% if water rises one foot higher. By requiring elevation based on the bottom of the frame, virtually no damage would be expected during base flood conditions.

If located in a Zone V or Coastal A Zone, the curve shows that a manufactured home will sustain nearly 100% damage if floodwaters rise to the elevation of the lowest floor. IRC R322.3.2 already references the bottom of the lowest horizontal structural member, which is the bottom of the frame.



Cost Impact: The cost of a foundation in Zone A will be marginally higher because of the approximately one additional foot that will have to be added to the foundation. The requirement to conform to the foundation requirements based on flood zone has always

been implicit in the NFIP requirement that manufactured homes be “elevated on a permanent foundation . . . and be securely anchored to an adequately anchored foundation system to resist floatation collapse and lateral movement” (see 44 CFR 60.3(c)(6)).

RB186-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R322.1.9 #2-RB-QUINN-WILSON

RB187 – 13

R322.1.9 (New)

Proponent: Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency (Gregory.wilson2@fema.dhs.gov); Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency (rcquinn@earthlink.net).

Add new text as follows

R322.1.9 Stairways and ramps. Stairways and ramps that are located below the lowest floor elevations specified in Sections R322.2.1 or R322.3.2, as applicable to the flood hazard area, shall either:

1. Be designed and constructed to resist flood-related loads and to minimize transfer of flood-related loads to the building or structure; or
2. Break away during design flood conditions without causing damage to the building or structure; or
3. Be retractable, or be able to be raised, to or above the lowest floor elevations, provided the ability to be retracted or raised prior to onset of conditions of flooding is not contrary to means of egress requirements of the code.

(Renumber subsequent sections)

Reason: This proposal lays out options for satisfying the general requirement in R322.1.3 which requires “All buildings and structures erected in flood hazard areas shall be constructed by methods and practices that minimize flood damage.” That means stairways and ramps should resist flood loads along with the dwellings they serve. These same requirements are included in ASCE 24-13.

In coastal high hazard areas (Zone V), stairs that are not properly constructed to meet the free-of-obstructions requirement below elevated buildings can damage the building when they fail. This damage has been observed during FEMA’s post-flood investigations after numerous flood events (also see Figure 1 from NFIP Technical Bulletin 2 Free-of-Obstruction Requirements).



Figure 1. Stairs did not break away cleanly, resulting in damage to the elevated building.

Cost Impact: There should be no additional costs because of the existing requirement in R322.1.3.

RB187-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R322.1.9-(NEW)-RB-QUINN-WILSON

RB188 – 13

R322.2.1, R322.3.2

Proponent: Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency (gregory.p.wilson@dhs.gov); Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency (rcquinn@earthlink.net).

Revise as follows:

R322.2.1 Elevation requirements.

1. Buildings and structures in flood hazard areas, including flood hazard areas not designated as Coastal A Zones, shall have the lowest floors elevated to or above the base flood elevation plus 1 foot (305 mm), or the design flood elevation, whichever is higher.
- ~~2. Buildings and structures in flood hazard areas designated as Coastal A Zones shall have the lowest floors elevated to or above the base flood elevation plus 1 foot (305 mm), or to the design flood elevation, whichever is higher.~~
- ~~2.3~~ In areas of shallow flooding (AO Zones), buildings and structures shall have the lowest floor (including basement) elevated at least as high above the highest adjacent grade as the depth number specified in feet (mm) on the FIRM plus 1 foot (305 mm), or at least 3 feet (15 mm) 2 feet (610 mm) if a depth number is not specified.
- ~~3.4~~ Basement floors that are below grade on all sides shall be elevated to or above base flood elevation plus 1 foot (305 mm), or the design flood elevation, whichever is higher.

Exception: Enclosed areas below the design flood elevation, including basements whose floors are not below grade on all sides, shall meet the requirements of Section R322.2.2.

R322.3.2 Elevation requirements.

1. All buildings and structures erected within coastal high-hazard areas shall be elevated so that the bottom of the lowest portion of all horizontal structural members supporting the lowest floor, with the exception of piling, pile caps, columns, grade beams and bracing, is elevated to or above the base flood elevation plus 1 foot (305 mm) or the design flood elevation, whichever is higher.
 - ~~1.1 Located at or above the design flood elevation, if the lowest horizontal structural member is oriented parallel to the direction of wave approach, where parallel shall mean less than or equal to 20 degrees (0.35 rad) from the direction of approach, or~~
 - ~~1.2 Located at the base flood elevation plus 1 foot (305 mm), or the design flood elevation, whichever is higher, if the lowest horizontal structural member is oriented perpendicular to the direction of wave approach, where perpendicular shall mean greater than 20 degrees (0.35 rad) from the direction of approach.~~
2. Basement floors that are below grade on all sides are prohibited.
3. The use of fill for structural support is prohibited.
4. Minor grading, and the placement of minor quantities of fill, shall be permitted for landscaping and for drainage purposes under and around buildings and for support of parking slabs, pool decks, patios and walkways.

Exception: Walls and partitions enclosing areas below the design flood elevation shall meet the requirements of Sections R322.3.4 and R322.3.5.

Reason: The purpose of this code change is to reduce flood risks on homes by adding a factor of safety of one-foot of additional height (called freeboard) to the elevation requirements. This proposal will align the IRC with the elevation requirements for Category II buildings (includes Group R), by reference to ASCE 24 which requires elevation to BFE + 1 or DFE, whichever is higher.

This statement identifies several reasons to add just one foot to the elevation requirements to the IRC.

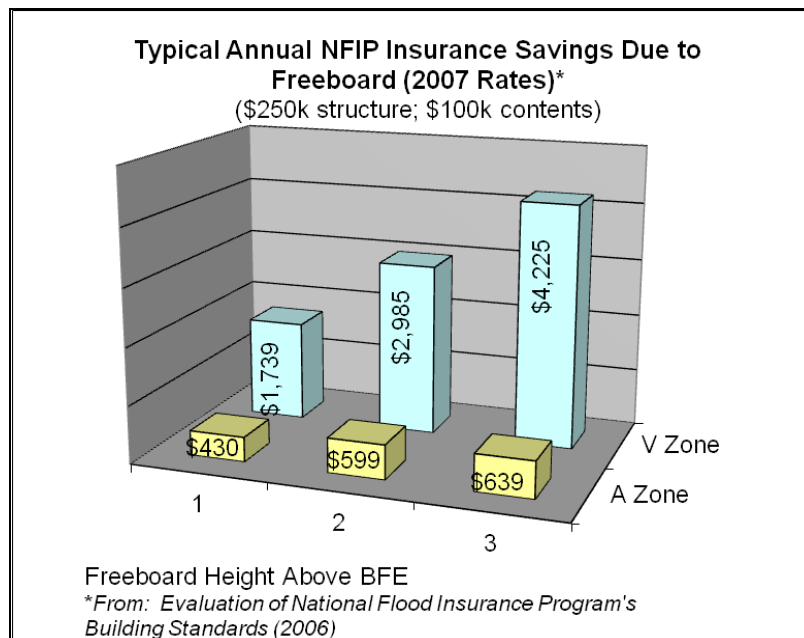
More than 20 states adopt the I-Codes at the state level and mandate local enforcement. Many of those states do not permit communities to modify the code. Some states do not explicitly recognize that communities may have a “stand alone” floodplain management ordinance that includes requirements for buildings, including elevation, and some provide that only the building code governs buildings (which may have the effect of nullifying building requirements in local ordinances). It is no longer valid to argue that the IRC should not provide reasonable protection of just one additional foot of elevation for dwellings based on the assumption that communities can separately adopt higher standards.

In New Jersey and New York, about 43 percent of the areas flooded by Superstorm Sandy had water that rose above the BFE (according to preliminary analyses). Of the land area where flooding exceeded BFE, about half was between BFE and BFE +1, and about a quarter was between BFE + 1 and BFE + 2. Although there isn't a count of the total number of flooded homes in those areas, it's easy to see that if lowest floors had been elevated just one foot higher, the majority would have had considerably less damage. According to a Quinnipiac University Polling poll taken shortly after Superstorm Sandy and cited by Reuters, “Seven in 10 New Jersey voters favored rebuilding the Jersey Shore under stricter building codes, including three-quarters of shore residents.”

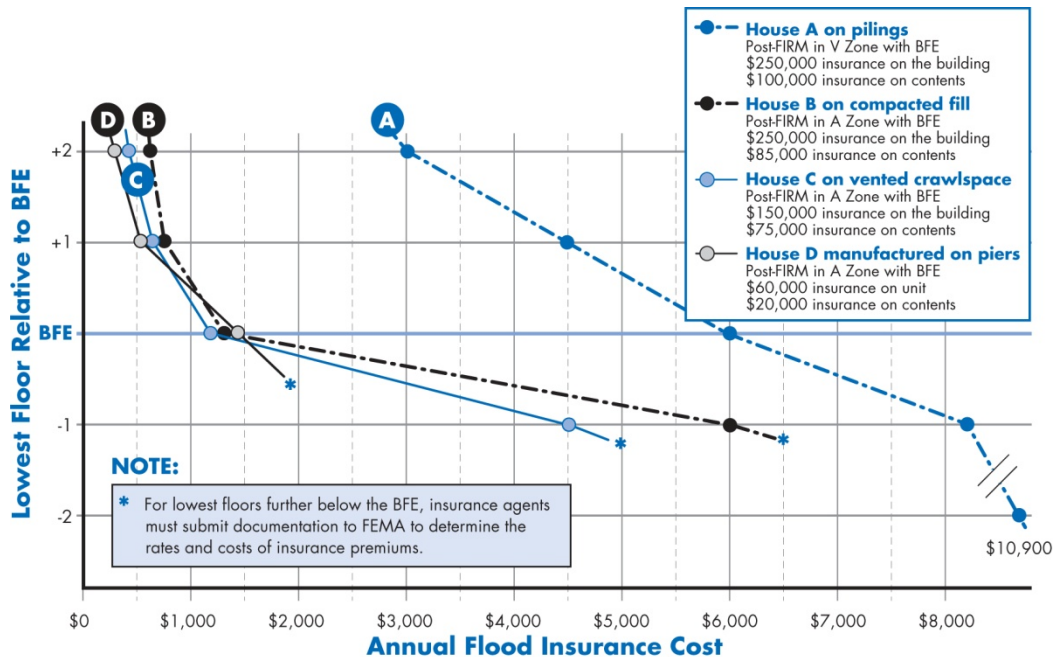
An independent report prepared for FEMA, *Evaluation of the National Flood Insurance Program's Building Standards* (October 2006), provides clear evidence of the benefits associated with adding freeboard. It documents the added costs (as a percent of the cost of building to the base flood elevation) and the benefits of adding freeboard. Approximately 1,500 combinations of house size, foundation type, flood zone, flood elevation, freeboard added, and discount rate were evaluated. The benefits considered are two-fold: flood damages avoided and flood insurance premium savings.

The report concluded that – based on flood damages avoided only -- it is worth spending an additional percentage of the at-BFE building cost to incorporate freeboard, where the percentage generally ranges from less than 1% to 5% for one-foot of freeboard, depending on the flood hazard zone. The cost of adding one-foot of freeboard, on the other hand, ranged from 0.25% to 3% of the at-BFE building cost (see cost statement below) depending on the type of foundation and the flood hazard zone. The flood damage reduction benefits of BFE + 1 ft outweighed the costs of constructing that freeboard in all but a few cases (e.g., where large quantities of fill are already needed to raise a Zone A building to the BFE).

The savings in insurance premium reduction (see graphic), which are realized by every homeowner for the life of the building, are on top of savings associated with avoiding future damage. Flood insurance premium savings alone can recover the added cost of freeboard in just a few years. Importantly, the report acknowledges that the computed benefits “are conservative, and will understate the true benefits” because some avoided costs are not accounted for, including clean-up and demolition costs, debris disposal costs, uninsured losses, displacement and relocation costs, loss of jobs and tax base, etc.



Additional substantiation for the additional elevation requirement is found in the insurance rating structure of the NFIP which bases rates for new buildings as a function of risk. Freeboard reduces risk because the lowest floors of buildings are elevated above the predicted flood levels associated with the base (100-year) flood. This risk reduction is reflected in reduced insurance rates, with reductions of 20% or more for the first foot of freeboard above the base flood elevation. The graphic below shows examples of how the cost of insurance varies as a function of elevation (based on insurance rates in effect in 2009). Note: the graphic illustrates insurance costs for four scenario dwellings with different foundation types and different values of the structure and contents; it should not be used for any purpose other than to illustrate the general variation in costs as a function of elevation. In Zone V, the annual cost of flood insurance is approximately 25% less if a number is one foot higher than the minimum (House A). In Zone A, the annual cost is approximately 40% less.



Further substantiation for this code change is found in Mitigation Assessment Team reports prepared by teams of experts assembled by FEMA after significant disasters. Reports prepared after hurricanes and flood disasters include recommendations to reduce future damage, including adding at least one-foot of freeboard (see bibliography). Specific recommendations are to adopt freeboard requirements that are consistent with those specified in ASCE 24.

Bibliography:

Mitigation Assessment Team reports published by FEMA, including: FEMA 490 Summary Report on Building Performance: 2004 Hurricane Season 2005; FEMA 549 Mitigation Assessment Team Report: Hurricane Katrina in the Gulf Coast (2006); FEMA P-757 Hurricane Ike in Texas and Louisiana (2009); FEMA P-765 Midwest Floods of 2008 in Iowa and Wisconsin (2009). Available online: <http://www.fema.gov/fema-mitigation-assessment-team-reports>

American Institutes for Research (October 2006), *Evaluation of the National Flood Insurance Program's Building Standards*. Available online: www.fema.gov/business/nfip/nfipeval.shtm.

Reuters. <http://www.reuters.com/article/2012/11/27/us-storm-sandy-newjersey-idUSBRE8AQ0V620121127>

Cost Impact: This code change will increase the initial cost of construction. The anticipated damage avoided because of the higher level of protection, other savings realized by owners, and the lower annual cost of federal flood insurance justify the added initial construction costs. Flood insurance premium savings alone can recover the added cost of freeboard in just a few years. As cited in the *Evaluation of the National Flood Insurance Program's Building Standards* (2006), the added cost is a function of the type of foundation. However, estimates of the cost increase over the cost to build a foundation at the base flood elevation range from less than 1% to 3% of to add one foot of freeboard, where the lower range is applicable to pile or masonry pier foundations and the upper end of the range applies to masonry walls with interior piers (crawlspace). The cost increase to add freeboard when placing fill to raise a slab-on-grade foundation is somewhat higher because the fill quantity and therefore costs do not increase linearly with added height. There is no requirement to use fill; lower-cost foundation types can be used.

RB188-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R322.2.1-RB-QUINN-WILSON

RB189 – 13

R322.2.2, R322.2.2.1 (New)

Proponent: Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency (Gregory.wilson2@fema.dhs.gov); Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency (rcquinn@earthlink.net).

Revise as follows:

R322.2.2 Enclosed area below design flood elevation. Enclosed areas, including crawl spaces, that are below the design flood elevation shall:

1. Be used solely for parking of vehicles, building access or storage.
2. Be provided with flood openings that meet the following criteria and are installed in accordance with Section R322.2.2.1:
 - ~~2.1. There shall be a minimum of two openings on different sides of each enclosed area; if a building has more than one enclosed area below the design flood elevation, each area shall have openings on exterior walls.~~
 - 2.1. 2.2 The total net area of all openings shall be at least 1 square inch (645 mm²) for each square foot (0.093 m²) of enclosed area where the enclosed area is measured on the exterior of the enclosure walls, or the openings shall be designed as engineered openings and the construction documents shall include a statement by a registered design professional that the design of the openings will provide for equalization of hydrostatic flood forces on exterior walls by allowing for the automatic entry and exit of floodwaters as specified in Section 2.6.2.2 of ASCE 24.
 - ~~2.3. The bottom of each opening shall be 1 foot (305 mm) or less above the adjacent ground level.~~
 - 2.2 2.4 Openings shall be not less than 3 inches (76 mm) in any direction in the plane of the all.
 - ~~2.5. Any louvers, screens or other opening covers shall allow the automatic flow of floodwaters into and out of the enclosed area.~~
 - 2.3 The presence of louvers, blades, screens and faceplates or other covers and devices shall not block or impede the automatic flow of floodwaters into and out of the enclosed areas and shall be accounted for in the determination of the net open area.
 - ~~2.6. Openings installed in doors and windows, that meet requirements 2.1 through 2.5, are acceptable; however, doors and windows without installed openings do not meet the requirements of this section.~~

R322.2.2.1 Installation of openings. The walls of enclosed areas shall have openings installed such that:

1. There shall be a minimum of two openings on different sides of each enclosed area; if a building has more than one enclosed area below the design flood elevation, each area shall have openings on exterior walls.
2. The bottom of each opening shall be not more than 1 ft (305 mm) above the higher of the final interior grade or floor and the finished exterior grade immediately under each opening.
3. Openings shall be permitted to be installed in doors and windows; doors and windows without installed openings do not meet the requirements of this section.

Reason: The primary purpose of this proposal is to reorganize to put all of the installation requirements in a separate section, separating installation from the requirements that apply to the openings themselves. There are only two minor clarifications in R322.2.2 about the openings themselves: (1) the square foot area of enclosures is to be measured from the outside; and (2) the net open area calculation has to take into account if there are louvers, blades, screens and faceplates because their presence affects the flow of water.

There is only one clarification in the proposed R322.2.2.1 for installation, and that is to specify that how high openings are installed in walls depends on the higher of the exterior finished grade or the interior grade (crawl space) or floor (e.g., garage or

stairwell). These changes are consistent with FEMA's NFIP Technical Bulletin 1, Openings in Foundation Walls and Walls of Enclosures <http://www.fema.gov/plan/prevent/floodplain/techbul.shtm> and similar to the provisions of the revised ASCE 24-13 that is a referenced standard in the IBC and IRC.

Cost Impact: There is no cost increase associated with this proposal because it only clarifies the existing requirement by consolidating the installation requirements.

RB189-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R322.2.2-RB-QUINN-WILSON

RB190 – 13

R322.2.3, Table R322.2.3(1) (New), Table R322.2.3(2) (New), R404.1.3

Proponent: Greg Wilson, US Dept of Homeland Security, Federal Emergency Management Agency (Gregory.P.Wilson@dhs.gov); Glenn Overcash, URS Corporation representing FEMA

Revise as follows:

R322.2.3 Foundation design and construction. Foundation walls for all buildings and structures erected in flood hazard areas shall meet the requirements of Chapter 4 subject to the following limitations:

1. Plain masonry walls are not permitted.
2. Masonry walls in flood hazard areas not designated as Coastal A Zones, shall comply with Table R322.2.3(1) or shall be designed in accordance with ASCE 24.
3. Masonry walls in flood hazard areas designated as Coastal A Zones, shall comply with Table R322.2.3(2) or shall be designed in accordance with ASCE 24.

Exception: ~~Unless designed in accordance with Section 404:~~

1. ~~The unsupported height of 6-inch (152 mm) plain masonry walls shall be no more than 3 feet (914 mm).~~
2. ~~The unsupported height of 8-inch (203 mm) plain masonry walls shall be no more than 4 feet (1219 mm).~~
3. ~~The unsupported height of 8-inch (203 mm) reinforced masonry walls shall be no more than 8 feet (2438 mm).~~

For the purpose of this exception, unsupported height is the distance from the finished grade of the under-floor space to the top of the wall.

TABLE R322.2.3(1)
MASONRY WALLS IN FLOOD HAZARD AREAS NOT DESIGNATED AS COASTAL A ZONE (ZONE A)

<u>WALL THICKNESS</u>	<u>MAXIMUM UNSUPPORTED WALL HEIGHT^a (feet)</u>	<u>MINIMUM VERTICAL REINFORCEMENT AND SPACING (INCHES)^{b,c}</u>
<u>8-inch, with reinforcing in accordance with Table R404.1.1(2)</u>	<u>7</u>	<u>#4 at 48</u>
	<u>10</u>	<u>#4 at 24 or #5 at 40</u>
<u>10-inch, with reinforcing in accordance with Table R404.1.1(3)</u>	<u>7</u>	<u>#4 at 56</u>
	<u>10</u>	<u>#4 at 32 or #5 at 48</u>
<u>12-inch, with reinforcing in accordance with Table R404.1.1(4)</u>	<u>7</u>	<u>#4 at 72</u>
	<u>10</u>	<u>#4 at 40 or #5 at 64</u>

- a. Unsupported wall height is the distance from the finished interior grade adjacent to the wall, or the footing, whichever is higher, to the top of the wall.
- b. If unbalanced fill conditions exist, then vertical reinforcement shall be the greater of that required by this table or referenced table in Section R404 (Tables R404.1.2(2) through R404.1.2(4)).

TABLE R322.2.3(2)
MASONRY WALLS IN FLOOD HAZARD AREAS DESIGNATED AS COASTAL A ZONE (ZONE A)

WALL THICKNESS	MAXIMUM UNSUPPORTED WALL HEIGHT^a (feet)	MINIMUM VERTICAL REINFORCEMENT AND SPACING (INCHES)
8-inch, with reinforcing in accordance with Table R404.1.1(2)	<u>2</u>	#4 at 48
	<u>3</u>	#4 at 32 #5 at 48
	<u>4</u>	#4 at 16 #5 at 24
10-inch, with reinforcing in accordance with Table R404.1.1(3)	<u>4</u>	#4 at 16 #5 at 24
12-inch, with reinforcing in accordance with Table R404.1.1(4)	<u>5</u>	#4 at 8 #6 at 16

a. Unsupported wall height is the distance from the finished interior grade adjacent to the wall, or the footing, whichever is higher, to the top of the wall.

Revise as follows:

R404.1.3 Design required. Concrete or masonry foundation walls shall be designed in accordance with accepted engineering practice when one either of the following conditions exists:

1. Walls are subject to hydrostatic pressure from groundwater.
2. Walls supporting more than 48 inches (1219 mm) of unbalanced backfill that do not have permanent lateral support at the top or bottom.
3. Masonry walls in flood hazard areas other than coastal high hazard areas that do not conform to the limitations in of R322.2.3 shall be designed in accordance with ASCE 24.

Reason: Current criteria for prescriptive masonry foundation wall construction per Tables R404.1.1(1) through (4) of Section R404 are based on wall height, soil classification, and unbalanced fill. However, for locations in flood hazard areas when wall sections are analyzed with applicable flood loads, the limits on wall height are typically driven by flood depth (per elevation requirements in R322.2.1) and are less often a function of site grade changes that result in lateral loads from unbalanced fill.

IRC Section R322.2.3 permits construction of masonry foundation walls in flood hazard areas per Section R404 with height restrictions on plain masonry and 8" reinforced masonry walls. The wall height limitations in R322.2.3 are based on analyses performed in 1998 for a range of flood depths and flood velocities. FEMA re-examined those limitations this year after observing wall damage.

Foundation walls in flood hazard areas may be susceptible to hydrostatic forces (addressed by the requirement for flood openings in R322.2.2) and hydrodynamic forces imposed by moving water and moderate breaking wave loads on vertical walls with wave heights between 1 ½ feet and 3 feet (see R322.2, if areas subject to such waves are delineated, they are designated "Coastal A Zones"). FEMA evaluated the resistance of masonry walls of variable heights, with flood openings, to a range of velocities and a range of wave heights, in combination with wind loading conditions covered in the IRC. FEMA used Allowable Stress Design (ASD) Load Combination 7, according to ASCE 7-10 Section 2.4.2 (2).

The hydrodynamic load analyses yielded the proposed wall height limitations and the corresponding minimum vertical reinforcement for 8", 10" and 12" thicknesses. Assumptions included:

1. 1- Story wood-framed residential structure supported on masonry foundation walls with flood openings installed per IRC R322.2.2
2. Top of foundation wall braced by elevated floor system
3. Material strengths per standards referenced in the IRC
4. All wood-frame shear resisting walls are on the exterior; foundation wall shear loads are limited by the capacity of the IRC-compliant light-frame braced walls
5. For analysis of wall sections in Zone A other than Coastal A Zones, the maximum flood velocity evaluated is 6 fps

As an example of how the results of the new analyses demonstrate the need to revise the limitations, the analysis indicates 8" reinforced masonry walls per Table 404.1.1.(2), with minimal reinforcement of #4 bar at 48" on center for an 8 ft high wall have a design strength of 32 ksi in axial tension and flexure. When just an 18" breaking wave load is applied to a 3' high wall at mid-height, the resulting ASD factored force in flexure exceeds 38 ksi.

The analyses also demonstrate the need to specify minimal reinforcement. When wind and flood loads are applied under Allowable Stress Design (ASD) Load Combination 7 per ASCE 7-10 Section 2.4.2 (2), net tension results at the top of the foundation wall from the minimum ASCE 7-10 basic wind speed of 115 mph (Exposure Category B). Higher design wind speeds result in greater uplift. The design criteria of ACI-530 Section 2.2.4 specifies that the tensile strength of unreinforced masonry shall be neglected when subjected to axial tension forces. Accordingly, unreinforced wall sections analyzed with net axial tension at the top of wall from the combined effects of wind and flood loading have been disallowed. ACI-530 commentary to Section 2.2.4 further

stipulates, “*Net axial tension in unreinforced masonry walls due to axially applied load are not permitted. If axial tension develops in walls due to uplift of connected roofs or floors, the walls must be reinforced to resist the tension. Compressive stress from dead load can be used to offset axial tension.*”

Evidence from FEMA's post-disaster Mitigation Assessment Team reports indicates residential unreinforced masonry (URM) wall failure under design wind (see FEMA P-908, Spring 2011 Tornadoes) and flood loads (see FEMA P-765, Midwest Floods of 2008 in Iowa and Wisconsin). MAT teams deployed shortly after Hurricane Sandy have documented numerous examples of failed unreinforced and lightly reinforced walls sections in areas shown on Flood Insurance Rate Maps as Zone A, both with and without moderate wave.

Cost Impact: The code change proposal will increase the cost of construction for a limited set of perimeter wall foundations in flood hazard areas, but will reduce the likelihood of failure under anticipated flood loads, and thus will decrease future costs associated with rebuilding after flood and flood/high wind events.

RB190-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R322.2.3-RB-OVERCASH-WILSON

RB191 – 13

R322.2.4 (New), R322.3.3, R322.3.4 (New)

Proponent: Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency (Gregory.wilson2@fema.dhs.gov); Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency (rcquinn@earthlink.net).

Revise as follows:

R322.2.4 Concrete slabs. Concrete slabs used as parking pads, enclosure floors, landings, decks, walkways, patios and similar uses that are located below the base flood elevation shall be structurally independent of the primary foundation systems of buildings or, where structurally connected, the main structure shall be capable of resisting any added flood loads and effects of scour due to the presence of the slabs.

(Renumber subsequent sections.)

R322.3.3 Foundations. Buildings and structures erected in coastal high-hazard areas shall be supported on pilings or columns and shall be adequately anchored to such pilings or columns. The space below the elevated building shall be either free of obstruction or, if enclosed with walls, the walls shall meet the requirements of Section R322.3.4. Pilings shall have adequate soil penetrations to resist the combined wave and wind loads (lateral and uplift). Water loading values used shall be those associated with the design flood. Wind loading values shall be those required by this code. Pile embedment shall include consideration of decreased resistance capacity caused by scour of soil strata surrounding the piling. Pile systems design and installation shall be certified in accordance with Section R322.3.6. Spread footing, mat, raft or other foundations that support columns shall not be permitted where soil investigations that are required in accordance with Section 401.4 indicate that soil material under the spread footing, mat, raft or other foundation is subject to scour or erosion from wave-velocity flow conditions. If permitted, spread footing, mat, raft or other foundations that support columns shall be designed in accordance with ASCE 24. ~~Slabs, pools, pool decks and walkways shall be located and constructed to be structurally independent of buildings and structures and their foundations to prevent transfer of flood loads to the buildings and structures during conditions of flooding, scour or erosion from wave-velocity flow conditions, unless the buildings and structures and their foundation are designed to resist the additional flood load.~~

R322.3.4 Concrete slabs. Concrete slabs used as parking pads, enclosure floors, landings, decks, walkways, patios and similar uses that are located beneath or adjacent to structures shall be designed and constructed to:

1. Be structurally independent of the primary foundation system of the structure, do not transfer flood loads to the main structure, are constructed to break away cleanly, and are frangible so as to not produce debris capable of causing significant damage to any structure. Reinforcing of concrete slabs, including welded wire reinforcement, shall not be used so as to minimize the potential for concrete slabs being a source of debris. Slabs shall not have turned down edges and slab thickness shall be not more than 4 inches; or
2. Be self-supporting structural slabs capable of remaining intact and functional under base flood conditions, including expected erosion, and the main structure shall be capable of resisting any added flood loads and effects of local scour due to the presence of the slabs.

(Renumber subsequent sections.)

Reason: This proposal includes specifications for concrete slabs that are not found elsewhere in the IRC. Under flood conditions, the presence of concrete slabs can contribute to building damage. The existing language in R322.2 (Zone A) does not provide any specifications and the existing language in R322.3.3 (Zone V) does not provide any specifications for concrete slabs themselves; it only specifies that slabs are to be structurally independent of buildings, unless the buildings are designed to account for the added flood loads. The specific requirements are consistent with revised ASCE 24-13.

Cost Impact: There should be no added cost; the benefits are associated with less potential damage.

RB191-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R322.2.4 (NEW) #1-RB-QUINN-WILSON

RB192 – 13

R322.2.4 (New), R322.3.6 (New)

Proponent: Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency (Gregory.wilson2@fema.dhs.gov); Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency (rcquinn@earthlink.net).

Add new text as follows:

R322.2.4 Decks and porches. Attached and detached decks and porches that are not enclosed by solid, rigid walls and that are located below the elevations specified in Section R322.2.1 shall comply with the following:

1. Attached decks and porches shall be designed to function as a continuation of the building or structure.
2. Detached decks and porches shall be anchored to remain in place during base flood conditions.

R322.3.6 Decks and porches. Attached decks and porches shall meet the elevation requirements of Section R322.3.2 and shall meet the foundation requirements of this section or be cantilevered from or knee braced to the building or structure. Detached decks and patios that are below the elevation requirements of Section R322.3.2 shall not be enclosed by solid, rigid walls, including walls designed to break away. Detached decks and patios shall be designed and constructed to remain intact and shall be anchored to remain in place during base flood conditions, or shall be frangible and break away cleanly so as not to produce debris capable of causing significant damage to any structure.

Reason: The IRC does not have specific requirements for decks and porches that are common elements for dwellings. These same requirements are included in ASCE 24-13.

Attached decks and porches can be elevated to the same requirements as dwellings. If not elevated, they can contribute to loads on buildings under flood conditions, so the buildings should be designed to account for those added loads. Decks and patios can be detached (structurally independent), in which case they can be below the elevation of buildings (provide they are not enclosed with walls – screen and lattice are not walls for this purpose). Detached decks and patios either have to be anchored so they don't become large debris that can batter other buildings or block drainage structures.

Cost Impact: Electing to structurally attach decks or patios would likely increase foundation costs, but the alternative is to choose to use detached decks and patios. Decks and patios are structures and have always been subject to the general NFIP requirement to be constructed by methods and practices that minimize flood damage and to be stable under flood conditions, both are included in the IRC at R322.1.2 and R322.1.3.

RB192-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R322.2.4 (NEW) #2-RB-QUINN

RB193 – 13

R322.2.4 (New), R322.3.7 (New), M2201.6

Proponent: Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency (Gregory.wilson2@fema.dhs.gov); Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency (rcquinn@earthlink.net).

Add new text as follows:

R322.2.4 Tanks. Underground tanks shall be anchored to prevent flotation, collapse and lateral movement under conditions of the base flood. Above-ground tanks shall be installed at or above the elevation required in Section R322.2.1 or shall be anchored to prevent flotation, collapse and lateral movement under conditions of the base flood and shall be protected from impact by floating debris.

R322.3.7 Tanks. Underground tanks shall be anchored to prevent flotation, collapse and lateral movement under conditions of the base flood. Above-ground tanks shall be installed at or above the elevation required in Section R322.3.2. Where elevated on platforms, the platforms shall conform to the foundation requirements of Section R322.3.

Revise as follows:

M2201.6 Flood-resistant installation. In flood hazard areas as established by Table R301.2(1), tanks shall be installed in accordance with Section R322.2.4 (flood hazard areas including Zone A) or Section R322.3.7 (coastal high-hazard areas including Zone V). ~~at or above the elevation required in Section R322.2.1 or R322.3.2 or shall be anchored to prevent flotation, collapse and lateral movement under conditions of the design flood.~~

Reason: This proposal more clearly separates underground tanks from above-ground tanks. Dislodged tanks not only can release contents into floodwaters, but they become battering debris that can contribute to structural damage.

Underground tanks need to be installed in ways that take into consideration the fact that soils may be saturated during flooding, creating conditions that can cause tanks to be dislodged. This occurs after many flood events; most recently, problems with tanks were observed throughout the Hurricane Sandy impact area.

How above-ground tanks that serve dwellings are handled depends on flood zone. In coastal high hazard areas (Zone V) above-ground tanks have to be elevated – they may be elevated on separate platforms or on platforms that are cantilevered from the elevated building/foundation. In other flood hazard areas (Zone A) above-ground tanks may be elevated, or may be below base flood elevation, provided they are adequately anchored.

These same requirements are included in ASCE 24-13. The NFIP considers tanks as structures and structures have always been subject to the general NFIP requirement to be constructed by methods and practices that minimize flood damage and to be stable under flood conditions, both are included in the IRC at R322.1.2 and R322.1.3.

Cost Impact: None. These requirements articulate how the basic NFIP requirements (and the requirements of R322) should have been applied.

RB193-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R322.2.4 (NEW) #3-RB-QUINN-WILSON

RB194 – 13

R322.3.2

Proponent: Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency (Gregory.wilson2@fema.dhs.gov); Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency (rcquinn@earthlink.net).

Revise as follows:

R322.3.2 Elevation requirements.

1. All buildings and structures erected within coastal high-hazard areas shall be elevated so that the bottom of the lowest portion of all horizontal structural members supporting the lowest floor, with the exception of piling, pile caps, columns, grade beams and bracing, is elevated to or above the base flood elevation plus 1 foot (305 mm) or the design flood elevation, whichever is higher.
 - ~~1.1 Located at or above the design flood elevation, if the lowest horizontal structural member is oriented parallel to the direction of wave approach, where parallel shall mean less than or equal to 20 degrees (0.35 rad) from the direction of approach, or~~
 - ~~1.2 Located at the base flood elevation plus 1 foot (305 mm), or the design flood elevation, whichever is higher, if the lowest horizontal structural member is oriented perpendicular to the direction of wave approach, where perpendicular shall mean greater than 20 degrees (0.35 rad) from the direction of approach.~~
2. Basement floors that are below grade on all sides are prohibited.
3. The use of fill for structural support is prohibited.
4. Minor grading, and the placement of minor quantities of fill, shall be permitted for landscaping and for drainage purposes under and around buildings and for support of parking slabs, pool decks, patios and walkways.

Exception: Walls and partitions enclosing areas below the design flood elevation shall meet the requirements of Sections R322.3.4 and R322.3.5.

Reason: This proposal simplifies application of the elevation requirement in coastal high hazard areas (Zone V) by eliminating different elevation requirements as a function of orientation of the lowest horizontal structural member. FEMA determines BFEs based on many assumptions about waves. Not accounted for in those assumptions is the observation that under base flood conditions some wave crests are higher than estimated. Even the occasional wave impacting the lowest horizontal structural member imparts significant load that can lead to structural damage. In practice, determining the direction of wave approach is difficult at best, especially since wave approach varies through the storm cycle when storms move on paths along the shoreline rather than approach the shore directly. This proposal eliminates the distinction based on orientation but retains the requirement for additional elevation to account for wave crests that exceed the BFE, even under base flood conditions. The revised ASCE 24-13 also eliminates orientation as a factor to determine elevation. For additional discussion about the benefits of elevation to BFE + 1 ft, see reason statement submitted for a separate proposal to add + 1 ft to all elevation requirements.

Cost Impact: There is a minimal cost increase for homes to be elevated one additional foot, but that increase is offset over a relatively short time by reduced damage and by the lower annual flood insurance premiums that will be charged to all future owners of the home. An independent economic analysis determined the payback period for the incremental cost to add one additional foot to a piling or column foundation is about 4 years. See "Evaluation of the National Flood Insurance Program's Building Standards," <http://www.fema.gov/national-flood-insurance-program/national-flood-insurance-program-evaluation>

RB194-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R322.3.2 #1-RB-QUINN-WILSON

RB195 – 13

R322.3.2

Proponent: Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency (Gregory.wilson2@fema.dhs.gov); Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency (rcquinn@earthlink.net).

Revise as follows:

R322.3.2 Elevation requirements.

1. All buildings and structures erected within coastal high-hazard areas shall be elevated so that the lowest portion of all structural members supporting the lowest floor, with the exception of piling, pile caps, columns, grade beams and bracing, is:
 - 1.1 Located at or above the design flood elevation, if the lowest horizontal structural member is oriented parallel to the direction of wave approach, where parallel shall mean less than or equal to 20 degrees (0.35 rad) from the direction of approach, or
 - 1.2 Located at the base flood elevation plus 1 foot (305 mm), or the design flood elevation, whichever is higher, if the lowest horizontal structural member is oriented perpendicular to the direction of wave approach, where perpendicular shall mean greater than 20 degrees (0.35 rad) from the direction of approach.
2. Basement floors that are below grade on all sides are prohibited.
3. The use of fill for structural support is prohibited.
4. Minor grading, and the placement of minor quantities of fill, shall be permitted for landscaping and for drainage purposes under and around buildings and for support of parking slabs, pool decks, patios and walkways.
5. Walls and partitions enclosing areas below the design flood elevation shall meet the requirements of Sections R322.3.4 and R322.3.5.

~~**Exception:** Walls and partitions enclosing areas below the design flood elevation shall meet the requirements of Sections R322.3.4 and R322.3.5.~~

Reason: This is only a format change, so that the provision is part of the requirements and not an exception. Because there are other items in this requirement that are not subject to elevation requirements (see #3 and #4), there is no reason why the requirements for walls should be written as an exception.

Cost Impact: None; no change in requirements.

RB195-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R322.3.2 #2-RB-QUINN-WILSON

RB196 – 13

R322.3.4

Proponent: Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency (Gregory.wilson2@fema.dhs.gov); Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency (rcquinn@earthlink.net).

Add new text as follows:

R322.3.4 Walls below design flood elevation. Walls and partitions are permitted below the elevated floor, provided that such walls and partitions are not part of the structural support of the building or structure and:

1. Electrical, mechanical, and plumbing system components are not to be mounted on or penetrate through walls that are designed to break away under flood loads; and
2. Are constructed with insect screening or open lattice; or
3. Are designed to break away or collapse without causing collapse, displacement or other structural damage to the elevated portion of the building or supporting foundation system. Such walls, framing and connections shall have a design safe loading resistance of not less than 10 (470 Pa) and no more than 20 pounds per square foot (958 Pa); or
4. Where wind loading values of this code exceed 20 pounds per square foot (958 Pa), the construction documents shall include documentation prepared and sealed by a registered design professional that:
 - 4.1. The walls and partitions below the design flood elevation have been designed to collapse from a water load less than that which would occur during the design flood.
 - 4.2. The elevated portion of the building and supporting foundation system have been designed to withstand the effects of wind and flood loads acting simultaneously on all building components (structural and nonstructural). Water loading values used shall be those associated with the design flood. Wind loading values used shall be those required by this code.
5. Walls intended to break away under flood loads as specified in Items 3 or 4 have flood openings that meet the criteria in Section R322.2.2(2).

Reason: Breakaway walls are intended to fail under wave loads. However, experience shows that walls are breaking away under water depths and wave conditions that are less than the water depths and waves expected during the base flood. Having openings will permit the water level inside to match the water level outside, limiting failure under "shallow" flooding that occurs more frequently than the base (100-year) flood. These same requirements are included in ASCE 24-13.

Homes that are built with enclosures surrounded by breakaway walls with flood openings will sustain damage less frequently, not only to the walls themselves, but the interior of the enclosures won't be exposed to wind-driven rain and sand. In addition, with fewer wall failures there will be less debris added to floodwaters and waves which will reduce damage by battering. FEMA guidance for home builders advises use of flood openings in breakaway walls to relieve flood forces and reduce damage to walls (FEMA P-499, Fact Sheet 8.1).

Cost Impact: The additional cost to install flood openings will be offset by less frequent failure of breakaway walls. NFIP flood insurance policies do not cover claims for damage to the walls, which means owners have to bear the full cost of reconstructing breakaway walls frequently, if the walls fail under less than base flood conditions.

RB196-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R322.3.4 #1-RB-QUINN-WILSON

RB197 – 13

R322.3.4

Proponent: Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency (Gregory.wilson2@fema.dhs.gov); Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency (rcquinn@earthlink.net).

Revise as follows:

R322.3.4 Walls below design flood elevation. Walls and partitions are permitted below the elevated floor, provided that such walls and partitions are not part of the structural support of the building or structure and:

1. Electrical, mechanical, and plumbing system components are not to be mounted on or penetrate through walls that are designed to break away under flood loads; and
2. Are constructed with insect screening or open lattice; or
3. Are designed to break away or collapse without causing collapse, displacement or other structural damage to the elevated portion of the building or supporting foundation system. Such walls, framing and connections shall have a ~~design safe loading~~ resistance of not less than 10 (470 Pa) and no more than 20 pounds per square foot (958 Pa) as determined using allowable stress design; or
4. Where wind loading values of this code exceed 20 pounds per square foot (958 Pa) as determined using allowable stress design, the construction documents shall include documentation prepared and sealed by a registered design professional that:
 - 4.1. The walls and partitions below the design flood elevation have been designed to collapse from a water load less than that which would occur during the base design flood.
 - 4.2. The elevated portion of the building and supporting foundation system have been designed to withstand the effects of wind and flood loads acting simultaneously on all building components (structural and nonstructural). Water loading values used shall be those associated with the design flood. Wind loading values used shall be those required by this code.

Reason: This proposal clarifies that the method used to determine breakaway wall resistance is the “allowable stress design,” making it consistent with language used in IBC Sec. 1612.5(2.3) where a design profession is required to certify “breakaway walls designed to have a resistance of more than 20 psf (0.96 kN/m²) determined using allowable stress design.”

Cost Impact: No cost impact.

RB197-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R322.3.4 #2-RB-QUINN-WILSON

RB198_ – 13

R322.3.5.1 (New)

Proponent: Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency (Gregory.wilson2@fema.dhs.gov); Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency (rcquinn@earthlink.net).

Add new text as follows:

R322.3.5.1 Protection of building envelope. An exterior door that meets the requirements of Section R612 shall be installed at the top of stairs that are enclosed with walls designed to break away in accordance with Section R322.3.4.

Reason: Walls below elevated buildings in coastal high hazard areas (Zone V) are permitted if the area enclosed by walls is used for parking of vehicles, building access or storage. If the enclosed area is used for building access, then a stairway provides access to the elevated building. R322.3.4 requires the walls to be designed and constructed to break away under flood loads. Post-disaster investigations have identified increased damage to the interior of elevated buildings because wave splash, wave run-up, and wind-driven rain can enter buildings through the unprotected doorway at the top of the stairs.

Cost Impact: The added cost of an exterior door is offset by reduced damage caused by wave splash, wave run-up, and wind-driven rain, some of which is not covered by NFIP flood insurance.

RB198-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R322.3.5.1 (NEW)-RB-QUINN-WILSON

RB199 – 13

R323

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials
(rdavidson@maplegrovern.gov)

Revise as follows:

SECTION R323 **APPENDIX R** **STORM SHELTERS**

R323.1 AR101.1 General. This section applies to the construction of storm shelters when constructed as separate detached buildings or when constructed as safe rooms within buildings for the purpose of providing safe refuge from storms that produce high winds, such as tornados and hurricanes. In addition to other applicable requirements in this code, storm shelters shall be constructed in accordance with ICC/NSSA-500.

Reason: Section R323.1 is a new addition to the 2012 IRC. This section intends to make sure that if a storm shelter or safe room is built it will provide "safe refuge from storms that produce high winds, such as tornados and hurricanes." **Storm shelters** are separate detached buildings; **safe rooms** are rooms inside a dwelling, usually a bathroom, walk-in closet, or utility room that are reinforced to withstand high winds and wind borne debris. R323.1 of the 2012 IRC does not require IRC dwellings to include a storm shelter or safe room. But if a homeowner or builder decides to build a safe room this new section of the code makes sure they are built to the specifications of ICC/NSSA 500.

ICC/NSSA 500 is co-published by the International Code Council and the National Storm Shelter Association. It is a technical document that has precise requirements for safe rooms in homes designed to resist tornados. For instance, the walls and doors of a safe room meeting ICC/NSSA 500 must withstand wind gusts of 250 mph and horizontal wind borne debris of 100 mph. To meet this design standard, safe room designs or its components are tested and pass the projectile test by launching a 15 lb. 2x4 at 100 mph at the safe room's walls and doors.

Sometimes new code language written with the best intentions produces the exact opposite effect when enforced in the "real world" of construction. The new safe room amendment is an example.

Very infrequently a homeowner will ask their builder or remodeler to install a room to help protect their family from tornados or other severe wind storms. The builder will add reinforced walls to a bathroom, walk-in closet or utility room using building techniques recommended by the Federal Emergency Management Agency. These added safety features significantly increase the likelihood that family members will survive a severe weather event if they have enough warning to be in the safe room when the storm hits. These rooms would not be consider "safe rooms" because they would not meet all of the ICC/NSSA 500 standards required by R323.1, only some of them. Why? Because the vast majority of homeowners are unwilling to pay for the following upgrades required by the ICC/NSSA 500 standard:

- 3 - grade 1 commercial deadbolts with 1" bolt throws
- A 12 gauge welded steel door frame with welded mitered corners and 7 gauge lock reinforcements
- 5 anchor points at each jamb and 3 points of attachment to frame stiffeners in the door head
- A steel door with a 14 gauge skin and a honeycomb core or equivalent
- 2-4 square inches of natural ventilation per occupant
- A minimum of 3 sq. ft. of area for each occupant.

In fact, this new code amendment would require a building code official to enforce every provision of ICC/NSSA 500 if it looks like a homebuilder or remodeler's plans include reinforced walls in one room in a house. The result? Homeowners will never ask to include a "safe room" in their home because they are unwilling to upgrade to a ICC/NSSA 500 certified "safe room." This code section should be moved to the appendix where it can be used as a guide rather than as a mandatory requirement for those areas of the country where these structures are not required.

This proposal is necessary because it allows a homeowner to install certain elements to make their homes safer without the need to upgrade the home to a standard that is not required in the first place. The proposal is reasonable because it still permits safer elements and encourages uniformity.

Cost Impact: None

RB199-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R323-RB-DAVIDSON

RB200 – 13

R324 (New), R325 (New), R326 (New), R327 (New), R328 (New)

Proponent: Ali M. Fattah, P.E., City of San Diego, representing the San Diego Area Chapter of ICC (afattah@sandiego.gov)

Add new text as follows:

R324 Structural Tests and Special Inspections. Where structural tests and special inspections are required due to the methods of construction, the tests and inspections shall be performed and documented as is required in Chapter 17 of the *International Building Code*.

R325 Swimming Pool Enclosures and Safety Devices. Swimming pools shall comply with the requirements of Sections 3109.2 through 3109.5 and other applicable sections of the *International Building Code*.

R326 Encroachments Into The Public Right-Of- Way. Encroachments into the Public Right-of-Way shall comply with the standards in Chapter 32 of the *International Building Code*.

R327 Safeguards During Construction Provisions for safety during construction and the protection of adjacent public and private properties shall be governed by the requirements of Chapter 33 of the *International Building Code*.

R328 Sound Transmission. Wall and floor-ceiling assemblies separating dwelling units from each other shall provide airborne sound insulation for walls, and both airborne and impact sound insulation for floor-ceiling assemblies as required in Chapter 12 of the *International Building Code*.

Reason: The IRC is developed as a standalone code however it does not address certain issues regulated by the International Building Code. This code change provides a cross reference to the IBC in lieu of adopting IBC regulations by transcription. The IRC allows multi-unit dwellings and townhouses but does not address sound transmission control between dwelling units and townhouses. Additionally the IRC does not seem to regulate swimming pools, encroachments into the public right of way or safety during construction.

Section R324 is necessary since special inspections and tests may be required by product evaluation reports or due to non-conforming construction that was approved to comply with the IRC may need to be qualified by testing.

Cost Impact: This code change will not increase the cost of construction.

RB200-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R324 (NEW)-RB-FATTAH

RB201 – 13

R324 (New), R202, Chapter 44

Proponent: David P. Kapturowski representing the American Association of Radon Scientist & Technologists

Add new text as follows:

SECTION R324 **RADON REDUCTION**

R324.1 General. This Section applies to radon control methods for buildings and structures within EPA Radon Zones 1 & 2, as defined in Section R324.42. *Rough-Ins* or complete *Active Soil Depressurization (ASD)* systems shall be installed as necessary to reduce soil gas entry and vapor intrusion so as to establish indoor radon levels below the *National Radon Action Level (NRAL)*.

R324.2 Mitigation system required. *A mitigation system Rough-In* shall be installed in *dwellings* located in *radon* potential zones 1 and 2 in accordance with Section R324.8. The *radon* potential zones shall be determined in accordance with Section R324.42.

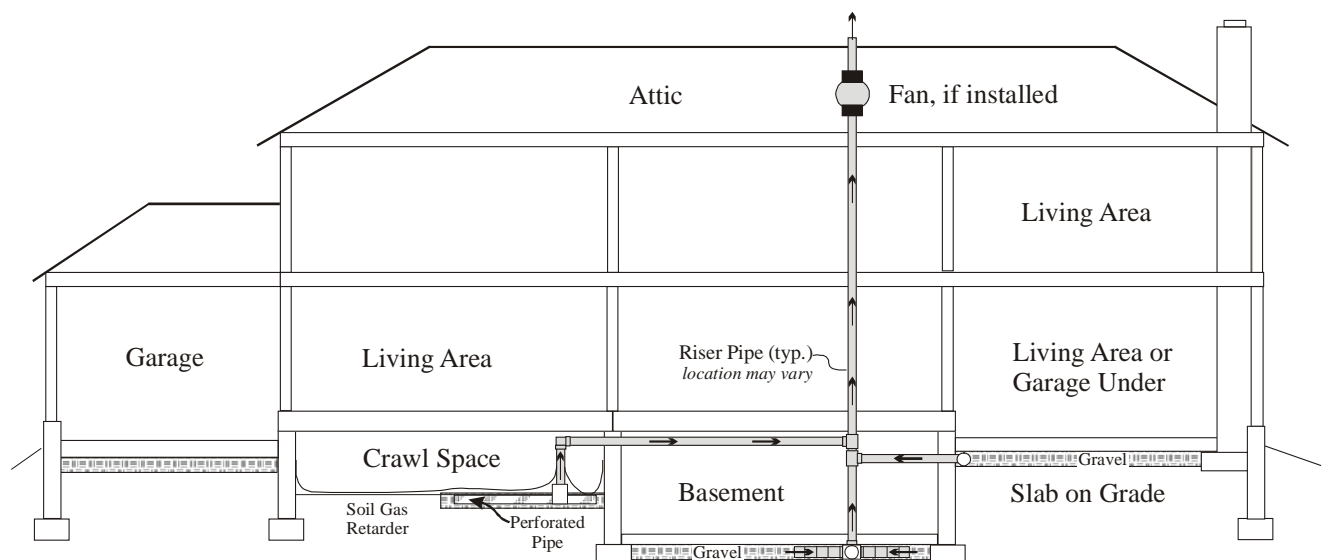
Exception: Where the foundation system does not have any enclosed area of soil contact and where prior to occupancy, testing in accordance with Section R324.41 indicates that the building has a *radon* level below the *National Action Level (NAL)*.

R324.3 Design. The design of *radon mitigation systems* shall comply with Section R324 and, for buildings having a total foundation area of greater than 2500 square feet [232 sq. m], shall be performed by a *mitigator* who is *certified* or *licensed* to design such systems. Designs of *radon mitigation systems* for foundation types other than those specified herein shall be performed by a *mitigator* who is *certified* or *licensed* to design such systems.

R324.4 Foundation area. The foundation area shall be calculated from the inside perimeter dimensions of the foundation walls.

R324.5 Mitigation system rough-in required. The *Rough-In* installation of a *mitigation system* shall be required for all foundations and *combination foundations* types, including *crawl space*, *basement*, *slab-on-grade* and *slab-on-grade garage* located below a living area. The installation shall be in accordance with Sections R324.6 through R324.28. Figure R324.5 illustrates the four foundation types.

FIGURE R324.5
FOUNDATION TYPES



R324.6 Soil gas collection plenums. Foundation areas shall be constructed so as to create sealed *soil gas collection plenums* in accordance with Sections R324.7 through R324.9.6.

R324.7 Submembrane soil gas collection plenums in crawl spaces with earthen floors. For each *suction point*, a *soil gas collector* shall be installed in accordance with Sections R324.7.1 through R324.7.7 and Section R324.9.

R324.7.1 Soil gas collector. One *soil gas collector* for each *suction point* in accordance with Section R324.7.1.1 shall be installed in accordance with Section R324.7.1.1, R324.7.1.2 or R324.7.1.3.

R324.7.1.1 Pipe soil gas collector. The *soil gas collector* shall consist of a perforated pipe with a nominal diameter of not less than 4 inches [102 mm]. The pipe shall be not less than 10 feet [3048 mm] in length. Such piping shall be placed in a trench backfilled with clean aggregate meeting the criteria of Section R324.8.1.1.1 such that the pipe is completely surrounded by not less than 4 inches [102 mm] of aggregate.

R324.7.1.1.2 Geotextile soil gas collector. The *soil gas collector* shall consist of a strip of geotextile drain matting not less than 10 feet [3048 mm] in length and having a cross sectional area of not less than 12 square inches [7742 sq. mm]. The strip of matting shall be placed on top of the soil or in a trench.

R324.7.1.1.3 Gravel soil gas collector. A uniform layer of clean aggregate, not less than 4 inches [102 mm] in depth, shall be placed over the soil. The aggregate shall have a void ratio of not less than 35 percent or shall be in accordance with Size Number 4, 5, 56, or 6 as classified by ASTM C33.

R324.7.2 Suction points. One *suction point* shall be provided for each *soil gas collector*. *Suction points* shall be installed in accordance with Section R324.7.2.1, R324.7.2.2 or R324.7.2.3, as applicable for the type of plenum installed.

R324.7.2.1 Suction point for pipe soil gas collector. The *suction point* for a pipe *soil gas collector* shall consist of a pipe fitting or other device having not less than three openings with two openings oriented so as to create multiple horizontal intake openings. The perforated pipe plenum shall be inserted into both of the horizontal openings of the pipe fitting or device. One opening of the fitting or device shall be oriented in a vertical "up" position. Alternatively, the sub-membrane area and the other foundation types shall be interconnected by a *pipe loop soil gas collector* that is constructed in accordance with Section R324.8.1.1.3 and served by one or more *suction points*.

R324.7.2.2 Suction point for geotextile soil gas collector. The *suction point* for a geotextile *soil gas collector* shall consist of a pipe fitting or other device having not less than three openings with two openings oriented so as to create multiple horizontal intake openings. The horizontal openings shall be connected to the matting in a manner to facilitate airflow from the collector. One opening of the fitting or device shall be oriented in a vertical "up" position.

R324.7.2.3 Suction point for gravel soil gas collector. The *suction point* for a gravel *soil gas collector* shall consist of a pipe fitting or other device having not less than three openings with two openings oriented so as to create multiple horizontal intake openings. The horizontal openings shall be provided with not less than 5 feet [1524 mm] of perforated pipe extending from each opening of the fitting or device into the gravel layer. Such perforated pipe shall provide not less than 1 square inch [645 sq. mm] of open perforation area per lineal foot of pipe.

R324.7.3 Suction points not permitted. *Suction points* are not permitted on sump lids

R324.7.4 Fasten suction points. *Suction point* fittings and devices shall be fixed in place to prevent dislocation.

R324.7.5 Seal top of the soil gas collection plenum. A *soil gas retarder* shall cover the top of the *soil gas collection plenum* and all exposed soil. The installation of the *soil gas retarder* shall be in accordance with Sections R324.7.5.1 through R324.7.5.4.

R324.7.5.1 Sheeting. The *soil gas retarder* membrane shall meet ASTM E1745 Class A, B or C.

R324.7.5.2 Seams. The seams between adjacent membrane sheets shall be overlapped not less than 12 inches [305 mm] and shall be sealed by one of the following methods:

1. A tape recommended by the membrane manufacturer.
2. Caulk complying with ASTM C920 class 25 or greater.
3. An equivalent method.

R324.7.5.3 Repairs. Tears or punctures in the membrane shall be sealed by one or more of the following methods:

1. A tape recommended by the membrane manufacturer.
2. An additional sheet of the membrane material that covers and overlaps the tear or puncture not less than 12 inches [305 mm] on all sides and that is sealed with a caulk complying with ASTM C920 class 25 or greater.
3. An equivalent method.

R324.7.5.4 Penetrations. Openings in the *soil gas retarder* membrane for piping, utilities, structural supports or similar penetrations shall be sealed.

R324.7.6 Seal sides of the soil gas collection plenum. The *soil gas retarder* membrane shall turn up onto foundation walls not less than 6 inches [152 mm] and shall be continuously sealed to the wall along the full perimeter with a caulk complying with ASTM C920 class 25 or higher or equivalent method.

R324.7.7 Membrane label required. *Soil gas retarder* membranes shall be marked in a conspicuous place with a label to identify that the membrane is a component of a *radon* reduction system. The label lettering shall be not less than 1/4 inch [6.35 mm] in height and shall be of a color in contrast to the color of the background on which the lettering is applied.

R324.8 Subslab soil gas collection plenums for concrete floors. The floors of basement, concrete crawlspace and slab-on-grade foundation systems shall be provided with a *soil gas collection plenum* installed in accordance with Sections R324.8.1 through R324.9.6.

R324.8.1 Soil gas collector. A *soil gas collector* shall be installed in accordance with Section R324.8.1.1, R324.8.1.2 or R324.8.1.3.

R324.8.1.1 Gravel. A uniform layer of clean aggregate, not less than 4 inches [102 mm] in depth, shall be placed over the soil. The aggregate shall have a void ratio of not less than 35 percent or shall be in accordance with Size Number 4, 5, 56, or 6 as classified by ASTM C33.

R324.8.1.2 Geotextile. A layer of geotextile drainage matting shall be placed over a uniform layer of either soil or sand. The geotextile drainage matting shall be designed to allow the lateral flow of *soil gases* to the system's *suction point* fitting. The *geotextile matting* shall have a cross-sectional area of not less than 12 square inches [7742 sq. mm] and shall be placed, at a minimum, along the entire inside perimeter of the foundation at a distance of 12 inches [305 mm] to 18 inches [457 mm] from the foundation wall to the edge of the drainage matting. Deviation from the 12 inch [305 mm] to 18 inch [457 mm] distance to the foundation wall shall be allowed to avoid obstacles such as plumbing and other utilities.

R324.8.1.3 Pipe loop. A loop of not less than 4 inch [102 mm] diameter perforated pipe shall be placed along the entire inside perimeter of the foundation at a distance of 12 inches [305 mm] to 18 inches [457 mm] from the centerline of the pipe to the foundation walls. Such piping shall be placed in a trench

backfilled with clean aggregate meeting the criteria of Section R324.8.1.1 and surrounding the pipe on at least 2 sides. The cross-sectional area of the aggregate and pipe *soil gas collector* shall be not less than 50 square inches [32,258 sq. mm]. The piping shall form a continuous loop and pipe sections shall be joined with a connector device or method recommended by the manufacturer. Deviation from the 12 inch [305 mm] to 18 inch [457 mm] distance to the foundation wall shall be allowed to avoid obstacles such as plumbing and other utilities.

R324.8.2 Suction points. One *suction point* shall be provided for each *soil gas collector*. Not less than one *suction point* shall be provided for each foundation type. Alternatively, each *soil gas collector* shall be interconnected by a *pipe loop soil gas collector* that is constructed in accordance with Section R324.8.3 and served by one or more *suction points*. *Suction points* shall be installed in accordance with Sections R324.8.2.1, R324.8.2.2 or R324.8.2.3 as applicable for the type of *soil gas collector* installed.

R324.8.2.1 Gravel layer soil gas collector. A *suction point* for a *gravel type soil gas collector* shall consist of a pipe fitting or other device having not less than two openings oriented so as to create multiple horizontal intake openings within the *gravel* layer. The horizontal openings shall be provided with not less than 5 feet [1534 mm] of perforated pipe extending from each opening of the fitting or device into the *gravel* layer. Said perforated pipe shall provide a not less than 1 square inch [645 sq. mm] of open perforation area per lineal foot of pipe. *Suction point* openings above the slab shall be protected from the entry of aggregate, concrete and debris.

R324.8.2.2 Geotextile layer soil gas collector. A *suction point* for a *geotextile type soil gas collector* shall consist of a pipe fitting or other device having not less than three openings with two oriented so as to create multiple horizontal intake openings connected to the geotextile mat in a manner to maintain airflow capacity from the plenum. *Suction point* openings above the slab shall be protected from the entry of aggregate, concrete and debris.

R324.8.2.3 Pipe loop soil gas collector. A *suction point* for a *pipe loop type collector* shall consist of a pipe tee fitting or pipe saddle device installed in the loop piping. *Suction point* openings above the slab shall be protected from the entry of aggregate, concrete and debris.

R324.8.3 Multiple soil gas collection plenums. Where interior footings divide a *soil gas collector* into two or more areas, each such area shall be provided with the required *suction points* and joined with *mitigation system* piping in accordance with Section R324.10. Alternatively, each area so created by the interior footings shall be interconnected by a *pipe loop soil gas collector* that is constructed in accordance with Section R324.8.1.3 and served by one or more *suction points*.

R324.8.4 Suction points not permitted. *Suction points* are not permitted on sump lids.

R324.8.5 Fasten suction points. *Suction point* fittings and piping shall be fastened in place to prevent dislocation during placement of the gas permeable layer, *soil gas retarder* and concrete.

R324.8.6 Seal top of the soil gas plenum. The *soil gas collector* and all exposed soil shall be covered with a *soil gas retarder* installed in accordance with Section R324.8.6.1.

R324.8.6.1 Sheeting. Polyethylene sheeting of not less than 6 *mils* [0.152 mm] in thickness, or cross-laminated polyethylene sheeting of not less than 3 *mils* [0.076 mm] in thickness shall be installed on top of the *soil gas collector* and shall completely cover the area under the concrete floor and shall be sealed in accordance with Sections R324.8.6.1.1 through R324.8.6.1.3. Where sheet foam board insulation is installed on top of the *soil gas collector*, the polyethylene sheeting shall be installed below the foam board insulation.

R324.11.8.1.1 Seams. Seams between adjacent polyethylene sheets shall be overlapped not less than 12 inches [305 mm] and sealed with a caulk complying with ASTM C920 class 25 or higher, or equivalent method.

R324.11.8.1.2 Repairs. Tears or punctures in the polyethylene sheeting shall be sealed or an additional sheet of polyethylene shall cover the tear or puncture with an overlap of not less than 12 inches [305 mm] on all sides. Such additional sheet shall be sealed and fixed in place to prevent displacement during slab casting.

R324.11.8.1.3 Penetrations. Openings in the *soil gas retarder* membrane for piping, utilities, structural posts and similar penetrations shall be sealed.

R324.8.7 Concrete floors. The concrete floor shall be cast directly upon the *soil gas retarder* or upon the sheet foam board insulation where it is installed on top of the *soil gas retarder*.

R324.8.8 Penetrations. Penetrations through the concrete slab and *soil gas retarder* shall be sealed with a caulk complying with ASTM C920 class 25 or higher, or equivalent method.

R324.8.9 Block-outs. Where openings are cast or constructed in the concrete slab under plumbing fixtures, the openings shall be filled with expanding foam or a non-shrink grout or an approved equivalent method. Exposed openings shall be sealed with non-shrink grout or an approved equivalent method.

R324.8.10 Seal sides of the soil gas collection plenum. The intersection of floors and foundation walls shall be sealed with a caulk complying with ASTM C920 class 25 or higher or an approved equivalent method. Sealing shall be performed in accordance with Section R324.8.10.1, R324.8.10.2 or R324.8.10.3.

R324.8.10.1 Seal floor to wall. The intersection of floors and foundation walls shall be sealed.

R324.8.10.2 Seal soil gas retarder to footing or wall. Where foundation walls are solid concrete, the *soil gas retarder* shall be sealed to the footing or to the foundation wall.

R324.8.10.3 Seal soil gas retarder to wall. Where foundation walls are masonry block, the *soil gas retarder* shall be sealed to the foundation wall.

R324.9 General sealing of soil gas collection plenums. Sealing of potential *soil gas* pathways shall be in accordance with Sections R324.9.1 through R324.9.6.

R324.9.1 Sumps in floors. Sumps in interior floors shall have a rigid lid and the lid shall be sealed with a gasket or silicone caulk and mechanically fastened in a manner to facilitate removal for maintenance. Pipe and wiring penetrations through the lid shall be sealed. The intersection of the floor and sump basin shall be sealed with a caulk complying with ASTM C920 class 25 or higher or equivalent method.

R324.9.2 Hollow masonry unit walls. The top course of hollow block masonry walls shall be made of solid masonry units or the top course shall be fully grouted. The top course under the full width of door and window openings shall be made of solid masonry units or the hollow masonry units shall be fully grouted. Where a brick veneer or other masonry ledge is installed, the course immediately below that ledge shall be made of solid masonry units or the top course shall be fully grouted. Other penetrations through foundation walls shall be sealed.

R324.9.3 Floor drains. Floor drains and condensate drains shall not allow *soil gas* entry.

R324.9.4 Air ducts. Air ducts located below concrete slabs shall be sealed to prevent *radon* entry and constructed in accordance with Chapter 16.

R324.9.5 Foundation drains. Gravity foundation drainage systems shall include a *check valve* or other mechanical means to isolate the *soil gas collection plenum* from any exterior drain piping. Access shall be provided for maintenance.

R324.9.6 Access openings. Access openings in the floor provided for drain maintenance shall not allow *soil gas* entry.

R324.10 Mitigation system piping. The *mitigation system* piping that extends from the *soil gas* plenum to the point of discharge shall be rigid, non-perforated pipe in accordance with Sections R324.11 through R324.19.

R324.11 Pipe size. *Mitigation system* pipe shall be not less than 3 inch [76 mm] nominal inside diameter.

R324.12 ABS piping. ABS pipe shall comply with ASTM D2661, F628 or F1488. The pipe wall thickness shall be Schedule 40.

R324.13 PVC piping. PVC pipe shall comply with ASTM D2665, F891, or F1488. The pipe wall thickness shall be Schedule 40.

Exception: Rigid, non-perforated PVC pipe meeting ASTM D2949 shall be an alternative to the material specified herein, where installed vertically within enclosed wall cavities.

R324.14 Slope. Above ground piping shall have a slope of not less than 1/8 inch [3.2 mm] per foot [305 mm]. Piping shall slope downwards towards the *suction point*. Piping arrangements that could allow water to collect are prohibited.

R324.15 Joints. Plastic pipe joints shall be solvent welded in accordance with Sections R324.15.1 and R324.15.2. Where disassembly of piping is required such as for removal of a fan, the joints shall be made with flexible couplings complying with ASTM D5926 or ASTM C1173 or an approved equivalent method.

R324.15.1 ABS plastic pipe joints. ABS plastic pipe joints shall be solvent welded in accordance with the pipe manufacturer's instructions with solvent cement conforming to ASTM D 2235.

R324.15.2 PVC plastic pipe joints. The joint surfaces for PVC plastic pipe and fittings to be solvent welded shall be prepared with a primer conforming to ASTM F 656. PVC plastic pipe joints shall be solvent welded in accordance with the pipe manufacturer's instructions with solvent cement conforming to ASTM D 2564.

R324.16 Support. Above ground piping shall be supported by the structure of the building using hangers or strapping designed for piping support. Supports for horizontal piping shall be installed at intervals of not more than 4 feet [1219 mm] and supports for vertical piping shall be installed at intervals of not more than 10 feet [3048 mm].

R324.17 Protection against physical damage. Where pipes penetrate top or bottom plates of stud walls and the nearest edge of the hole is within 1 ½ inches [38 mm] of the face of the member, the pipe shall be protected by steel shield plates. Such shield plates shall have a thickness of not less than 0.0575 inches [1.463 mm] (No. 16 gage). Such plates shall cover the area of the pipe where the plate is bored, and shall extend not less than 2 inches [51 mm] above bottom plates and not less than 2 inches [51 mm] below top plates.

R324.18 Insulation required. In spaces where *mitigation system* piping is subject to freezing temperatures and in spaces where the exterior of *mitigation system* piping is subject to the formation of condensation, such piping shall be provided with insulation having an external vapor barrier and an R-value of not less than 1.8.

R324.19 Labels required (piping). *Mitigation system* piping shall be marked prior to the closing of wall cavities with not less than one label at each floor level and at intervals not more than 10 feet [3048 mm] along the developed length of the piping. The label shall identify that the item is a component of a *radon* reduction system. The label lettering shall be not less than 1/4 inch [6.35 mm] in height and shall be of a color in contrast to the color of the background on which the lettering is applied.

R324.20 Mitigation system termination. The discharge point of a *mitigation system* shall be to the outdoors and shall be directed vertically upward.

R324.21 Elevation and vertical walls. The point of discharge of a *mitigation system* shall comply with all of the following:

1. It shall be not less than 1 foot [305 mm] above the roof at the point penetrated.
2. It shall be not less than 10 feet [3048 mm] above grade nearest the point of discharge.
3. It shall be not less than 10 feet [3048 mm] horizontally from a vertical wall that extends above the roof penetrated.

R324.22 Windows and doors. The discharge point of a *mitigation system* shall be not less than 2 feet [610 mm] above or not less than 10 feet [3048 mm] from windows, doors or other gravity intake openings into the structure or an adjacent structure excluding attic ventilation openings. The 10 foot [3048 mm] distance shall be measured around intervening obstacles.

R324.23 Equipment air intake. The discharge point of a *mitigation system* shall be not less than 3 feet [914 mm] above or 10 feet [3048 mm] away from mechanical air intake openings such as those for evaporative coolers, make-up air, and heat energy recovery ventilators. The 10 foot [3048 mm] distance shall be measured around intervening obstacles.

R324.24 Provision for Active Soil Depressurization (ASD) fan. A space having a vertical height of not less than 48 inches [1219 mm] and a diameter of not less than 21 inches [533 mm] shall be provided in the area where the *ASD fan* will be installed if required. The space provided for the *ASD fan* shall be located according to Section 901.8. The *ASD* pipe shall be centered in this space.

R324.25 Electrical. A receptacle outlet supplied by branch circuit conductors shall be located within 6 feet [1.8 m] of an interior *ASD fan* location

R324.25.1 Label. The over-current device for the branch circuit supplying the *ASD fan* shall be labeled to indicate that it supplies the *radon fan*.

R324.25.2 Disconnect required. Where the fan is not cord and plug connected, a means of electrical disconnect shall be provided for and in sight of the *ASD fan*. The electrical disconnect shall be labeled as to its purpose.

R324.26 Fan access. Limited access shall be provided for each *ASD fan* location to allow installation of *ASD fans* and replacement of same. Access entry shall be located not more than 20 feet [6096 mm] from the *ASD fan* location.

R324.27 Radon test kit required. A minimum of one long term *radon-in-air* test kit from a *certified* and/or *licensed* laboratory shall be provided for the occupants of each *dwelling* unit.

R324.28 Completion of ASD system. Prior to occupancy, the *ASD* system shall be completed and activated in accordance with Sections R324.30 through R324.41.

Exception: Where prior to occupancy, testing in accordance with Section R324.41 indicates that the building has a *radon* level below the *National Action Level (NAL)* and the *Rough-In* piping is labeled in accordance with Section R324.29.

R324.29 Labels required, system Rough-in. *Mitigation system* piping shall be marked with not less than one label in a conspicuous location. An additional label shall be placed on or within 12 inches [305 mm] of the electrical service panel. The labels shall state the following: "This radon system is nonfunctional because the system has NOT been activated with a radon fan. The building should be tested for radon at least every 2 years or as recommended by the state or USEPA." The label lettering

shall be of a height of not less than 1/4 inch [6.35 mm] and shall be of a color that is in contrast to the color of the background on which the lettering is applied.

R324.30 Fan selection. Fans installed in the ASD system shall be recommended by the manufacturer for radon mitigation. Such fans shall be designed and sealed by the manufacturer to minimize leakage of water or soil gas from the fan housing and shall be sized in accordance with Table R324.33 or as specified by a *certified or licensed radon mitigator*.

TABLE R324.30
FAN SIZING

PIPE SIZE Nominal (I.D.)	TOTAL FOUNDATION AREA		
	Less Than 1600 sq. feet	1600 to 2500 sq. feet	Greater than 2500 sq. feet
	Less Than 149 sq. meters	149 to 232 sq. meters	Greater than 232 sq. meters
(3 inch) [76 mm]	Use Radon Fan Type: RF1 RF1 Minimum rating: ^a 50 cfm @ 0.5 in. WC [85m ³ /hr @ 125 Pa]	Use Radon Fan Type: RF2 RF2 Minimum rating: ^a 75 cfm @ 1.0 in. WC [127m ³ /hr @ 250 Pa]	Radon fan to be sized by <i>certified and/or licensed radon mitigator</i>
(4 inch) [102 mm]	Use Radon Fan Type: RF1 RF1 Minimum rating: ^a 50 cfm @ 0.5 in. WC [85m ³ /hr @ 125 Pa]	Use Radon Fan Type: RF1 RF1 Minimum rating: ^a 50 cfm @ 0.5 in. WC [85m ³ /hr @ 125 Pa]	Radon fan to be sized by <i>certified and/or licensed radon mitigator</i>

a. Radon Fan Types RF1 & RF2 minimum flow and pressure ratings are manufacturer specifications.

R324.31 Orientation. ASD inline fans shall be installed only on vertical ASD piping.

R324.32 Installation. ASD fans shall be installed in accordance with the manufacturer's instructions.

R324.33 Flexible connectors required. ASD fans shall be connected to the ASD piping using flexible unshielded couplings complying with ASTM D5926 or ASTM C1173 or an equivalent method. Connections shall be air and water-tight.

R324.34 Fan start-up. ASD fans shall be electrically energized upon installation on the ASD system piping.

R324.35 Fan location. ASD fans shall be installed only outdoors, in attics or in garages that are not beneath conditioned spaces. ASD fans shall not be installed below ground, in conditioned spaces, in occupiable spaces of a building or in a basement, crawlspace or other interior location that is directly beneath a conditioned or occupiable space of a building. ASD fans shall not be mounted in a location where pipe that is positively pressurized by the fan is located inside of conditioned or occupiable space.

R324.36 System monitor required. Each ASD system shall be provided with a system negative pressure monitor, such as, but not limited to, manometer type pressure gauges, to indicate system operation. The system monitor shall be located indoors in an area where the monitor is readily observable by the occupants.

R324.37 Startup marking. ASD system monitors shall be clearly marked to indicate the pressure that existed when the system was initially activated. The monitor device shall have a durable label on or in close proximity to it that describes how to interpret the monitor and what to do if the monitor indicates that system performance has degraded.

R324.38 Automatic reset. Pressure activated electrical *ASD* system monitors, whether visual or audible, shall be supplied by un-switched electrical branch circuits and shall be designed to reset automatically when power is restored after power supply failure. Battery operated monitoring devices shall not be used except where they are equipped with a low power warning feature.

R324.39 Labels required (system and sump). System description labels made of durable material shall be placed on or within 12 inches [30 cm] of the electric service panel and also on the *ASD* system or other prominent location. The lettering on the label shall be not less than 1/4 inch [6.35 mm] in height and shall be of a color in contrast to the color of the background on which the lettering is applied. The label shall state the following: "Radon Reduction System;" the installer's name, phone number, and applicable certification identification; date of installation, an advisory stating that the building should be tested for *radon* at least every 2 years or as required or recommended by state or federal agencies, and shall include notice of additional *radon* resources at www.epa.gov/radon and the *radon* hotline 1-800-SOS-RADON (767-7236).

R324.39.1 Label sump basins. Sump basin covers shall be identified with a durable label that reads as follows: "Component of a Radon Reduction System. Do not tamper with or disconnect." or approved equivalent wording. The lettering on the label shall be not less than 1/4 inch [6.35 mm] in height and shall be of a color in contrast to the color of the background on which the lettering is applied.

R324.40 Documentation package. The occupants of the *dwelling* shall be provided with a documentation package that includes the following:

1. A description of system operation, such as shown in Exhibit 1 "Understanding a Radon Reduction System".
2. All *radon* test data for the property.
3. The annual energy consumption of the installed *ASD fan(s)*, whether estimated or actual, and the projected monetary cost of such energy.

R324.41 Radon testing prior to occupancy. A *radon* test shall be performed prior to occupancy and shall be performed by a *certified* or *licensed* measurement professional. Testing shall be performed in accordance with applicable state protocols or requirements; or if there are no state protocols or requirements, with accepted Federal protocols or "Protocols for Radon Measurements in Homes", AARST Consortium on National Radon Standards. Where testing results are greater than the *NAL*, a *certified* and/or *licensed mitigator* shall be required to perform *diagnostic tests* and remediation action. Further *radon* testing shall be required until *radon* concentrations below the *NAL* are achieved.

R324.42 EPA established zones. The *radon* potential of a building site shall be estimated from Figure R324.42 or from Table R324.42. Where state or local jurisdictions have published *radon* potential data, such data shall supersede the information in Figure R324.42 and Table R324.42.

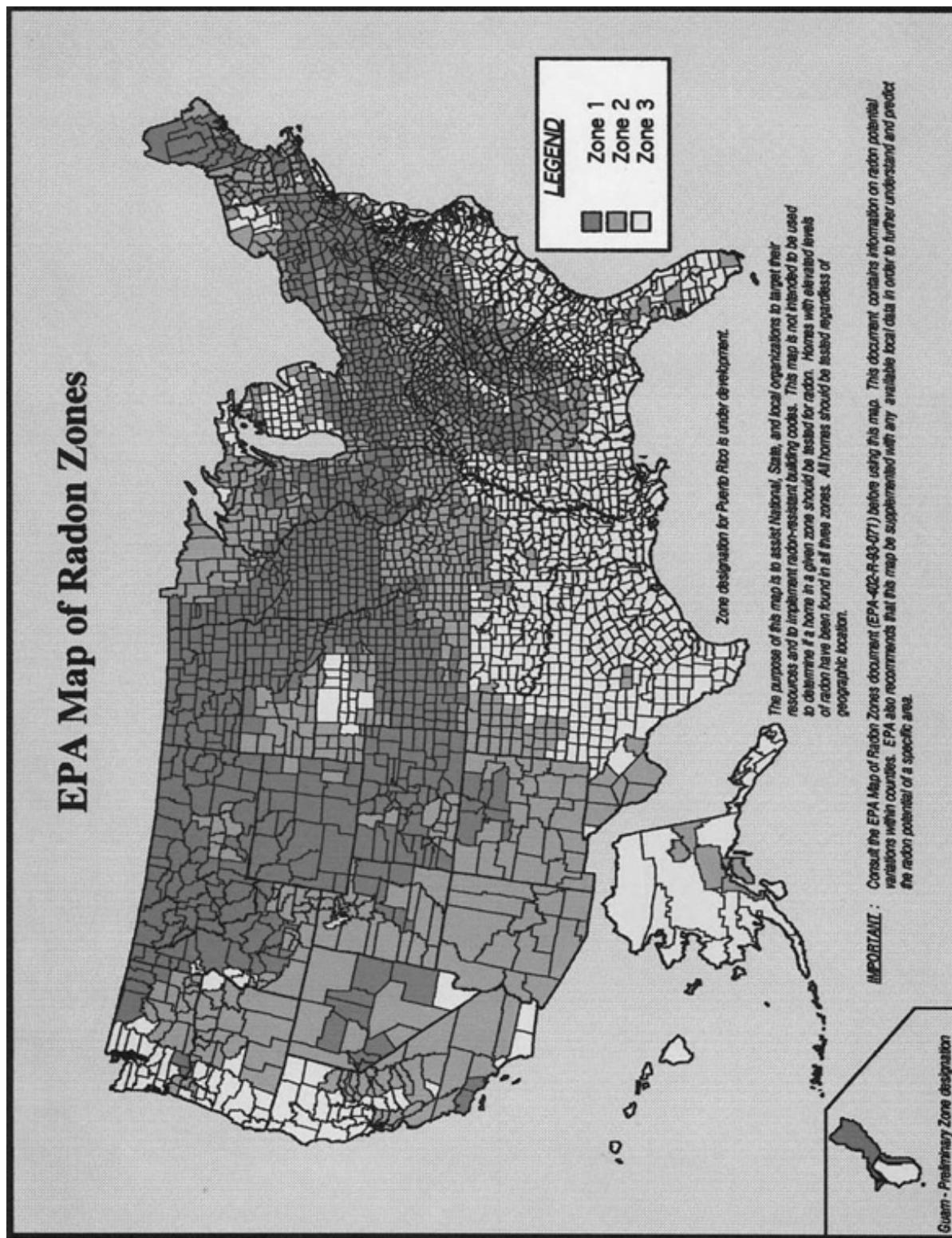


FIGURE R324.42
RADON POTENTIAL ZONES MAP
TABLE R324.42 EPA RADON ZONE 1 and 2 COUNTIES BY STATE

<u>Alabama</u>	<u>Alaska</u>	Sharp Stone	<u>California</u>	Clear Creek Crowley Custer Delta Denver Dolores Douglas El Paso Elbert Fremont Garfield Gilpin Grand Gunnison Huerfano Jackson Jefferson Kiowa Kit Carson La Plata Larimer Las Animas Lincoln Logan Mesa Moffat Montezuma Montrose Morgan Otero Ouray Park Phillips Pitkin Prowers Pueblo Rio Blanco San Miguel Sedgwick Summit Teller Washington Weld Yuma	Saguache San Juan	Fannin Fayette Floyd Forsyth Franklin Gilmer Greene Habersham Hall Haralson Harris Hart Heard Henry Jackson Jasper Lamar Lumpkin Madison Meriwether Monroe Morgan Newton Oconee Oglethorpe Paulding Pickens Pike Rabun Richmond Rockdale Spalding Stephens Talbot Towns Troup Union Upson Walker Walton White Whitfield
<u>Zone 1</u> <u>Calhoun</u> <u>Clay</u> <u>Cleburne</u> <u>Colbert</u> <u>Coosa</u> <u>Franklin</u> <u>Jackson</u> <u>Lauderdale</u> <u>Lawrence</u> <u>Limestone</u> <u>Madison</u> <u>Morgan</u> <u>Talladega</u>	<u>Zone 2</u> <u>Anchorage</u> <u>Municipality</u> <u>Dillingham</u> <u>Census Area</u> <u>Fairbanks</u> <u>North Star</u> <u>Borough</u> <u>Kenai</u> <u>Peninsula</u> <u>Borough</u> <u>Matanuska-</u> <u>Susitna</u> <u>Borough</u> <u>Southeast</u> <u>Fairbanks</u> <u>Census Area</u>	<u>Zone 1</u> <u>Santa</u> <u>Barbara</u> <u>Ventura</u>	<u>Zone 2</u> <u>Alameda</u> <u>Alpine</u> <u>Amador</u> <u>Calaveras</u> <u>Contra</u> <u>Costa</u> <u>El Dorado</u> <u>Fresno</u> <u>Inyo</u> <u>Kern</u> <u>Los Angeles</u> <u>Madera</u> <u>Mariposa</u> <u>Mono</u> <u>Monterey</u> <u>Nevada</u> <u>Placer</u> <u>Plumas</u> <u>Riverside</u> <u>San Benito</u> <u>San</u> <u>Bernardino</u> <u>San</u> <u>Francisco</u> <u>San Luis</u> <u>Obispo</u> <u>San Mateo</u> <u>Santa Clara</u> <u>Santa Cruz</u> <u>Sierra</u> <u>Tulare</u> <u>Tuolumne</u> <u>Yuba</u>	<u>Connecticut</u>	<u>Zone 1</u> <u>Fairfield</u> <u>Middlesex</u> <u>New Haven</u> <u>New London</u> <u>Zone 2</u> <u>Litchfield</u> <u>Tolland</u> <u>Windham</u>	<u>Delaware</u>
<u>Zone 2</u> <u>Autauga</u> <u>Barbour</u> <u>Bibb</u> <u>Blount</u> <u>Bullock</u> <u>Cherokee</u> <u>Chilton</u> <u>Cullman</u> <u>Dallas</u> <u>DeKalb</u> <u>Elmore</u> <u>Etowah</u> <u>Fayette</u> <u>Greene</u> <u>Hale</u> <u>Jefferson</u> <u>Lamar</u> <u>Lee</u> <u>Lowndes</u> <u>Macon</u> <u>Marion</u> <u>Marshall</u> <u>Montgomery</u> <u>Perry</u> <u>Pickens</u> <u>Randolph</u> <u>Russell</u> <u>Shelby</u> <u>St Clair</u> <u>Sumter</u> <u>Tuscaloosa</u> <u>Walker</u> <u>Winston</u>	<u>Arizona</u>	<u>Zone 2</u> <u>Apache</u> <u>Cochise</u> <u>Coconino</u> <u>Gila</u> <u>Graham</u> <u>Greenlee</u> <u>La Paz</u> <u>Maricopa</u> <u>Mohave</u> <u>Navajo</u> <u>Pima</u> <u>Pinal</u> <u>Santa Cruz</u> <u>Yavapai</u> <u>Yuma</u>	<u>Florida</u>	<u>Zone 2</u> <u>Alachua</u> <u>Citrus</u> <u>Columbia</u> <u>Hillsborough</u> <u>Leon</u> <u>Marion</u> <u>Miami-Dade</u> <u>Polk</u> <u>Union</u>	<u>Georgia</u>	<u>Zone 1</u> <u>Cobb</u> <u>DeKalb</u> <u>Fulton</u> <u>Gwinnett</u>
	<u>Arkansas</u>		<u>Colorado</u>	<u>Zone 2</u> <u>Alamosa</u> <u>Archuleta</u> <u>Conejos</u> <u>Costilla</u> <u>Eagle</u> <u>Hinsdale</u> <u>Lake</u> <u>Mineral</u> <u>Rio Grande</u> <u>Routt</u>	<u>Zone 2</u> <u>Banks</u> <u>Barrow</u> <u>Bartow</u> <u>Butts</u> <u>Carroll</u> <u>Catoosa</u> <u>Cherokee</u> <u>Clarke</u> <u>Clayton</u> <u>Coweta</u> <u>Dawson</u> <u>Douglas</u> <u>Elbert</u>	<u>Hawaii</u> -----None----- -
	<u>Zone 2</u> <u>Baxter</u> <u>Benton</u> <u>Boone</u> <u>Carroll</u> <u>Fulton</u> <u>Garland</u> <u>Independenc</u> <u>e</u> <u>Izard</u> <u>Marion</u> <u>Montgomery</u> <u>Randolph</u> <u>Searcy</u>		<u>Zone 1</u> <u>Adams</u> <u>Arapahoe</u> <u>Baca</u> <u>Bent</u> <u>Boulder</u> <u>Broomfield</u> <u>Chaffee</u> <u>Cheyenne</u>		<u>Idaho</u>	<u>Zone 1</u> <u>Benewah</u> <u>Blaine</u> <u>Boise</u> <u>Bonner</u> <u>Boundary</u>

Butte
Camas
Clark
Clearwater
Custer
Elmore
Fremont
Gooding
Idaho
Kootenai
Latah
Lemhi
Shoshone
Valley

Zone 2

Ada
Bannock
Bear Lake
Bingham
Bonneville
Canyon
Caribou
Cassia
Franklin
Jefferson
Jerome
Lincoln
Madison
Minidoka
Oneida
Owyhee
Payette
Power
Teton
Twin Falls

Illinois

Zone 1

Adams
Boone
Brown
Bureau
Calhoun
Carroll
Cass
Champaign
Coles
De Witt
DeKalb
Douglas
Edgar
Ford
Fulton
Greene

Grundy
Hancock
Henderson
Henry
Iroquois
Jersey
Jo Daviess
Kane
Kendall
Knox
LaSalle
Lee
Livingston
Logan
Macon
Marshall
Mason
McDonough
McLean
Menard
Mercer
Morgan
Moultrie
Ogle
Peoria
Piatt
Pike
Putnam
Rock Island
Sangamon
Schuyler
Scott
Stark
Stephenson
Tazewell
Vermilion
Warren
Whiteside
Winnebago
Woodford

Zone 2

Bond
Christian
Clark
Clay
Clinton
Cook
Crawford
Cumberland
DuPage
Edwards
Effingham
Fayette
Franklin
Gallatin

Hamilton
Hardin
Jackson
Jasper
Jefferson
Johnson
Kankakee
Lake
Lawrence
Macoupin
Madison
Marion
McHenry
Monroe
Montgomery
Perry
Pope
Randolph
Richland
Saline
Shelby
St Clair
Union
Wabash
Washington
Wayne
White
Will
Williamson

Indiana

Zone 1

Adams
Allen
Bartholomew
Benton
Blackford
Boone
Carroll
Cass
Clark
Clinton
Decatur
DeKalb
Delaware
Elkhart
Fayette
Fountain
Fulton
Grant
Hamilton
Hancock
Harrison
Hendricks
Henry

Howard
Huntington
Jay
Jennings
Johnson
Kosciusko
LaGrange
Lawrence
Madison
Marion
Marshall
Miami
Monroe
Montgomery
Noble
Orange
Putnam
Randolph

Rush
Scott
Shelby
St Joseph
Steuben
Tippecanoe
Tipton
Union
Vermillion
Wabash
Warren
Washington
Wayne
Wells
White
Whitley

Zone 2

Brown
Clay
Crawford
Daviess
Dearborn
Dubois
Floyd
Franklin
Gibson
Greene
Jackson
Jasper
Jefferson
Knox
Lake
LaPorte
Martin
Morgan
Newton
Ohio

Owen
Parke
Perry
Pike
Porter
Posey
Pulaski
Ripley
Spencer
Starke
Sullivan
Switzerland
Vanderburgh
Vigo
Warrick

Iowa

Zone 1

Adair
Adams
Allamakee
Appanoose
Audubon
Benton
Black Hawk
Boone
Bremer
Buchanan
Buena Vista
Butler
Calhoun
Carroll
Cass
Cedar
Cerro Gordo
Cherokee
Chickasaw
Clarke
Clay
Clayton
Clinton
Crawford
Dallas
Davis
Decatur
Delaware
Des Moines
Dickinson
Dubuque
Emmet
Fayette
Floyd
Franklin
Fremont
Greene

Grundy
Guthrie
Hamilton
Hancock
Hardin
Harrison
Henry
Howard
Humboldt
Ida
Iowa
Jackson
Jasper
Jefferson
Johnson
Jones
Keokuk
Kossuth
Lee
Linn
Louisa
Lucas
Lyon
Madison
Mahaska
Marion
Marshall
Mills
Mitchell
Monona
Monroe
Montgomery
Muscatine
O'Brien
Osceola
Page
Palo Alto
Plymouth
Pocahontas
Polk
Pottawattami
e
Poweshiek
Ringgold
Sac
Scott
Shelby
Sioux
Story
Tama
Taylor
Union
Van Buren
Wapello
Warren
Washington

Wayne
Webster
Winnebago
Winneshiek
Woodbury
Worth
Wright

Kansas

Zone 1

Atchison
Barton
Brown
Cheyenne
Clay
Cloud
Decatur
Dickinson
Douglas
Ellis
Ellsworth
Finney
Ford
Geary
Gove
Graham
Grant
Gray
Greeley
Hamilton
Haskell
Hodgeman
Jackson
Jewell
Johnson
Kearny
Kingman
Kiowa
Lane
Leavenworth
Lincoln
Logan
Marion
Marshall
McPherson
Meade
Mitchell
Nemaha
Ness
Norton
Osborne
Ottawa
Pawnee
Phillips

Pottawatomie
Pratt
Rawlins
Republic
Rice
Riley
Rooks
Rush
Russell
Saline
Scott
Sheridan
Sherman
Smith
Stanton
Thomas
Trego
Wallace
Washington
Wichita
Wyandotte

Zone 2

Allen
Anderson
Barber
Bourbon
Butler
Chase
Chautauqua
Cherokee
Clark
Coffey
Comanche
Cowley
Crawford
Doniphan
Edwards
Elk
Franklin
Greenwood
Harper
Harvey
Jefferson
Labette
Linn
Lyon
Miami
Montgomery
Morris
Morton
Neosho
Osage
Reno
Sedgwick

Seward
Shawnee
Stafford
Stevens
Sumner
Wabaunsee
Wilson
Woodson

Kentucky

Zone 1

Adair
Allen
Barren
Bourbon
Boyle
Bullitt
Casey
Clark
Cumberland
Fayette
Franklin
Green
Harrison
Hart
Jefferson
Jessamine
Lincoln
Marion
Mercer
Metcalfe
Monroe
Nelson
Pendleton
Pulaski
Robertson
Russell
Scott
Taylor
Warren
Woodford

Zone 2

Anderson
Bath
Bell
Boone
Boyd
Bracken
Breathitt
Breckinridge
Butler
Caldwell
Campbell
Carroll

Carter
Christian
Clay
Clinton
Crittenden
Daviess
Edmonson
Elliott
Estill
Fleming
Floyd
Gallatin
Garrard
Grant
Grayson
Greenup
Hancock
Hardin
Harlan
Henderson
Henry
Hopkins
Jackson
Johnson
Kenton
Knott
Knox
Larue
Laurel
Lawrence
Lee
Leslie
Letcher
Lewis
Livingston
Logan
Lyon
Madison
Magoffin
Martin
Mason
McCreary
McLean
Meade
Menifee
Montgomery
Morgan
Muhlenberg
Nicholas
Ohio
Oldham
Owen
Owsley
Perry
Pike
Powell

Rockcastle
Rowan
Shelby
Simpson
Spencer
Todd
Trigg
Trimble
Union
Washington
Wayne
Webster
Whitley
Wolfe

Louisiana

-----None---

Maine

Zone 1

Androscoggin
Aroostook
Cumberland
Franklin
Hancock
Kennebec
Lincoln
Oxford
Penobscot
Piscataquis
Somerset
York

Zone 2

Knox
Sagadahoc
Waldo
Washington

Maryland

Zone 1

Baltimore
Calvert
Carroll
Frederick
Harford
Howard
Montgomery

Washington

Zone 2

Allegany
Anne
Arundel
Baltimore
City
Cecil
Charles
Garrett
Prince
George's
Somerset

Massachusetts

Zone 1

Essex
Middlesex
Worcester

Zone 2

Barnstable
Berkshire
Bristol
Dukes
Franklin
Hampden
Hampshire
Nantucket
Norfolk
Plymouth

Michigan

Zone 1

Branch
Calhoun
Cass
Hillsdale
Jackson
Kalamazoo
Lenawee
St Joseph
Washtenaw

Zone 2

Alcona
Alger
Alpena
Antrim
Baraga
Barry

Charlevoix
Clinton
Dickinson
Eaton
Emmet
Genesee
Gogebic
Houghton
Ingham
Ionia
Iron
Kent
Keweenaw
Lapeer
Leelanau
Livingston
Marquette
Menominee
Monroe
Montcalm
Montmorenc
y
Oakland
Otsego
Presque Isle
Sanilac
Shiawassee

Minnesota

Zone 1
Becker
Big Stone
Blue Earth
Brown
Carver
Chippewa
Clay
Cottonwood
Dakota
Dodge
Douglas
Faribault
Count
Fillmore
Freeborn
Goodhue
Grant
Hennepin
Houston
Hubbard
Jackson
Kanabec
Kandiyohi
Kittson
Lac qui Parle

Le Sueur
Lincoln
Lyon
Mahnomen
Marshall
Martin
McLeod
Meeker
Mower
Murray
Nicollet
Nobles
Norman
Olmsted
Otter Tail
Pennington
Pipestone
Polk
Pope
Ramsey
Red Lake
Redwood
Renville
Rice
Rock
Roseau
Scott
Sherburne

Sibley
Stearns
Steele
Stevens
Swift
Todd
Traverse
Wabasha
Wadena
Waseca
Washington
Watsonwan
Wilkin
Winona
Wright
Yellow
Medicine

Zone 2
Aitkin
Anoka
Beltrami
Benton
Carlton
Cass
Chisago
Clearwater
Cook

Crow Wing
Isanti
Itasca
Koochiching
Lake
Lake of the
Woods
Mille Lacs
Morrison
Pine
St Louis

Mississippi

Zone 2
Alcorn
Chickasaw
Clay
Lee
Lowndes
Noxubee
Pontotoc
Rankin
Union
Washington

Missouri

Zone 1
Andrew
Atchison
Buchanan
Cass
Clay
Clinton
Holt
Iron
Jackson
Nodaway
Platte

Zone 2
Adair
Audrain
Barry
Barton
Bates
Benton
Bollinger
Boone
Caldwell
Callaway
Camden
Cape
Girardeau

Carroll
Carter
Cedar
Chariton
Christian
Clark
Cole
Cooper
Crawford
Dade
Dallas
Daviess
DeKalb
Dent
Douglas
Franklin
Gasconade
Gentry
Greene
Grundy
Harrison
Henry
Hickory
Howard
Howell
Jasper
Jefferson
Johnson
Knox
Laclede
Lafayette
Lawrence
Lewis
Lincoln
Linn
Livingston
Macon
Madison
Maries
Marion
McDonald
Mercer
Miller
Moniteau
Monroe
Montgomery
Morgan
Newton
Oregon
Osage
Ozark
Perry
Pettis
Phelps
Pike
Polk

Pulaski
Putnam
Ralls
Randolph
Ray
Reynolds
Ripley
Saline
Schuyler
Scotland
Shannon
Shelby
St Charles
St Clair
St Francois
St Louis city
St Louis
Ste
Genevieve
Stone
Sullivan
Taney
Texas
Vernon
Warren
Washington
Wayne
Webster
Worth
Wright

Montana

Zone 1
Beaverhead
Big Horn
Blaine
Broadwater
Carbon
Carter
Cascade
Chouteau
Custer
Daniels
Dawson
Deer Lodge
Fallon
Fergus
Flathead
Gallatin
Garfield
Glacier
Granite
Hill
Jefferson
Judith Basin

Lake
Lewis and
Clark
Liberty
Lincoln
Madison
McCone
Meagher
Mineral
Missoula
Park
Phillips
Pondera
Powder
River
Powell
Prairie
Ravalli
Richland
Roosevelt
Rosebud
Sanders
Sheridan
Silver Bow
Stillwater
Teton
Toole
Valley
Wibaux

Zone 2

Golden
Valley
Musselshell
Petroleum
Sweet Grass
Treasure
Wheatland
Yellowstone

Nebraska

Zone 1
Adams
Boone
Boyd
Burt
Butler
Cass
Cedar
Clay
Colfax
Cuming
Dakota
Dixon

Dodge
Douglas
Fillmore
Franklin
Frontier
Furnas
Gage
Gosper
Greeley
Hamilton
Harlan
Hayes
Hitchcock
Jefferson
Johnson
Kearney
Knox
Lancaster
Madison
Nance
Nemaha
Nuckolls
Otoe
Pawnee
Phelps
Pierce
Platte
Polk
Red Willow
Richardson
Saline
Sarpy
Saunders
Seward
Stanton
Thayer
Thurston
Washington
Wayne
Webster
York
Zone 2
Antelope
Banner
Box Butte
Buffalo
Chase
Cheyenne
Custer
Dawes
Dawson
Deuel
Dundy
Hall
Howard
Keith

Keya Paha
Kimball
Merrick
Morrill
Perkins
Scotts Bluff
Sheridan
Sherman
Sioux
Valley

Nevada

Zone 1
Carson City
Douglas
Eureka
Lander
Lincoln
Lyon
Mineral
Pershing
White Pine

Zone 2
Churchill
Elko
Esmeralda
Humboldt
Nye
Storey
Washoe

New Hampshire

Zone 1
Carroll

Zone 2
Belknap
Cheshire
Coos
Grafton
Hillsborough
Merrimack
Rockingham
Strafford
Sullivan

New Jersey

Zone 1
Hunterdon
Mercer

Monmouth
Morris
Somerset
Sussex
Warren

Zone 2
Bergen
Burlington
Camden
Cumberland
Essex
Gloucester
Hudson
Middlesex
Passaic
Salem
Union

New Mexico

Zone 1
Bernalillo
Colfax
Mora
Rio Arriba
San Miguel
Santa Fe
Taos

Zone 2
Catron
Chaves
Cibola
Curry
De Baca
Dona Ana
Eddy
Grant
Guadalupe
Harding
Hidalgo
Lea
Lincoln
Los Alamos
Luna
McKinley
Otero
Quay
Roosevelt
San Juan
Sandoval
Sierra
Socorro
Torrance
Union

Valencia

New York

Zone 1
Albany
Allegany
Broome
Cattaraugus
Cayuga
Chautauqua
Chemung
Chenango
Columbia
Cortland
Delaware
Dutchess
Erie
Genesee
Greene
Livingston
Madison
Onondaga
Ontario
Orange
Otsego
Putnam
Rensselaer
Schoharie
Schuyler
Seneca
Steuben
Sullivan
Tioga
Tompkins
Ulster
Washington
Wyoming
Yates

Zone 2
Clinton
Jefferson
Lewis
Monroe
Montgomery
Niagara
Oneida
Orleans
Oswego
Saratoga
Schenectady
St Lawrence
Wayne

North Carolina

Zone 1
Alleghany
Buncombe
Cherokee
Henderson
Mitchell
Rockingham
Transylvania
Watauga

Zone 2
Alexander
Ashe
Avery
Burke
Caldwell
Caswell
Catawba
Clay
Cleveland
Forsyth
Franklin
Gaston
Graham
Haywood
Iredell
Jackson
Lincoln
Macon
Madison
McDowell
Polk
Rutherford
Stokes
Surry
Swain
Vance
Wake
Warren
Wilkes
Yadkin
Yancey

North Dakota

Zone 1
Adams
Barnes
Benson
Billings
Bottineau
Bowman

Burke
Burleigh
Cass
Cavalier
Dickey
Divide
Dunn
Eddy
Emmons
Foster
Golden
Valley
Grand Forks
Grant
Griggs
Hettinger
Kidder
LaMoure
Logan
McHenry
McIntosh
McKenzie
McLean
Mercer
Morton
Mountrail
Nelson
Oliver
Pembina
Pierce
Ramsey
Ransom
Renville
Richland
Rolette
Sargent
Sheridan
Sioux
Slope
Stark
Steele
Stutsman
Towner
Traill
Walsh
Ward
Wells
Williams

Ohio

Zone 1
Adams
Allen
Ashland
Auglaize

Belmont
Butler
Carroll
Champaign
Clark
Clinton
Columbiana
Coshocton
Crawford
Darke
Delaware
Fairfield
Fayette
Franklin
Greene
Guernsey
Hamilton
Hancock
Hardin
Harrison
Holmes
Huron
Jefferson
Knox
Licking
Logan
Madison
Marion
Mercer
Miami
Montgomery
Morrow
Muskingum
Perry
Pickaway
Pike
Preble
Richland
Ross
Seneca
Shelby
Stark
Summit
Tuscarawas
Union
Van Wert
Warren
Wayne
Wyandot

Zone 2
Ashtabula
Athens
Brown
Clermont
Cuyahoga

Defiance
Erie
Fulton
Gallia
Geauga
Henry
Highland
Hocking
Jackson
Lake
Lawrence
Lorain
Lucas
Mahoning
Medina
Meigs
Monroe
Morgan
Noble
Ottawa
Paulding
Portage
Putnam
Sandusky
Scioto
Trumbull
Vinton
Washington
Williams
Wood

Oklahoma

Zone 2
Adair
Beaver
Cherokee
Cimarron
Delaware
Ellis
Mayes
Sequoyah
Texas

Oregon

Zone 2
Baker
Clatsop
Columbia
Crook
Gilliam
Grant
Harney
Hood River

Jefferson
Klamath
Lake
Malheur
Morrow
Multnomah
Sherman
Umatilla
Union
Wasco
Washington
Wheeler
Yamhill

Pennsylvania
a

Zone 1
Adams
Allegheny
Armstrong
Beaver
Bedford
Berks
Blair
Bradford
Bucks
Butler
Cameron
Carbon
Centre
Chester
Clarion
Clearfield
Clinton
Columbia
Cumberland
Dauphin
Delaware
Franklin
Fulton
Huntingdon
Indiana
Juniata
Lackawanna
Lancaster
Lebanon
Lehigh
Luzerne
Lycoming
Mifflin
Monroe
Montgomery
Montour
Northampton

Northumberland
Perry
Schuylkill
Snyder
Sullivan
Susquehanna
Tioga
Union
Venango
Westmoreland
Wyoming
York

Zone 2

Cambria
Crawford
Elk
Erie
Fayette
Forest
Greene
Jefferson
Lawrence
McKean
Mercer
Pike
Potter
Somerset
Warren
Washington
Wayne

Rhode Island

Zone 1
Kent
Washington

Zone 2
Newport
Providence

South Carolina

Zone 1
Greenville

Zone 2
Abbeville
Anderson

Cherokee
Laurens
Oconee
Pickens
Spartanburg
York

South Dakota

Zone 1
Aurora
Beadle
Bon Homme
Brookings
Brown
Brule
Buffalo
Campbell
Charles Mix
Clark
Clay
Codington
Corson
Davison

Day
Deuel
Douglas
Edmunds
Faulk
Grant
Hamlin
Hand
Hanson
Hughes
Hutchinson
Hyde
Jerauld
Kingsbury
Lake
Lincoln
Lyman
Marshall
McCook
McPherson
Miner
Minnehaha
Moody
Perkins
Potter
Roberts
Sanborn
Spink
Stanley
Sully
Turner

Union
Walworth
Yankton

Zone 2
Bennett
Butte
Custer
Dewey
Fall River
Gregory
Haakon
Harding
Jackson
Jones
Lawrence
Meade
Mellette
Pennington
Shannon
Todd
Tripp
Ziebach

Tennessee

Zone 1
Anderson
Bedford
Blount
Bradley
Claiborne
Davidson
Giles
Grainger
Greene
Hamblen
Hancock
Hawkins
Hickman
Humphreys
Jackson
Jefferson
Knox
Lawrence
Lewis
Lincoln
Loudon
Macon
Madison
Marshall
McMinn
Meigs
Monroe
Moore
Perry

Roane
Rutherford
Smith
Sullivan
Trousdale
Union
Washington
Wayne
Williamson
Wilson

Zone 2

Benton
Cannon
Carter
Cheatham
Chester
Clay
Cocke
Coffee
Decatur
DeKalb
Dickson
Fentress
Hamilton
Hardin
Henderson
Houston
Johnson
Marion
McNairy
Montgomery
Overton
Pickett
Polk
Putnam
Robertson
Sevier
Stewart
Sumner
Unicoi
Van Buren
Warren
White

Texas

Zone 2
Armstrong
Bailey
Brewster
Carson
Castro
Crosby
Culberson
Dallam

Deaf Smith
Donley
Floyd
Garza
Gray
Hale
Hansford
Hartley
Hemphill
Hockley
Hudspeth
Hutchinson
Jeff Davis
Lamb
Lipscomb
Llano
Lubbock
Lynn
Mason
Moore
Ochiltree
Oldham
Parmer
Potter
Presidio
Randall
Reeves
Roberts
Sherman
Swisher
Terrell

Utah

Zone 1
Carbon
Duchesne
Grand
Piute
Sanpete
Sevier
Uintah

Zone 2
Beaver
Box Elder
Cache
Daggett
Davis
Emery
Garfield
Iron
Juab
Kane
Millard
Morgan

Rich
Salt Lake
San Juan
Summit
Tooele
Utah
Wasatch
Washington
Wayne
Weber

Vermont

Zone 2
Addison
Bennington
Caledonia
Essex
Franklin
Lamoille
Orange
Orleans
Rutland
Washington
Windham
Windsor

Virginia

Zone 1
Alleghany
Amelia
Appomattox
Augusta
Bath
Bland
Botetourt
Brunswick
Buckingham
Campbell
Chesterfield
Clarke
Craig
Cumberland
Dinwiddie
Fairfax
Fluvanna
Frederick
Giles
Goochland
Henry
Highland
Lee
Louisa
Montgomery

Nottoway
Orange
Page
Patrick
Pittsylvania
Powhatan
Pulaski
Roanoke
Rockbridge
Rockingham
Russell
Scott
Shenandoah
Smyth
Spotsylvania
Stafford
Tazewell
Warren
Washington
Wythe

Zone 2

Albemarle
Amherst
Arlington
Bedford
Buchanan
Carroll
Charlotte
Culpeper
Dickenson
Fauquier
Floyd
Franklin
Grayson
Greene
Halifax
Loudoun
Lunenburg
Madison
Mecklenburg
Nelson
Prince
Edward
Prince
William
Rappahanno
ck
Wise

Washington

Zone 1
Clark
Ferry
Okanogan
Pend Oreille

Skamania
Spokane
Stevens

Zone 2

Adams
Asotin
Benton
Columbia
Douglas
Franklin
Garfield
Grant
Kittitas
Klickitat
Lincoln
Walla Walla
Whitman
Yakima

West Virginia

Zone 1

Berkeley
Brooke
Grant
Greenbrier
Hampshire
Hancock
Hardy
Jefferson
Marshall
Mercer
Mineral
Monongalia
Monroe
Morgan
Ohio
Pendleton
Pocahontas
Preston
Summers
Wetzel

Zone 2

Barbour
Braxton
Cabell
Calhoun
Clay
Doddridge
Fayette
Gilmer
Harrison
Jackson
Lewis

Lincoln
Marion
Mason
Nicholas
Pleasants
Putnam
Raleigh
Randolph
Ritchie
Roane
Taylor
Tucker
Tyler
Upshur
Wayne
Webster
Wirt
Wood

Wisconsin

Zone 1

Buffalo
Crawford
Dane
Dodge
Door
Fond du Lac
Grant
Green
Green Lake
Iowa
Jefferson
Lafayette
Langlade
Marathon
Menominee
Pepin
Pierce
Portage
Richland
Rock
Shawano
St Croix
Vernon
Walworth
Washington
Waukesha
Waupaca
Wood

Zone 2

Adams
Ashland
Barron
Bayfield

Brown
Burnett
Calumet
Chippewa
Clark
Columbia
Douglas
Dunn
Eau Claire
Florence
Forest
Iron
Jackson
Juneau
Kenosha
Kewaunee
La Crosse
Lincoln
Manitowoc
Marinette
Marquette
Milwaukee
Monroe
Oconto
Oneida
Outagamie
Ozaukee
Polk
Price
Racine
Rusk
Sauk
Sawyer
Sheboygan
Taylor
Trempealea
u
Vilas
Washburn
Waushara
Winnebago

<u>Wyoming</u>

Zone 1

Albany
Big Horn
Campbell
Carbon
Converse
Crook
Fremont
Goshen
Hot Springs
Johnson
Laramie
Lincoln
Natrona
Niobrara
Park
Sheridan
Sublette
Sweetwater
Teton
Uinta
Washakie

Zone 2

Platte
Weston

R324.46

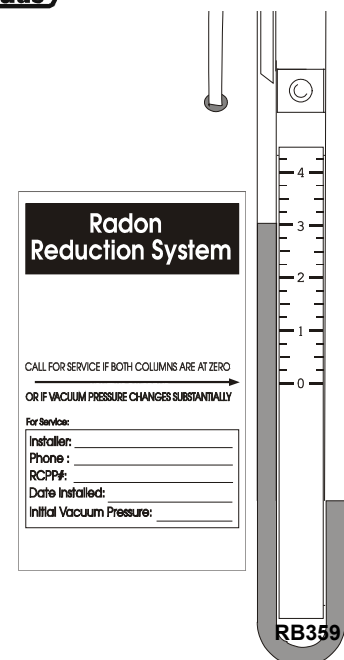
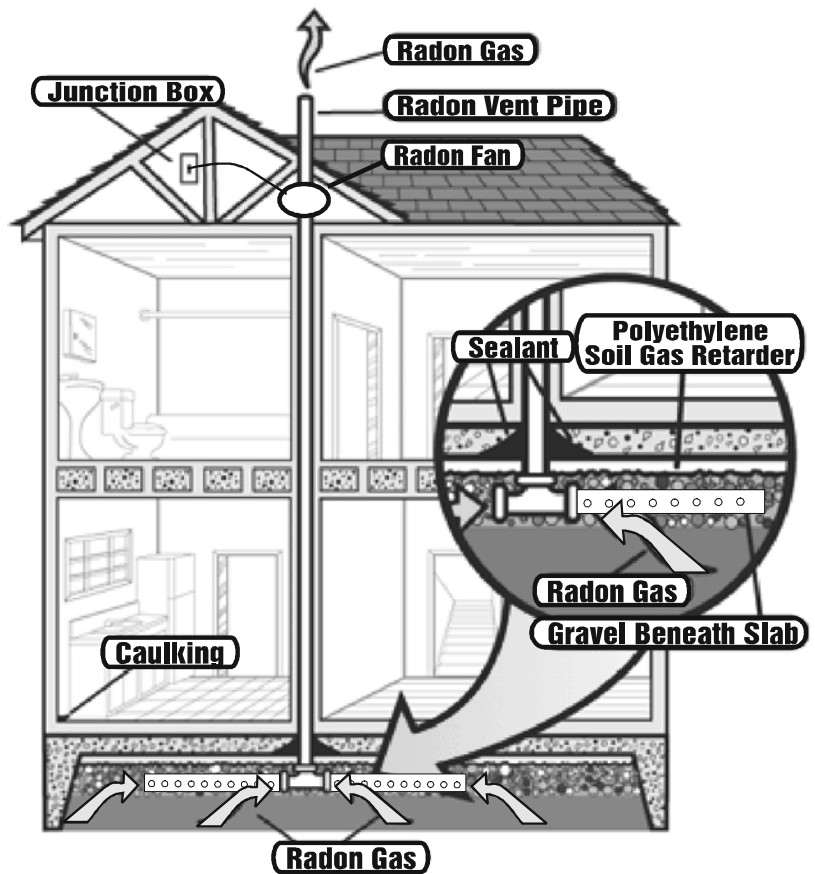
Exhibit 1 - Understanding a Radon Reduction System (Occupants)

General: *Radon* is a radioactive gas that has been found in homes all over the United States. It comes from the natural breakdown of uranium in soil, rock and water and gets into the air you breathe. The *radon* potential of any specific building lot is dependent on whether there is sufficient *radon* source material in the ground below the home and sufficient upward air movement for the *radon* to be near your home's foundation. *Radon* typically moves up through the ground to the air above and into your home through gaps and other holes in the foundation. The primary health concern associated with *radon* is lung cancer. The Environmental Protection Agency (EPA) estimates that 21,000 people die in the US each year from *radon*-induced lung cancer.

Radon Reduction System: Your new home was constructed with an *Active Subslab Depressurization (ASD)* System to protect your family's health. The *ASD* system is designed to limit *radon* entry into your home by keeping the soil under your home at a lower pressure than the air in your home. In doing so, *radon* and other *soil gases* from below your home are exhausted above your roof through a specially designed *radon* fan. An *ASD* system is recognized by the EPA as the Best Available Technology for *radon* control because it keeps much of the *radon* from entering your home. The system is designed to run 24 hours a day, 7 days a week. The electrical power required to run the fan, which is the only active component in the system, will typically cost 5 to 25 cents per day depending upon the type of fan and your electrical utility rates. Cost to operate this fan would be less than operating a normal light bulb.

System Maintenance: Your *ASD* System is designed to provide many years of service under normal conditions without significant maintenance. As the occupant of this home, you need to routinely check the system pressure gauge or other system monitor to verify that the fan is operating correctly. There are various labeled components of your *radon* system such as pipe, crawlspace membrane, fan, system pressure monitor and sump basin. **DO NOT ALTER OR DISCONNECT** any of these components. If the sump basin is opened for required maintenance or repair, restore to the original condition immediately after completing work. You also need to be aware that foundation settling, renovations or additions to your home can change your indoor *radon* concentrations. A *certified/licensed radon mitigator* can provide guidance when changes are to be made to the *dwelling* or provide a routine check-up on the operation of the system.

Understanding the System Pressure Gauge: The pressure gauge shown on the right is typical of a gauge used to monitor the pressure developed in the piping system by the *radon* fan. Your fan pressure



should be checked regularly to ensure the fan system continues to operate properly. This gauge measures pressure in Inches Water Column (*in. WC*). This gauge does NOT measure *radon*.

Call for service if the measure changes substantially (20% or more) or if the gauge reads zero pressure (both columns equal).

Your ASD system may have an audible alarm to alert you to call for service in the event of a problem.

Radon Testing: Your builder left behind a long term test kit for you to use to test your home after you move in. The way you and your family live in your new home, how you set heating and cooling controls or use your clothes dryer and other exhaust fans can affect indoor *radon* levels. It is recommended that you test for a minimum of 3 months or preferably longer to determine your actual *radon* exposure in the home. Be sure to check the warranty your builder provides to make certain you complete your testing before the end of the new home warranty period.

Follow the instructions provided by the test laboratory to open, activate and place the test kit to test your *radon* levels.

<u>The USEPA recommends that you retest your home at least every 2 years or if major renovations or additions are made to the <i>dwelling</i>.</u>

Other sources of radon: *Radon* can also be found in the water from private wells. Testing can determine if your well contains significant amounts of *radon*.

More Info: For more information on *radon*, *radon* testing or *radon* removal: www.epa.gov/radon

NOTE: Exhibit 1 may be reprinted without license.

Add definitions as follows:

R202 DEFINITIONS

ACCESS (limited). For the purposes of Section R324, the point of entry to fan location that allows service personnel to reach an *ASD fan* or intended fan location for the purpose of installing or replacing an *ASD fan*. Such access does not require walkways, service platforms, level working spaces, receptacle and lighting outlets or clear and unobstructed passageways with continuous solid flooring such as are typically required for appliances that require periodic maintenance, servicing and inspection.

ACTIVE SOIL DEPRESSURIZATION (ASD). A family of *radon mitigation systems* involving fan-powered soil depressurization, including but not limited to *sub-slab depressurization* and *sub-membrane depressurization*.

ASD FAN. A particular type of fan that is designed and rated by the manufacturer for continuous duty and for use in an *ASD* system.

CERTIFIED. For the purposes of Section R324, a designation applied to individuals or companies that have met qualification requirements or are authorized by the state to provide *radon* laboratory, measurement or mitigation services. Programs providing national certifications for *radon* laboratories, measurement and mitigation professionals are those of the National Radon Proficiency Program (NRPP) and the National Radon Safety Board (NRSB). Also see LICENSED.

CHECK VALVE. A mechanical device that will allow water to flow in one direction while preventing airflow in the opposite direction.

DEPRESSURIZATION. A negative pressure induced in one area relative to another.

DIAGNOSTIC TESTS. For the purposes of Section R324, procedures, including Communication Tests and other tests, used to identify or characterize conditions under, beside and within buildings that could contribute to *radon* entry or elevated *radon* levels or that could provide information regarding the performance of a *radon mitigation system*.

GEOTEXTILE MATTING. A product suitable for soil contact, that provides a void space laterally through the material to allow air movement. The void space is created through a matrix of woven mesh, “egg crate” support of a fabric enclosure or similar means. Also referred to as “Vent Strip”.

LICENSED. For the purposes of Section R324, a designation applied to individuals and/or companies that are qualified and specifically authorized as *radon* laboratories, measurement and/or mitigation professionals within certain states or jurisdictions that regulate *radon* services. Also see CERTIFIED.

MITIGATOR. For the purposes of Section R324, a *certified/licensed* individual who designs, installs or directly supervises the installation of the *radon ASD mitigation systems*.

MITIGATION SYSTEM. For the purposes of Section R324, any system or steps designed to reduce *radon* concentrations in the indoor air of a building.

NATIONAL RADON ACTION LEVEL (NRAL). The indoor *radon* concentration at which mitigation is recommended. The *NAL* is defined as the US Environmental Protection Agency’s Action Level of 4 *pCi/L* [148 *Bq/m³*].

PIPE LOOP. A continuous length of perforated pipe extending around the inside perimeter of the foundation.

RADON. A naturally occurring, chemically inert, radioactive element (Rn-222) which exists as a gas.

ROUGH-IN. For the purposes of Section R324, the installation of all parts and materials of an *ASD* system that must be completed prior to the placement of concrete, prior to the closure of building cavities and prior to the installation of finish materials. Such parts and materials are gas permeable layers, *soil gas retarders*, plenums, membranes, piping, *suction points*, discharge points and wiring.

SOIL GAS. The gas mixture present in soil, which could contain *radon* and water vapor.

SOIL GAS COLLECTION PLENUM. A constructed enclosure for collecting *radon* and other *soil gases* from under a foundation.

SOIL GAS COLLECTOR. A gas permeable conduit constructed of *gravel*, perforated pipe or *geotextile matting* for collecting *radon* and other *soil gases* from within a *soil gas collection plenum* and connecting the plenum to the *ASD* pipe system.

SOIL GAS RETARDER. A continuous membrane or other comparable material laid over a *soil gas* plenum or earthen floor area that is used to retard the flow of *soil gases* into a building.

SUB-MEMBRANE DEPRESSURIZATION. A *radon* mitigation technique designed to maintain lower air pressure in the space under a *soil gas retarder* membrane than above it by use of an *ASD fan* drawing air from beneath the membrane.

SUB-SLAB DEPRESSURIZATION. A *radon* mitigation technique designed to maintain lower air pressure under a floor slab than above it. An *ASD fan* is installed in the *radon* system piping that draws air from below the floor slab.

SUCTION POINT. For the purposes of Section R324, the location where the *soil gas collector* is connected to the *ASD* system piping.

Add standards to Chapter 44 as follows:

ASTM

D5926-11 "Standard Specification for Poly (Vinyl Chloride) (PVC) Gaskets for Drain, Waste, and Vent (DWV), Sewer, Sanitary, and Storm Plumbing Systems "

E1745-11 "Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs"

Reason: 21,000 Americans die each year from radon-induced lung cancer. The primary source of exposure to radon for the general public is the home. Geographical areas of the highest radon potential in the United States are located in EPA radon zones 1 & 2. Application of the methods contained in this proposed code change will ensure all new homes built in radon zones 1 & 2 will be tested to be below the EPA Action Level of 4 pCi/L prior to occupancy.

The code change proposal presented herein was developed as an ANSI consensus standard by the AARST Radon Standards Consortium. This standard, AARST/ANSI #CCAH "Reducing Radon in New Construction of 1 & 2 Family Dwellings and Townhouses," was produced by a committee of (27) representing radon professionals, home inspectors, home builders, architects, code officials, consumer advocates and state and federal government.

There is no requirement in the Residential Code to apply radon reduction methods to new construction and thereby prevent elevated radon concentrations in newly built homes. Appendix F of the IRC (Radon Control Methods) is inadequate, 20 years old and not a mandatory part of the building code unless voluntarily adopted by a local jurisdiction.

This proposal adds requirements to homes in the high risk radon counties. Like snow and wind load, seismic and flood-resistance provisions, this proposal targets requirements to the areas with the greatest likelihood of exposure. The EPA estimates that 1 out of 15 of all homes in the US has elevated indoor radon levels. The incidence of elevated radon may be greater than 7 out of 10 homes in some high radon areas. Nonrandomized industry data shows a significant number of homes across the United States have tested high for elevated indoor radon concentrations. Builders of new homes will continue to add to the existing inventory of homes with elevated radon without changes in the residential code that address this important life/safety issue.

Radon Test Results Data by State

STATE	STATENAME	TOTAL # TESTS	AVG (pCi/L)	% > EPA Action Level of 4 pCi/L
AL	ALABAMA	11,629	3.8	21.9
AK	ALASKA	432	2.2	13.0
AZ	ARIZONA	7,495	2.1	11.9
AR	ARKANSAS	1,243	2.5	13.7
CA	CALIFORNIA	16,960	2.1	9.1
CO	COLORADO	88,346	6.5	49.0
CT	CONNECTICUT	41,292	3.4	23.9
DE	DELAWARE	5,539	2.5	17.4
FL	FLORIDA	40,039	1.8	10.2
GA	GEORGIA	27,222	2.6	18.9
HI	HAWAII	94	0.4	2.1
ID	IDAHO	16,138	7.1	40.4
IL	ILLINOIS	84,366	5.1	41.0
IN	INDIANA	18,031	4.7	37.2
IA	IOWA	96,260	6.2	49.3
KS	KANSAS	34,288	5.2	44.0
KY	KENTUCKY	47,575	7.4	43.6
LA	LOUISIANA	786	0.9	3.1
ME	MAINE	5,494	5.9	38.3
MD	MARYLAND	55,949	5.4	33.4
MA	MASSACHUSETTS	29,850	3.8	25.6
MI	MICHIGAN	164,678	3.4	25.4
MN	MINNESOTA	135,419	4.7	42.2
MS	MISSISSIPPI	700	1.2	5.6
MO	MISSOURI	27,771	4.2	31.6
MT	MONTANA	18,082	7.2	46.3
NE	NEBRASKA	27,481	5.7	51.6
NV	NEVADA	1,952	3.0	19.3
NH	NEW HAMPSHIRE	35,974	5.5	34.0
NJ	NEW JERSEY	41,092	4.3	24.1
NM	NEW MEXICO	8,165	3.9	30.2
NY	NEW YORK	66,713	4.8	23.9
NC	NORTH CAROLINA	79,384	3.8	27.5
ND	NORTH DAKOTA	10,887	6.0	50.5

STATE	STATENAME	TOTAL # TESTS	AVG (pCi/L)	% > EPA Action Level of 4 pCi/L
OH	OHIO	102,352	7.9	49.0
OK	OKLAHOMA	1,356	2.3	9.7
OR	OREGON	13,675	3.5	25.4
PA	PENNSYLVANIA	149,543	8.3	44.3
RI	RHODE ISLAND	8,667	4.2	31.0
SC	SOUTH CAROLINA	38,971	2.7	18.7
SD	SOUTH DAKOTA	4,081	9.8	59.2
TN	TENNESSEE	40,632	4.6	31.8
TX	TEXAS	5,821	2.4	8.7
UT	UTAH	14,636	4.5	33.6
VT	VERMONT	3,231	3.7	23.4
VA	VIRGINIA	62,577	3.5	25.4
WA	WASHINGTON	22,199	7.0	39.3
DC	WASHINGTON DC	6,948	1.6	8.8
WV	WEST VIRGINIA	14,976	6.0	35.0
WI	WISCONSIN	72,694	5.6	41.8
WY	WYOMING	25,090	5.2	39.6
TOTALS		1,834,775		

Source: AARST radon industry test data; published 10/29/2012.

Cost Impact: This change proposal will slightly increase the cost of construction. Most homes can be built with only a mitigation system rough-in. If the home tests high for elevated radon then the system can be upgraded with a fan to reduce the indoor radon levels.

Cost of mitigation system rough-in (passive) = \$296*

Cost of fan driven mitigation system = \$707* (total cost, not in addition to \$296)

***Source: Annual Builder Practices Report 2011, NAHB Research Center, Inc.**

The cost savings for reduced health care resulting from a healthier indoor environment has not been calculated.

Analysis: A review of the standards proposed for inclusion in the code, [ASTM D5926-11 and ASTM E1745-11] with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

RB201-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R324 (NEW)-RB-KAPUROWSKI

RB202 – 13

R324 (New)

Proponent: Tim Pate, City and County of Broomfield, CO, representing self

Add new text as follows:

SECTION R324

WINDOW REPLACEMENT

R324.1 Window replacement. Window replacements shall require permits and replacement windows shall comply with the requirements for new glazing including, but not limited to, emergency escape and rescue, child fall, safety glazing and energy related requirements.

Reason: This code change proposal will add specific language to require building permits for all replacement windows. The new windows will need to meet the current requirements for egress size requirements, child fall requirements, safety glazing requirements, and energy code requirements. It is important to require all new windows and glazing to meet the current code requirements in order to verify all of the current safety issues.

Based on surveys I have done throughout Colorado jurisdictions there is not a clear consensus on whether or not the current IRC does require permits for window changeouts.

I suggest that they are now required already based on language in section R101.2 which states that the scope of the IRC applies to "alterations" and section R105 which states permits are required for owner or authorized agent who intends to "alter" a structure. I also suggest this since window or glass replacement is not listed under exceptions to requiring a permit in section R105.2. This new language will clarify that a permit is required for this type of work and what requirements they need to comply with.

Cost Impact: This proposal will increase the cost of construction

RB202-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R324 (NEW)-RB-PATE

RB203 – 13

R202, R301.2.2.3.1, R324 (New)

Proponent: Maureen Traxler/City of Seattle/Washington Association of Building Officials Technical Code Development Committee (maureen.traxler@seattle.gov)

Revise as follows:

SECTION R202 DEFINITIONS

MEZZANINE, LOFT. An intermediate level or levels between the floor and ceiling of any story with an aggregate floor area of not more than one-third of the area of the room or space in which the level or levels are located.

Revise as follows:

R301.2.2.3.1 Height limitations. Wood-framed buildings shall be limited to three stories above *grade* plane or the limits given in Table R602.10.3(3). Cold-formed, steel-framed buildings shall be limited to less than or equal to three stories above *grade* plane in accordance with AISI S230. Mezzanines as defined in Section R202 that comply with Section R324 shall not be considered as stories. Structural insulated panel buildings shall be limited to two stories above *grade* plane.

SECTION R324 MEZZANINES

R324.1 General. Mezzanines shall comply with Section R324.

R324.2 Mezzanines. The clear height above and below *mezzanine* floor construction shall be not less than 7 feet (2134 mm).

R324.3 Area limitation. The aggregate area of a *mezzanine* or *mezzanines* shall be not greater than one-third of the floor area of the room or space in which they are located. The enclosed portion of a room shall not be included in a determination of the floor area of the room in which the *mezzanine* is located.

R324.4 Means of egress. The *means of egress* for *mezzanines* shall comply with the applicable provisions of Section R311.

R324.5 Openness. *Mezzanines* shall be open and unobstructed to the room in which they are located except for walls not more than 42 inches (1067 mm) in height, columns and posts.

Exceptions:

1. *Mezzanines* or portions thereof are not required to be open to the room in which they are located, provided that the aggregate floor area of the enclosed space is not greater than 10 percent of the *mezzanine* area.
2. In buildings that are no more than two *stories* above *grade plane* and equipped throughout with an *automatic sprinkler system* in accordance with NFPA 13R, NFPA 13D or Appendix S, a *mezzanine* having two or more *means of egress* shall not be required to be open to the room in which the *mezzanine* is located.

Reason: The IRC provisions for mezzanines are incomplete. The code provides a definition of “mezzanine, loft” but doesn’t include any other provisions to clarify the allowable size or extent of mezzanines. This proposal copies relevant portions of IBC Section 505.2 into the IRC.

Mezzanines are allowed to be considered not to be stories because they are limited in size and because they are subject to provisions that provide protection from fire hazards. Mezzanines are required to be open to the room in which they are located, which provides early warning to occupants should a fire occur in either the mezzanine or in the room. The IBC provisions also include more specific provisions for determining the portion of the room that can be included in the allowable area of the mezzanine.

There is also reason to limit the size of mezzanines. Section R301.2.2.3.1 states that mezzanines are not considered stories in the context of height limitations for buildings in higher seismic design categories. Mezzanines that are large in relation to the size of the story will act more like a story in response to seismic forces and should be treated as stories.

In addition, we are proposing to delete the word "loft" from the definition of mezzanine. The word is not used anywhere in the code, so it is not necessary to define it.

Cost Impact: The code change proposal will not increase the cost of construction.

RB203-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R324 (NEW)-RB-TRAXLER

RB204 – 13

R401.2 (NEW)

Proponent: Andrew Herseth, US Dept of Homeland Security, representing, Federal Emergency Management Agency (FEMA) and Glenn Overcash, URS Corporation representing FEMA

Add new text as follows:

R401.2 Wind limitations. Where wind design is required in accordance with Section R301.2.1.1, foundations shall be designed in accordance with ICC 600 or the *International Building Code*.

Reason: This code change is essentially a clarification. Section R301.2.1.1 states that the wind provisions of this code shall not apply to the design of buildings where wind design is required in accordance with Figure R301.2(4)B. However, the code does not clearly define the “wind provisions of this code”. This new language simply clarifies the intent of the code. The footings and foundations specified in Chapter 4 of the IRC do not apply to buildings that are to be sited in high wind regions. ICC 600 contains prescriptive foundation details developed specifically for residential structures sited in high wind regions. Prescriptive details are provided for concrete, masonry and light-frame construction. Alternately, the foundation could be designed for the applicable wind loads using the IBC.

FEMA P-550, *Recommended Residential Construction for Coastal Areas* (FEMA, 2009), notes that - along with potential flood hazards, erosion and scour - high wind hazard must be considered in the design of residential building foundation for coastal areas. Appendix B of ICC 600 includes prescriptive flood-resistant foundation designs from FEMA P-550 that may be selected to support residential buildings in coastal high wind regions under specified conditions. Although most common in coastal areas, it is important to note that the damaging effects of hurricane-force winds are not limited to coastal counties.

Cost Impact: The code change proposal will not increase the cost of construction.

RB204-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R401.2 (NEW)-RB-HERSETH-OVERCASH.doc

RB205 – 13

R106.2.1 (NEW), R401.3, Chapter 44

Proponent: John Whitescarver, National Stormwater Center

Add new text as follows:

106.2.1 Stormwater pollution prevention. Where required by federal or state law, the construction documents shall include a stormwater construction permit and stormwater pollution prevention plan.

Revise as follows:

401.3 Drainage. Surface drainage shall be diverted to a stormwater sewer conveyance or other approved point of collection that does not create a hazard. Where required, surface drainage shall be accomplished in accordance with an approved pollution prevention plan complying with 40 CFR Part 450. Lots shall be graded to drain surface water away from foundation walls. The *grade* shall fall a minimum of 6 inches (152 mm) within the first 10 feet (3048 mm).

Exception: Where *lot lines*, walls, slopes or other physical barriers prohibit 6 inches (152 mm) of fall within 10 feet (3048 mm), drains or swales shall be constructed to ensure drainage away from the structure. Impervious surfaces within 10 feet (3048 mm) of the building foundation shall be sloped a minimum of 2 percent away from the building.

Add new standard to Chapter 44 as follows:

EPA

40 CFR PART 450 Effluent Limitations Guidelines and Standards for the Construction and Development Point Source Category – December 1, 2009

Reason: At the national level, the construction and development industry is a major contributor to problems of water pollution, with consequent damage to the environment and infrastructure. These problems generated by the construction and development industry arise from failures to properly protect stormwater drains and conveyances from the impact of stormwater run-off during site preparation and then during construction activity.

Failure to control sedimentary and chemical run-off into the stormwater system has multiple impacts on local communities which reach far beyond the issue of water quality. Failure to adopt best management practices in this regard also leads to siltation of both the stormwater drainage system and the natural watercourses, thereby reducing capacity of those systems and directly increasing the risk of flooding.

The improper management of construction activities therefore constitutes a serious threat to flood-prone communities. This threat is also progressive in nature. Allowing cementitious materials to enter the stormwater drainage system leads to concretization of the deposited sediments. This constitutes a permanent capacity reduction in the stormwater system which is further reduced by each successive failure to protect the system during construction activity.

Attention to stormwater management practices is already a mandated issue under the IBC. Section 3301.1 of that code provides that "*Provision shall be made to control water run-off and erosion during construction or demolition activities*". However, this mandatory requirement is not supported by reference to the published regulatory performance standards imposed on local jurisdictions and construction contractors under the terms of the Act.

Further, the code does not make reference to required Stormwater Construction Permits or the mandated Stormwater Pollution Prevention Plans, within those sections defining and making reference to construction documents, except that the code provides "*where special conditions exist, the building official is authorized to require additional documents*". These stormwater documents clearly fall into the code defined category of "*construction documents*", but are not subject to specific citation in the code and not subject to code required submission to the building official to support application for a building permit. This results in such documents not being taken into account in plan review processes and denies the building inspector awareness of the contractors plans for compliance with construction law in this regard.

Under the code as currently drafted reliance must therefore be placed on the power of the building official to address "*special conditions*" by requiring the submission of additional construction documents. However claiming "*special conditions*" for a regular requirement is not necessarily the most prudent course in a litigious environment, opening the door to argument about the legitimacy of a building official's powers to require the submission of documents which should be required for a significant proportion of new construction activity.

These proposals for amendment of the IRC therefore seek to embed stormwater pollution prevention performance standards into the ICC codes, by reference to the appropriate legislation and regulatory standards mandated for enforcement by the local community. This action will not only address local, regional and national concerns with regard to water quality, but will also support

other sections of the code related to reduction of flood hazard risk within local communities. For more information on stormwater go to www.npdes.com.

REFERENCE DOCUMENTS:

1. EPA Construction General Permit

Stormwater discharges from construction activities (such as clearing, grading, excavating, and stockpiling) that disturb one or more acres, or smaller sites that are part of a larger common plan of development or sale, are regulated under the National Pollutant Discharge Elimination System (NPDES) stormwater program. Prior to discharging stormwater, construction operators must obtain coverage under an NPDES permit, which is administered by either the State (if it has been authorized to operate the NPDES stormwater program) or EPA, depending on where the construction site is located.

On February 16, 2012, EPA issued a construction general permit at: http://www.epa.gov/npdes/pubs/cgp2012_finalpermit.pdf

2. Federal Register Volume 74, Number 229 (Tuesday, December 1, 2009)]

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 450

Effluent Limitations Guidelines and Standards for the
Construction and Development Point Source Category

SUMMARY: The Environmental Protection Agency is publishing final regulations establishing Clean Water Act (CWA) technology-based Effluent Limitations Guidelines and New Source Performance Standards for the Construction and Development (C&D) point source category. EPA expects compliance with this regulation to reduce the amount of sediment and other pollutants discharged from construction and development sites by approximately 4 billion pounds per year.

The performance standards are found at:

<http://www.gpo.gov/fdsys/pkg/FR-2009-12-01/html/E9-28446.htm>

Cost Impact: The code change proposal will not increase the cost of construction. There is nothing in the proposal that represents new cost requirements. The requirements are in National Pollutant Elimination (NPDES) Permits issued under the Federal Clean Water Act.

Analysis: A review of the standard proposed for inclusion in the code, EPA 40 CFR450 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

RB205-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R401.3-RB-WHITESCARVER.doc

RB206 – 13

R401.5 (New)

Proponent: Jonathan Siu, City of Seattle Department of Planning & Development, representing Washington Association of Building Officials Technical Code Development Committee (jon.siu@seattle.gov)

Add new text as follows:

R401.5 Protection of adjoining property. Adjoining public and private property shall be protected from damage during construction, remodeling and demolition work. Protection shall be provided for footings, foundations, party walls, chimneys, skylights, roofs and other building elements. Provisions shall be made to control water runoff and erosion during construction or demolition activities.

Reason: Currently, the IRC contains no provisions requiring adjacent property be protected from construction activities. This proposal brings text from IBC Section 3307 (Protection of Adjoining Property) into the IRC, bringing the codes into closer alignment. One difference between this proposal and the IBC text is the addition of “and other building elements” in the second sentence. The WABO TCD Committee feels it is just as important to protect elements such as bay or garden windows with roof-like components from hazards as it is to protect roofs and skylights.

It is to be noted that there is a requirement in the IBC text to notify owners of adjoining buildings at least 10 days prior to the start of excavation. The WABO TCD Committee considers this to be unenforceable language, and therefore has not included it in this proposal. However, if the committee feels led to do so, the following text (verbatim from IBC Section 3307.1) can be added to the proposal as a committee modification, in order to get complete consistency between the codes:

“The person making or causing an excavation to be made shall provide written notice to the owners of adjoining buildings advising them that the excavation is to be made and that the adjoining buildings should be protected. Said notification shall be delivered not less than 10 days prior to the scheduled starting date of the excavation.”

Cost Impact: Potential increase in initial cost of construction since this is not currently specifically regulated in the code, but may reduce potential for lawsuits where precautions are not already being taken.

RB206-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R401.5 (NEW) #1-RB-SIU.doc

RB207– 13

R401.5 (NEW), R403.1, Chapter 44

Proponent: Jonathan Siu, City of Seattle Department of Planning & Development, representing Washington Association of Building Officials Technical Code Development Committee (jon.siu@seattle.gov)

Revise as follows:

R401.5 Site work. Site work shall be performed in accordance with Sections R401.5.1 through R401.5.4.

R401.5.1 Excavation and fill. Excavation and fill for buildings and structures shall be constructed or protected so as not to endanger life or property. Excavation, fill, or shoring, whether temporary or permanent, shall not extend onto adjacent property. Existing footings or foundations that can be affected by any excavation shall be underpinned adequately or otherwise protected against settlement and shall be protected against lateral movement.

R401.5.2 Slope limits. Slopes for permanent fill shall be not steeper than one unit vertical in two units horizontal (50-percent slope). Cut slopes for permanent excavations shall be not steeper than one unit vertical in two units horizontal (50-percent slope). Deviation from the foregoing limitations for cut slopes shall be permitted only upon the submittal of a geotechnical report acceptable to the *building official*.

R401.5.3 Surcharge. No fill or other surcharge loads shall be placed adjacent to any building or structure, or caused to be imposed on them, unless such building or structure is designed to resist the additional loads caused by the fill or surcharge.

R401.5.4 Soil supporting foundations. Footings and foundations shall be supported on undisturbed natural soils or engineered fill. Fill to be used to support the footings or foundations of any building or structure shall comply with the provisions of a geotechnical report acceptable to the *building official*. The compaction shall be verified by a *registered design professional*.

Exception: Compacted fill material 12 inches (305 mm) in depth or less need not comply with a geotechnical report, provided the in-place dry density is not less than 90 percent of the maximum dry density at optimum moisture content determined in accordance with ASTM D 1557, and the compaction is verified by a *registered design professional*.

R403.1 General. All exterior walls shall be supported on continuous solid or fully grouted masonry or concrete footings, crushed stone footings, wood foundations, or other *approved* structural systems which shall be of sufficient design to accommodate all loads according to Section R301 and to transmit the resulting loads to the soil within the limitations as determined from the character of the soil. ~~Footings shall be supported on undisturbed natural soils or engineered fill.~~ Concrete footing shall be designed and constructed in accordance with the provisions of Section R403 or in accordance with ACI 332.

Add new standard to Chapter 44 as follows:

ASTM

D 1557-07 - Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort [56,000 ft-lb/ft³ (2,700 KN m/m³)]

Reason: This proposal adds provisions to the IRC to protect adjacent structures and property from the effects of site work. Currently, there are no regulations in the IRC that would prevent an excavation for a foundation or footing from endangering adjacent buildings or property, nor is guidance given for fill material properties. An extreme example of where this was a problem was the collapse of the Lotus Riverside apartment building in Shanghai in 2009. There, the contractor stockpiled up to 10 meters of soil on one side of the building, while excavating on the other, leading to the building tipping over (see http://www.chinadaily.com.cn/china/2009-07/03/content_8376126.htm). For IRC-type buildings, the failures would not be as

dramatic, but can still become a headache for the building official. This proposal is based on text found in IBC Section 3304, which would bring the two codes into closer alignment. Specifically:

R401.5.1 – Requires excavations or fill not endanger (undercut or overhang) adjacent buildings or property. It also clearly states that all site work (temporary or permanent) has to stay within the property lines—a principle that is understood by most people, but not stated anywhere in the I-codes. This does not preclude other approved alternates, such as a temporary easement, from being employed to allow work to extend onto the adjacent property, since those can be approved under Section R104.11. Finally, this section states that any footings or foundations that are undercut by an adjacent excavation must be underpinned or supported by other means. If the affected foundation is on the adjacent property, the shoring or permanent foundation wall being constructed must be designed for the appropriate surcharge to support the adjacent foundation. (See also proposed Section R401.5.3.)

R401.5.2 – Sets some practical limits on permanent cut or fill slopes. A geotechnical report (usually by a geotechnical engineer) can set different parameters, but the text gives the building official the opportunity to review the report to see if the recommendations are based on an appropriate investigation.

R401.5.3 – Requires structures supporting surcharge loads to be designed for those loads. Examples of sources of surcharge loads might be: a steep slope being supported by a retaining wall; vehicular loads from an adjacent right-of-way; foundation/footing loads from adjacent buildings; or fill placed next to an existing structure. All these and other sources can impose additional loads on foundation or retaining walls (or even temporary shoring walls) that must be accounted for in a design.

R401.5.4 – Replaces a general requirement in IRC Section 403.1, and gives more guidance. Requires structures be supported by natural soils or structural fill. Structural fill properties must be determined in a geotechnical report. Since special inspections are not included in the IRC but compaction must be verified, a registered design professional (again, usually a geotechnical engineer) is required to conduct the verification. The exception gives an alternative to the full geotechnical report, allowing field verification of 90% compaction in accordance with the ASTM standard if the compaction is again verified by a registered design professional.

Chapter 44 – The standard has already been adopted into the IBC, so the addition in Chapter 44 just brings it into the IRC in order to provide appropriate guidance for the purposes of the exception.

Cost Impact: The code change proposal will not increase the cost of construction, if site development is being done in accordance with IBC requirements as a matter of course, it may increase the cost of construction if not.

Analysis: A review of the standard proposed for inclusion in the code, ASTM D1557 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

RB207-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R401.5 (NEW) #2-RB-SIU.doc

RB208 – 13

R402.2.1 (New)

Proponent: Stephen S. Szoke, P.E., Portland Cement Association

Add new text as follows:

R402.2.1 Materials for concrete. Materials for concrete shall comply with the requirements of Section R611.5.1.

Reason: This change coordinates sections R402 and R611 to reflect updated standard specifications for Portland Cement, Blended Hydraulic Cement, and Hydraulic Cement referenced for use in concrete. This change directs the user to one section for specific information about the general properties and requirements for concrete.

Cost Impact: This change will not increase the cost of construction.

RB208-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.2.1 (NEW)-RB-SZKE.doc

RB209 – 13

R402.4 (NEW)

Proponent: Jason Thompson, National Concrete Masonry Association representing Masonry Alliance for Codes and Standards (jthompson@ncma.org)

Add new text as follows:

R402.4 Masonry. Masonry systems shall be designed and installed in accordance with this chapter and shall have a minimum specified compressive strength of 1,500 psi (10.3 MPa).

Reason: Section R402 provides charging language for wood foundations (R402.1), concrete (R402.2), and precast concrete (R402.3), but not masonry. This is an inadvertent oversight that is corrected with this code change proposal. The addition of a minimum f'm of 1,500 psi reflects the design assumption upon which the prescriptive masonry foundation tables of Section R404.1.1.1 are based.

Cost Impact: This code change will not increase the cost of construction.

RB209-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R402.4 (NEW)-RB-THOMPSON.doc

RB210 – 13

R403.1, Figure R403.3(1) (NEW)

Proponent: Jason Thompson, National Concrete Masonry Association representing Masonry Alliance for Codes and Standards (jthompson@ncma.org)

Revise as follows:

R403.1 General. All exterior walls shall be supported on continuous solid or fully grouted masonry or concrete footings, crushed stone footings, wood foundations, or other *approved* structural systems which shall be of sufficient design to accommodate all loads according to Section R301 and to transmit the resulting loads to the soil within the limitations as determined from the character of the soil. Footings shall be supported on undisturbed natural soils or engineered fill. Concrete footing shall be designed and constructed in accordance with the provisions of Section R403 or in accordance with ACI 332.

At transitions between footings located at different elevations, precast concrete lintels complying with Figure R403.1(1) shall be permitted in Seismic Design Categories A, B, and C.

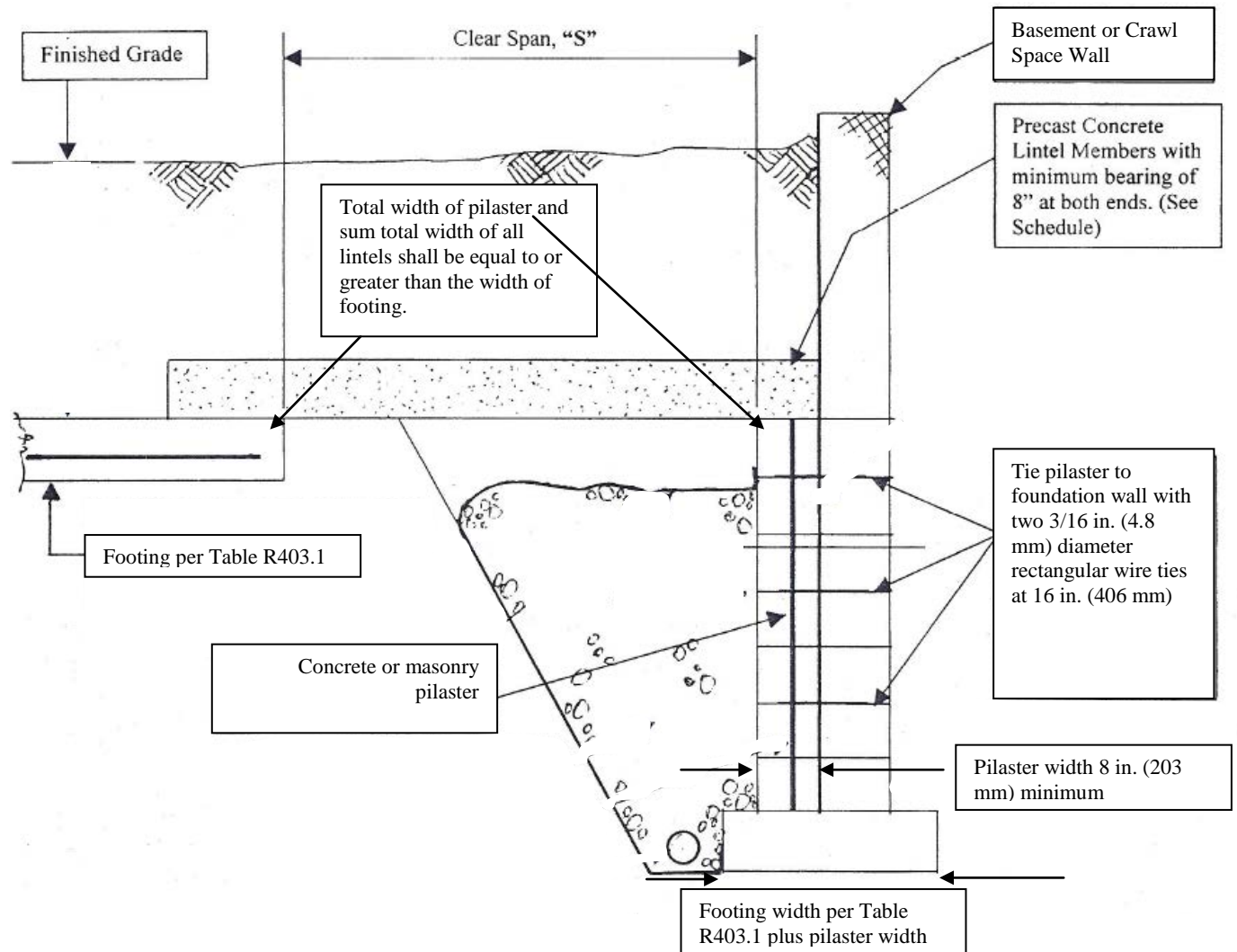


FIGURE 403.1(1) DISCONTINUOUS FOOTERS

<u>Required Reinforcement for Each 4 in. by 8 in. Lintel</u>			<u>Required Reinforcement for Each 6 in. by 8 in. Lintel</u>		
<u>Clear Span, S</u>	<u>Top Bar Size</u>	<u>Bottom Bar Size</u>	<u>Clear Span, S</u>	<u>Top Bar Size</u>	<u>Bottom Bar Size</u>
<u>4'-0"</u>	<u>No. 3</u>	<u>No. 3</u>	<u>4'-0"</u>	<u>No. 3</u>	<u>No. 3</u>
<u>4'-8"</u>	<u>No. 3</u>	<u>No. 3</u>	<u>4'-8"</u>	<u>No. 3</u>	<u>No. 3</u>
<u>5'-4"</u>	<u>No. 3</u>	<u>No. 3</u>	<u>5'-4"</u>	<u>No. 3</u>	<u>No. 3</u>
<u>6'-0"</u>	<u>No. 3</u>	<u>No. 3</u>	<u>6'-0"</u>	<u>No. 3</u>	<u>No. 3</u>
<u>6'-8"</u>	<u>No. 3</u>	<u>No. 3</u>	<u>6'-8"</u>	<u>No. 3</u>	<u>No. 4</u>
<u>7'-4"</u>	<u>No. 3</u>	<u>No. 4</u>	<u>7'-4"</u>	<u>No. 3</u>	<u>No. 5</u>
<u>8'-0"</u>	<u>No. 3</u>	<u>No. 5</u>	<u>8'-0"</u>	<u>No. 3</u>	<u>No. 5</u>

1. All reinforcing bars shall comply with ASTM A615, Grade 60.

2. Minimum 28 day compressive strength of the lintel shall be 3,000 psi.

Reason: Situations often arise in the field whereby it is not practical to have a continuous footing around the perimeter of a residence, such as at the transition between a basement wall and a stem wall below a garage, which is further complicated due to excavating around the basement. A common solution to this situation is to span between the stem wall footer and basement wall footer using a precast lintel to support surcharge loads applied from above.

This change proposes to introduce an alternative design and construction option to allow discontinuous footers when complying with the requirements of the proposed new Figure 403.1(1). Similar detailing has been used successfully for years in various regions of the country.

The detailing options presented here are applicable only to structures assigned to SDC A, B, and C. For higher seismic design categories, the provisions of Section R403.1.3 are still applicable.

Cost Impact: This code change will not increase the cost of construction.

RB210-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R403.1-RB-THOMPSON.doc

RB211 – 13

R403.1.1, Table R403.1(1), Table 403.1(2) (New), Table R403.1(3) (NEW)

Proponent: Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee and Virginia Building and Code Officials Association, (BajnaiC@chesterfield.gov), James R. Baty II, Technical Director of Concrete Foundations Association, and Matthew R. Senecal, Senior Engineer, American Concrete Institute

Revise as follows:

R403.1.1 Minimum size. ~~The minimum sizes width, W, and thickness, T, for concrete and masonry footings shall be as set forth in accordance with Table R403.1(1) through R403.1(3) and Figure R403.1(1). The footing width, W, shall be based on the load-bearing value of the soil in accordance with Table R401.4.1. Spread footings shall be at least 6 inches (152 mm) in thickness, T. Footing projections, P, shall be at least 2 inches (51 mm) and shall not exceed the thickness of the footing. Footing thickness and projection for fireplaces shall be in accordance with Section R1001.2. The size of footings supporting piers and columns shall be based on the tributary load and allowable soil pressure in accordance with Table R401.4.1. Footings for wood foundations shall be in accordance with the details set forth in Section R403.2, and Figures R403.1(2) and R403.1(3).~~

~~TABLE R403.1~~
~~MINIMUM WIDTH OF CONCRETE PRECAST OR MASONRY FOOTINGS (inches)^a~~

TABLE R403.1(1)
MINIMUM WIDTH AND THICKNESS FOR CONCRETE FOOTINGS FOR LIGHT FRAME
CONSTRUCTION

Snow load or Roof Live Load	Story and Type of Structure with Light Frame	Load-Bearing Value of Soil (psf)					
		1500	2000	2500	3000	3500	4000
20 psf	1 story - slab on grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - slab on grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	16 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - plus basement	22 x 6	16 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	3 story - slab on grade	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	3 story - with crawl space	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	3 story - plus basement	25 x 8	19 x 6	15 x 6	13 x 6	12 x 6	12 x 6
30 psf	1 story - slab on grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	13 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - slab on grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	17 x 6	13 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - plus basement	23 x 6	17 x 6	14 x 6	12 x 6	12 x 6	12 x 6
	3 story - slab on grade	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	3 story - with crawl space	20 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	3 story - plus basement	26 x 8	20 x 6	16 x 6	13 x 6	12 x 6	12 x 6
50 psf	1 story - slab on grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	16 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	21 x 6	16 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	2 story - slab on grade	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - plus basement	25 x 7	19 x 6	15 x 6	12 x 6	12 x 6	12 x 6
	3 story - slab on grade	17 x 6	13 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	3 story - with crawl space	22 x 6	17 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	3 story - plus basement	28 x 9	21 x 6	17 x 6	14 x 6	12 x 6	12 x 6
70 psf	1 story - slab on grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	18 x 6	13 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	24 x 7	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6
	2 story - slab on grade	16 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	21 x 6	16 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	2 story - plus basement	27 x 9	20 x 6	16 x 6	14 x 6	12 x 6	12 x 6
	3 story - slab on grade	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	3 story - with crawl space	25 x 7	18 x 6	15 x 6	12 x 6	12 x 6	12 x 6
	3 story - plus basement	30 x 10	23 x 6	18 x 6	15 x 6	13 x 6	12 x 6

1. Interpolation allowed. Extrapolation is not allowed
2. Based on 32 foot wide house with load bearing center wall that carries half of the tributary attic, and floor framing. For every 2 feet of adjustment to the width of the house add or subtract 2 inches of footing width and 1 inch of footing thickness (but not less than 6 inches thick).

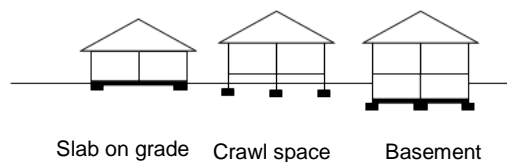


TABLE R403.1(2)
MINIMUM WIDTH AND THICKNESS FOR CONCRETE FOOTINGS FOR CONCRETE FOOTINGS FOR
LIGHT FRAME CONSTRUCTION WITH BRICK VENEER

Snow load or Roof Live Load	Story and Type of Structure with Brick Veneer	Load-Bearing Value of Soil (psf)					
		1500	2000	2500	3000	3500	4000
20 psf	1 story - slab on grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	21 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - slab on grade	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	20 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - plus basement	26 x 8	20 x 6	16 x 6	13 x 6	12 x 6	12 x 6
	3 story - slab on grade	20 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	3 story - with crawl space	26 x 8	19 x 6	15 x 6	13 x 6	12 x 6	12 x 6
	3 story - plus basement	32 x 11	24 x 7	19 x 6	16 x 6	14 x 6	12 x 6
30 psf	1 story - slab on grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	16 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	22 x 6	16 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	2 story - slab on grade	16 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	22 x 6	16 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	2 story - plus basement	27 x 9	21 x 6	16 x 6	14 x 6	12 x 6	12 x 6
	3 story - slab on grade	21 x 6	16 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	3 story - with crawl space	27 x 8	20 x 6	16 x 6	13 x 6	12 x 6	12 x 6
	3 story - plus basement	33 x 11	24 x 7	20 x 6	16 x 6	14 x 6	12 x 6
50 psf	1 story - slab on grade	13 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	24 x 7	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6
	2 story - slab on grade	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	24 x 7	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6
	2 story - plus basement	29 x 10	22 x 6	18 x 6	15 x 6	13 x 6	12 x 6
	3 story - slab on grade	24 x 7	18 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	3 story - with crawl space	29 x 9	22 x 6	17 x 6	14 x 6	12 x 6	12 x 6
	3 story - plus basement	35 x 12	26 x 8	21 x 6	17 x 6	15 x 6	13 x 6
70 psf	1 story - slab on grade	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	20 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	26 x 8	20 x 6	16 x 6	13 x 6	12 x 6	12 x 6
	2 story - slab on grade	20 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	26 x 8	19 x 6	15 x 6	13 x 6	12 x 6	12 x 6
	2 story - plus basement	32 x 11	24 x 7	19 x 6	16 x 6	14 x 6	12 x 6
	3 story - slab on grade	26 x 8	19 x 6	15 x 6	13 x 6	12 x 6	12 x 6
	3 story - with crawl space	31 x 11	23 x 7	19 x 6	16 x 6	13 x 6	12 x 6
	3 story - plus basement	37 x 13	28 x 9	22 x 6	18 x 6	16 x 6	14 x 6

1. Interpolation allowed. Extrapolation is not allowed
2. Based on 32 foot wide house with load bearing center wall that carries half of the tributary attic, and floor framing. For every 2 feet of adjustment to the width of the house add or subtract 2 inches of footing width and 1 inch of footing thickness (but not less than 6 inches thick).

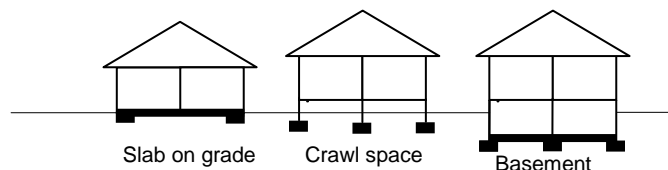
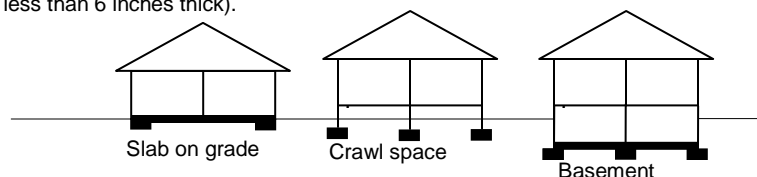


TABLE R403.1(3)
MINIMUM WIDTH AND THICKNESS FOR CONCRETE FOOTINGS WITH CAST-IN-PLACE
CONCRETE OR FULL MASONRY WALL CONSTRUCTION

Snow load or Roof Live Load	Story and Type of Structure with CMU	Load-Bearing Value of Soil (psf)					
		1500	2000	2500	3000	3500	4000
20 psf	1 story - slab on grade	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	25 x 8	19 x 6	15 x 6	13 x 6	12 x 6	12 x 6
	2 story - slab on grade	23 x 7	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	29 x 9	22 x 6	17 x 6	14 x 6	12 x 6	12 x 6
	2 story - plus basement	35 x 12	26 x 8	21 x 6	17 x 6	15 x 6	13 x 6
	3 story - slab on grade	32 x 11	24 x 7	19 x 6	16 x 6	14 x 6	12 x 6
	3 story - with crawl space	38 x 14	28 x 9	23 x 6	19 x 6	16 x 6	14 x 6
	3 story - plus basement	43 x 17	33 x 11	26 x 8	22 x 6	19 x 6	16 x 6
30 psf	1 story - slab on grade	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	20 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	26 x 8	20 x 6	16 x 6	13 x 6	12 x 6	12 x 6
	2 story - slab on grade	24 x 7	18 x 6	15 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	30 x 10	22 x 6	18 x 6	15 x 6	13 x 6	12 x 6
	2 story - plus basement	36 x 13	27 x 8	21 x 6	18 x 6	15 x 6	13 x 6
	3 story - slab on grade	33 x 12	25 x 7	20 x 6	17 x 6	14 x 6	12 x 6
	3 story - with crawl space	39 x 14	29 x 9	23 x 7	19 x 6	17 x 6	14 x 6
	3 story - plus basement	44 x 17	33 x 12	27 x 8	22 x 6	19 x 6	17 x 6
50 psf	1 story - slab on grade	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	23 x 7	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6
	2 story - slab on grade	21 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story - with crawl space	25 x 8	19 x 6	15 x 6	13 x 6	12 x 6	12 x 6
	2 story - plus basement	30 x 10	23 x 6	18 x 6	15 x 6	13 x 6	12 x 6
	3 story - slab on grade	27 x 8	20 x 6	20 x 6	13 x 6	12 x 6	12 x 6
	3 story - with crawl space	32 x 11	24 x 7	19 x 6	16 x 6	14 x 6	12 x 6
	3 story - plus basement	36 x 13	27 x 9	22 x 6	18 x 6	16 x 6	14 x 6
70 psf	1 story - slab on grade	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story - with crawl space	25 x 7	18 x 6	15 x 6	12 x 6	12 x 6	12 x 6
	1 story - plus basement	30 x 10	23 x 6	18 x 6	15 x 6	13 x 6	12 x 6
	2 story - slab on grade	29 x 9	22 x 6	17 x 6	14 x 6	12 x 6	12 x 6
	2 story - with crawl space	34 x 12	26 x 8	21 x 6	17 x 6	15 x 6	13 x 6
	2 story - plus basement	40 x 15	30 x 10	24 x 7	20 x 6	17 x 6	15 x 6
	3 story - slab on grade	38 x 14	28 x 9	23 x 6	19 x 6	16 x 6	14 x 6
	3 story - with crawl space	43 x 16	32 x 11	26 x 8	21 x 6	18 x 6	16 x 6
	3 story - plus basement	49 x 19	37 x 13	29 x 10	24 x 7	21 x 6	18 x 6

1. Interpolation allowed. Extrapolation is not allowed
2. Based on 32 foot wide house with load bearing center wall that carries half of the tributary attic, and floor framing. For every 2 feet of adjustment to the width of the house add or subtract 2 inches of footing width and 1 inch of footing thickness (but not less than 6 inches thick).



Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

The existing table was based on:

- a snow load of 50 psf
- 20 feet of tributary roof area
- 16 feet of tributary floor area
- 10 feet first floor height
- 8 feet second and third floor heights

For some parts of the country, the table's assumptions may not "fit" well.

1. These new tables factor in four snow live load conditions that were not previously acknowledged: 20 psf (the minimum allowed per Table R301.6), 30 psf, 50 psf and 70 psf (the maximum to be designed prescriptively by R301.2.3). Between these increments, the table allows for interpolation.
2. The tables account for additional soil bearing conditions. They now provide sizing for 1500 psf, 2000 psf, 2500 psf, and 3000 psf, 3500 psf and 4000psf soil bearing locations.
3. The tables take into consideration the same three framing types as the current table:
 - a. Conventional light framing,
 - b. Conventional light framing with veneer, and
 - c. Cast-in-place concrete or full masonry wall construction.
4. The new tables were expanded to cover more conditions. They now differentiate houses built:
 - a. 1, 2 and 3 stories built slab on grade (without a first floor load),
 - b. 1, 2 and 3 stories built over a crawl space (with a first floor load and foundation wall/footing),
 - c. 1, 2 and 3 stories built with basement (with a first floor load and basement walls. Previously, the table was silent on how to handle the extra load from a masonry or concrete basement wall).
5. The tables also provide the width of the footing based on the loads and the minimum projection – whichever governs. 6" is the minimum thickness already required by Section R403.1.1.
6. The table are based on the loading case of: $TL = DL + .75LL$
7. General assumptions, formulas and example follow for peer review:

ASSUMPTIONS

House width	32	
Roof ground snow load	varies	psf
Roof dead load	10	psf
Rafter length of house	16	ft
Roof overhang	2	ft
Attic live load	15	psf
Attic dead load	10	psf
Attic tributary width	8	ft
Third floor wall height	8	ft
Third floor wall materials	15	#/vert ft
Third floor with veneer	45	#/vert ft
Third floor with cmu wall	100	#/vert ft
Third floor live load	22.5	psf
Third floor dead load	15	psf
Third floor tributary length	8	ft
Second floor wall height	9	ft
Second floor wall materials	15	#/vert ft
Second floor with veneer	45	#/vert ft
Second floor with cmu wall	100	#/vert ft
Second floor live load	22.5	psf
Second floor dead load	15	psf
Second floor tributary length	8	ft
First floor wall height	10	ft
First floor with light frame	15	#/vert ft
First floor with veneer	45	#/vert ft
First floor with cmu wall	100	#/vert ft
First floor live load	30	psf
First floor dead load	15	psf
First floor tributary length	8	ft
Crawl wall height	3	ft
Basement wall height	10	ft
Wall thickness	10	in
Basement/crawl floor wall materials	125	pcf
Footing width (min)	12	in
Footing thickness (min)	8	in
Concrete weight	150	pcf
	0.0868	pci

SAMPLE CALCULATION WITH FORMULAS

DESIGN PARAMETERS (variables)	CMU CONSTRUCTION BASED ON 50 psf SNOW LOAD									
	1 story slab on grade	1 story with crawl	1 story with basement	2 story slab on grade	2 story with crawl	2 story with basement	3 story slab on grade	3 story with crawl	3 story with basement	
Roof load	855	855	855	855	855	855	855	855	855	
Attic Floor load	200	200	200	200	200	200	200	200	200	
TF Wall load										
TF Floor load										
SF Wall load										
SF Floor load										
FF Wall load										
FF Floor load										
Crawl Wall load										
Basement Wall load										
Footing										
CALCULATED LOAD (plf)	1730	2340	2923	2570	3180	3763	3350	3960	4543	
Soil bearing capacity/variances (psf)	14	19	23	7	21	30	27	32	36	13
	10	14	18	6	15	23	20	24	27	9
	8	11	14	6	12	18	16	19	22	6
	7	9	12	6	10	13	13	16	18	6
	6	8	10	6	9	11	11	14	16	6
	5	7	9	8	10	11	10	12	14	6

Cost Impact: The code change proposal may increase the cost of construction.

RB211-13

Public Hearing: Committee:
Assembly:

AS
ASF

AM
AMF

D
DF

R403.1(1)-RB-BAJNAI-BATY-SENECAL-BCAC.doc

RB212 – 13

Figure R403.1(1), Figure R403.1(2), Figure R403.1(3), R403.1.3.2, Figure R403.1.3.2

Proponent: Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee and Virginia Building and Code Officials Association (bajnaiC@chesterfield.gov)

Revise as follows:

**~~FIGURE R403.1(1)~~
CONCRETE AND MASONRY FOUNDATION DETAILS**

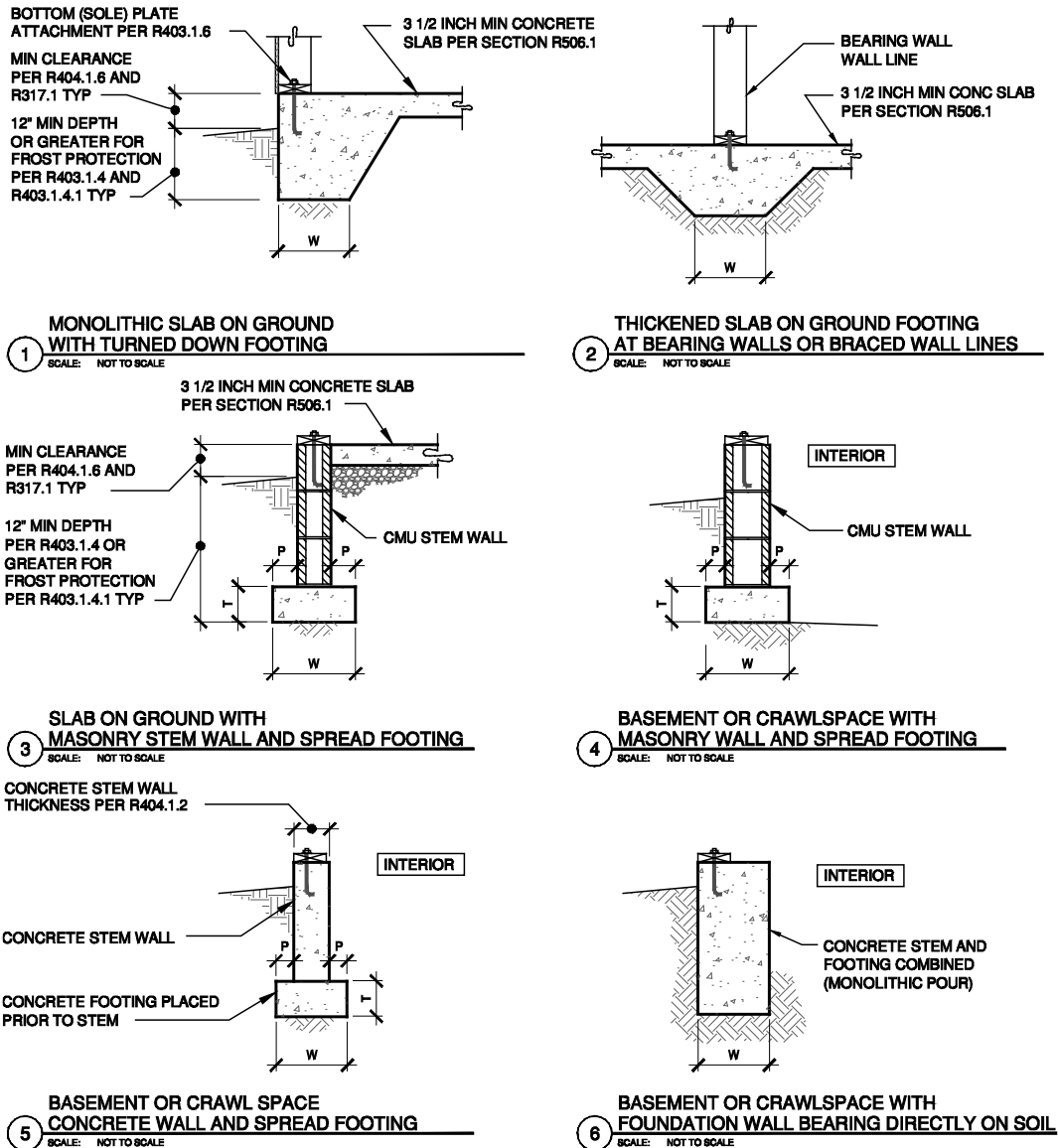


FIGURE R403.1(1)

PLAIN CONCRETE FOOTINGS AND MASONRY AND CONCRETE STEMWALLS IN SDC A, B AND C

a, b, c, d, e, f, g

W=WIDTH OF FOOTING, T=THICKNESS OF FOOTING AND P=PROJECTION PER SECTION R403.1.1.

a. SEE SECTION R404.3 FOR SILL REQUIREMENTS.

b. SEE SECTION R403.1.6 FOR SILL ATTACHMENT.

c. SEE SECTION R506.2.3 FOR VAPOR BARRIER REQUIREMENTS.

d. SEE SECTION R403.1 FOR BASE

e. SEE FIGURE R403.1(2) FOR ADDITIONAL FOOTING REQUIREMENTS FOR STRUCTURES IN SDC D0, D1 AND D2 AND TOWNHOUSES IN SDC C

f. SEE SECTION R408 FOR UNDERFLOOR VENTILATION AND ACCESS REQUIREMENTS.

g. SEE SECTION R403.1.3.4 FOR REINFORCEMENT REQUIREMENTS.

FIGURE R403.1(1)
PLAN CONCRETE FOOTINGS AND MASONRY AND CONCRETE STEMWALLS OM SDC D₀, D₁
AND D₂—_{a,b,c,d,e,f,g}

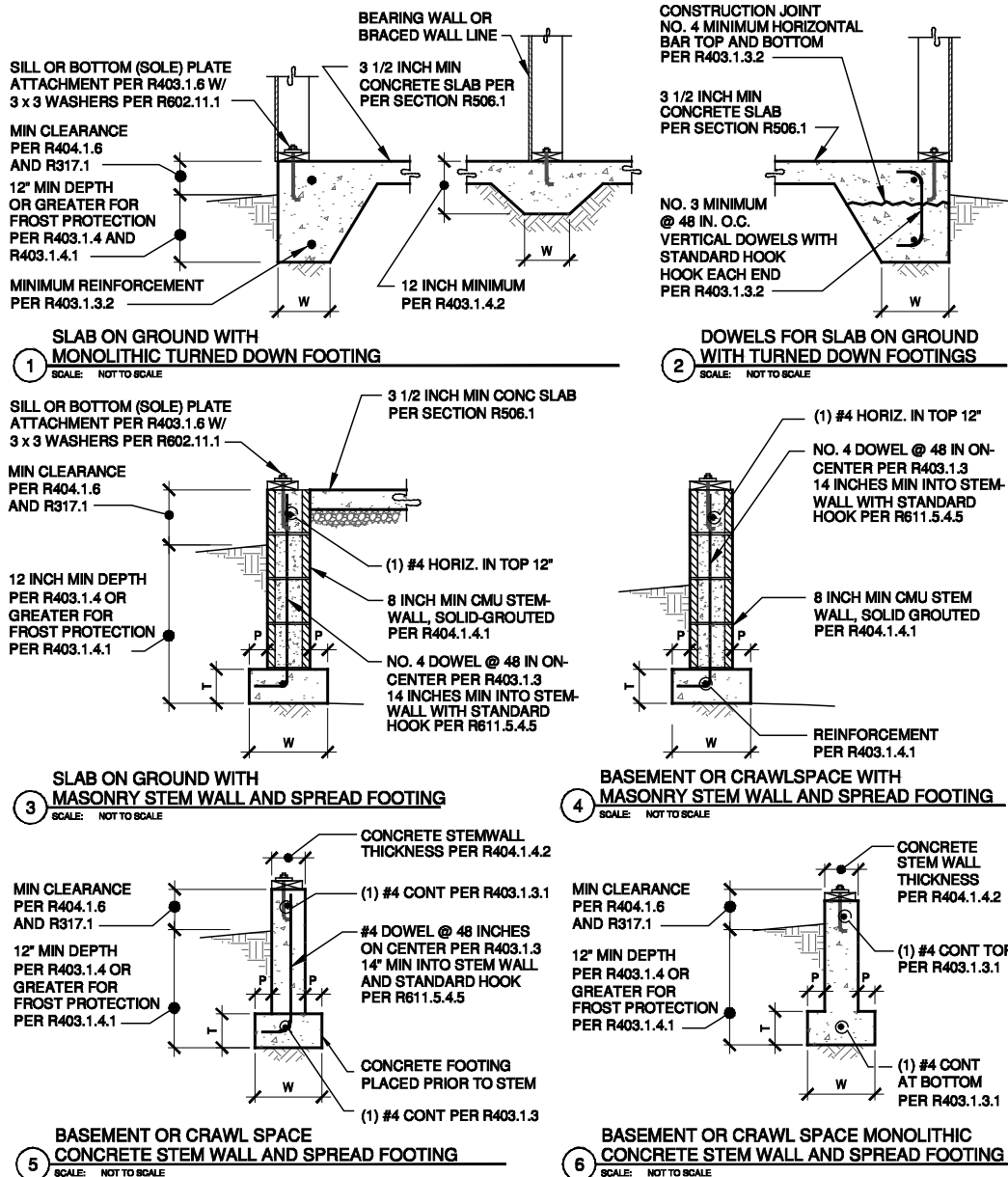


FIGURE R403.1(2)
REINFORCED CONCRETE FOOTINGS AND MASONRY AND CONCRETE STEMWALLS IN SDC D0, D1 AND D2 a, b, c, d, e, f, g

- W=WIDTH OF FOOTING, T=THICKNESS OF FOOTING AND P=PROJECTION PER SECTION R403.1.1.
a. SEE SECTION R404.3 FOR SILL REQUIREMENTS.
b. SEE SECTION R403.1.6 FOR SILL ATTACHMENT.
c. SEE SECTION R506.2.3 FOR VAPOR BARRIER REQUIREMENTS.
d. SEE SECTION R403.1 FOR BASE
f. SEE SECTION R408 FOR UNDERFLOOR VENTILATION AND ACCESS REQUIREMENTS.
g. SEE SECTION R403.1.3.4 FOR REINFORCEMENT REQUIREMENTS.

FIGURE R403.1(2) REINFORCED CONCRETE FOOTINGS AND MASONRY AND CONCRETE STEMWALLS IN SDC D₀, D₁ AND D₂ a,b,c,d,e,f,g

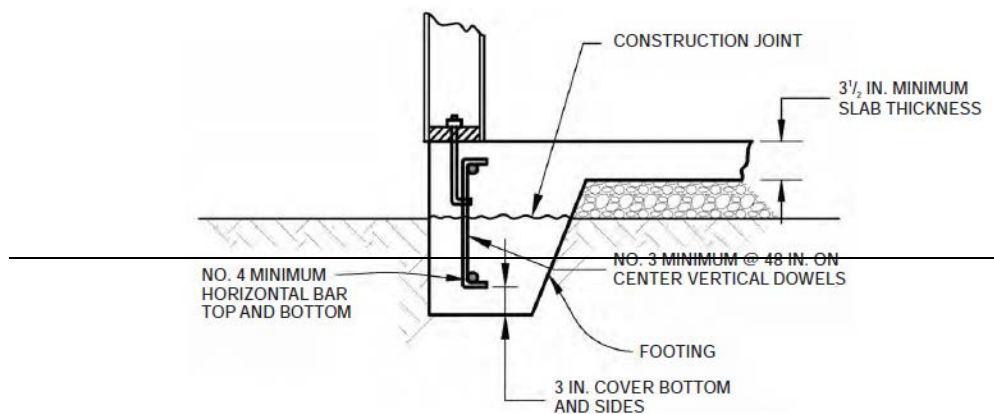
FIGURE R403.1(2) R403.1(3) PERMANENT WOOD FOUNDATION BASEMENT WALL SECTION

FIGURE R403.1(3) R403.1(4)
PERMANENT WOOD FOUNDATION CRAWL SPACE SECTION

R403.1.3.2 Slabs-on-ground with turned-down footings. Slabs on ground with turned down footings shall have a minimum of one No. 4 bar at the top and the bottom of the footing

Exception: For slabs-on-ground cast monolithically with the footing, locating one No. 5 bar or two No. 4 bars in the middle third of the footing depth shall be permitted as an alternative to placement at the footing top and bottom.

Where the slab is not cast monolithically with the footing, No. 3 or larger vertical dowels with standard hooks on each end shall be provided in accordance with Figure R403.1.3.2 R403.1(2), detail 2. Standard hooks shall comply with Section R611.5.4.5.



For SI: 1 inch = 25.4 mm.

FIGURE R403.1.3.2
DOWELS FOR SLABS-ON-GROUND WITH TURNED-DOWN FOOTINGS

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

This proposal is to revise and update the existing footing figures in the code. The revised figures improve the graphic quality of the figures and add information that is helpful to the code user. In addition, the current figures do not show, describe or address the specific reinforcement requirements for Seismic Design Categories D0, D1 and D2. Initial attempts to incorporate the SDC reinforcement requirements into the set of figures resulted in overly complex details that would contain information not necessary to code users in lower SDC's. Therefore, the committee decided to generate a second set of figures specifically detailing the reinforcement requirements for the applicable SDC's.

This proposal also moves existing figure R403.1.3.2 to Figure R403.1(2) and changes the reference in section R403.1.3.2. The footnotes were also expanded to alert the code user to other applicable sections relating to foundations but were not necessarily helpful to add to the figures such as vapor barriers and ventilation.

This proposal does not change any requirements in the current code and are a great improvement to the code enabling the code user to visualize the code requirements.

Cost Impact: The code change proposal will not increase the cost of construction.

RB212-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.1(1)-F-RB-BAJNAI-BCAC.doc

RB213 – 13

Figure R403.1(2), Figure R403.1(3)

Proponent: Stephen Kerr, S.E., Josephson Werdowatz and Associates Inc., representing self (skerr@jwa-se.com)

Revise as follows:

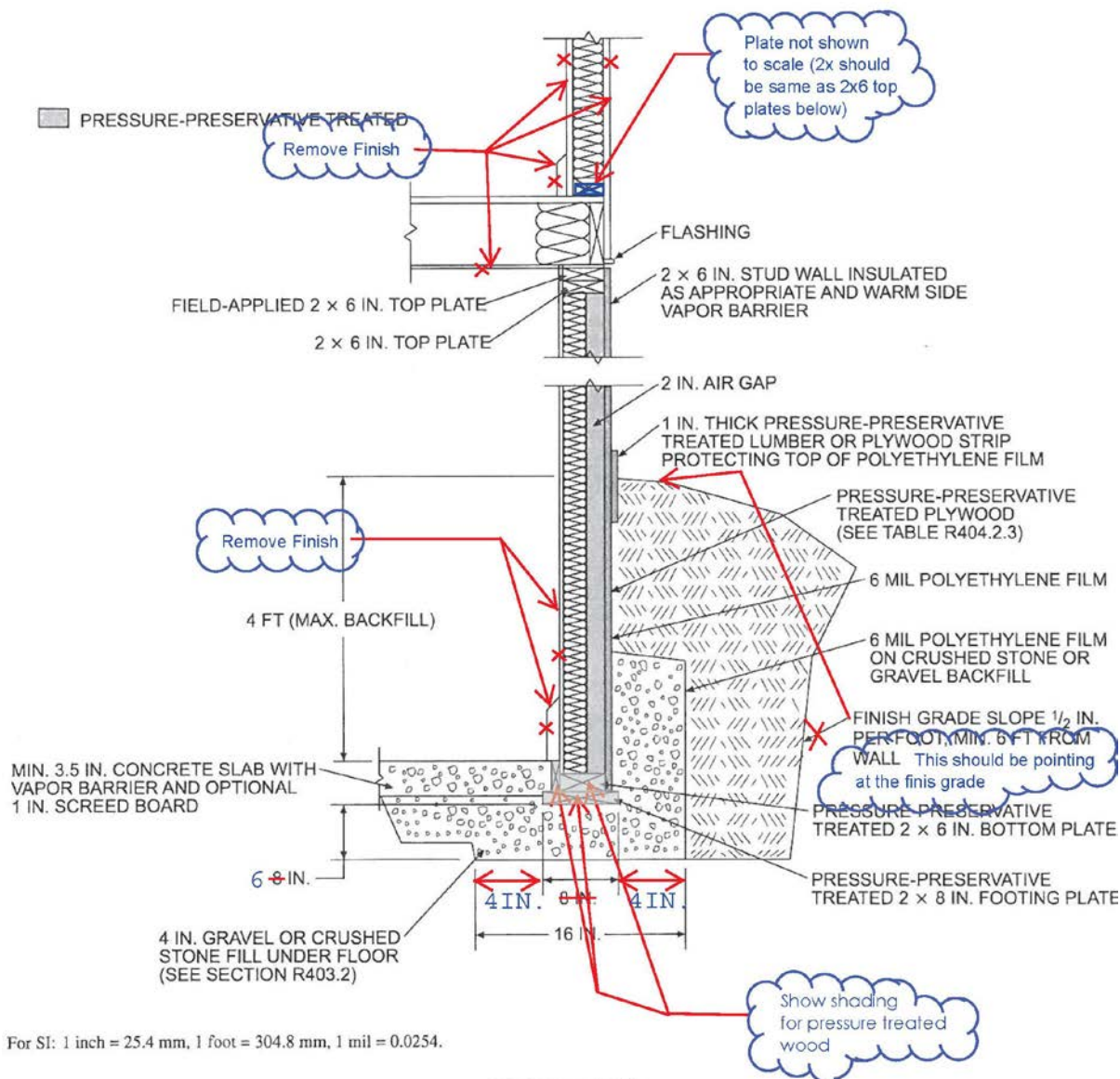


FIGURE R403.1(2)
PERMANENT WOOD FOUNDATION BASEMENT WALL SECTION

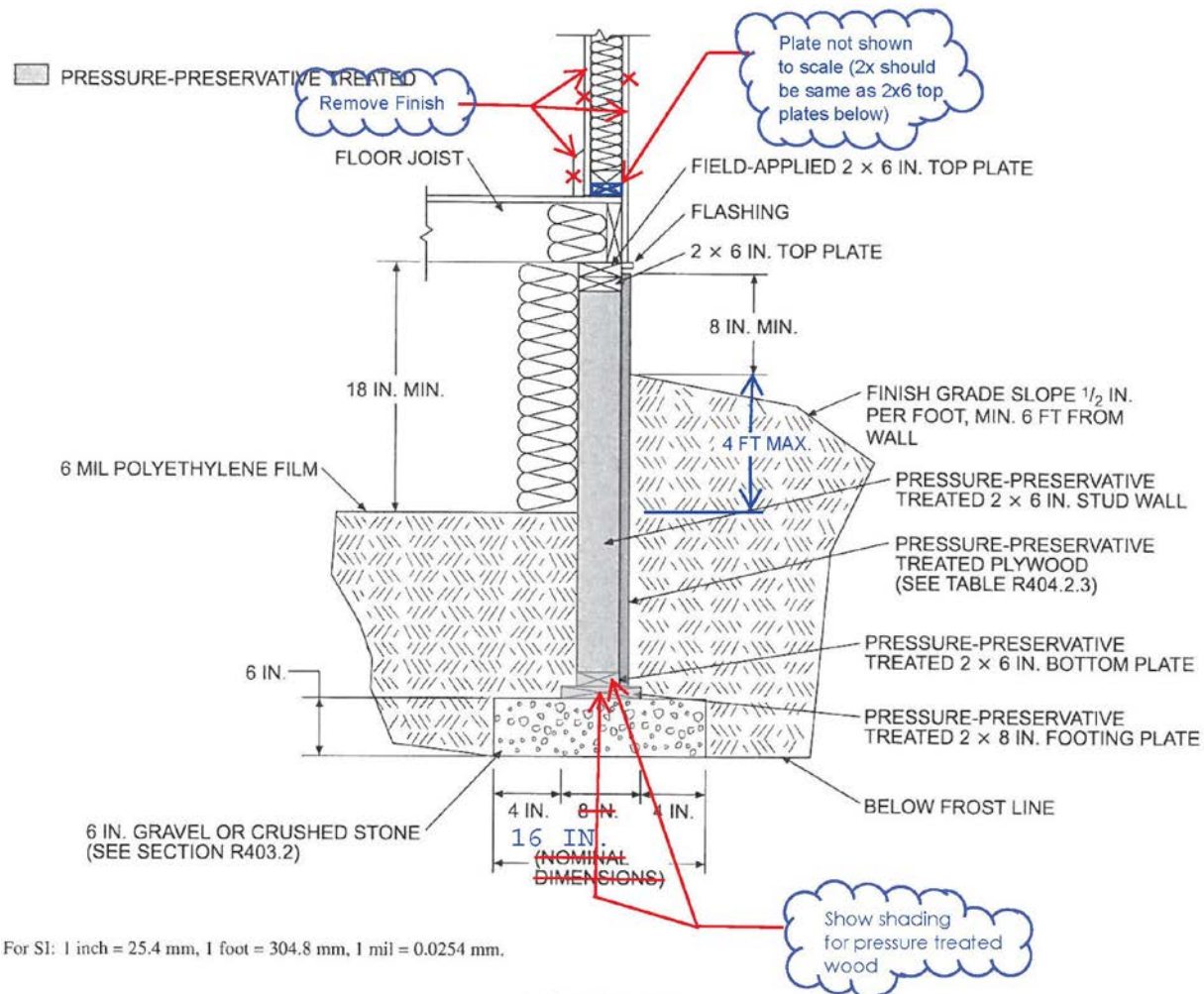


FIGURE R403.1(3)
PERMANENT WOOD FOUNDATION CRAWL SPACE SECTION

Reason: The proposed changes to the permanent wood foundation contain numerous changes to help clarify and bring conformity to the two figures.

The proposal contains mostly editorial changes, including:

- The removal of the building finishes
- Shading the pressure treated wood bottom and foundation plates
- Making the thickness, width and the dimension callouts of the gravel or crushed stone fill similar in both figures
- Showing the floor sill plate dimensionally accurate
- In figure R403.1(2) for the finish grade callout, change the arrow to point to the actual grade

In Figure R403.1(3) the addition of the 4ft height limitation is to set the upper bound on the height of the wall, similar to the limitation of R403.1(2). With the dimensions as currently shown, there is no upper bound on the unbalanced backfill height.

Cost Impact: This code change proposal will not increase construction cost.

RB213-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R403.1(2)F-RB-KERR.doc

RB214 – 13

R403.1.2, R602.10.9.1

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

R403.1.2 Continuous footing in Seismic Design Categories D₀, D₁ and D₂. The *braced wall panels* at exterior walls of buildings located in Seismic Design Categories D₀, D₁ and D₂ shall be supported by continuous footings. ~~All required interior *braced wall panels* in buildings with plan dimensions greater than 50 feet (15 240 mm) shall also be supported by continuous footings. For one-story buildings in Seismic Design Category D₂ and one- and two-story buildings in Seismic Design Categories D₀ and D₁, *braced wall panels* shall be supported on continuous foundations at intervals not exceeding 50 feet (15 240 mm). For two-story buildings in Seismic Design Category D₂, all *braced wall panels* shall be supported on continuous foundations.~~

Revise as follows:

R602.10.9.1 Braced wall panel support for Seismic Design Category Categories D₀, D₁ and D₂. ~~In one-story buildings located in Seismic Design Category D₂, *braced wall panels* shall be supported on continuous foundations at intervals not exceeding 50 feet (15 240 mm). In two-story buildings located in Seismic Design Category D₂, all *braced wall panels* shall be supported on continuous foundations. In Seismic Design Categories D₀, D₁ and D₂ braced wall panel footings shall be as specified in Section R403.1.2.~~

Exception: ~~Two-story buildings shall be permitted to have interior *braced wall panels* supported on continuous foundations at intervals not exceeding 50 feet (15 240 mm) provided that:~~

- ~~1. The height of cripple walls does not exceed 4 feet (1219 mm).~~
- ~~2. First floor *braced wall panels* are supported on doubled floor joists, continuous blocking or floor beams.~~
- ~~3. The distance between bracing lines does not exceed twice the building width measured parallel to the *braced wall line*.~~

Reason: The intent of this code change proposal is to clarify the foundation requirements under braced wall panels in high seismic areas. The existing provisions in Chapters 4 and 6 are contradictory and incomplete. In addition, there is no specific guidance on what to do in SDCs D₀ and D₁ for interior braced wall panels. Section R602.10.9.1 provides some guidance by inference that it tells you what to do in SDC D₂:

“In one-story buildings located in Seismic Design Category D₂, *braced wall panels* shall be supported on continuous foundations at intervals not exceeding 50 feet (15 240 mm).”

The inference is that in lesser SDCs, both one and two story buildings shall be supported on continuous footings at intervals exceeding 50 feet. This is in line with the existing Section 403.1.2.

In addition, Section R602.10.9.1, as written, provides for the SDC D₂, two story buildings, an exception to the “all braced wall panel” restriction, if all of 3 seemingly arbitrary limitations are met. The benefit of this unlikely exception is far exceeded by the complexity of the existing code with the exception. This proposal removed this unlikely exception and reformats the Section R602.10.9.1 information and moves it to the foundation chapter in Section R403.1.2.

Note that the exception is removed, making the code more stringent or removing a loophole, depending on your perspective. There is little doubt that it strengthens the foundation requirements for two-story buildings in SDC D₂. It certainly reduced a loop hole that weakens the code requirements for the most vulnerable of structures in a very limited area in the US.

Cost Impact: The code change proposal will increase the cost of construction in that it will eliminate the unlikely exception permitting two story structures in SDC D₂ to have minimal *braced wall panel* support.

RB214-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.1.2-RB-KEITH.doc

RB215 – 13

R403.1.2, R403.1.4.2

Proponent: Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee (BajnaiC@chesterfield.gov)

Revise as follows:

R403.1.2 Continuous footing in Seismic Design Categories D₀, D₁ and D₂. ~~The braced wall panels at~~ exterior walls of buildings located in Seismic Design Categories D₀, D₁ and D₂ shall be supported by continuous solid or fully grouted masonry or concrete footings. Other footing materials or systems shall be designed in accordance with accepted engineering practice. All required interior ~~braced wall panels~~ in buildings located in Seismic Design Categories D₀, D₁ and D₂ with plan dimensions greater than 50 feet (15 240 mm) shall also be supported by continuous solid or fully grouted masonry or concrete footings– in accordance with Section R403.1.4.2.

R403.1.4.2 Bearing and braced wall panel support in Seismic Design Categories D₀, D₁ and D₂. ~~Seismic conditions~~ In Seismic Design Categories D₀, D₁ and D₂, interior footings supporting bearing walls or braced wall panels, bracing walls and cast monolithically with a slab on grade, shall extend to a depth of not less than 12 inches (305 mm) below the top of the slab.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

The International Code Council's Building Code Action Committee identified several items in Chapter 4, "Foundations", that are in conflict with other provisions of the code or lack clarity. This proposal specifically addresses conflicts and confusing language.

In the current code, section R403.1 states,

"R403.1 General. All exterior walls shall be supported on continuous solid or fully grouted masonry or concrete footings, crushed stone footings, wood foundations, or other approved structural systems which shall be of sufficient design to accommodate all loads according to Section R301 and to transmit the resulting loads to the soil within the limitations as determined from the character of the soil."

Then, for Seismic Design Categories D₀, D₁ and D₂ specifically, R403.1.2 repeats that requirement by specifying that the braced wall panels in exterior walls in Seismic Design Categories D₀, D₁ and D₂ are required to be supported by continuous footings. That portion of R403.1.2 is redundant and actually implies a conflict with other sections of code. The existing language is also in conflict with section R301.2.2.5 that allows braced wall panels supported on cantilevered floor framing.

As shown above, the general requirements of Section R403.1 refers to, "crushed stone footings and wood foundations". However, per sections R401.1 and R403.4.1, wood foundations and crushed stone footings are limited to use in Seismic Design Categories A, B and C. Section R403.1.2 is specifically addressing Seismic Design Categories D₀, D₁ and D₂ where they are not allowed without being designed. That clarification is made with this proposal.

This proposal is to change the first sentence to refer specifically to the requirement for Seismic Design Categories D₀, D₁ and D₂ and to note the limitations of wood and crushed stone footings.

The second sentence of R403.1.2 specifies another requirement of Seismic Design Categories D₀, D₁ and D₂. The second sentence requires that interior braced wall panels are required to be supported by continuous footings at not greater than 50 intervals. That requirement is unchanged in this proposal but is clarified to specify continuous solid or fully-grouted masonry or concrete footings. Terminology is also changed in section R403.1.2 to correlate with current language in the wall bracing requirements of Chapter 6.

Cost Impact: The code change proposal will not increase the cost of construction.

RB215-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.1.2-RB-BAJNAI-BCAC.doc

RB216 – 13

R403.1.3, R403.1.3.1, R403.1.3.2, R403.1.3.5 (NEW), R403.1.3.5.1 (NEW), R403.1.3.5.2 (NEW), R403.1.3.5.3 (NEW), R403.1.3.5.4 (NEW), R403.1.3.6 (NEW), R403.1.4.2

Proponent: Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee (BajnaiC@chesterfield.gov)

Revise as follows:

R403.1.3 Seismic reinforcing Footing and stem wall reinforcing in Seismic Design Categories D₀, D₁ and D₂. Concrete footings located in Seismic Design Categories D₀, D₁ and D₂, as established in Table R301.2(1), shall have minimum reinforcement in accordance with this section. ~~Bottom reinforcement shall be located installed in accordance with Section R403.1.3.5. a minimum of 3 inches (76 mm) clear from the bottom of the footing.~~

~~In Seismic Design Categories D₀, D₁ and D₂ where a construction joint is created between a concrete footing and a stem wall, a minimum of one No. 4 bar shall be installed at not more than 4 feet (1219 mm) on center. The vertical bar shall extend to 3 inches (76 mm) clear of the bottom of the footing have a standard hook and extend a minimum of 14 inches (357 mm) into the stem wall.~~

~~In Seismic Design Categories D₀, D₁ and D₂ where a grouted masonry stem wall is supported on a concrete footing and stem wall, a minimum of one No. 4 bar shall be installed at not more than 4 feet (1219 mm) on center. The vertical bar shall extend to 3 inches (76 mm) clear of the bottom of the footing and have a standard hook. In Seismic Design Categories D₀, D₁ and D₂ masonry stem walls without solid grout and vertical reinforcing are not permitted.~~

Exception: ~~In detached one- and two-family dwellings which are three stories or less in height and constructed with stud bearing walls, isolated plain concrete footings, supporting columns or pedestals are permitted.~~

R403.1.3.1 Foundations with stemwalls. ~~Foundations with stem walls shall have installed a minimum of one No. 4 bar within 12 inches (305 mm) of the top of the wall and one No. 4 bar located 3 inches (76 mm) to 4 inches (102 mm) from the bottom of the footing.~~

R403.1.3.1 Concrete stem walls with concrete footings. ~~In Seismic Design Categories D₀, D₁ and D₂ where a construction joint is created between a concrete footing and a concrete stem wall, a minimum of one No. 4 vertical bar shall be installed at not more than 4 feet (1219 mm) on center. The vertical bar shall extend to the bottom of the footing and shall have a standard hook and extend a minimum of 14 inches (357 mm) into the stem wall. Standard hooks shall comply with Section R611.5.4.5. A minimum of one No. 4 horizontal bar shall be installed within 12 inches (305 mm) of the top of the stem wall and one No. 4 horizontal bar shall be located three to four inches from the bottom of the footing.~~

R403.1.3.2 Masonry stem walls with concrete footings. ~~In Seismic Design Categories D₀, D₁ and D₂ where a masonry stem wall is supported on a concrete footing, a minimum of one No. 4 vertical bar shall be installed at not more than 4 feet (1219 mm) on center. The vertical bar shall extend to the bottom of the footing and have a standard hook and extend a minimum of 14 inches (357 mm) into the stem wall. Standard hooks shall comply with Section R611.5.4.5. A minimum of one No. 4 horizontal bar shall be installed within 12 inches (305 mm) of the top of the wall and one No. 4 horizontal bar shall be located three to four inches from the bottom of the footing. Masonry stem walls shall be solid grouted.~~

R403.1.3.2 R403.1.3.3 Slabs-on-ground with turned-down footings. ~~In Seismic Design Categories D₀, D₁ and D₂, Slabs on ground cast monolithically with turned down footings shall have a minimum of one~~

No. 4 bar at the top and the bottom of the footing or one No. 5 bar or two No. 4 bars in the middle third of the footing depth.

Exception: ~~For slabs on-ground cast monolithically with the footing, locating one No. 5 bar or two No. 4 bars in the middle third of the footing depth shall be permitted as an alternative to placement at the footing top and bottom.~~

Where the slab is not cast monolithically with the footing, one No. 3 or larger vertical dowels with standard hooks on each end shall be provided installed at not more than 4 feet (1219 mm) on center in accordance with Figure R403.1.3.2 . Standard hooks shall comply with Section R611.5.4.5.

R403.1.4.2 Seismic conditions **R403.1.3.4 Interior bearing and braced wall panel footings in Seismic Design Categories D₀, D₁ and D₂.** In Seismic Design Categories D₀, D₁ and D₂, interior footings supporting bearing ~~walls or braced wall panels, bracing walls~~ and cast monolithically with a slab on ~~grade,~~ shall extend to a depth of not less than 12 inches (305 mm) below the top of the slab.

R403.1.3.5 Reinforcement. Footing and stem wall reinforcement shall comply with Sections R403.1.3.5.1 through R403.1.3.5.4.

R403.1.3.5.1 Steel reinforcement. Steel reinforcement shall comply with the requirements of ASTM A 615, A 706, or A 996. ASTM A 996 bars produced from rail steel shall be Type R. In buildings assigned to Seismic Design Category A, B or C, the minimum yield strength of reinforcing steel shall be 40,000 psi (Grade 40) (276 MPa). In buildings assigned to Seismic Design Category D₀, D₁ or D₂, reinforcing steel shall comply with the requirements of ASTM A 706 for low-alloy steel with a minimum yield strength of 60,000 psi (Grade 60) (414 MPa).

R403.1.3.5.2 Location of reinforcement in wall. The center of vertical reinforcement in stem walls shall be located at the centerline of the wall. Horizontal and vertical reinforcement shall be located in footings and stem walls to provide the minimum cover required by Section R403.1.3.5.3.

R403.1.3.5.3 Support and cover. Reinforcement shall be secured in the proper location in the forms with tie wire or other bar support system to prevent displacement during the concrete placement operation. Steel reinforcement in concrete cast against the earth shall have a minimum cover of 3 inches (75 mm). Minimum cover for reinforcement in concrete cast in removable forms that will be exposed to the earth or weather shall be 1-1/2 inches (38 mm) for No. 5 bars and smaller, and 2 inches (50 mm) for No. 6 bars and larger. For concrete cast in removable forms that will not be exposed to the earth or weather, and for concrete cast in stay-in-place forms, minimum cover shall be 3/4 inch (19 mm). The minus tolerance for cover shall not exceed the smaller of one-third the required cover or 3/8 inch (10 mm).

R403.1.3.5.4 Lap splices. Vertical and horizontal reinforcement shall be the longest lengths practical. Where splices are necessary in reinforcement, the length of lap splice shall be in accordance with Table R611.5.4.(1) and Figure R611.5.4(1). The maximum gap between noncontact parallel bars at a lap splice shall not exceed the smaller of one-fifth the required lap length and 6 inches (152 mm). See Figure R611.5.4(1).

R403.1.3.6 Isolated concrete footings. In detached one- and two-family *dwelling*s which are three stories or less in height and constructed with stud bearing walls, isolated plain concrete footings, supporting columns or pedestals are permitted.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

The International Code Council's Building Code Action Committee identified several items in Chapter 4, "Foundations", that are in conflict with other provisions of the code or lack clarity. This proposal specifically addresses conflicts and confusing language in the current sections of code that address reinforcement required for Seismic Design Categories D₀, D₁ and D₂.

The title and language in section R403.1.3 is changed for clarity. Additionally, a note is added that references a new section, R403.1.3.4, that defines the installation requirements for the reinforcement.

The existing language describing concrete stem walls and masonry stem walls on concrete footings are separated into two sections, "Concrete stem walls" and "Masonry stem walls" respectively.

Section R403.1.3.1 describes the existing requirements for the horizontal reinforcement at the top of the stem wall and the bottom of the footing. This proposal deletes that section and incorporates the language into the two sections describing the requirements for the stem wall, R403.1.3.1 and R403.1.3.2 respectively.

The language in the existing section R403.1.3.2 for slabs on ground is changed to clarify that this section is addressing turned down footings cast monolithically with the slab since there are new provisions in the code to allow turned down footings that are not cast monolithically with the slab. Also, the existing exception for the reinforcement to be installed in the middle third of the footing have been moved into the section instead of being an exception.

Cost Impact: The code change proposal will not increase the cost of construction.

RB216-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.1.3-RB-BAJNAI-BCAC.doc

RB217 – 13

R403.1.6

Proponent: Gary J. Ehrlich, P.E., National Association of Home Builders (NAHB) (gehrlich@nahb.org);
Bonnie E. Manley, P.E., American Iron and Steel Institute

Revise as follows:

R403.1.6 Foundation anchorage. Wood sill plates and wood walls supported directly on continuous foundations shall be anchored to the foundation in accordance with this section.

Cold-formed steel framing shall be anchored directly to the foundation or fastened to wood sill plates anchored to the foundation. Anchorage of cold-formed steel framing and sill plates supporting cold-formed steel framing shall be in accordance with this section and Sections R505.3.1 or R603.3.1.

Wood sole plates at all exterior walls on monolithic slabs, wood sole plates of braced wall panels at building interiors on monolithic slabs and all wood sill plates shall be anchored to the foundation with anchor bolts spaced a maximum of 6 feet (1829 mm) on center. Bolts shall be at least 1/2 inch (12.7 mm) in diameter and shall extend a minimum of 7 inches (178 mm) into concrete or grouted cells of concrete masonry units. A nut and washer shall be tightened on each anchor bolt. There shall be a minimum of two bolts per plate section with one bolt located not more than 12 inches (305 mm) or less than seven bolt diameters from each end of the plate section. Interior bearing wall sole plates on monolithic slab foundation that are not part of a braced wall panel shall be positively anchored with approved fasteners. Sill plates and sole plates shall be protected against decay and termites where required by Sections R317 and R318. ~~Cold-formed steel framing systems shall be fastened to wood sill plates or anchored directly to the foundation as required in Section R505.3.1 or R603.3.1.~~

Reason: The purpose of this proposal is to clarify the foundation anchorage requirements for cold-formed steel framing systems. Currently, the anchorage requirements for cold-formed steel are part of a larger paragraph mostly concerning wood framing. This proposal moves the cold-formed steel requirements to a separate paragraph. This paragraph becomes "charging language" which points the user to the appropriate CFS provisions in Chapters 5 and 6. In addition, the language is revised to clarify that both the provisions of Section R403.1.6 and the applicable provisions of Section R505.3.1 (for cold-formed steel floor framing) and Section R603.3.1 (for cold-formed steel wall framing) need to be followed. This is to insure that anchor bolt spacing and embedment requirements specific to cold-formed steel and detailed in Sections R505.3.1 and R603.3.1 are not overlooked or inadvertently overridden.

Cost Impact: The code change proposal will not increase the cost of construction.

RB217-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.1.6-RB-EHRLICH-MANLEY.doc

RB218 – 13

R403.1.6

Proponent: Gary J. Ehrlich, P.E., National Association of Home Builders (NAHB) (gehrlich@nahg.org)

Revise as follows:

R403.1.6 Foundation anchorage. Sill plates and walls supported directly on continuous foundations shall be anchored to the foundation in accordance with this section.

Wood sole plates at all exterior walls on monolithic slabs, wood sole plates of braced wall panels at building interiors on monolithic slabs and all wood sill plates shall be anchored to the foundation with minimum 1/2 inch (12.7 mm) diameter anchor bolts spaced a maximum of 6 feet (1829 mm) on center or approved anchors or anchor straps spaced as required to provide equivalent anchorage to 1/2-inch-diameter (12.7 mm) anchor bolts. Bolts shall ~~be at least 1/2 inch (12.7 mm) in diameter and shall~~ extend a minimum of 7 inches (178 mm) into concrete or grouted cells of concrete masonry units. A nut and washer shall be tightened on each anchor bolt. There shall be a minimum of two bolts per plate section with one bolt located not more than 12 inches (305 mm) or less than seven bolt diameters from each end of the plate section. Interior bearing wall sole plates on monolithic slab foundation that are not part of a braced wall panel shall be positively anchored with approved fasteners. Sill plates and sole plates shall be protected against decay and termites where required by Sections R317 and R318. Cold-formed steel framing systems shall be fastened to wood sill plates or anchored directly to the foundation as required in Section R505.3.1 or R603.3.1.

Exceptions:

- ~~1. Foundation anchorage, spaced as required to provide equivalent anchorage to 1/2-inch-diameter (13 mm) anchor bolts.~~
- ~~21.~~ Walls 24 inches (610 mm) total length or shorter connecting offset braced wall panels shall be anchored to the foundation with a minimum of one anchor bolt located in the center third of the plate section and shall be attached to adjacent braced wall panels at corners as shown in item 8 of Table R602.3(1).
- ~~32.~~ Connection of walls 12 inches (305 mm) total length or shorter connecting offset braced wall panels to the foundation without anchor bolts shall be permitted. The wall shall be attached to adjacent braced wall panels at corners as shown in item 8 of Table R602.3(1).

Reason: The purpose of this proposal is to clarify the foundation anchorage requirements by moving the current exception for alternate foundation anchor systems providing equivalent capacity to ½" anchor bolts spaced at 6'-0" (or as otherwise required by the code or design) into the main text of R403.1.6. The revised language is similar to 2012 IBC Section 2308.6. This will place the use of wedge anchors, expansion anchors, adhesive anchors, mudsill anchors and other alternatives approved by the building official on an equal level with cast-in-place anchor bolts.

Cost Impact: The code change proposal will not increase the cost of construction.

RB218-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.1.6-RB-EHRLICH.doc

RB219 – 13

R403.1.6

Proponent: Hope Medina, Colorado Code Consulting, representing Colorado Chapter of ICC
(hmedina@coloradocode.net)

Revise as follows:

R403.1.6 Foundation anchorage. Sill plates and walls supported directly on continuous foundations shall be anchored to the foundation in accordance with this section.

Wood sole plates at all exterior walls on monolithic slabs, wood sole plates of braced wall panels at building interiors on monolithic slabs and all wood sill plates shall be anchored to the foundation with anchor bolts spaced a maximum of 6 feet (1829 mm) on center. Bolts shall be at least 1/2 inch (12.7 mm) in diameter and shall extend a minimum of 7 inches (178 mm) into concrete or grouted cells of concrete masonry units. The bolts shall be located a minimum 1 3/4" from the plate's edge or in the middle third of the plate's edge. A nut and washer shall be tightened on each anchor bolt. There shall be a minimum of two bolts per plate section with one bolt located not more than 12 inches (305 mm) or less than seven bolt diameters from each end of the plate section. Interior bearing wall sole plates on monolithic slab foundation that are not part of a braced wall panel shall be positively anchored with approved fasteners. Sill plates and sole plates shall be protected against decay and termites where required by Sections R317 and R318. Cold-formed steel framing systems shall be fastened to wood sill plates or anchored directly to the foundation as required in Section R505.3.1 or R603.3.1.

Exceptions:

1. Foundation anchorage, spaced as required to provide equivalent anchorage to 1/2-inch-diameter (12.7 mm) anchor bolts.
2. Walls 24 inches (610 mm) total length or shorter connecting offset *braced wall panels* shall be anchored to the foundation with a minimum of one anchor bolt located in the center third of the plate section and shall be attached to adjacent *braced wall panels* at corners as shown in item 8 of Table R602.3(1).
3. Connection of walls 12 inches (305 mm) total length or shorter connecting offset *braced wall panels* to the foundation without anchor bolts shall be permitted. The wall shall be attached to adjacent *braced wall panels* at corners as shown in item 8 of Table R602.3(1).

Reason: It has become a common occurrence to see an anchor bolt placed at the edge of the sole plate, and on many occasions the threads of the bolt are visible. The "practicing industry standard" is for the bolt to be located at least two bolt diameters from the plate's edge, but there is nothing in the IRC to govern this. We require two bolts per plate, within 12" of a break, and spaced no more than 6 feet apart, but nothing plainly referencing its placement from the plate's edge. Having a specified placement of the bolt in the bottom plate allows for proper enforcement while still giving some flexibility to the contractors. Simpson Strong Tie has performed tests demonstrating that the bolt lost the expected anchoring capacity when placed closer than 1 3/4" from the plate's edge.

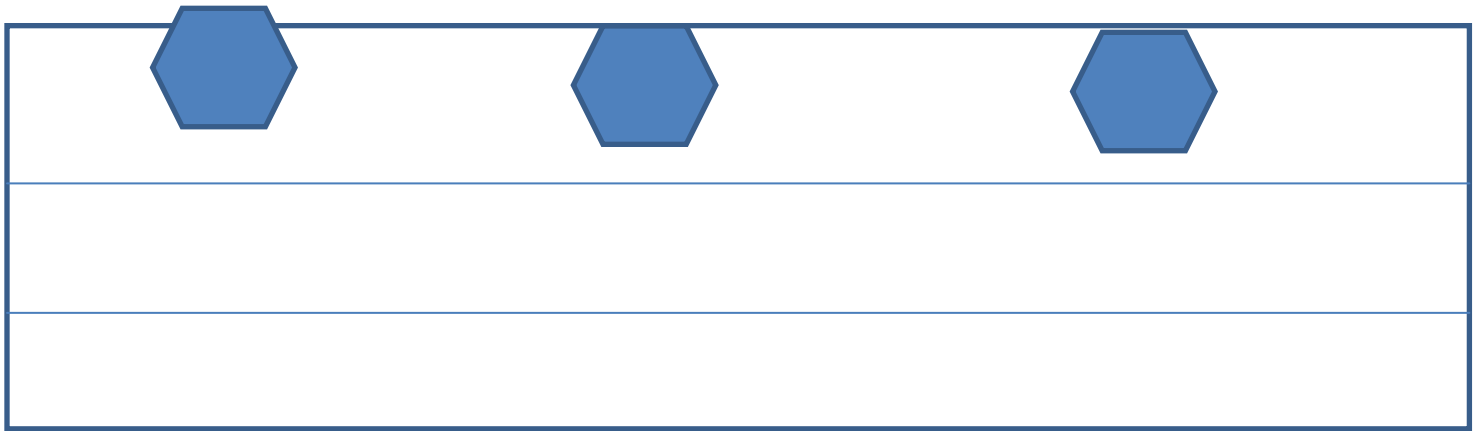
Both the Simpson Strong Tie Wood Construction Connectors 2011-2012 edition and the USP Structural Connectors state that their connectors must have a minimum placement of 1 3/4 inches from the edge. The IRC reference the NDS for wood design for items not covered in the code like wood edge and end distances. The 2012 NDS has edge distance of 3/4" for shear and 2" for wind loads (Table 11.5.1C). So if the edge distance is 1-1/8" you would need to reduce the anchor capacity with an 0.56 allowable load adjustment factor (1.125/2) when resisting wind loads. So you can space in the middle 1/3 of plate, but you may need to increase the number of bolts for wind.

In chapter 7 of the National Design Specifications for wood construction reference of anchor bolt placement.

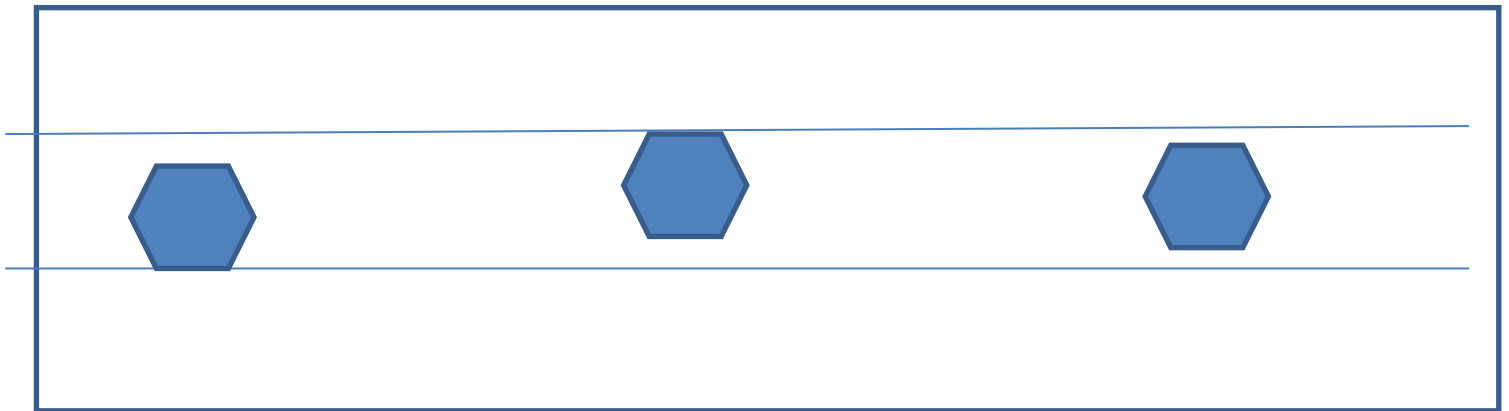
Spacing, Edge, and End Distance

The center-to-center distance along the grain should be at least four times the bolt diameter for parallel-to-grain loading. The minimum center-to-center spacing of bolts in the across-the-grain direction for loads acting through metal side plates and parallel to the grain need only be sufficient to permit the tightening of the nuts. For wood side plates, the spacing is controlled by the rules applying to loads acting parallel to grain if the design load approaches the bolt-bearing capacity of the side plates. When the design load is less than the bolt-bearing capacity of the side plates, the spacing may be reduced below that required to develop their maximum capacity.

COMMON PLACEMENT OF BOLTS IN THE FIELD



PROPER PLACEMENT OF BOLTS WITH CODE CHANGE







Cost Impact: The code change proposal will not increase the cost of construction.

RB219-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.1.6-RB-MEDINA.doc

RB220 – 13

R403.1.8.1

Proponent: Paul L. Hilpman, PhD., R.G., L.G., representing self (hilpmanpa@yahoo.com)

Revise as follows:

R403.1.8.1 Expansive soils classifications. Soils meeting all four of the following provisions shall be considered expansive, except that tests showing compliance with Items 1, 2 and 3 shall ~~not be required if the test prescribed in Item 4 is conducted~~; only apply to natural soils, and tests to showing compliance with Item 4 shall only apply to mechanically compacted soils:

1. Plasticity Index (PI) of 15 or greater, determined in accordance with ASTM D 4318.
2. More than 10 percent of the soil particles pass a No. 200 sieve (75mm), determined in accordance with ASTM D 422.
3. More than 10 percent of the soil particles are less than 5 micrometers in size, determined in accordance with ASTM D 422.
4. Expansion Index greater than 20, determined in accordance with ASTM D 4829.

Reason: Most foundations for One- and Two-Family Dwellings are constructed on *natural soils* rather than mechanically *compacted soils*. Historically, the geotechnical community has relied on ASTM D 4318 and D 422 tests to predict the engineering behavior of *natural soils* such as compressibility, hydraulic conductivity (permeability), shrink-swell, and shear strength. In contrast, the ASTM D 4829 test is specifically designed to provide an indication of swelling potential of a mechanically *compacted soil*. Accordingly, this proposal is an attempt to make it clear that provisions 1, 2 & 3 are only appropriate for evaluating *natural soils* and that provision 4 is only appropriate for evaluating *compacted soils*. As presently phrased in the 2012 Edition of the IRC for One- and Two-Family Dwellings, this distinction is articulated in an ambiguous manner. Building Officials in cities that have adopted the present wording have had to accept builder's test results from ASTM D 4829 that indicate a "very low" expansion index when, in fact, none of the soils at the building site were to be compacted. When subject to ASTM D 4318 and D 422 tests, the results indicated that the CH soil was highly expansive.

Cost Impact: The code change proposal will not increase the cost of construction.

RB220-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.1.8.1-RB-HILPMAN.doc

RB221 – 13

Table R403.3(1)

Proponent: Betsy Steiner, EPS Molders Association (emsteiner@epsindustry.org)

Revise as follows:

TABLE R403.3(1) MINIMUM FOOTING DEPTH AND INSULATION REQUIREMENTS FOR FROST-PROTECTED FOOTINGS IN HEATED BUILDINGS^a

e. Horizontal insulation shall be expanded polystyrene insulation or extruded polystyrene insulation.

(Portions of Table not shown remain unchanged)

Reason: Expanded polystyrene is widely recognized for use in below grade applications, specifically geofoam installments (as recognized by the Federal Highway Administration) as a means to achieve slope stabilization, bridge abutments and other seismic loading functions in all climate zones, including those experiencing severe freeze-thaw cycling. The National Association of Home Builders Research Center also recognizes expanded polystyrene as suitable for horizontal applications in its publication "Revised Builder's Guide To Frost Protected Shallow Foundations," September 2004.

Cost Impact: This code change proposal will not increase the cost of construction.

RB221-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.3(1)T-RB-STEINER.doc

RB222 – 13

Figure R403.4(1), Table R403.4

Proponent: Paul Edward Helderman Jr., Codes and Standards Manager, Superior Walls of America, Ltd., representing Lancaster County Code Officials (LANCODE)

Revise as follows:

TABLE R403.4
MINIMUM DEPTH OF CRUSHED STONE FOOTINGS (D), (inches)

Number of Stories	Uniform Wall Load	Load Bearing Value of Soil (psf)															
		1500				2000				3000				4000			
		MH,CH,CL,ML				SC,GC,SM,GM,SP,SW				GP,GW							
		Wall width (inches)				Wall width (inches)				Wall width (inches)				Wall width (inches)			
		6	8	10	12	6	8	10	12	6	8	10	12	6	8	10	12
Conventional light-frame construction																	
1-Story	(1100plf)	6	4	4	4	6	4	4	4	6	4	4	4	6	4	4	4
2-Story	(1800plf)	8	6	4	4	6	4	4	4	6	4	4	4	6	4	4	4
3-Story	(2900plf)	16	14	12	10	10	8	6	6	6	4	4	4	6	4	4	4
4-inch brick veneer over light-frame or 8-inch hollow concrete masonry																	
1-Story	(1500plf)	6	4	4	4	6	4	4	4	6	4	4	4	6	4	4	4
2-Story	(2700plf)	14	12	10	8	10	8	6	4	6	4	4	4	6	4	4	4
3-Story	(4000plf)	22	22	20	18	16	14	12	10	10	8	6	4	6	4	4	4
8-inch solid or fully grouted masonry																	
1-Story	(2000plf)	10	8	6	4	6	4	4	4	6	4	4	4	6	4	4	4
2-Story	(3600plf)	20	18	16	16	14	12	10	8	8	6	4	4	6	4	4	4
3-Story	(5300plf)	32	30	28	26	22	22	20	18	10	12	10	8	10	8	6	4

For SI: 1 inch = 25.4 mm, 1 pound per square inch = 6.89 pounds per linear foot, 1 plf = 2.4414.6 N/m, 1 pounds per square foot = 47.9 N/m²

Notes:

1. Linear interpolation of stone depth between wall widths is permitted within each Load Bearing Value of Soil (psf)

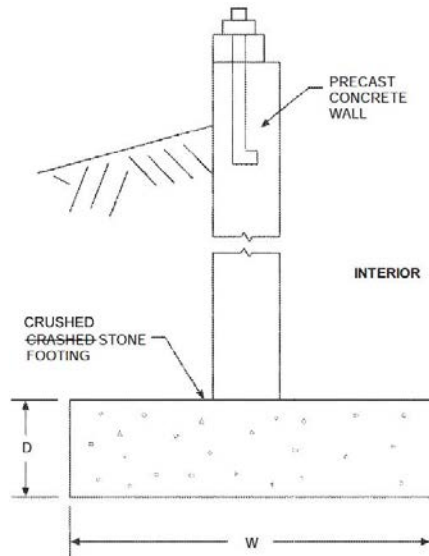


FIGURE R403.4(1)
BASEMENT OR CRAWL SPACE WITH PRECAST
FOUNDATION WALL BEARING ON CRUSHED STONE

Reason: This table is already in the code and it shows a code official a simple way to estimate the crushed stone depth for any precast foundation wall between 6 inches to 12 inches in width. The reason for this proposal is to add headings column 1 and 2 for clarification. The conversion information at the bottom of the table was incorrect and has already been identified by the technical staff of the ICC and will be published as an erratum and corrected in the next printing of the 2012 IRC and the 2009 IRC.

A note has been added pointing out that linear interpolation may be used to determine stone depth for wall widths not shown on the table if those wall widths are between 6 and 12 inches.

For example: An 11 inch precast foundation wall is setting on 1500 psf soil and it will be carrying a uniform wall load of 4000plf because the house will be a 3-story 4-inch brick veneer over light-frame construction. To calculate the minimum depth of the crushed stone footing required by the table you must interpolate between 18 inches of stone for a 12 inch wall width, and 20 inches of stone for a 10 inch wall width. This gives you an interpolated value of 19 inches minimum depth of crushed stone for a 3 story home with 4-inches of brick veneer over light-frame construction (4000plf) for an 11 inch wall width setting on 1500 psf soil. Note: You cannot interpolate between two different soil bearing values of soil.

Example: Answer = **19 inches** - based on interpolation (3 story home, 11 inch precast foundation wall width, on 1500 psf soil.)

TABLE R403.4
MINIMUM DEPTH OF CRUSHED STONE FOOTINGS (D), (inches)

Number of Stories	Uniform Wall Load	Load Bearing Value of Soil (psf)															
		1500				2000				3000				4000			
		MH,CH,CL,ML				SC,GC,SM,GM,SP,SW				GP,GW							
		Wall width (inches)				Wall width (inches)				Wall width (inches)				Wall width (inches)			
		6	8	10	12	6	8	10	12	6	8	10	12	6	8	10	12
Conventional light-frame construction																	
1-Story	(1100plf)	6	4	4	4	6	4	4	4	6	4	4	4	6	4	4	4
2-Story	(1800plf)	8	6	4	4	6	4	4	4	6	4	4	4	6	4	4	4
3-Story	(2900plf)	16	14	12	10	10	8	6	6	6	4	4	4	6	4	4	4
4-inch brick veneer over light-frame or 8-inch hollow concrete masonry																	
1-Story	(1500plf)	6	4	4	4	6	4	4	4	6	4	4	4	6	4	4	4
2-Story	(2700plf)	14	12	10	8	10	8	6	4	6	4	4	4	6	4	4	4
3-Story	(4000plf)	22	22	20	18	16	14	12	10	10	8	6	4	6	4	4	4
8-inch solid or fully grouted masonry																	
1-Story	(2000plf)	10	8	6	4	6	4	4	4	6	4	4	4	6	4	4	4
2-Story	(3600plf)	20	18	16	16	14	12	10	8	8	6	4	4	6	4	4	4
3-Story	(5300plf)	32	30	28	26	22	22	20	18	10	12	10	8	10	8	6	4

No other changes were made to the table, but for clarification, please note that calculations will show that the plf values for the Uniform Wall Loads shown in the table were directly determined from the loads and footing widths found in IRC Table R403.1, and thereby the crushed stone depths are calculated to approximate the same load bearing widths on the soil as the concrete footings found in Table R403.1 assuming a load spread at a conservative angle of 60 degrees from vertical.

The word "CRUSHED" is misspelled as "CRASHED" in Figure R403.4 (1). The spelling is corrected in this proposal.

Cost Impact: The code change proposal will not increase the cost of construction.

RB222-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R403.4T-RB-HELDERMAN.doc

RB223 – 13

R404.1.1

Proponent: Matthew L. Mlakar, Barrish Pelham & Associates, Inc., representing Structural Engineers Association of California

Revise as follows:

R404.1.1 Design of masonry foundation walls. Masonry foundation walls shall be designed and constructed in accordance with the provisions of this section or in accordance with the provisions of ACI530/ASCE 5/TMS 402 or ~~NCMA TR68-A~~. When ACI530/ASCE 5/TMS 402, ~~NCMA TR68-A~~ or the provisions of this section are used to design masonry foundation walls, project drawings, typical details and specifications are not required to bear the seal of the architect or engineer responsible for design, unless otherwise required by the state law of the jurisdiction having authority.

Reason: The referenced standard, NCMA TR-68-A-75 is out of date, and no longer available. Under ICC CP#28 policy section 3.6.3.2 the referenced standards shall be developed and maintained through a consensus process such as ASTM or ANSI. While NCMA TR68 was not developed through the ANSI consensus process during the adoption of the 2000 IRC, it was grandfathered into the code. However since the inception of the code, the referenced standard has not been maintained and is no longer in publication. The referenced standard should be removed at this time.

There are several other methods for the design of plain and reinforced masonry walls, so the removal of the standard will not prevent the use of masonry foundation walls.

Cost Impact: The proposal will not change the cost of construction.

RB223-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R404.1.1-RB-MLAKAR.doc

RB224 – 13

Table R404.1.1(1)

Proponent: Stephen Kerr, S.E., Josephson Werdowatz and Associates, Inc., representing self (skerr@jwa-se.com)

Revise as follows:

TABLE R404.1.1(1)
PLAIN MASONRY FOUNDATION WALLS

MAXIMUM WALL HEIGHT (feet)	MAXIMUM UNBALANCE D BACKFILL HEIGHT ^c (feet)	PLAIN MASONRY ^a MINIMUM NOMINAL WALL THICKNESS (inches)		
		Soil classes ^b		
		GW, GP, SW and SP	GM, GC, SM, SM-SC and ML	SC, MH, ML-CL and inorganic CL
5	4	6 solid ^d or 8	6 solid ^d or 8	6 solid ^d or 8
	5	6 solid ^d or 8	8	8
6	4	6 solid ^d or 8	6 solid ^d or 8	6 solid ^d or 8
	5	6 solid ^d or 8	8	10
	6	8	10	12
7	4	6 solid ^d or 8	8	8
	5	6 solid ^d or 8	10	10
	6	10	12	10 solid ^d
	7	12	10 solid ^d	12 solid ^d
8	4	6 solid ^d or 8	6 solid ^d or 8	8
	5	6 solid ^d or 8	10	12
	6	10	12	12 solid ^d
	7	12	12 solid ^d	Footnote e
	8	10 solid grout ^d	12 solid grout ^d	Footnote e
9	4	6 solid grout ^d or 8 solid ^d or 12	6 solid grout ^d or 8 solid ^d or 12	8 grout ^d or 10 solid ^d
	5	8-6 grout ^d or 10 solid ^d	10-8 grout ^d or 12 solid ^d	12-8 grout ^d
	6	10-8 grout ^d or 12 solid ^d	12-10 grout ^d	12-10 solid ^d 10 grout ^d
	7	12-10 grout ^d	12-10 solid ^d 10 grout ^d	12 grout ^d Footnote e
	8	12 solid 10 grout ^d	12 grout ^d Footnote e	Footnote e
	9	12 grout ^d Footnote e	Footnote e	Footnote e

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square inch = 6.895 Pa.

- Mortar shall be Type M or S and masonry shall be laid in running bond. UngROUTED hollow masonry units are permitted except where otherwise indicated.
- Soil classes are in accordance with the Unified Soil Classification System. Refer to Table R405.1.
- Unbalanced backfill height is the difference in height between the exterior finish ground level and the lower of the top of the concrete footing that supports the foundation wall or the interior finish ground level. Where an interior concrete slab-on-grade is provided and is in contact with the interior surface of the foundation wall, measurement of the unbalanced backfill height from the exterior finish ground level to the top of the interior concrete slab is permitted.
- Solid indicates solid masonry unit, grout indicates grouted hollow units or solid masonry units.
- Wall construction shall be in accordance with either Table R404.1.1(2), Table R404.1.1(3), Table 404.1.1(4), or a design shall be provided.

Reason: For plain masonry walls with a maximum height of 9 ft., all backfill depths, and 8ft. tall walls with 8ft. of backfill, the wall construction limitations of Table R404.1.1 (1) exceed the prescriptive requirements of TMS 402/ACI 530/ASCE 5 section 5.6.3 and Table 5.6.3.1. For these specific walls, when analyzed in accordance with TMS 402/ACI 530/ASCE 5, using the allowable flexural tensile stresses in Table 2.2.3.2, the values shown in Table R404.1.1 (1) cannot be justified. The proposed change is to make the values shown in Table R404.1.1 (1) compliant with the prescriptive and analytical requirements of TMS 402/ACI 530/ASCE 5.

It should be noted that in Table R404.1.1 (1) footnote d currently lumps solid grouted hollow units with solid masonry units. However, in both TMS 402/ACI 530/ASCE 5 Tables 5.6.3.1 and 2.2.3.2 the limitations of solid units are less than those of solid

grouted hollow units. Depending on the type of mortar, the capacity from Table 2.2.3.2 for solid units is either 62% or 40% the capacity of solid grouted hollow units.

With this proposal the IRC table for plain masonry wall will meet the requirements found in the referenced standard.

Cost Impact: The cost of construction for 8ft and 9ft tall plain masonry walls will slightly increase. The cost increase will primarily only impact the 8ft and 9ft walls where solid masonry units are currently specified.

RB224-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R404.1.1(1)T-RB-KERR.doc

RB225 – 13

Table R404.1.1(1), Table R404.1.1(2), Table R404.1.1(3), Table R404.1.1(4) and Tables R404.1.2(2) thru R404.1.2(8)

Proponent: Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee and Virginia Building and Code Officials Association (BajnaiC@chesterfield.gov)

Revise as follows:

TABLE R404.1.1(1)
PLAIN MASONRY FOUNDATION WALLS^f

MAXIMUM WALL HEIGHT (feet)	MAXIMUM UNBALANCED BACKFILL HEIGHT ^c (feet)	PLAIN MASONRY ^a MINIMUM NOMINAL WALL THICKNESS (inches)		
		Soil classes ^b		
		GW, GP, SW and SP	GM, GC, SM, SM-SC and ML	SC, MH, ML-CL and inorganic CL

f. The use of this table shall be prohibited for soil classifications not shown.

(Portions of Table not shown remain unchanged)

TABLE R404.1.1(2)
8-INCH MASONRY FOUNDATION WALLS WITH REINFORCING WHERE d > 5 INCHES^{a, c, f}

f. The use of this table shall be prohibited for soil classifications not shown.

(Portions of Table not shown remain unchanged)

TABLE R404.1.1(3)
10-INCH MASONRY FOUNDATION WALLS WITH REINFORCING WHERE d > 6.75 INCHES^{a, c, f}

f. The use of this table shall be prohibited for soil classifications not shown.

(Portions of Table not shown remain unchanged)

TABLE R404.1.1(4)
12-INCH MASONRY FOUNDATION WALLS WITH REINFORCING WHERE d > 8.75 INCHES^{a, c, f}

f. The use of this table shall be prohibited for soil classifications not shown.

(Portions of Table not shown remain unchanged)

TABLE R404.1.2(2)
MINIMUM VERTICAL REINFORCEMENT FOR 6-INCH NOMINAL FLAT CONCRETE BASEMENT WALLS^{b, c, d, e, g, h, i, j, k}

f. The use of this table shall be prohibited for soil classifications not shown.

(Portions of Table not shown remain unchanged)

TABLE R404.1.2(3)
MINIMUM VERTICAL REINFORCEMENT FOR 8-INCH (203 mm) NOMINAL FLAT CONCRETE BASEMENT WALLS^{b, c, d, e, f, h, i, j}

f. The use of this table shall be prohibited for soil classifications not shown.

(Portions of Table not shown remain unchanged)

TABLE R404.1.2(4)
MINIMUM VERTICAL REINFORCEMENT FOR 10-INCH NOMINAL FLAT CONCRETE BASEMENT WALLS^{b, c, d, e, f, h, i, j}

f. The use of this table shall be prohibited for soil classifications not shown.

(Portions of Table not shown remain unchanged)

TABLE R404.1.2(5)
MINIMUM VERTICAL WALL REINFORCEMENT FOR 6-INCH WAFFLE-GRID BASEMENT WALLS^{b, c, d, e, f, h, i, j}

f. The use of this table shall be prohibited for soil classifications not shown.

(Portions of Table not shown remain unchanged)

TABLE R404.1.2(6)
MINIMUM VERTICAL REINFORCEMENT FOR 8-INCH WAFFLE-GRID BASEMENT WALLS^{b, c, d, e, f, h, i, j, k}

f. The use of this table shall be prohibited for soil classifications not shown.

(Portions of Table not shown remain unchanged)

TABLE R404.1.2(7)
MINIMUM VERTICAL REINFORCEMENT FOR 6-INCH (152 mm) SCREEN-GRID BASEMENT WALLS^{b, c, d, e, g, h, i, j}

f. The use of this table shall be prohibited for soil classifications not shown.

(Portions of Table not shown remain unchanged)

TABLE R404.1.2(8)
MINIMUM VERTICAL REINFORCEMENT FOR 6-, 8-, 10-INCH AND 12-INCH NOMINAL FLAT BASEMENT WALLS^{b, c, d, e, f, h, i, k, n, o}

f. The use of this table shall be prohibited for soil classifications not shown.

(Portions of Table not shown remain unchanged)

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

The table specifically says that the wall design is a function of a maximum of 60 psf hydraulic pressure. Soils with CH, MH, OL, OH and Pt have higher hydraulic pressures and therefore should not be allowed for backfilling purposes unless the wall is designed by a registered design professional.

Cost Impact: The code change proposal could increase the cost of construction.

RB225-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

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RB226 – 13

R404.1.4.1, Table R404.1.1(2), Table R404.1.1(3), Table R404.1.1(4)

Proponent: Stephen Kerr, S.E., Josephson Werdowatz and Associates Inc., representing self (skerr@jwa-se.com)

Revise as follows:

R404.1.4.1 Masonry foundation walls. ~~In addition to the requirements of Table R404.1.1(1) plain masonry foundation walls in buildings assigned to Seismic Design Category D₀, D₁ or D₂, as established in Table R301.2(1), masonry foundation walls shall comply with this section. In addition to the requirements of Table R404.1.1(1), plain masonry foundation walls shall comply with the following.~~

1. Wall height shall not exceed 8 feet (2438 mm).
2. Unbalanced backfill height shall not exceed 4 feet (1219 mm).
3. Minimum nominal thickness for plain masonry foundation walls shall be 8 inches (203 mm).
4. Masonry stem walls shall have a minimum vertical reinforcement of one No. ~~3~~ 4 (No. ~~10~~ 13) bar located a maximum of 4 feet (1219 mm) on center in grouted cells. Vertical reinforcement shall be tied to the horizontal reinforcement in the footings.

~~Foundation walls in buildings assigned to Seismic Design Category D₀, D₁ or D₂, as established in Table R301.2(1), supporting more than 4 feet (1219 mm) of unbalanced backfill or exceeding 8 feet (2438 mm) in height shall be constructed in accordance with Table R404.1.1(2), R404.1.1(3) or R404.1.1(4). Masonry foundation walls shall have two No. 4 (No. 13) horizontal bars located in the upper 12 inches (305 mm) of the wall.~~

TABLE R404.1.1(2)
8-INCH MASONRY FOUNDATION WALLS WITH REINFORCING WHERE $d \geq 5$ INCHES^{a, c}

WALL HEIGHT	HEIGHT OF UNBALANCED BACKFILL ^e	MINIMUM VERTICAL REINFORCEMENT AND SPACING (INCHES) ^{b, c}		
		Soil classes and lateral soil load ^d (psf per foot below grade)		
		GW, GP, SW and SP soils 30	GM, GC, SM, SM-SC and ML soils 45	SC, ML-CL and inorganic CL soils 60
6 feet 8 inches	4 feet (or less)	#4 at 48	#4 at 48	#4 at 48
	5 feet	#4 at 48	#4 at 48	#4 at 48
	6 feet 8 inches	#4 at 48	#5 at 48	#6 at 48
7 feet 4 inches	4 feet (or less)	#4 at 48	#4 at 48	#4 at 48
	5 feet	#4 at 48	#4 at 48	#4 at 48
	6 feet	#4 at 48	#5 at 48	#5 at 48
	7 feet 4 inches	#5 at 48	#6 at 48	#6 at 40
8 feet	4 feet (or less)	#4 at 48	#4 at 48	#4 at 48
	5 feet	#4 at 48	#4 at 48	#4 at 48
	6 feet	#4 at 48	#5 at 48	#5 at 48
	7 feet	#5 at 48	#6 at 48	#6 at 40
	8 feet	#5 at 48	#6 at 48	#6 at 32
8 feet 8 inches	4 feet (or less)	#4 at 48	#4 at 48	#4 at 48
	5 feet	#4 at 48	#4 at 48	#5 at 48
	6 feet	#4 at 48	#5 at 48	#6 at 48
	7 feet	#5 at 48	#6 at 48	#6 at 40
	8 feet 8 inches	#6 at 48	#6 at 32	#6 at 24

9 feet 4 inches	4 feet (or less)	#4 at 48	#4 at 48	#4 at 48
	5 feet	#4 at 48	#4 at 48	#5 at 48
	6 feet	#4 at 48	#5 at 48	#6 at 48
	7 feet	#5 at 48	#6 at 48	#6 at 40
	8 feet	#6 at 48	#6 at 40	#6 at 24
	9 feet 4 inches	#6 at 40	#6 at 24	#6 at 16
10 feet	4 feet (or less)	#4 at 48	#4 at 48	#4 at 48
	5 feet	#4 at 48	#4 at 48	#5 at 48
	6 feet	#4 at 48	#5 at 48	#6 at 48
	7 feet	#5 at 48	#6 at 48	#6 at 32
	8 feet	#6 at 48	#6 at 32	#6 at 24
	9 feet	#6 at 40	#6 at 24	#6 at 16
	10 feet	#6 at 32	#6 at 16	#6 at 16

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot per foot = 0.157 kPa/mm.

a. Mortar shall be Type M or S and masonry shall be laid in running bond.

b. Alternative reinforcing bar sizes and spacings having an equivalent cross-sectional area of reinforcement per lineal foot of wall shall be permitted provided the spacing of the reinforcement does not exceed 72 inches in Seismic Design Categories A, B, and C and 48 inches in Seismic Design Categories D₀, D₁ and D₂.

c. Vertical reinforcement shall be Grade 60 minimum. The distance, *d*, from the face of the soil side of the wall to the center of vertical reinforcement shall be at least 5 inches.

d. Soil classes are in accordance with the Unified Soil Classification System and design lateral soil loads are for moist conditions without hydrostatic pressure. Refer to Table R405.1.

e. Unbalanced backfill height is the difference in height between the exterior finish ground level and the lower of the top of the concrete footing that supports the foundation wall or the interior finish ground level. Where an interior concrete slab-on-grade is provided and is in contact with the interior surface of the foundation wall, measurement of the unbalanced backfill height from the exterior finish ground level to the top of the interior concrete slab is permitted.

TABLE R404.1.1(3)
10-INCH MASONRY FOUNDATION WALLS WITH REINFORCING WHERE $d \geq 6.75$ INCHES^{a, c}

WALL HEIGHT	HEIGHT OF UNBALANCED BACKFILL ^e	MINIMUM VERTICAL REINFORCEMENT AND SPACING (INCHES) ^{b, c}		
		Soil classes and later soil load ^d (psf per foot below grade)		
		GW, GP, SW and SP soils 30	GM, GC, SM, SM-SC and ML soils 45	SC, ML-CL and inorganic CL soils 60
6 feet 8 inches	4 feet (or less)	#4 at 56	#4 at 56	#4 at 56
	5 feet	#4 at 56	#4 at 56	#4 at 56
	6 feet 8 inches	#4 at 56	#5 at 56	#5 at 56
7 feet 4 inches	4 feet (or less)	#4 at 56	#4 at 56	#4 at 56
	5 feet	#4 at 56	#4 at 56	#4 at 56
	6 feet	#4 at 56	#4 at 56	#5 at 56
	7 feet 4 inches	#4 at 56	#5 at 56	#6 at 56
8 feet	4 feet (or less)	#4 at 56	#4 at 56	#4 at 56
	5 feet	#4 at 56	#4 at 56	#4 at 56
	6 feet	#4 at 56	#4 at 56	#5 at 56
	7 feet	#4 at 56	#5 at 56	#6 at 56
	8 feet	#5 at 56	#6 at 56	#6 at 48
8 feet 8 inches	4 feet (or less)	#4 at 56	#4 at 56	#4 at 56
	5 feet	#4 at 56	#4 at 56	#4 at 56
	6 feet	#4 at 56	#4 at 56	#5 at 56
	7 feet	#4 at 56	#5 at 56	#6 at 56
	8 feet 8 inches	#5 at 56	#6 at 48	#6 at 32

9 feet 4 inches	4 feet (or less)	#4 at 56	#4 at 56	#4 at 56
	5 feet	#4 at 56	#4 at 56	#4 at 56
	6 feet	#4 at 56	#5 at 56	#5 at 56
	7 feet	#4 at 56	#5 at 56	#6 at 56
	8 feet	#5 at 56	#6 at 56	#6 at 40
	9 feet 4 inches	#6 at 56	#6 at 40	#6 at 24
10 feet	4 feet (or less)	#4 at 56	#4 at 56	#4 at 56
	5 feet	#4 at 56	#4 at 56	#4 at 56
	6 feet	#4 at 56	#5 at 56	#5 at 56
	7 feet	#5 at 56	#6 at 56	#6 at 48
	8 feet	#5 at 56	#6 at 48	#6 at 40
	9 feet	#6 at 56	#6 at 40	#6 at 24
	10 feet	#6 at 48	#6 at 32	#6 at 24

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot per foot = 0.157 kPa/mm.

a. Mortar shall be Type M or S and masonry shall be laid in running bond.

b. Alternative reinforcing bar sizes and spacings having an equivalent cross-sectional area of reinforcement per lineal foot of wall shall be permitted provided the spacing of the reinforcement does not exceed 72 inches in Seismic Design Categories A, B, and C and 48 inches in Seismic Design Categories D₀, D₁ and D₂.

c. Vertical reinforcement shall be Grade 60 minimum. The distance, *d*, from the face of the soil side of the wall to the center of vertical reinforcement shall be at least 6.75 inches.

d. Soil classes are in accordance with the Unified Soil Classification System and design lateral soil loads are for moist conditions without hydrostatic pressure. Refer to Table R405.1.

e. Unbalanced backfill height is the difference in height between the exterior finish ground level and the lower of the top of the concrete footing that supports the foundation wall or the interior finish ground level. Where an interior concrete slab-on-grade is provided and is in contact with the interior surface of the foundation wall, measurement of the unbalanced backfill height from the exterior finish ground level to the top of the interior concrete slab is permitted.

TABLE R404.1.1(4)
12-INCH MASONRY FOUNDATION WALLS WITH REINFORCING WHERE $d \geq 8.75$ INCHES^{a, c}

WALL HEIGHT	HEIGHT OF UNBALANCED BACKFILL ^e	MINIMUM VERTICAL REINFORCEMENT AND SPACING (INCHES) ^{b, c}		
		Soil classes and lateral soil load ^d (psf per foot below grade)		
		GW, GP, SW and SP soils 30	GM, GC, SM, SM-SC and ML soils 45	SC, ML-CL and inorganic CL soils 60
6 feet 8 inches	4 feet (or less)	#4 at 72	#4 at 72	#4 at 72
	5 feet	#4 at 72	#4 at 72	#4 at 72
	6 feet 8 inches	#4 at 72	#4 at 72	#5 at 72
7 feet 4 inches	4 feet (or less)	#4 at 72	#4 at 72	#4 at 72
	5 feet	#4 at 72	#4 at 72	#4 at 72
	6 feet	#4 at 72	#4 at 72	#5 at 72
	7 feet 4 inches	#4 at 72	#5 at 72	#6 at 72
8 feet	4 feet (or less)	#4 at 72	#4 at 72	#4 at 72
	5 feet	#4 at 72	#4 at 72	#4 at 72
	6 feet	#4 at 72	#4 at 72	#5 at 72
	7 feet	#4 at 72	#5 at 72	#6 at 72
	8 feet	#5 at 72	#6 at 72	#6 at 64
8 feet 8 inches	4 feet (or less)	#4 at 72	#4 at 72	#4 at 72
	5 feet	#4 at 72	#4 at 72	#4 at 72
	6 feet	#4 at 72	#4 at 72	#5 at 72
	7 feet	#4 at 72	#5 at 72	#6 at 72
	8 feet 8 inches	#5 at 72	#7 at 72	#6 at 48

9 feet 4 inches	4 feet (or less)	#4 at 72	#4 at 72	#4 at 72
	5 feet	#4 at 72	#4 at 72	#4 at 72
	6 feet	#4 at 72	#5 at 72	#5 at 72
	7 feet	#4 at 72	#5 at 72	#6 at 72
	8 feet	#5 at 72	#6 at 72	#6 at 56
	9 feet 4 inches	#6 at 72	#6 at 48	#6 at 40
10 feet	4 feet (or less)	#4 at 72	#4 at 72	#4 at 72
	5 feet	#4 at 72	#4 at 72	#4 at 72
	6 feet	#4 at 72	#5 at 72	#5 at 72
	7 feet	#4 at 72	#6 at 72	#6 at 72
	8 feet	#5 at 72	#6 at 72	#6 at 48
	9 feet	#6 at 72	#6 at 56	#6 at 40
	10 feet	#6 at 64	#6 at 40	#6 at 32

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot per foot = 0.157 kPa/mm.

a. Mortar shall be Type M or S and masonry shall be laid in running bond.

b. Alternative reinforcing bar sizes and spacings having an equivalent cross-sectional area of reinforcement per lineal foot of wall shall be permitted provided the spacing of the reinforcement does not exceed 72 inches in Seismic Design Categories A, B, and C and 48 inches in Seismic Design Categories D₀, D₁ and D₂.

c. Vertical reinforcement shall be Grade 60 minimum. The distance, *d*, from the face of the soil side of the wall to the center of vertical reinforcement shall be at least 8.75 inches.

d. Soil classes are in accordance with the Unified Soil Classification System and design lateral soil loads are for moist conditions without hydrostatic pressure. Refer to Table R405.1.

e. Unbalanced backfill height is the difference in height between the exterior finish ground level and the lower of the top of the concrete footing that supports the foundation wall or the interior finish ground levels. Where an interior concrete slab-on-grade is provided and in contact with the interior surface of the foundation wall, measurement of the unbalanced backfill height is permitted to be measured from the exterior finish ground level to the top of the interior concrete slab is permitted.

Reason: There are two parts to this proposal which are attempting to bring conformity within the IRC and with the requirements of the referenced standard.

The first sentence is changed so that the requirements for masonry and concrete foundation walls follow the same format. This should provide clarity and make it easier for the users of the IRC to utilize both materials. As part of this change, the repeated language referencing Table R301.2(1) in the last paragraph is redundant and removed.

The second item addressed by this proposal is the change from No. 3 bars to No. 4 bars for seismic reinforcement in SDC D₀, D₁ and D₂. TMS 402/ACI 530/ASCE 5, the adopted standard for masonry design, section 1.18.4.4.1 requires vertical reinforcement to be a minimum diameter of No. 4 bar spaced at a maximum of 48 inches. Footnote b in Tables R404.1.1(2), R404.1.1(3) and R404.1.1(4), are modified to reflect the maximum spacing limitation. In addition to the modification to footnote b, an editorial change is made to the titles, changing the greater than symbol (>) to a greater than or equal symbol (≥) in order to reflect the distance *d* as specified in footnote c. Under ICC CP#28 policy section 1.3.1 the provisions of all codes shall be consistent with one another so that conflicts between codes do not occur. The change in bar size and spacing will bring the minimum requirements of the referenced standard into the IRC.

Cost Impact: The code change proposal will slightly increase the cost of construction.

RB226-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R404.1.4.1-RB-KERR.doc

RB227 – 13

R403.3.4, R404.1.2.3.6.1

Proponent: Stephen Kerr, S.E., Josephson Werdowatz and Associates Inc., representing self (skerr@jwa.se.com)

Revise as follows:

R403.3.4 Termite protection damage. The use of foam plastic in areas of “very heavy” termite infestation probability shall be in accordance with Section R318.4.

R404.1.2.3.6.1 Stay-in-place forms Stay-in-place concrete forms shall comply with this section.

1. Surface burning characteristics. The flame-spread index and smoke-developed index of forming material, other than foam plastic, left exposed on the interior shall comply with Section R302. The surface burning characteristics of foam plastic used in insulating concrete forms shall comply with Section R316.3.
2. Interior covering. Stay-in-place forms constructed of rigid foam plastic shall be protected on the interior of the building as required by Section R316. Where gypsum board is used to protect the foam plastic, it shall be installed with a mechanical fastening system. Use of adhesives in addition to mechanical fasteners is permitted.
3. Exterior wall covering. Stay-in-place forms constructed of rigid foam plastics shall be protected from sunlight and physical damage by the application of an *approved* exterior wall covering complying with this code. Exterior surfaces of other stay-in-place forming systems shall be protected in accordance with this code.
4. Termite protection hazards. In areas where the probability of termite infestation hazard of termite damage is “very heavy” as indicated by Table R301.2(1) or in accordance with Figure R301.2(6), foam plastic insulation shall be permitted below *grade* on foundation walls in accordance with section R318.4. ~~one of the following conditions:~~
 - 4.1. ~~Where in addition to the requirements in Section R318.1, an approved method of protecting the foam plastic and structure from subterranean termite damage is provided.~~
 - 4.2. ~~The structural members of walls, floors, ceilings and roofs are entirely of noncombustible materials or pressure preservative treated wood.~~
 - 4.3. ~~On the interior side of basement walls.~~
5. Flat ICF wall system forms shall conform to ASTM E 2634.

Reason: The three methods of foam plastic insulation protection listed in items 4.1, 4.2 and 4.3 are already covered in section R318.4. Instead of repeating these items, this proposal will place a pointer directly to section R318 Protection Against Subterranean Termites. If the methods of foam plastic protection change in the future, then the removal of the duplicative provisions may save a possible conflict in the code.

For reference: Item 4.1 is a repeat of the R318.4 exception 2
 Item 4.2 is a repeat of the R318.4 exception 1
 Item 4.3 is a repeat of the R318.4 exception 3

The wording of item 4 is also changed so that this section (R404.1.2.3.6.1) uses the same vernacular as the other sections in the code (R318.4). A similar change is proposed for section R403.3.4 changing “damage” to “protection”. This will help bring uniformity to the IRC, improving the code.

Cost Impact: The code change proposal will not increase construction cost.

RB227-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R404.3.3.4-RB-KERR.doc

RB228 – 13

R202, R404.1.3, R404.4

Proponent: Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee (BajnaiC@chesterfield.gov)

Revise as follows:

R404.1.3 Design required. Concrete or masonry foundation walls shall be designed in accordance with accepted engineering practice when either of the following conditions exists:

1. Walls are subject to hydrostatic pressure from groundwater.
2. Walls supporting more than 48 inches (1219 mm) of unbalanced backfill that do not have permanent lateral support at the top ~~or~~ and bottom.

R404.4 Retaining walls. Retaining walls that are not laterally supported at the top and that retain in excess of ~~24~~ 48 inches (610 mm) of unbalanced fill, or retaining walls exceeding 24 inches in height that resist lateral loads in addition to soil, shall be designed in accordance with accepted engineering practice to ensure stability against overturning, sliding, excessive foundation pressure and water uplift. Retaining walls shall be designed for a safety factor of 1.5 against lateral sliding and overturning

Revise definition as follows:

WALL, RETAINING. A wall not laterally supported at the top, that resists only lateral soil load, ~~and other imposed loads.~~

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

The International Code Council's Building Code Action Committee identified several items in Chapter 4, "Foundations", that are in conflict with other provisions of the code or lack clarity. This proposal specifically addresses conflicts and confusing language for when a design is required in Section R404.1.3 and retaining walls in Section R404.4.

Section R404.1.3 specifically requires that walls supporting more than 48 inches of unbalanced fill and not laterally supported require an engineered design. Section R404.4 addresses the same walls where they are not supported at the top but states that a design is required when the height of the unbalanced fill exceeds 24 inches. The two sections are in direct conflict. This proposal changes the trigger height in R404.4 to 48 inches to be consistent with other sections of the code.

In addition, this proposal clarifies, in R404.1.3 that the lateral support is required at the top **and** bottom. The definition of "WALL, RETAINING" is modified to be consistent with the intent of section R404.4. The type of wall addressed in R404.4 is a self-standing retaining wall that is not supported at the top and is laterally supported at the bottom against sliding and overturning by a factor of 1.5. This type of wall would typically be a site retaining wall where it is primarily resisting only lateral soil loads. The definition is modified to clarify that this type of wall is not intended to support structural loads. A similar wall that does support structural loads would be addressed by other sections.

Cost Impact: The code change will not increase the cost of construction.

RB228-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R404.4-RB-BAJNAI-BCAC.doc

RB229 – 13

R404.5.1, R404.5.2

Proponent: Paul Edward Helderman Jr., Codes and Standards Manager, Superior Walls of America, Ltd., representing Lancaster County Code Officials (LANCODE)

Revise as follows:

R404.5.1 Panel System Design. Precast concrete foundation walls-panel systems shall be designed in accordance with accepted engineering practice. The design and manufacture of precast concrete foundation wall panels shall comply with the materials requirements of Section R402.3 or ACI 318. ~~The panel design drawings shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed in accordance with Section R106.~~

R404.5.2 Precast concrete foundation site specific construction documents design drawings. Precast concrete foundation wall site specific construction documents design drawings shall be submitted to the building official and approved prior to installation. ~~Drawings~~ Site specific construction documents shall include, at a minimum, the information specified below:

1. Design loading as applicable
2. Footing design and material
3. Concentrated loads and their points of application
4. Soil bearing capacity
5. Maximum allowable total uniform load
6. Seismic design category
7. Basic wind speed

Reason: Previous language was vague and it confuses language about the engineered or pre-engineered “panel system designs”, and “site specific construction documents” by using the term “panel design drawing.” This language applies to any precast foundation system and is not proprietary to any one system. The term “panel design drawing” is ambiguous and is not defined in the code and needs to be removed from this paragraph. The reference to section R106 has been removed because the language is redundant and not necessary again in this section.

The new language is more clearly written and it more clearly separates these very different ideas of a panel system design and the construction documents and it removes the ambiguous term “panel design drawings.” Section R404.5.1 as written in this proposal clearly deals only with the panel system design while section R404.5.2 describes only the site specific construction documents. Section R402.5.2 also still maintains the same minimum list of important items that shall be included in the construction documents to address structural and environmental loads for any precast concrete foundation system.

The panel system design still is required to be designed in accordance with accepted engineering practice.

Cost Impact: The code change proposal will not increase the cost of construction.

RB229-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R404.5.1-RB-HELDERMAN.doc

RB230 – 13

R405.1

Proponent: Gary J. Ehrlich, P.E., National Association of Home Builders (NAHB) (gehrlich@nahb.org)

Revise as follows:

R405.1 Concrete or masonry foundations. Drains shall be provided around all concrete or masonry foundations that retain earth and enclose habitable or usable spaces located below grade. Drainage tiles, gravel or crushed stone drains, perforated pipe or other approved systems or materials shall be installed at or below the area to be protected and shall discharge by gravity or mechanical means into an approved drainage system. Gravel or crushed stone drains shall extend at least 1 foot (305 mm) beyond the outside edge of the footing and 6 inches (152 mm) above the top of the footing and be covered with an approved filter membrane material. The top of open joints of drain tiles shall be protected with strips of building paper. Except where otherwise recommended by the drain manufacturer, perforated drains shall be surrounded with an approved filter membrane or the filter membrane shall cover the washed gravel or crushed rock covering the drain. Drainage tiles or perforated pipe shall be placed on a minimum of 2 inches (51 mm) of washed gravel or crushed rock at least one sieve size larger than the tile joint opening or perforation and covered with not less than 6 inches (152 mm) of the same material.

Exception: A drainage system is not required when the foundation is installed on well-drained ground or sand-gravel mixture soils according to the Unified Soil Classification System, Group I Soils, as detailed in Table R405.1.

Reason: The purpose of this code change proposal is to add an exception to the requirement for filter fabric over gravel, crushed stone or perforated pipe drains. The Metropolitan Kansas Chapter of ICC introduced this requirement last cycle in proposal RB82-09/10 to provide additional direction for the installation of filter fabric. The intent was to improve the performance of foundation drains by insuring proper installation of the filter fabric, which keeps fines from clogging the drains. Since that time, it has come to light that some waterproofing manufacturers recommend against using filter fabric over the gravel or perforated pipe when the foundation drain is installed in "heavy" soils (certain clays and loams) as the fabric will inhibit water from entering the pipe. Therefore, some manufacturers will not warrant their product when a filter fabric is used in such conditions. This revision will provide an exception to the filter fabric requirement if the drain manufacturer's installation instructions recommend against using the filter fabric.

Cost Impact: The code change proposal will not increase the cost of construction.

RB230-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R405.1-RB-EHRLICH.doc

RB231 – 13

R405.1, R405.2.3

Proponent: Rick Davidson, City of Maple Grove, MN, representing Association of Minnesota Building Officials (rdavidson@maplegrovern.gov)

Revise as follows:

R405.1 Concrete or masonry foundations. Drains shall be provided around all concrete or masonry foundations that retain earth and enclose habitable or usable spaces located below *grade*. Drainage tiles, gravel or crushed stone drains, perforated pipe or other *approved* systems or materials shall be installed at or below the area to be protected and shall discharge to daylight by gravity or ~~mechanical means into an approved drainage system by a sump pump installed in accordance with the manufacturer's written installation instructions.~~ Gravel or crushed stone drains shall extend at least 1 foot (305 mm) beyond the outside edge of the footing and 6 inches (152 mm) above the top of the footing and be covered with an *approved* filter membrane material. The top of open joints of drain tiles shall be protected with strips of building paper, and the drainage tiles or perforated pipe shall be placed on a minimum of 2 inches (51 mm) of washed gravel or crushed rock at least one sieve size larger than the tile joint opening or perforation and covered with not less than 6 inches (152 mm) of the same material.

Exception: A drainage system is not required when the foundation is installed on well-drained ground or sand-gravel mixture soils according to the Unified Soil Classification System, Group I Soils, as detailed in Table R405.1.

R405.2.3 Drainage system. In other than Group I soils, a sump shall be provided to drain the porous layer and footings. The sump shall be at least 24 inches (610 mm) in diameter or 20 inches square (0.0129 m²), and shall extend at least 24 inches (610 mm) below the bottom of the *basement* floor and shall be capable of positive gravity or mechanical drainage to remove any accumulated water. The drainage system shall discharge into an approved sewer system or to daylight. The sump shall discharge to daylight by gravity or by a sump pump installed in accordance with the manufacturer's written installation instructions.

Reason: This is a prescriptive code and the code needs to spell out what the mechanical means are. Realistically, we are talking about a sump pump so why not just say that? A homeowner or contractor should not have to guess at the meaning of such a simple requirement. This proposal is consistent with the requirements found in IRC Chapter 33. The term "sump pump" is defined.

SUMP PUMP. A pump installed to empty a sump. These pumps are used for removing storm water only. The pump is selected for the specific head and volume of the load and is usually operated by level controllers.

Cost Impact: The code change proposal will not increase the cost of construction.

RB231-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R405.1-RB-DAVIDSON.doc

RB232 – 13

R406.1, R406.2

Proponent: Gary J. Ehrlich, P.E., National Association of Home Builders (NAHB) (gehrlich@nahb.org)

Revise as follows:

R406.1 Concrete and masonry foundation ground water table level determination. In areas where a ground water table at or above the lowest proposed basement floor level or other severe soil water conditions are anticipated by soil studies or known conditions at nearby locations, the building official shall require a visual subsurface soil inspection to be performed at or before the time of foundation excavation to verify whether the existing ground water table is above a level one foot below the lowest proposed basement floor level or that other severe soil water conditions exists. The inspection may be performed by the building official or other person who is knowledgeable in making such determinations.

Exception: A subsurface soil inspection as specified above shall not be required where waterproofing is provided in accordance with Section R406.3.

R406.1 R406.2 Concrete and masonry foundation dampproofing. Except where required by Section R406.2 R406.3 to be waterproofed, foundation walls that retain earth and enclose interior spaces and floors below *grade* shall be dampproofed from the top of the footing to the finished *grade*. Masonry walls shall have not less than 3/8 inch (9.5 mm) portland cement parging applied to the exterior of the wall. The parging shall be dampproofed in accordance with one of the following:

1. Bituminous coating.
2. Three pounds per square yard (1.63 kg/m²) of acrylic modified cement.
3. One-eighth inch (3.2 mm) coat of surface-bonding cement complying with ASTM C 887.
4. Any material permitted for waterproofing in Section R406.2.
5. Other approved methods or materials.

Exception: Parging of unit masonry walls is not required where a material is *approved* for direct application to the masonry.

Concrete walls shall be dampproofed by applying any one of the above listed dampproofing materials or any one of the waterproofing materials listed in Section R406.2 to the exterior of the wall.

R406.2 R406.3 Concrete and masonry foundation waterproofing. ~~In areas where a high water table or other severe soil water conditions are known to exist~~ Where the subsurface soil inspection required by Section R406.1 verifies that the ground water table is above a level 1 foot below the lowest proposed basement floor level or that other severe soil water conditions exist, exterior foundation walls that retain earth and enclose interior spaces and floors below *grade* shall be waterproofed from the top of the footing to the finished *grade*. Walls shall be waterproofed in accordance with one of the following:

1. Two-ply hot-mopped felts.
2. Fifty-five-pound (25 kg) roll roofing. Six-mil (0.15 mm) polyvinyl chloride.
3. Six-mil (0.15 mm) polyethylene.
4. Forty-mil (1 mm) polymer-modified asphalt.
5. Sixty-mil (1.5 mm) flexible polymer cement.
6. One-eighth-inch (3 mm) cement-based, fiber-reinforced, waterproof coating.
7. Sixty-mil (0.22 mm) solvent-free liquid-applied synthetic rubber.

Exception: Organic-solvent-based products such as hydrocarbons, chlorinated hydrocarbons, ketones and esters shall not be used for ICF walls with expanded polystyrene form material. Use of plastic roofing cements, acrylic coatings, latex coatings, mortars and pargings to seal ICF walls is permitted. Cold-setting asphalt or hot asphalt shall conform to type C of ASTM D

449. Hot asphalt shall be applied at a temperature of less than 200°F (93°C).

All joints in membrane waterproofing shall be lapped and sealed with an adhesive compatible with the membrane.

Reason: The purpose of this code change is to amend the requirements for determining if waterproofing of concrete and masonry foundation walls is required. In many areas of the country, potential damp/wet basements are a significant problem that is not adequately addressed during the construction process. The existing language is vague and rarely results in any determination by the building official as to whether a high ground water table exists. Additionally, soils studies such as those published by the USDA are incorrectly used as the justification for requiring waterproofing despite the reference in their use that, "interpretations based on soil surveys are rarely suitable for such onsite evaluations as home sites without further evaluations at the specific site." This change would result in the use of soil studies, whether USDA- or locally-prepared, or known conditions on nearby/adjacent properties to properly serve as the basis for whether a visual subsurface soil inspection is warranted. This inspection, conducted either by the building official, building department inspector or other qualified personnel, will be used to determine if waterproofing needs to be provided for those dwellings where the builder does not already provide it as a matter of course.

This change would increase the cost of construction where a high ground water table or other severe soil water condition is anticipated by either requiring the inspection or requiring waterproofing if it was not already part of the construction. It may reduce the cost of construction if the visual inspection determines waterproofing is not required for a site where the USDA or other large-scale soil survey would otherwise suggest that it is.

Cost Impact: The code change proposal may increase the cost of construction.

RB232-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R406.1 (NEW)-RB-EHRLICH.doc

RB233 – 13

R406.1, R406.2

Proponent: Gary J. Ehrlich, P.E., National Association of Home Builders (NAHB) (gehrlich@nahb.org)

Revise as follows:

R406.1 Concrete and masonry foundation dampproofing. Except where required by Section R406.2 to be waterproofed, foundation walls that retain earth and enclose interior spaces and floors below *grade* shall be dampproofed from the higher of (a) the top of the footing or (b) 6 inches below the top of the basement floor, to the finished *grade*. Masonry walls shall have not less than 3/8 inch (9.5 mm) portland cement parging applied to the exterior of the wall. The parging shall be dampproofed in accordance with one of the following:

1. Bituminous coating.
2. Three pounds per square yard (1.63 kg/m²) of acrylic modified cement.
3. One-eighth inch (3.2 mm) coat of surface-bonding cement complying with ASTM C 887.
4. Any material permitted for waterproofing in Section R406.2.
5. Other approved methods or materials.

Exception: Parging of unit masonry walls is not required where a material is *approved* for direct application to the masonry.

Concrete walls shall be dampproofed by applying any one of the above listed dampproofing materials or any one of the waterproofing materials listed in Section R406.2 to the exterior of the wall.

R406.2 Concrete and masonry foundation waterproofing. In areas where a high water table or other severe soil-water conditions are known to exist, exterior foundation walls that retain earth and enclose interior spaces and floors below *grade* shall be waterproofed from the higher of (a) the top of the footing or (b) 6 inches below the top of the basement floor, to the finished *grade*. Walls shall be waterproofed in accordance with one of the following:

1. Two-ply hot-mopped felts.
2. Fifty-five-pound (25 kg) roll roofing.
3. Six-mil (0.15 mm) polyvinyl chloride.
4. Six-mil (0.15 mm) polyethylene.
5. Forty-mil (1 mm) polymer-modified asphalt.
6. Sixty-mil (1.5 mm) flexible polymer cement.
7. One-eighth-inch (3 mm) cement-based, fiber-reinforced, waterproof coating.
8. Sixty-mil (0.22 mm) solvent-free liquid-applied synthetic rubber.

Exception: Organic-solvent-based products such as hydrocarbons, chlorinated hydrocarbons, ketones and esters shall not be used for ICF walls with expanded polystyrene form material. Use of plastic roofing cements, acrylic coatings, latex coatings, mortars and pargings to seal ICF walls is permitted. Cold-setting asphalt or hot asphalt shall conform to type C of ASTM D 449. Hot asphalt shall be applied at a temperature of less than 200°F (93°C).

All joints in membrane waterproofing shall be lapped and sealed with an adhesive compatible with the membrane.

Reason: The purpose of this code change is to amend the requirements for dampproofing and waterproofing of concrete and masonry foundation walls. The change eliminates unnecessary dampproofing or waterproofing on wall areas that do not affect the livability of interior spaces and floors below grade. These wall areas include areas where the footings are stepped down below the basement floor level for required frost protection depth or to place footings on undisturbed natural soils or engineered fills. This will

reduce the cost of construction where the footings described in the reason statement are present. The 6 inch cut-off comes from the IBC Section 1805.1.3 requirements for a ground water control system.

It is noted that this code change does not prohibit a builder from providing waterproofing all the way down to the top of footings that are lower than 6" below the basement floor level if desired due to ease of installation of drainage boards or other panel waterproofing products, or if required by the manufacturer's installation instructions or details for a particular waterproofing product.

Cost Impact: The code change proposal will not increase the cost of construction.

RB233-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R406.1-RB-EHRLICH.doc

RB234 – 13

R501.3

Proponent: Rick Davidson, City of Maple Grove, MN, representing Association of Minnesota Building Officials (rdavidson@maplegrovern.gov)

Revise as follows:

~~R501.3~~ R302.13 Fire protection of floors. Floor assemblies, not required elsewhere in this code to be fire-resistance rated, shall be provided with a 1/2-inch (12.7 mm) gypsum wallboard membrane, 5/8-inch (16 mm) wood structural panel membrane, or equivalent on the underside of the floor framing member.

Exceptions:

1. Floor assemblies located directly over a space protected by an automatic sprinkler system in accordance with Section P2904, NFPA13D, or other approved equivalent sprinkler system.
2. Floor assemblies located directly over a crawl space not intended for storage or fuel-fired appliances.
3. Portions of floor assemblies can be unprotected when complying with the following:
 - 3.1. The aggregate area of the unprotected portions shall not exceed 80 square feet per story
 - 3.2. Fire blocking in accordance with Section R302.11.1 shall be installed along the perimeter of the unprotected portion to separate the unprotected portion from the remainder of the floor assembly.
4. Wood floor assemblies using dimension lumber or structural composite lumber equal to or greater than 2-inch by 10-inch (50.8 mm by 254 mm) nominal dimension, or other approved floor assemblies demonstrating equivalent fire performance

Reason: During the last cycle the IRC Committee endorsed a move to place all fire resistive requirements in the same section. This proposal simply relocates existing text in accordance with that goal.

Cost Impact: The code change proposal will not increase the cost of construction.

RB234-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R501.3 #1-RB-DAVIDSON.doc

RB235 – 13

R501.3

Proponent: Rick Davidson, City of Maple Grove, MN, representing Association of Minnesota Building Officials (rdavidson@maplegrovern.gov)

Revise as follows:

R501.3 Fire protection of floors. Floor assemblies, not required elsewhere in this code to be fire-resistance rated, shall be provided with a 1/2-inch (12.7 mm) gypsum wallboard membrane, 5/8-inch (16 mm) wood structural panel membrane, or equivalent on the underside of the floor framing member. Penetrations or openings for ducts, vents, electrical outlets, lighting, devices, luminaries, wires, speakers, drainage, piping, and similar openings or penetrations shall be permitted.

Exceptions:

1. Floor assemblies located directly over a space protected by an automatic sprinkler system in accordance with Section P2904, NFPA13D, or other approved equivalent sprinkler system.
2. Floor assemblies located directly over a crawl space not intended for storage or fuel-fired appliances.
3. Portions of floor assemblies can be unprotected when complying with the following:
 - 3.1. The aggregate area of the unprotected portions shall not exceed 80 square feet per story
 - 3.2. Fire blocking in accordance with Section R302.11.1 shall be installed along the perimeter of the unprotected portion to separate the unprotected portion from the remainder of the floor assembly.
4. Wood floor assemblies using dimension lumber or structural composite lumber equal to or greater than 2-inch by 10-inch (50.8 mm by 254 mm) nominal dimension, or other approved floor assemblies demonstrating equivalent fire performance.

Reason: There needs to be direction in the code relative to common openings and penetrations in these membranes. Where these membranes protect the underside of floors exposed to the weather, openings for drainage must be provided.

Cost Impact: The code change proposal will not increase the cost of construction.

RB235-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R501.3 #3-RB-DAVIDSON.doc

RB236 – 13

R501.3

Proponent: Jeffrey M. Hugo, CBO, National Fire Sprinkler Association (hugo@nfsa.org)

Revise as follows:

R501.3 Fire protection of floors. Floor assemblies, not required elsewhere in this code to be fire-resistance rated, shall be provided with a 1/2-inch (12.7 mm) gypsum wallboard membrane, 5/8-inch (16 mm) wood structural panel membrane, or equivalent on the underside of the floor framing member.

Exceptions:

1. Floor assemblies ~~located directly over a space in dwellings protected throughout by an automatic sprinkler system in accordance with Section P2904, or NFPA13D, or other approved equivalent sprinkler system.~~
2. Floor assemblies located directly over a crawl space not intended for storage or fuel-fired appliances.
3. Portions of floor assemblies can be unprotected when complying with the following:
 - 3.1. The aggregate area of the unprotected portions shall not exceed 80 square feet per story
 - 3.2. Fire blocking in accordance with Section R302.11.1 shall be installed along the perimeter of the unprotected portion to separate the unprotected portion from the remainder of the floor assembly.
4. Wood floor assemblies using dimension lumber or structural composite lumber equal to or greater than 2-inch by 10-inch (50.8 mm by 254 mm) nominal dimension, or other approved floor assemblies demonstrating equivalent fire performance.

Reason: In several areas where the IRC is adopted, Section 501.3 Exception #1 "...or other approved equivalent sprinkler system." is interpreted to permit the dwelling unit to only have a partial residential sprinkler "system" installed in the unprotected ceiling space, i.e. only fire sprinklers in the basement ceiling. This was not the intent of the authors of this text in the previous code cycle.

A residential fire sprinkler system designed according to NFPA 13D and/or P2904 is considered "sprinklered throughout" and does not have criteria or rules for partial systems. When a partial system is installed, it would violate not only the standards for installation, but the very requirement that mandated the system in the first place, Exception #1 of Section 501.3.

Cost Impact: The code change proposal will not increase the cost of construction.

RB236-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R501.3-RB-HUGO.doc

RB237 – 13

R501.3

Proponent: Sean DeCrane, Cleveland Division of Fire, representing Cleveland Division of Fire/ International Association of Fire Fighters (rovloc93@aol.com)

Revise as follows:

R501.3 Fire protection of floors. Floor assemblies, not required elsewhere in this code to be fire-resistant rated, shall be provided with a ½-inch (12.7 mm) gypsum wallboard membrane, 5/8-inch (16 mm) wood structural panel membrane, or equivalent on the underside of the floor framing member.

Exceptions:

1. Floor assemblies located directly over a space protected by an automatic sprinkler system in accordance with Section P2904, NFPA 13D, or other approved equivalent sprinkler system.
2. Floor assemblies located directly over a crawl space not intended for storage or fuel-fired appliances.
3. Portions of the floor assembly can be unprotected when complying with the following:
 - 3.1. The aggregate area of the unprotected portions shall not exceed 80 square feet per story.
 - 3.2. Fire blocking in accordance with Section R302.11.1 shall be installed along the perimeter of the unprotected portion to separate the unprotected portion from the remainder of the floor assembly.
4. Wood floor assemblies using dimension lumber or structural composite lumber equal to or greater than 2-inch by 10-inch (50.8 mm by 254 mm) nominal dimension, ~~or other approved floor assemblies demonstrating equivalent fire performance.~~

Reason: This author was the original proponent of the current language in the IRC and appreciates the assistance of the representatives from NAHB and the American Wood Council who worked hard to place this language in the code providing additional protection to the responding fire fighters and the residents occupying these occupancies.

Since passage of this language it has become apparent there is cause for concern in portions of the language. One serious concern that has been demonstrated through additional testing at Underwriters Laboratories involves the language in Exception 4 permitting the use of *other approved floor assemblies demonstrating equivalent fire performance*. While this language was placed in the body of the code its intent was to allow the equivalency for a protected floor assembly. The language in Exception 4 allows the equivalency to an unprotected floor assembly.

We also want to ask the question, demonstrating the equivalent performance by what Standard? If it is to the ASTM E 119 Standard the ICC-ES has already permitted a deviation from a true E 119 test. In recent hearings, despite testimony to the contrary and evidence that the decision was based on misrepresented numbers the ICC –ES permits the reduction of the applied load to 50% of the design load, submitted as AC 14. A proponent is also not required to test a full assembly; simply testing two joists would be permitted.

There is a great concern on the reduction of the applied load. Further testing completed at Underwriters Laboratories has demonstrated the importance of the applied load and the misrepresentation of true performance under fire conditions. I have provided a link at the bottom where the UL Tests reports can be accessed in detail.

The results of the original UL furnace testing on the performance of lightweight floor systems was instrumental in demonstrating the concern on the lack of performance in fire conditions of specific engineered products. Just a short recap, with a modified load of 40 lb/ft² on two sides of the floor system and two 300 pound fire fighter mannequins' tests results demonstrated:

- Unprotected 2 x 10 Dimensional Lumber collapsed at 18:45.
- Unprotected 16" I-Joists collapsed at 6:03.
- The use of ½" gypsum wallboard as protection allowed the 2 x 10 Dimensional to collapse at 44:45.
- The use of ½" gypsum wallboard as protection allowed the 16" I-Joist to collapse at 26:45.

A substantial improvement was realized simply by adding the gypsum board.

Let us now review recent test results conducted in the ASTM E 119 Standard test furnace. This report was issued in 2011 prior to the ICC-ES hearing. In the follow up tests there was an attempt to replicate test results for consistency plus there had been discussions on how some of the floor systems were not tested to a true E 119 test standard of 100% design load. The question would be; how would the applied load impact the performance of the floor? As you can clearly realize below, the test load has a direct impact on time performance.

- A 16" I-Joist floor assembly unprotected with a full design load collapsed at 2:02, a full four minutes earlier than the previous test to a modified load;

- A 2 x 10 dimensional lumber floor assembly with a full design load collapsed at 7:00, a full eleven minute difference to a modified load;
- A potential "equivalent" floor protection system (Intumescent paint) was tested to a modified load (40 lb/ft² on two sides and fire fighters in the middle) collapsed at 8:40. We saw a reduction in performance with the full load applied to the 2 x 10 dimensional lumber. What is the true performance when subjected to a full load? We will not know as the equivalency requirements allow the reduce test parameters including small samplings. (Test report language and timeline are listed below).

"Experiment 5 examined an engineered I-joist floor assembly with a spray applied fire retardant coating and the modified loading configuration (Figure 61 and Figure 62). The floor assembly failed at 8:40 after ignition. Observations made during the experiment of the exposed and unexposed sides of the floor assembly are detailed in Table 17. The average furnace temperature during the experiment followed the standard curve closely until approximately 6 minutes when the floor system was involved in flames (Figure 63).

The furnace pressure and oxygen concentration measured in the furnace are presented in Figure 64 and Figure 65 respectively. The pressure remained between -0.3 in. w.c. and 0.6 in. w.c. but fluctuated around 0 for most of the experiment. The oxygen concentration fluctuated and then decreased to less than 5 % by 7 minutes and remained at or below that concentration until collapse."¹See UL Report Fire Service Collapse Hazard Floor Furnace Experiments.

Exp. Time, Min:Sec	Surface Observations
1:15	Crackling could be heard and smoke was present at West edge.
2:00	More frequent crackling could be heard.
2:00	Too dark to seen in furnace.
3:10	Crackling and smoke ceased.
3:45	Crackling and smoke started again.
4:00	Material on joists began to lighten in color and started to crack.
4:15	More intense smoke and crackling was present.
4:45	Significant flaming could be seen from first two joist bays on the north end of the assembly.
5:10	Crackling continued.
6:00	Smoke from subfloor joints was present.
6:00	Joist orange in color and looked like charring wood.
6:45	Significant flaming over entire exposed surface.
7:00	Kneeling mannequin began to vibrate vertically.
7:30	Entire assembly began to deflect into the furnace.
7:30	Vision obscured by fall off material circulating throughout the furnace.
8:10	Larger vertical vibrations could be seen on both mannequins.
8:15	Noticeable deflection could be seen at the centerline of the assembly.
8:30	Joist webs started to burn through.
8:40	Structural failure.

In recent years the fire service has become concerned on the performance of "modern" lumber and the use of engineered trees to produce lumber in a shorter time frame. While the elimination of this code language does not address this concern it does require manufacturers to produce products that will be tested and compared to a protected floor assembly as opposed to an unprotected floor. There is currently a proposal to ICC-ES, at the time of this submission, AC 450, to consider the approval of the use of an intumescent product, eerily similar to the test parameters of Test #5. The previous approval of AC 14 now allows the reduced floor assembly and test load in the comparable.

As we have demonstrated the concern in allowing reduced test parameters to address equivalencies in structural floor systems. We believe we should be using equivalencies to meet protected floor systems. The other question we would like to present would be what is the expected equivalent performance? Is it the 2 x 10 dimensional lumber's performance to a 100% design load? We saw a test performance of seven minutes, very close to the performance time of lightweight systems in the original tests that moved the ICC membership to require the protection of these floor systems. This is a question yet to be truly answered by the current language and that is why the membership must remove the equivalency language in Exception 4.

Traditionally the International Residential Code has been a prescriptive code. While the intent of this code language was not to promote gypsum board specifically we must ensure any substitute for a known consistent protection feature be held to a comparative Standard of performance to ensure consistency and safety.

<http://www.ul.com/global/documents/offerings/industries/buildingmaterials/fireservice/basementfires/2009%20NIST%20ARRA%20Apendix%20B%20-%20Fire%20Service%20Collapse%20Hazard%20Floor%20Furnace%20Experiments.pdf>

¹: Underwriters Laboratories, <http://www.ul.com/global/eng/pages/offerings/industries/buildingmaterials/fire/fireservice/smokeparticulates/>

Cost Impact: This proposal may or may not increase costs depending on cost of equivalent product.

RB237-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R501.3-RB-DECRANE.doc

RB238 – 13

R501.3

Proponent: Rick Davidson, City of Maple Grove, MN, representing Association of Minnesota Building Officials (rdavidson@maplegrovern.gov)

Revise as follows:

R501.3 Fire protection of floors. ~~Floor~~ All floor assemblies, ~~not required elsewhere in this code to be fire-resistance rated,~~ shall be provided with a ½-inch (12.7 mm) gypsum wallboard membrane, ~~or a 5/8-inch (16 mm) wood structural panel membrane, or equivalent~~ on the underside of the floor framing members. Walls, columns, or other members supporting assemblies required to be protected by this section shall be provided protection equivalent to that provided for the floor.

Exceptions:

1. Floor assemblies located directly over a space protected by an automatic sprinkler system in accordance with Section ~~P2904, NFPA13D, or other approved equivalent sprinkler system~~ R313.
- ~~2. Floor assemblies located directly over a crawl space not intended for storage or fuel-fired appliances.~~
- ~~2. Floor assemblies required to be protected by R302.3, R302.6, or R302.7.~~
3. Portions of floor assemblies can be unprotected when complying with any of the following:
 - ~~3.1. The aggregate area of the unprotected portions shall not exceed 80 square feet per story.~~
A maximum of 150 square feet of floor assembly per story may be unprotected. The unprotected assembly must be separated from the protected assembly by a layer of ½-inch gypsum board, 5/8 structural panel sheathing, or solid sawn lumber blocking applied to the perimeter of the unprotected area.
 - ~~3.2. Fire blocking in accordance with Section R302.11.1 shall be installed along the perimeter of the unprotected portion to separate the unprotected portion from the remainder of the floor assembly.~~
 - 3.2 Floor assemblies or landings where the underfloor space is enclosed on all sides and there is not provided a means to access such underfloor space.
 - 3.3 Floor assemblies where the underfloor space is exposed to the exterior or is not within surrounding foundation walls of the dwelling such as decks, porches, or dwellings constructed on piers
 - 3.4 Floor assemblies of additions to existing dwellings.
 - 3.5 Floor assemblies in detached accessory structures.
- ~~4. Wood floor assemblies using dimension lumber or structural composite lumber equal to or greater than 2-inch by 10-inch (50.8 mm by 254 mm) nominal dimension, or other approved floor assemblies demonstrating equivalent fire performance.~~

Reason: This revision involves a little language cleanup for clarity, readability, and reasonability. The first paragraph has largely editorial revisions. Part of the first sentence has been moved to the "exceptions". A new sentence has been added that addresses protection of structural members supporting the fire protected floor assembly. There are numerous examples in the IRC consistent with this language including protection of walls in a garage when the ceiling is part of the garage/dwelling separation.

In exception #1, the reference to other approved systems is deleted. If other systems are known to exist, they should be noted. Otherwise the code already allows consideration of equivalencies.

The second exception is proposed for deletion. Crawl spaces aren't required to have sprinkler protection. Crawl spaces will be used for storage if there is access provided. Let's not kid ourselves. Let's simplify the process because you cannot plan check or inspect "not intended for". The builder/owner can decide to either add sprinkler protection, provide the membrane protection, or seal the area off completely.

A new second exception is added that specifically identifies the three locations in the code where floor assemblies must have a fire-resistant membrane. No more guessing.

The first two subsections of the third exception are combined into one exception as both parts must be used together to make sense. As currently written, one can take them as two different exceptions because that is how it is written. This can cause confusion and a lack of uniformity. Furthermore, the exception has been amended to increase the size of the unprotected space from 80 square feet to 150 square feet. Furnace/mechanical/laundry rooms are the most problematic places for compliance what

with pipes, ducts, vents, etc., making a ceiling installation difficult. Most of these spaces exceed 80 square feet (which is an arbitrary limit) so again we are faced with boxing out small portions of the ceiling to meet the 80 square foot limit. 150 square feet is a more workable size. The exception is further revised to address the perimeter separation. The term "fire blocking" is inappropriate for this application as many methods do not lend themselves to this environment and fire blocking by definition is intended for concealed spaces.

Additional means to allow unprotected portions of floor assemblies are addressed with several new items.

An exception is provided for landings and floor assemblies that are completely enclosed and not provided with a means to access such space thereby preventing fires from spreading to those areas.

An exception is provided for floors open to the exterior (decks, porches). It should be readily identifiable to the fire service if the space under such areas is on fire.

An exception is added for additions to existing dwellings. It makes little sense to require the basement ceiling of a 12 X 12 addition to an existing 2000 square foot house to be protected when the rest of the ceiling is unprotected. The rule has to have some semblance of reasonableness. Homes that have sprinkler protection will already be covered.

The last exception excludes protection for floors for detached accessory structures. This might be an attic storage space in a detached garage or the second floor of a small children's play house. There should be no need for entry of the fire service into these areas as they are not habitable space.

Exception number four is proposed for deletion for several reasons. New homes and additions are occasionally constructed with a mix of different size floor framing members. This can result in a patchwork of floor systems that require protection mixed with some that don't. No one believes that such a system serves any purpose.

And, recent studies show there is little difference in the performance of various structural floor systems in fire conditions. We need to do what many folks said at the hearings when this proposal was approved and "level the playing field", "protect them all". Is a floor of 2X8's 12" o.c. less resistant to collapse from a fire than 2X10's at 24" o.c.? I doubt it. Let's eliminate the confusion and "level the playing field". Protect them all.

Cost Impact: The code change proposal will not increase the cost of construction.

RB238-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R501.3 #2-RB-DAVIDSON.doc

RB239 – 13

R501.3

Proponent: Jonathan Humble, AIA, NCARB, LEED-AP BD&C, American Iron and Steel Institute (Jhumble@steel.org)

Revise as follows:

~~R501.3~~ R302.2 Fire protection of floors. Floor assemblies, not required elsewhere in this code to be fire-resistance rated, shall be provided with a 1/2-inch (12.7 mm) gypsum wallboard membrane, ~~5/8-inch (16 mm) wood structural panel membrane~~, or equivalent on the underside of the floor framing member.

Exceptions:

1. Floor assemblies located directly over a space protected by an automatic sprinkler system in accordance with Section P2904, NFPA13D, or other approved equivalent sprinkler system.
2. Floor assemblies located directly over a crawl space not intended for storage or fuel-fired appliances.
3. Portions of floor assemblies can be unprotected when complying with the following:
 - 3.1. The aggregate area of the unprotected portions shall not exceed 80 square feet per story
 - 3.2. Fire blocking in accordance with Section R302.11.1 shall be installed along the perimeter of the unprotected portion to separate the unprotected portion from the remainder of the floor assembly.
4. ~~Wood floor assemblies using dimension lumber or structural composite lumber equal to or greater than 2-inch by 10-inch (50.8 mm by 254 mm) nominal dimension, or other approved floor assemblies demonstrating equivalent fire performance.~~

Reason: We are proposing to make two modifications:

- Relocate this provision to Section R302 "Fire-Resistant Construction"
- Modify the provisions to delete the exposed wood allowances

Relocation:

We propose to move this provision into Section R302 "Fire-Resistant Construction" since the topic is directly related to that section. Our recommendation is that this section be adjacent to Section 302.1 "Exterior Walls" since both sections are related to the basic constructions of a dwelling. As a result of this action we also propose that the remaining sections be renumbered.

Conflict:

We know from experience that there are three basic components necessary to supporting fire; that of oxygen, heat, and fuel. In the case of Section 501.3 it is permitting a fuel source to be part of the fire resistance requirements, that of exposed wood panels and wood framing. We find this counterintuitive, and not consistent, to the other fire-resistance provisions of the International Residential Code.

We have also made an editorial change to the charging paragraph by modifying the reference "gypsum wallboard" to "gypsum board" to be consistent with the IRC and family of I-codes.

Modifications:

We propose to remove 5/8 inch wood structural panel provisions from this section as we do not believe they should be considered equivalent to the other provisions. We submit that combustibility, flame spread, and contributions to accelerated flashover should also be considered when assessing fire resistance.

In regard to Exception #4, we challenge the basis for this type of assembly to be considered an exception. If we examine the UL fire tests (See bibliography, Table 42, Collapse Time Table) we find that two (2) floor assemblies were designed with unprotected dimensional lumber of nominal 2x12 joists and that they failed at 11:09 min (with max. ventilation) and 12:45 min (with sequenced ventilation). And further, we found that the exposed framing also contributes to combustibility, flame spread and accelerated flashover. This was reported in the "review and comment" section of the report, which stated:

"...Unprotected wood assemblies, both dimensional and engineered components, upon combustion contributed significant fuel loads to the experimental fires raising corresponding temperatures above the standardized ASTM E119 time temperature curve...."[2]

This exception #4 is approximately 4 minutes less than the time assigned to an assembly containing 1/2 inch thick regular gypsum board in the component additive method and based on the other UL tests (e.g. 15 minutes) which cited in multiple locations that the "...addition of a 1/2 inch thick gypsum board ceiling as a protective layer increased the fire resistance time..." [2] Therefore, we submit that Exception #4 does not represent an equivalent, nor should it represent an exception, based on the fact that the time for failure is less than the assembly with a gypsum board membrane.

In addition, the allowance for exposed wood is contrary to the current provisions of Section R302 "Fire-resistant Construction." The current cases where a separation is defined we see that Section R302.6 "Dwelling/Garage Fire Separation," and Section R302.7 "Under-stair Protection," provisions do not allow exposed wood for anticipated circumstances that are similar to that of the basement conditions of current Section R501.3. Gypsum board on the other hand consists of a non-combustible core primarily of gypsum with a paper surfacing. As a result we would submit that it is inappropriate for wood to be exposed in conditions where the intent of separations are required to protect the occupants.

One may say that Section R302.5.1 "Opening Protection" allows exposed wood in the form of "solid wood doors," but that is permitted on the theory that solid wood (Like timber construction) will char due to its mass. We would submit that the 5/8-inch (16 mm) wood structural panel membrane does not represent an equivalency to a 1-3/8 inch thick solid wood door. In regard to the Exception #4 for exposed 2 x 10 nominal wood framing, we would again reiterate that when evaluating fire resistance more than just charring needs to be considered.

Bibliography:

[1] NFPA, *A Reporters Guide to Fire and the NFPA*, National Fire Protection Association, Quincy, MA, 2012. The guide can be found on the web at:
<http://www.nfpa.org/categoryList.asp?categoryID=1327&URL=Press%20Room/A%20Reporter's%20Guide%20to%20Fire%20and%20the%20NFPA&cookie%5Ftest=1>

[2] UL, *Full-Scale Floor System Field and Laboratory Fire Experiments*, Underwriters Laboratories, Northbrook, IL, January 2012. Report can be found on the web at:
<http://www.ul.com/global/eng/pages/offering/industries/buildingmaterials/fire/fireservice/basementfires/>

Cost Impact: The code change proposal will not increase the cost of construction.

RB239-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R501.3-RB-HUMBLE.doc

RB240 – 13

R501.3

Proponent: Thomas Peterson, Box Elder County, representing Utah Chapter of ICC
(tpeterson@boxeldercounty.org)

Delete without substitution as follows:

~~R501.3 Fire protection of floors.~~ ~~Floor assemblies, not required elsewhere in this code to be fire-resistance rated, shall be provided with a $\frac{1}{2}$ -inch (12.7 mm) gypsum wallboard membrane, $\frac{5}{8}$ -inch (16 mm) wood structural panel membrane, or equivalent on the underside of the floor framing member.~~

~~Exceptions:~~

- ~~1. Floor assemblies located directly over a space protected by an automatic sprinkler system in accordance with Section P2904, NFPA13D, or other approved equivalent sprinkler system.~~
- ~~2. Floor assemblies located directly over a crawl space not intended for storage or fuel-fired appliances.~~
- ~~3. Portions of floor assemblies can be unprotected when complying with the following:~~
 - ~~3.1. The aggregate area of the unprotected portions shall not exceed 80 square feet per story~~
 - ~~3.2. Fire blocking in accordance with Section R302.11.1 shall be installed along the perimeter of the unprotected portion to separate the unprotected portion from the remainder of the floor assembly.~~
- ~~4. Wood floor assemblies using dimension lumber or structural composite lumber equal to or greater than 2-inch by 10-inch (50.8 mm by 254 mm) nominal dimension, or other approved floor assemblies demonstrating equivalent fire performance.~~

Reason: The code reference is not needed as one of the exceptions of requiring the fire protection of floors is that an NFPA 13D system be installed. NFPA 13D systems are required by Section R313 of this code in all structures. Section R501.3 is not applicable and should be removed from the code to prevent confusion of what is required.

Cost Impact: This code change proposal will not increase the cost of construction.

RB240-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R501.3-RB-PETERSON.doc

RB241 – 13

R502.1 (NEW), R502.1.1, R502.1.1.1, R502.1.2, R502.2.2 (NEW)

Proponent: Dennis Pitts, American Wood Council (dpitts@awc.org)

Revise as follows:

R502.1 General. Wood and wood-based products used for load-supporting purposes shall conform to the applicable provisions of this section.

~~**R502.1 R502.1.1 Identification.**~~ **Sawn Lumber.** ~~Load-bearing dimension Sawn lumber for joists, beams and girders shall be identified by a grade mark of a an accredited lumber grading or inspection agency that has been approved by and have design values certified by an accreditation body that complies with DOC PS 20. In lieu of a grade mark, a certificate of inspection issued by a lumber grading or inspection agency meeting the requirements of this section shall be accepted.~~

~~**R502.1.1 R502.1.1.1 Preservative-treated lumber.**~~ Preservative treated dimension lumber shall also be identified as required by Section R317.2.

~~**R502.1.2 Blocking and subflooring.**~~ ~~Blocking shall be a minimum of utility grade lumber. Subflooring may be a minimum of utility grade lumber or No. 4 common grade boards.~~

R502.2.2 Blocking and subflooring. Blocking for fastening panel edges or fixtures shall be a minimum of utility grade lumber. Subflooring shall be a minimum of utility grade lumber or No. 4 common grade boards. Fireblocking shall be of any grade lumber.

Reason: The change is intended to clarify the process by which lumber design values are certified and recognized in the code. The current process, which has been used since 1970, relies on the internationally recognized U.S. Department of Commerce Voluntary Product Standard PS20. Because the current format of the section can be incorrectly interpreted to place a number of wood products under the identification requirements of PS20, a new format is proposed that clearly states this standard is only for sawn lumber. The format proposed is nearly identical to what is used in Section 2302 of the International Building Code. Wood products other than sawn lumber have unique manufacturing standards, design value development, and quality control criteria. This new format clarifies that these other wood products must comply with specific product standards.

Cost Impact: This code change proposal will not increase the cost of construction.

RB241-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R502.1 (NEW)-RB-PITTS.doc

RB242 – 13

R502.1.6, R602.1.3, R802.1.5

Proponent: Rob Pickett, RobPickett & Associates, LLC, representing Log Homes Council
(robpickett@vermontel.net)

Revise as follows:

R502.1.6 Structural log members. ~~Stress grading of structural log members of nonrectangular shape, as typically used in log buildings, shall be in accordance with ASTM D 3957. Such structural log members shall be identified by the grade mark of an approved lumber grading or inspection agency. In lieu of a grade mark on the material, a certificate of inspection as to species and grade issued by a lumber grading or inspection agency meeting the requirements of this section shall be permitted to be accepted.~~
Structural log members shall comply with the provisions of ICC-400.

Revise as follows:

R602.1.3 Structural log members. ~~Stress grading of structural log members of nonrectangular shape, as typically used in log buildings, shall be in accordance with ASTM D 3957. Such structural log members shall be identified by the grade mark of an approved lumber grading or inspection agency. In lieu of a grade mark on the material, a certificate of inspection as to species and grade issued by a lumber grading or inspection agency meeting the requirements of this section shall be permitted to be accepted.~~
Structural log members shall comply with the provisions of ICC-400.

Revise as follows:

R802.1.5 Structural log members. ~~Stress grading of structural log members of nonrectangular shape, as typically used in log buildings, shall be in accordance with ASTM D 3957. Such structural log members shall be identified by the grade mark of an approved lumber grading or inspection agency. In lieu of a grade mark on the material, a certificate of inspection as to species and grade issued by a lumber grading or inspection agency meeting the requirements of this section shall be permitted to be accepted.~~
Structural log members shall comply with the provisions of ICC-400.

Reason: The intent of this section is maintained and improved by referring to ICC400 where Section 302.2.1 covers stress grading of logs. ICC400 Section 302.2 provides additional information regarding moisture content, design stress values, section properties and presents design stress value tables for logs per visual stress grading rules written by approved log grading agencies in accordance with ASTM D 3957.

Cost Impact: The code change proposal will not increase the cost of construction.

RB242-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R502.1.6-RB-PICKETT.doc

RB243 – 13

R202 (NEW), R502.1.8 (NEW), R502.8.2, R602.1.5 (NEW), R802.1.6 (NEW), R802.7.2, Chapter 44

Proponent: Dennis Pitts, American Wood Council (dpitts@awc.org)

Revise as follows:

R502.1.8 Cross-laminated timber. Cross-laminated timber shall be manufactured and identified as required by ANSI/APA PRG 320.

R502.8.2 Engineered wood products. Cuts, notches and holes bored in trusses, structural composite lumber, structural glue-laminated members, cross-laminated timber members, or I-joists are prohibited except where permitted by the manufacturer's recommendations or where the effects of such alterations are specifically considered in the design of the member by a *registered design professional*.

Revise as follows:

R602.1.5 Cross-laminated timber. Cross-laminated timber shall be manufactured and identified as required by ANSI/APA PRG 320.

Revise as follows:

R802.1.6 Cross-laminated timber. Cross-laminated timber shall be manufactured and identified as required by ANSI/APA PRG 320.

R802.7.2 Engineered wood products. Cuts, notches and holes bored in trusses, structural composite lumber, structural glue-laminated members, cross-laminated timber members, or I-joists are prohibited except where permitted by the manufacturer's recommendations or where the effects of such *alterations* are specifically considered in the design of the member by a *registered design professional*.

Add new definition as follows:

CROSS-LAMINATED TIMBER. A prefabricated engineered wood product consisting of at least three layers of solid-sawn lumber or *structural composite lumber* where the adjacent layers are cross-oriented and bonded with structural adhesive to form a solid wood element.

Add new standard to Chapter 44 as follows:

APA

ANSI/APA PRG 320-2012 Standard for Performance-Rated Cross-Laminated Timber

Reason: During the Group A hearings, code changes S250-12 and G142-12 were approved as submitted which added cross-laminated timber (CLT) methodology to the IBC. Although it's envisioned that the primary use for CLT construction will be for non-residential construction, it's currently being used in some residential applications. This proposal recognizes CLT by defining it and mandates compliance with the CLT product standard. Like some of the other engineered wood products that are recognized in the IRC, such as structural composite lumber, details of use aren't provided.

Cost Impact: This code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, ANSI/APA PRG 320 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

RB243-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R502.1.8 (NEW) #1-RB-PITTS.doc

RB244 – 13

R202 (NEW), R502.1.8 (NEW), R602.1.5 (NEW), R802.1.7 (NEW), Chapter 44

Proponent: Dennis Pitts, American Wood Council (dpitts@awc.org)

Add new text as follows:

R502.1.8 Engineered wood rim board. Engineered wood rim boards shall conform to ANSI/APA PRR 410 or shall be evaluated in accordance with ASTM D 7672. Structural capacities shall be in accordance with ANSI/APA PRR 410 or established in accordance with ASTM D 7672. Rim boards conforming to ANSI/APA PRR 410 shall be marked in accordance with that standard.

Add new text as follows:

R602.1.5 Engineered wood rim board. Engineered wood rim boards shall conform to ANSI/APA PRR 410 or shall be evaluated in accordance with ASTM D 7672. Structural capacities shall be in accordance with ANSI/APA PRR 410 or established in accordance with ASTM D 7672. Rim boards conforming to ANSI/APA PRR 410 shall be marked in accordance with that standard.

Add new text as follows:

R802.1.7 Engineered wood rim board. Engineered wood rim boards shall conform to ANSI/APA PRR 410 or shall be evaluated in accordance with ASTM D 7672. Structural capacities shall be in accordance with ANSI/APA PRR 410 or established in accordance with ASTM D 7672. Rim boards conforming to ANSI/APA PRR 410 shall be marked in accordance with that standard.

Add new definition as follows:

ENGINEERED WOOD RIM BOARD. A full-depth structural composite lumber, wood structural panel, structural glued laminated timber, or pre-fabricated wood I-joist member designed to transfer horizontal (shear) and vertical (compression) loads, provide attachment for diaphragm sheathing, siding and exterior deck ledgers, and provide lateral support at the ends of floor or roof joists or rafters.

Add new standards to Chapter 44 as follows:

ANSI

ANSI/APA PRR 410-2011 Standard for Performance-Rated Engineered Wood Rim Boards

ASTM

ASTM D 7672-2012 Standard Specifications for Evaluating Structural Capacities of Rim Board Products and Assemblies

Reason: This proposal is intended for consistency with the IBC. S248-12 was approved which added this definition and text to the IBC. Engineered rim board is a key structural element in many engineered wood floor applications where both structural load path through the perimeter member and dimensional change compatibility are design considerations. Two new consensus standards address products intended for engineered wood rim board applications. While both ANSI/APA PRR 410 and ASTM D7672 standards address the fundamental requirements for testing and evaluation of engineered rim board, PRR 410 also includes performance categories for engineered wood products used in engineered rim board applications. Under PRR 410, products are assigned a grade based on performance category (e.g. categories based on structural capacity) and will bear a mark in accordance with the grade. In contrast, ASTM D7672 is applicable for determination of product specific rim board performance (i.e. structural capacities) for engineered wood products that may be recognized in manufacturer's literature or product evaluation reports.

Cost Impact: The code change will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, ANSI/APA PRR 410 and ASTM D 7672 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

RB244-13

Public Hearing: Committee:
Assembly:

AS
ASF

AM
AMF

D
DF

R502.1.8 (NEW) #2-RB-PITTS.doc

RB245 – 13

R202 (NEW), R502.1.8 (NEW), Chapter 44

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Add new text as follows:

R502.1.8 Cross-laminated timber. Cross-laminated timber (CLT) shall be manufactured and identified as required by ANSI/APA PRG 320.

Add new definition as follows:

CROSS-LAMINATED TIMBER. A prefabricated engineered wood product consisting of at least three layers of solid-sawn lumber or *structural composite lumber* where the adjacent layers are cross-oriented and bonded with structural adhesive to form a solid wood element.

Add new standard to Chapter 44 as follows:

APA

ANSI/APA-PRG 320-2012 Standard for Performance-Rated Cross-Laminated Timbers

Reason: This change is essentially identical to item S250-12/13 adopted in Portland in the October Final Action Hearing.

While new to North America, cross-laminated timber (CLT) construction is a well established building system in Europe. This system is made up of solid wood slabs up to 45-feet long, over 9-feet high, and 10-inches thick. Cross-laminated like plywood from lumber planks, CLT has a minimum of 3 and as many as 7 layers. (Think plywood on a grand scale!)

These timbers come in a number of configurations suitable for wall, roof and/or floor applications. Due to their makeup, these wall-size timbers have the fire resistance of heavy timber construction as well as exceptional in plane (shear walls and bracing) and out of plane (wind) strength and stiffness. Having essentially no inside cavities and being solid throughout, air infiltration and inner-wall condensation are essentially eliminated. Being wall sized, these timbers came to the jobsite with all openings pre-cut and erection times are just a fraction of those for conventional construction.

A National Design Specification (NDS) supplement is currently under development and several test projects are underway in North America. In parallel with the research and development work being conducted in North America, the APA initiated the development of an ANSI standard in 2010. The goal is to have a recognized national/consensus standard in place in the building codes when design information and fabrication capability comes on line.

Additional information is available at:

<http://www.woodworks.org/files/PDF/Presentations/SE-Nov-2010/Mohammad.pdf>

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, ANSI/APA-PRG 320 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

RB245-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R502.1.8 (NEW)-RB-KEITH.doc

RB246 – 13

R202 (NEW), R502.1.9 (NEW), R602.1.6 (NEW), R802.1.8 (NEW), Chapter 44

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Add new text as follows:

R502.1.9 Engineered wood rim board. Engineered wood rim boards shall conform to ANSI/APA PRR 410 or shall be evaluated in accordance with ASTM D 7672. Structural capacities shall be in accordance with ANSI/APA PRR 410 or established in accordance with ASTM D 7672. Rim boards conforming to ANSI/APA PRR 410 shall be marked in accordance with that standard.

Add new text as follows:

R602.1.6 Engineered wood rim board. Engineered wood rim boards shall conform to ANSI/APA PRR 410 or shall be evaluated in accordance with ASTM D 7672. Structural capacities shall be in accordance with ANSI/APA PRR 410 or established in accordance with ASTM D 7672. Rim boards conforming to ANSI/APA PRR 410 shall be marked in accordance with that standard.

Add new text as follows:

R802.1.8 Engineered wood rim board. Engineered wood rim boards shall conform to ANSI/APA PRR 410 or shall be evaluated in accordance with ASTM D 7672. Structural capacities shall be in accordance with ANSI/APA PRR 410 or established in accordance with ASTM D 7672. Rim boards conforming to ANSI/APA PRR 410 shall be marked in accordance with that standard.

Add new definition as follows:

ENGINEERED WOOD RIM BOARD. A full-depth structural composite lumber, wood structural panel, structural glued laminated timber, or pre-fabricated wood I-joist member designed to transfer horizontal (shear) and vertical (compression) loads, provide attachment for diaphragm sheathing, siding and exterior deck ledgers, and provide lateral support at the ends of floor or roof joists or rafters.

Add new standards to Chapter 44 as follows:

APA

ANSI/APA PRR 410-2011 Standard for Performance Rated Engineered Wood Rim Boards

ASTM

ASTM D 7672-2012 Standard for Specification for Evaluating Structural Capacities of Rim Board Products and Assemblies.

Reason: This change is essentially identical to item S248-12/13 adopted in Portland in the October Final Action Hearing.

With the acceptance of engineered wood floor joists and beams in to modern building systems it had become increasingly important to match the physical properties with respect to moisture of the various wood systems used in parallel load paths. The rim joist is a good example, in that a solid sawn lumber rim joist should not be used in conjunction with engineered wood floor joists. The engineered-wood floor joists are often dry when they are placed in the building system and subject to very little shrinkage as they reach equilibrium moisture content with the completed building system. As such it is imperative that a rim-joist product with similar physical properties be used in conjunction with the engineered-wood floor joists.

Lumber is normally delivered to the jobsite at a moisture content of from 16 to 18 percent. As the lumber rim joist dries out and reaches equilibrium of 8 – 10 percent moisture content, it can shrink by as much as ½ inch. As the lumber rim joist shrinks away from the top of the engineered-wood framing all of the vertical loads carried by the rim joist (up to 2000 plf) are effectively redistributed to the floor joists and other framing members, not designed for the extra load. For this reason, as well as the resource utilization advantages of engineered-wood products, engineered-wood rim joists have been produced and sold for almost as long as other popular engineered-wood products such as I-joists. Up until now each of these rim joist products has been manufactured to

proprietary standards or no standards at all. The building official was left without any guidance from the building code on the acceptability of these very common products.

The new ANSI/APA rim board standard or the new ASTM rim board standards are consensus-based standards that have been developed by industry to correct this discrepancy and to eliminate the necessity of the engineered wood industry to continually maintain a large number of proprietary product standards.

Voting to accept these consensus based standards will make the building officials' job easier, provide for better and safer structures at a lower cost to the consumer, as well as reducing the regulatory burden for the manufacturers.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, ANSI/APA PRR 410 and ASTM D 7672 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

RB246-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

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Table R502.3.3(1), Table R502.3.3(2)

Proponent: Gary J. Ehrlich, P.E., National Association of Home Builders (NAHB) (ehrlch@nahb.org)

Revise as follows:

TABLE R502.3.3(1)
CANTILEVER SPANS FOR FLOOR JOISTS SUPPORTING LIGHT-FRAME EXTERIOR BEARING
WALL AND ROOF ONLY^{a, b, c, f, g, h}
(Floor Live Load ≤ 40 psf, Roof Live Load ≤ 20 psf)

Member & Spacing	Maximum Cantilever Span (Uplift Force at Backspan Support in Lbs.) ^{d, e}											
	Ground Snow Load											
	≤ 20 psf			30 psf			50 psf			70 psf		
	Roof Width			Roof Width			Roof Width			Roof Width		
	24 ft	32 ft	40 ft	24 ft	32 ft	40 ft	24 ft	32 ft	40 ft	24 ft	32 ft	40 ft
2 × 8 @ 12"	20" (177)	15" (227)	—	18" (209)	—	—	—	—	—	—	—	—
2 × 10 @ 16"	29" (228)	21" (297)	16" (364)	26" (271)	18" (354)	—	20" (375)	—	—	—	—	—
2 × 10 @ 12"	36" (166)	26" (219)	20" (270)	34" (198)	22" (263)	16" (324)	26" (277)	—	—	19" (356)	—	—
2 × 12 @ 16"	—	32" (287)	25" (356)	36" (263)	29" (345)	21" (428)	29" (367)	20" (484)	—	23" (471)	—	—
2 × 12 @ 12"	—	42" (209)	31" (263)	—	37" (253)	27" (317)	36" (271)	27" (358)	17" (447)	31" (348)	19" (462)	—
2 × 12 @ 8"	—	48" (136)	45" (169)	—	48" (164)	38" (206)	—	40" (233)	26" (294)	36" (230)	29" (304)	18" (379)

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. Tabulated values are for clear-span roof supported solely by exterior bearing walls.

b. Spans are based on No. 2 Grade lumber of Douglas fir-larch, hem-fir, southern pine and spruce-pine-fir for repetitive (three or more) members.

c. Ratio of backspan to cantilever span shall be at least 3:1.

d. Connections capable of resisting the indicated uplift force shall be provided at the backspan support.

e. Uplift force is for a backspan to cantilever span ratio of 3:1. Tabulated uplift values are permitted to be reduced by multiplying by a factor equal to 3 divided by the actual backspan ratio provided (3/backspan ratio).

f. See [Section R301.2.2.2.5](#), Item 1, for additional limitations on cantilevered floor joists for detached one- and two-family dwellings in Seismic Design Category D₀, D₁, or D₂ and townhouses in Seismic Design Category C, D₀, D₁ or D₂.

g. A full-depth rim joist shall be provided at the unsupported end of the cantilever joists. Solid blocking shall be provided at the supported end. Where the cantilever length is 24 inches (610 mm) or less and the building is assigned to Seismic Design Category A, B or C, solid blocking at the supported end shall not be required.

h. Linear interpolation shall be permitted for building widths and ground snow loads other than shown.

TABLE R502.3.3(2)
CANTILEVER SPANS FOR FLOOR JOISTS SUPPORTING EXTERIOR BALCONY^{a, b, e, f}

Member Size	Spacing	Maximum Cantilever Span (Uplift Force at Backspan Support in lb) ^{c, d}		
		Ground Snow Load		
		≤ 30 psf	50 psf	70 psf

2 × 8	12"	42" (139)	39" (156)	34" (165)
2 × 8	16"	36" (151)	34" (171)	29" (180)
2 × 10	12"	61" (164)	57" (189)	49" (201)
2 × 10	16"	53" (180)	49" (208)	42" (220)
2 × 10	24"	43" (212)	40" (241)	34" (255)
2 × 12	16"	72" (228)	67" (260)	57" (268)
2 × 12	24"	58" (279)	54" (319)	47" (330)

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

- a. Spans are based on No. 2 Grade lumber of Douglas fir-larch, hem-fir, southern pine and spruce-pine-fir for repetitive (three or more) members.
- b. Ratio of backspan to cantilever span shall be at least 2:1.
- c. Connections capable of resisting the indicated uplift force shall be provided at the backspan support.
- d. Uplift force is for a backspan to cantilever span ratio of 2:1. Tabulated uplift values are permitted to be reduced by multiplying by a factor equal to 2 divided by the actual backspan ratio provided (2/backspan ratio).
- e. A full-depth rim joist shall be provided at the unsupported end of the cantilever joists. Solid blocking shall be provided at the supported end. Where the cantilever length is 24 inches (610 mm) or less and the building is assigned to Seismic Design Category A, B or C, solid blocking at the supported end shall not be required.
- f. Linear interpolation shall be permitted for ground snow loads other than shown.

Reason: The purpose of this code change proposal is to restore an exception to the requirement for full-depth blocking at the supported end of cantilever for low-seismic areas and short cantilevers. This exception was originally proposed by the Virginia Building and Code Officials Association as part of a revision to 2006 IRC Section R602.10.8 (RB225-06/07) and approved for the 2009 IRC (see 2009 IRC Section 602.10.7, Item #1). The provision made sense as the full-depth rim joist is close enough to the cantilever support (24" or less) to provide the rotational restraint that would otherwise be provided by the blocking at the support. There is no need for two closely-spaced sets of full-depth blocking in the specified case.

During the ICC Ad-Hoc Wall Bracing Committee's work on the "Mothership" proposal (RB105-09/10), it was realized the provision in R602.10 conflicted with existing footnotes in Tables R502.3.3(1) and R502.3.3(2). The Ad-Hoc Committee opted to remove the exception rather than attempting to fix the conflict, leaving just a pointer allowing cantilevered floor joists complying with Section R502.3.3 to support braced wall panels. This proposal restores the original intent of the 2006/2007 VBCOA proposal by adding the exception to the two footnotes.

Cost Impact: The code change proposal will not increase the cost of construction.

RB247-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R502.3.3(1)T-EHRLICH.doc

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Table R502.3.1(1), Table R502.3.1(2), Table 802.4(1), Table R802.4(2), Table R802.5.1(1) through Table R802.5.1(8)

Proponent: Dennis Pitts, American Wood Council (dpitts@awc.org)

Revise as follows:

TABLE R502.3.1(1)
FLOOR JOIST SPANS FOR COMMON LUMBER SPECIES
(Residential sleeping areas, live load = 30 psf, L/Δ = 360)^a

JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf				DEAD LOAD = 20 psf			
			2 X 6	2 X 8	2 X 10	2 X 12	2 X 6	2 X 8	2 X 10	2 X 12
			Maximum floor joist spans							
			(ft-in)	(ft-in)	(ft-in)	(ft-in)	(ft-in)	(ft-in)	(ft-in)	(ft-in)
12	Douglas fir-larch	#2	11-10	15-7	19-10	23-0 23-4	11-6 11-8	14-7 14-9	17-9 18-0	20-7 20-11
	Douglas fir-larch	#3	9-8 9-11	12-4 12-7	15-0 15-5	17-5 17-10	8-8 8-11	11-0 11-3	13-5 13-9	15-7 16-0
	Hem-Fir	#1	11-7	15-3	19-5	23-7	11-7	15-2 15-3	18-6 18-9	21-6 21-9
16	Douglas fir-larch	SS	11-4	15-0	19-1	23-3	11-4	15-0	19-1	23-0 23-3
	Douglas fir-larch	#2	10-9	14-1 14-2	17-2 17-5	19-11 20-3	9-11 10-1	12-7 12-9	15-5 15-7	17-10 18-1
	Douglas fir-larch	#3	8-5 8-7	10-8 10-11	13-0 13-4	15-1 15-5	7-6 7-8	9-6 9-9	11-8 11-11	13-6 13-10
	Hem-Fir	#1	10-6	13-10	17-8	20-9 21-1	10-4 10-6	13-1 13-4	16-0 16-3	18-7 18-10
19.2	Douglas fir-larch	SS	10-8	14-1	18-0	21-10	10-8	14-1	18-0	21-0 21-4
	Douglas fir-larch	#2	10-1	12-10 13-0	15-8 15-11	18-3 18-6	9-1 9-3	11-6 11-8	14-1 14-3	16-3 16-6
	Douglas fir-larch	#3	7-8 7-10	9-9 10-0	11-10 12-2	13-9 14-1	6-10 7-0	8-8 8-11	10-7 10-11	12-4 12-7
	Hem-Fir	#1	9-10	13-0	16-4 16-7	19-0 19-3	9-6 9-7	12-0 12-2	14-8 14-10	17-0 17-2
24	Douglas fir-larch	SS	9-11	13-1	16-8	20-3	9-11	13-1	16-2 16-5	18-9 19-1
	Douglas fir-larch	#2	9-1 9-3	11-6 11-8	14-1 14-3	16-3 16-6	8-1 8-3	10-3 10-5	12-7 12-9	14-7 14-9
	Douglas fir-larch	#3	6-10 7-0	8-8 8-11	10-7 10-11	12-4 12-7	6-2 6-3	7-9 8-0	9-6 9-9	11-0 11-3
	Hem-Fir	#1	9-2	12-0 12-1	14-8 14-10	17-0 17-2	8-6 8-7	10-9 10-10	13-1 13-3	15-2 15-5

(Portions of Table not shown remain unchanged)

TABLE R502.3.1(2)
FLOOR JOIST SPANS FOR COMMON LUMBER SPECIES
 (Residential living areas, live load = 40 psf, L/Δ = 360)^b

JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf				DEAD LOAD = 20 psf			
			2 X 6	2 X 8	2 X 10	2 X 12	2 X 6	2 X 8	2 X 10	2 X 12
			Maximum floor joist spans							
			(ft-in)	(ft-in)	(ft-in)	(ft-in)	(ft-in)	(ft-in)	(ft-in)	(ft-in)
12	Douglas fir-larch	#2	10-9	14.2	17-9 18-0	20-7 20-11	10-6 10-8	13-3 13-6	16-3 16-5	18-10 19-1
	Douglas fir-larch	#3	8-8 8-11	11-0 11-3	13-5 13-9	15-7 16-0	7-11 8-1	10-0 10-3	12-3 12-7	14-3 14-7
	Hem-Fir	#1	10-6	13-10	17-8	21-6	10-6	13-10	16-11 17-1	19-7 19-10
16	Douglas fir-larch	SS	10-4	13-7	17-4	21-1	10-4	13-7	17-4	21-0 21-1
	Douglas fir-larch	#2	9-9	12-7 12-9	15-5 15-7	17-10 18-1	9-4 9-3	11-6 11-8	14-4 14-3	16-3 16-6
	Douglas fir-larch	#3	7-6 7-8	9-6 9-9	11-8 11-11	13-6 13-10	6-10 7-0	8-8 8-11	10-7 10-11	12-4 12-7
	Hem-Fir	#1	9-6	12-7	16-0	18-7 18-10	9-6	12-0 12-2	14-8 14-10	17-0 17-2
19.2	Douglas fir-larch	SS	9-8	12-10	16-4	19-10	9-8	12-10	16-4	19-2 19-6
	Douglas fir-larch	#2	9-4 9-2	11-6 11-8	14-4 14-3	16-3 16-6	8-3 8-5	10-6 10-8	12-10 13-0	14-10 15-1
	Douglas fir-larch	#3	6-10 7-0	8-8 8-11	10-7 10-11	12-4 12-7	6-3 6-5	7-11 8-2	9-8 9-11	11-3 11-6
	Hem-Fir	#1	9-0	11-10	14-8 14-10	17-0 17-2	8-8 8-9	10-11 11-1	13-4 13-6	15-6 15-8
24	Douglas fir-larch	SS	9-0	11-11	15-2	18-5	9-0	11-11	14-9 15-0	17-4 17-5
	Douglas fir-larch	#2	8-4 8-3	10-3 10-5	12-7 12-9	14-7 14-9	7-5 7-6	9-5 9-6	11-6 11-8	13-4 13-6
	Douglas fir-larch	#3	6-2 6-3	7-9 8-0	9-6 9-9	11-0 11-3	5-7 5-9	7-4 7-3	8-8 8-11	10-4 10-4
	Hem-Fir	#1	8-4	10-9 10-10	13-4 13-3	15-2 15-5	7-9 7-10	9-9 9-11	11-11 12-1	13-10 14-0

(Portions of Table not shown remain unchanged)

Revise as follows:

TABLE R802.4(1)
CEILING JOIST SPANS FOR COMMON LUMBER SPECIES
 (Uninhabitable attics without storage, live load = 10 psf, L/Δ = 240)

CEILING JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 5 psf			
			2x4	2x6	2x8	2x10
			Maximum ceiling joist spans			
			(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
12	Douglas fir – larch	#3	10-10 11-1	15-10 16-3	20-4 20-7	24-6 25-2
16	Douglas fir – larch	#2	11-3	17-8	23-0 23-4	Note a
	Douglas fir – larch	#3	9-5 9-7	13-9 14-1	17-5 17-10	21-3 21-9
	Southern Pine	#1	11-16	18-1	23-4 23-10	Note a
19.2	Douglas fir – larch	#2	10-7	16-7	21-0	25-

CEILING JOIST SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 5 psf			
		2x4	2x6	2x8	2x10
		Maximum ceiling joist spans			
		(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
24	Douglas fir – larch #3	8-7 8-9	16-8 12-6 12-10	21-4 15-10 16-3	26-0 19-5 19-10
	Douglas fir – larch #2	9-10	14-10 15-0	18-9 19-1	22-11 23-3
	Douglas fir – larch #3	7-8 7-10	11-2 11-6	14-2 14-7	17-4 17-9
	Hem-Fir #1	9-8	15-2	19-7 19-10	23-11 24-3

(Portions of Table not shown remain unchanged)

TABLE R802.4(2)
CEILING JOIST SPANS FOR COMMON LUMBER SPECIES
(Uninhabitable attics without storage, live load = 20 psf, L/Δ = 240)

CEILING JOIST SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf			
		2x4	2x6	2x8	2x10
		Maximum ceiling joist spans			
		(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
12	Douglas fir – larch #2	9-10	14-10 15-0	18-9 19-1	22-11 23-3
	Douglas fir – larch #3	7-8 7-10	11-2 11-6	14-2 14-7	17-4 17-9
	Hem-Fir #1	9-8	15-2	19-7 19-10	23-11 24-3
16	Douglas fir – larch #2	8-9 8-11	12-10 13-0	16-3 16-6	19-10 20-2
	Douglas fir – larch #3	6-8 6-10	9-8 9-11	12-4 12-7	15-0 15-5
	Hem-Fir #1	8-9	13-5 13-7	16-10 17-2	20-8 21-0
19.2	Douglas fir – larch SS	8-11	14-0	18-5	23-4 23-7
	Douglas fir – larch #2	8-0 8-2	11-09 11-11	14-10 15-1	18-2 18-5
	Douglas fir – larch #3	6-1 6-2	8-10 9-1	11-3 11-6	13-8 14-1
	Hem-Fir #1	8-3	12-3 12-4	15-6 15-8	18-11 19-2
24	Douglas fir – larch SS	8-3	13-0	17-4 17-2	20-11 21-3
	Douglas fir – larch #2	7-2 7-3	10-6 10-8	13-3 13-6	16-3 16-5
	Douglas fir – larch #3	5-5 5-7	7-11 8-1	10-0 10-3	12-3 12-
	Hem-Fir #1	7-6 7-7	10-11 11-1	13-10 14-0	16-11 17-1

(Portions of Table not shown remain unchanged)

TABLE R802.5.1(1)
RAFTER SPANS FOR COMMON LUMBER SPECIES
(Roof live load = 20 psf, ceiling not attached to rafters, L/Δ = 180)

RAFTER SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
		2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
		Maximum rafter spans ^a									
		(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
12	Douglas fir-larch SS	11-6	18-0	23-9	Note b	Note b	11-6	18-0	23-5 23-9	Note b	Note b
	Douglas fir-larch #2	10-10	16-7 16-10	21-0 21-4	25-8 26-0	Note b	9-10 10-0	14-4 14-7	18-2 18-5	22-3 22-6	25-9 26-0
	Douglas fir-larch #3	8-7 8-9	12-6 12-10	15-10 16-3	19-5 19-10	22-6 23-0	7-5 7-7	10-10 11-1	13-9 14-1	16-9 17-2	19-6 19-11
	Hem-Fir #1	10-7	16-8	21-10 22-0	Note b	Note b	10-3 10-4	14-11 15-2	18-11 19-2	23-2 23-5	Note b
16	Douglas fir-larch SS	10-5	16-4	21-7	Note b	Note b	10-5	16-0 16-3	20-3 20-7	24-9 25-2	Note b
	Douglas fir-larch #2	9-10	14-4 14-7	18-2 18-5	22-3 22-6	25-9 26-0	8-6 8-7	12-5 12-7	15-9 16-0	19-3 19-6	22-4 22-7
	Douglas fir-larch #3	7-5 7-7	10-10 11-1	13-9 14-1	16-9 17-2	19-6 19-11	6-5 6-7	9-5 9-8	11-11 12-12	14-6 14-11	16-10 17-3
	Hem-Fir #1	9-8	14-11 15-2	18-11 19-2	23-2 23-5	Note b	8-10 9-0	12-11 13-1	16-5 16-7	20-0 20-4	23-3 23-7
19.2	Douglas fir-larch SS	9-10	15-5	20-4	24-11	Note b	9-10	14-7 14-10	18-6 18-10	22-7 23-0	Note b
	Douglas fir-larch #2	8-11 9-1	13-1 13-3	16-7 16-10	20-3 20-7	23-6 23-10	7-9 7-10	11-4 11-6	14-4 14-7	17-7 17-10	20-4 20-8
	Douglas fir-larch #3	6-9 6-11	9-11 10-2	12-7 12-10	15-4 15-8	17-9 18-3	5-10 6-0	8-7 8-9	10-10 11-2	13-3 13-7	15-5 15-9
	Hem-Fir #1	9-4	13-8 13-10	17-4 17-6	21-1 21-5	24-6 24-10	8-1 8-2	11-10 12-0	15-0 15-2	18-4 18-6	21-3 21-6
24	Douglas fir-larch SS	9-1	14-4	18-0	23-4 23-9	Note b	8-11 9-1	13-1 13-3	16-7 16-10	20-3 20-7	23-5 23-10
	Douglas fir-larch #2	8-0 8-2	11-9 11-11	14-10 15-1	18-2 18-5	21-0 21-4	6-11 7-0	10-2 10-4	12-10 13-0	15-8 15-11	18-3 18-6
	Douglas fir-larch #3	6-1 6-2	8-10 9-1	11-3 11-6	13-8 14-1	15-11 16-3	5-3 5-4	7-8 7-10	9-9 10-0	11-10 12-2	13-9 14-1
	Hem-Fir #1	8-4 8-5	12-3 12-4	15-6 15-8	18-11 19-2	21-11 22-2	7-3 7-4	10-7 10-9	13-5 13-7	16-4 16-7	19-0 19-3

(Portions of Table not shown remain unchanged)

TABLE R802.5.1(2)
RAFTER SPANS FOR COMMON LUMBER SPECIES
(Roof live load = 20 psf, ceiling attached to rafters, L/Δ = 240)

RAFTER SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
		2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
		Maximum rafter spans ^a									
		(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
12	Douglas fir-larch #2	9-10	15-6	20-5	25-8 26-0	Note b	9-10	14-4 14-7	18-2 18-5	22-3 22-6	25-9 26-0
	Douglas fir-larch #3	8-7 8-9	12-6 12-10	15-10 16-3	19-5 19-10	22-6 23-0	7-5 7-7	10-10 11-1	13-9 14-1	16-9 17-2	19-6 19-11
	Hem-Fir #1	9-8	15-2	19-11	25-5	Note b	9-8	14-11 15-2	18-11 19-2	23-2 23-5	Note b
16	Douglas fir-larch SS	9-6	14-11	19-7	25-0	Note b	9-6	14-11	19-7	24-9 25-0	Note b
	Douglas fir-larch #2	8-11	14-1	18-2 18-5	22-3 22-6	25-9 26-0	8-6 8-7	12-5 12-7	15-9 16-0	19-3 19-6	22-4 22-7

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
			Maximum rafter spans ^a									
			(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
	Douglas fir-larch	#3	<u>7-5</u> <u>7-7</u>	<u>10-10</u> <u>11-1</u>	<u>13-9</u> <u>14-1</u>	<u>16-9</u> <u>17-2</u>	<u>19-6</u> <u>19-11</u>	<u>6-5</u> <u>6-7</u>	<u>9-5</u> <u>9-8</u>	<u>11-11</u> <u>12-2</u>	<u>14-6</u> <u>14-11</u>	<u>16-10</u> <u>17-3</u>
	Hem-Fir	#1	8-9	13-9	18-1	23-1	Note b	8-9	<u>12-11</u> <u>13-1</u>	<u>16-5</u> <u>16-7</u>	<u>20-0</u> <u>20-4</u>	<u>23-3</u> <u>23-7</u>
19.2	Douglas fir-larch	SS	18-11	14-0	18-5	23-7	Note b	8-11	14-0	18-5	<u>22-7</u> <u>23-0</u>	Note b
	Douglas fir-larch	#2	8-5	<u>13-1</u> <u>13-3</u>	<u>16-7</u> <u>16-10</u>	<u>20-3</u> <u>20-7</u>	<u>23-6</u> <u>23-10</u>	<u>7-9</u> <u>7-10</u>	<u>11-4</u> <u>11-6</u>	<u>14-4</u> <u>14-7</u>	<u>17-7</u> <u>17-10</u>	<u>20-4</u> <u>20-8</u>
	Douglas fir-larch	#3	<u>6-9</u> <u>6-11</u>	<u>9-11</u> <u>10-2</u>	<u>12-7</u> <u>12-10</u>	<u>15-4</u> <u>15-8</u>	<u>17-9</u> <u>18-3</u>	<u>5-10</u> <u>6-0</u>	<u>8-7</u> <u>8-9</u>	<u>10-10</u> <u>11-2</u>	<u>13-3</u> <u>13-7</u>	<u>15-5</u> <u>15-9</u>
	Hem-Fir	#1	8-3	12-11	17-1	<u>21-1</u> <u>21-5</u>	<u>24-6</u> <u>24-10</u>	<u>8-1</u> <u>8-2</u>	<u>11-10</u> <u>12-0</u>	<u>15-0</u> <u>15-2</u>	<u>18-4</u> <u>18-6</u>	<u>21-3</u> <u>21-6</u>
24	Douglas fir-larch	SS	8-3	13-0	17-2	21-10	Note b	8-3	13-0	<u>16-7</u> <u>16-10</u>	<u>20-3</u> <u>20-7</u>	<u>23-5</u> <u>23-10</u>
	Douglas fir-larch	#2	7-10	<u>11-9</u> <u>11-11</u>	<u>14-10</u> <u>15-1</u>	<u>18-2</u> <u>18-5</u>	<u>21-0</u> <u>21-4</u>	<u>6-11</u> <u>7-0</u>	<u>10-2</u> <u>10-4</u>	<u>12-10</u> <u>13-0</u>	<u>15-8</u> <u>15-11</u>	<u>18-3</u> <u>18-6</u>
	Douglas fir-larch	#3	<u>6-1</u> <u>6-2</u>	<u>8-10</u> <u>9-1</u>	<u>11-3</u> <u>11-6</u>	<u>13-8</u> <u>14-1</u>	<u>15-11</u> <u>16-3</u>	<u>5-3</u> <u>5-4</u>	<u>7-8</u> <u>7-10</u>	<u>9-9</u> <u>10-0</u>	<u>11-10</u> <u>12-2</u>	<u>13-9</u> <u>14-1</u>
	Hem-Fir	#1	7-8	12-10	<u>15-6</u> <u>15-8</u>	<u>18-11</u> <u>19-2</u>	<u>21-11</u> <u>22-2</u>	<u>7-3</u> <u>7-4</u>	<u>10-7</u> <u>10-9</u>	<u>13-5</u> <u>13-7</u>	<u>16-4</u> <u>16-7</u>	<u>19-0</u> <u>19-3</u>

(Portions of Table not shown remain unchanged)

TABLE R802.5.1(3)
RAFTER SPANS FOR COMMON LUMBER SPECIES
(Ground snow load = 30 psf, ceiling not attached to rafters, L/Δ = 180)

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
			Maximum rafter spans ^a									
			(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
12	Douglas fir-larch	SS	10-0	15-9	20-9	Note b	Note b	10-0	15-9	<u>20-1</u> <u>20-5</u>	<u>24-6</u> <u>24-11</u>	Note b
	Douglas fir-larch	#2	<u>9-5</u> <u>9-6</u>	<u>13-9</u> <u>14-0</u>	<u>17-5</u> <u>17-8</u>	<u>21-4</u> <u>21-7</u>	<u>24-8</u> <u>25-1</u>	<u>8-5</u> <u>8-6</u>	<u>12-4</u> <u>12-6</u>	<u>15-7</u> <u>15-10</u>	<u>19-1</u> <u>19-4</u>	<u>22-1</u> <u>22-5</u>
	Douglas fir-larch	#3	<u>7-1</u> <u>7-3</u>	<u>10-5</u> <u>10-8</u>	<u>13-2</u> <u>13-6</u>	<u>16-1</u> <u>16-6</u>	<u>18-8</u> <u>19-2</u>	<u>6-4</u> <u>6-6</u>	<u>9-4</u> <u>9-6</u>	<u>11-9</u> <u>12-1</u>	<u>14-5</u> <u>14-9</u>	<u>16-8</u> <u>17-1</u>
	Hem-Fir	#1	9-3	<u>14-4</u> <u>14-6</u>	<u>18-2</u> <u>18-5</u>	<u>22-2</u> <u>22-6</u>	<u>25-9</u> <u>26-0</u>	<u>8-9</u> <u>8-11</u>	<u>12-10</u> <u>13-0</u>	<u>16-3</u> <u>16-6</u>	<u>19-10</u> <u>20-1</u>	<u>23-0</u> <u>23-4</u>
16	Douglas fir-larch	SS	9-1	14-4	18-10	<u>23-9</u> <u>24-1</u>	Note b	9-1	<u>13-9</u> <u>14-0</u>	<u>17-5</u> <u>17-8</u>	<u>21-3</u> <u>21-7</u>	<u>24-8</u> <u>25-1</u>
	Douglas fir-larch	#2	<u>8-2</u> <u>8-3</u>	<u>11-11</u> <u>12-1</u>	<u>15-1</u> <u>15-4</u>	<u>18-5</u> <u>18-9</u>	<u>21-5</u> <u>21-8</u>	<u>7-3</u> <u>7-5</u>	<u>10-8</u> <u>10-10</u>	<u>13-6</u> <u>13-8</u>	<u>16-6</u> <u>16-9</u>	<u>19-2</u> <u>19-5</u>
	Douglas fir-larch	#3	<u>6-2</u> <u>6-4</u>	<u>9-0</u> <u>9-3</u>	<u>11-5</u> <u>11-8</u>	<u>13-11</u> <u>14-3</u>	<u>16-2</u> <u>16-7</u>	<u>5-6</u> <u>5-8</u>	<u>8-1</u> <u>8-3</u>	<u>10-3</u> <u>10-6</u>	<u>12-6</u> <u>12-9</u>	<u>14-6</u> <u>14-10</u>
	Hem-Fir	#1	8-5	<u>12-5</u> <u>12-7</u>	<u>15-9</u> <u>15-11</u>	<u>19-3</u> <u>19-6</u>	<u>22-3</u> <u>22-7</u>	<u>7-7</u> <u>7-8</u>	<u>11-1</u> <u>11-3</u>	<u>14-1</u> <u>14-3</u>	<u>17-2</u> <u>17-5</u>	<u>19-11</u> <u>20-2</u>
19.2	Douglas fir-larch	SS	8-7	13-6	17-9	<u>21-8</u> <u>22-1</u>	<u>25-2</u> <u>25-7</u>	8-7	<u>12-6</u> <u>12-9</u>	<u>15-10</u> <u>16-2</u>	<u>19-5</u> <u>19-9</u>	<u>22-6</u> <u>22-10</u>
	Douglas fir-larch	#2	<u>7-5</u> <u>7-7</u>	<u>10-11</u> <u>11-0</u>	<u>13-9</u> <u>14-0</u>	<u>16-10</u> <u>17-1</u>	<u>19-6</u> <u>19-10</u>	<u>6-8</u> <u>6-9</u>	<u>9-9</u> <u>9-10</u>	<u>12-4</u> <u>12-6</u>	<u>15-1</u> <u>15-3</u>	<u>17-6</u> <u>17-9</u>

RAFTER SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
		2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
		Maximum rafter spans ^a									
		(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
	Douglas fir-larch #3	<u>5-7</u> <u>5-9</u>	<u>8-3</u> <u>8-5</u>	<u>10-5</u> <u>10-8</u>	<u>12-9</u> <u>13-1</u>	<u>14-9</u> <u>15-2</u>	<u>5-0</u> <u>5-2</u>	<u>7-4</u> <u>7-7</u>	<u>9-4</u> <u>9-7</u>	<u>11-5</u> <u>11-8</u>	<u>13-2</u> <u>13-6</u>
	Hem-Fir #1	<u>7-9</u> <u>7-10</u>	<u>11-4</u> <u>11-6</u>	<u>14-4</u> <u>14-7</u>	<u>17-7</u> <u>17-9</u>	<u>20-4</u> <u>20-7</u>	<u>6-11</u> <u>7-0</u>	<u>10-2</u> <u>10-3</u>	<u>12-10</u> <u>13-0</u>	<u>15-8</u> <u>15-11</u>	<u>18-2</u> <u>18-5</u>
24	Douglas fir-larch SS	<u>7-11</u> <u>8-0</u>	<u>12-6</u>	<u>15-10</u> <u>16-2</u>	<u>19-5</u> <u>19-9</u>	<u>22-6</u> <u>22-10</u>	<u>7-8</u> <u>7-10</u>	<u>11-3</u> <u>11-5</u>	<u>14-2</u> <u>14-5</u>	<u>17-4</u> <u>17-8</u>	<u>20-1</u> <u>20-5</u>
	Douglas fir-larch #2	<u>6-8</u> <u>6-9</u>	<u>9-9</u> <u>9-10</u>	<u>12-4</u> <u>12-6</u>	<u>15-1</u> <u>15-3</u>	<u>17-6</u> <u>17-9</u>	<u>5-11</u> <u>6-0</u>	<u>8-8</u> <u>8-10</u>	<u>11-0</u> <u>11-2</u>	<u>13-6</u> <u>13-8</u>	<u>15-7</u> <u>15-10</u>
	Douglas fir-larch #3	<u>5-0</u> <u>5-2</u>	<u>7-4</u> <u>7-7</u>	<u>9-4</u> <u>9-7</u>	<u>11-5</u> <u>11-8</u>	<u>13-2</u> <u>13-6</u>	<u>4-6</u> <u>4-7</u>	<u>6-7</u> <u>6-9</u>	<u>8-4</u> <u>8-7</u>	<u>10-2</u> <u>10-5</u>	<u>11-10</u> <u>12-1</u>
	Hem-Fir #1	<u>6-11</u> <u>7-0</u>	<u>10-2</u> <u>10-3</u>	<u>12-10</u> <u>13-0</u>	<u>15-8</u> <u>15-11</u>	<u>18-2</u> <u>18-5</u>	<u>6-2</u> <u>6-3</u>	<u>9-1</u> <u>9-2</u>	<u>11-6</u> <u>11-8</u>	<u>14-0</u> <u>14-3</u>	<u>16-3</u> <u>16-6</u>

(Portions of Table not shown remain unchanged)

TABLE R802.5.1(4)
RAFTER SPANS FOR COMMON LUMBER SPECIES
(Ground snow load = 50 psf, ceiling not attached to rafters, L/Δ = 180)

RAFTER SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
		2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
		Maximum rafter spans ^a									
		(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
12	Douglas fir-larch SS	<u>8-5</u>	<u>13-3</u>	<u>17-6</u>	<u>22-4</u>	<u>26-0</u>	<u>8-5</u>	<u>13-3</u>	<u>17-0</u> <u>17-3</u>	<u>20-9</u> <u>21-1</u>	<u>24-0</u> <u>24-5</u>
	Douglas fir-larch #2	<u>7-8</u> <u>7-10</u>	<u>11-3</u> <u>11-5</u>	<u>14-3</u> <u>14-5</u>	<u>17-5</u> <u>17-8</u>	<u>20-2</u> <u>20-5</u>	<u>7-1</u> <u>7-3</u>	<u>10-5</u> <u>10-7</u>	<u>13-2</u> <u>13-4</u>	<u>16-1</u> <u>16-4</u>	<u>18-8</u> <u>18-11</u>
	Douglas fir-larch #3	<u>5-10</u> <u>6-0</u>	<u>8-6</u> <u>8-9</u>	<u>10-9</u> <u>11-0</u>	<u>13-2</u> <u>13-6</u>	<u>15-3</u> <u>15-7</u>	<u>5-5</u> <u>5-6</u>	<u>7-10</u> <u>8-1</u>	<u>10-0</u> <u>10-3</u>	<u>12-2</u> <u>12-6</u>	<u>14-1</u> <u>14-6</u>
	Hem-Fir #1	<u>7-10</u>	<u>11-9</u> <u>11-10</u>	<u>14-10</u> <u>15-0</u>	<u>18-1</u> <u>18-4</u>	<u>21-0</u> <u>21-3</u>	<u>7-5</u> <u>7-6</u>	<u>10-10</u> <u>11-0</u>	<u>13-9</u> <u>13-11</u>	<u>16-9</u> <u>17-0</u>	<u>19-5</u> <u>19-9</u>
16	Douglas fir-larch SS	<u>7-8</u>	<u>12-1</u>	<u>15-10</u> <u>15-11</u>	<u>19-5</u> <u>19-9</u>	<u>22-6</u> <u>22-10</u>	<u>7-8</u>	<u>11-7</u> <u>11-10</u>	<u>14-8</u> <u>14-11</u>	<u>17-11</u> <u>18-3</u>	<u>20-10</u> <u>21-2</u>
	Douglas fir-larch #2	<u>6-8</u> <u>6-9</u>	<u>9-9</u> <u>9-10</u>	<u>12-4</u> <u>12-6</u>	<u>15-1</u> <u>15-3</u>	<u>17-6</u> <u>17-9</u>	<u>6-2</u> <u>6-3</u>	<u>9-0</u> <u>9-2</u>	<u>11-5</u> <u>11-7</u>	<u>13-11</u> <u>14-2</u>	<u>16-2</u> <u>16-5</u>
	Douglas fir-larch #3	<u>5-0</u> <u>5-2</u>	<u>7-4</u> <u>7-7</u>	<u>9-4</u> <u>9-7</u>	<u>11-5</u> <u>11-8</u>	<u>13-2</u> <u>13-6</u>	<u>4-8</u> <u>4-9</u>	<u>6-10</u> <u>7-0</u>	<u>8-8</u> <u>8-10</u>	<u>10-6</u> <u>10-10</u>	<u>12-3</u> <u>12-6</u>
	Hem-Fir #1	<u>6-11</u> <u>7-0</u>	<u>10-2</u> <u>10-3</u>	<u>12-10</u> <u>13-0</u>	<u>15-8</u> <u>15-11</u>	<u>18-2</u> <u>18-5</u>	<u>6-5</u> <u>6-6</u>	<u>9-5</u> <u>9-6</u>	<u>11-11</u> <u>12-1</u>	<u>14-6</u> <u>14-9</u>	<u>16-10</u> <u>17-1</u>
19.2	Douglas fir-larch SS	<u>7-3</u>	<u>11-4</u>	<u>14-6</u> <u>14-9</u>	<u>17-8</u> <u>18-0</u>	<u>20-6</u> <u>20-11</u>	<u>7-3</u>	<u>10-7</u> <u>10-9</u>	<u>13-5</u> <u>13-8</u>	<u>16-5</u> <u>16-8</u>	<u>19-0</u> <u>19-4</u>
	Douglas fir-larch #2	<u>6-1</u> <u>6-2</u>	<u>8-11</u> <u>9-0</u>	<u>11-3</u> <u>11-5</u>	<u>13-9</u> <u>13-11</u>	<u>15-11</u> <u>16-2</u>	<u>5-7</u> <u>5-8</u>	<u>8-3</u> <u>8-4</u>	<u>10-5</u> <u>10-7</u>	<u>12-9</u> <u>12-11</u>	<u>14-9</u> <u>15-0</u>
	Douglas fir-larch #3	<u>4-7</u> <u>4-8</u>	<u>6-9</u> <u>6-11</u>	<u>8-6</u> <u>8-9</u>	<u>10-5</u> <u>10-8</u>	<u>12-1</u> <u>12-4</u>	<u>4-3</u> <u>4-4</u>	<u>6-3</u> <u>6-4</u>	<u>7-11</u> <u>8-1</u>	<u>9-7</u> <u>9-10</u>	<u>11-2</u> <u>11-5</u>
	Hem-Fir #1	<u>6-4</u> <u>6-5</u>	<u>9-3</u> <u>9-5</u>	<u>11-9</u> <u>11-11</u>	<u>14-4</u> <u>14-6</u>	<u>16-7</u> <u>16-10</u>	<u>5-10</u> <u>8-11</u>	<u>8-7</u> <u>8-8</u>	<u>10-10</u> <u>11-0</u>	<u>13-3</u> <u>13-5</u>	<u>15-5</u> <u>15-7</u>
24	Douglas fir-larch SS	<u>6-8</u>	<u>10-5</u>	<u>13-0</u> <u>13-2</u>	<u>15-10</u> <u>16-1</u>	<u>18-4</u> <u>18-8</u>	<u>6-6</u> <u>6-7</u>	<u>9-6</u> <u>9-8</u>	<u>12-0</u> <u>12-2</u>	<u>14-8</u> <u>14-11</u>	<u>17-0</u> <u>17-3</u>

RAFTER SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
		2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
		Maximum rafter spans ^a									
		(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
	Douglas fir-larch #2	5-5 5-6	7-11 8-1	10-1 10-3	12-4 12-6	14-3 14-6	5-0 5-1	7-4 7-6	9-4 9-5	11-5 11-7	13-2 13-5
	Douglas fir-larch #3	4-1 4-3	6-0 6-2	7-7 7-10	9-4 9-6	10-9 11-1	3-10 3-11	5-7 5-8	7-1 7-3	8-7 8-10	10-0 10-3
	Hem-Fir #1	5-8 5-9	8-3 8-5	10-6 10-8	12-10 13-0	14-10 15-1	5-3 8-4	7-8 7-9	9-9 9-10	11-10 12-0	13-9 13-11

(Portions of Table not shown remain unchanged)

TABLE R802.5.1(5)
RAFTER SPANS FOR COMMON LUMBER SPECIES
(Ground snow load = 30 psf, ceiling attached to rafters, L/Δ = 240)

RAFTER SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
		2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
		Maximum rafter spans ^a									
		(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
12	Douglas fir-larch #2	8-7	13-6	17-5 17-8	21-4 21-7	24-8 25-1	8-5 8-6	12-4 12-6	15-7 15-10	19-1 19-4	22-1 22-5
	Douglas fir-larch #3	7-1 7-3	10-5 10-8	13-2 13-6	16-1 16-6	18-8 19-2	6-4 6-6	9-4 9-6	11-9 12-1	14-5 14-9	16-8 17-1
	Hem-Fir #1	8-5	13-3	17-5	22-2 22-3	25-9 26-0	8-5	12-10 13-0	16-3 16-6	19-10 20-1	23-0 23-4
16	Douglas fir-larch SS	8-3	13-0	17-2	21-0	Note b	8-3	13-0	17-2	21-3 21-7	24-8 25-1
	Douglas fir-larch #2	7-10	11-11 12-1	15-1 15-4	18-5 18-9	21-5 21-8	7-3 7-5	10-8 10-10	13-6 13-8	16-6 16-9	19-2 19-5
	Douglas fir-larch #3	6-2 6-4	9-0 9-3	11-5 11-8	13-11 14-3	16-2 16-7	5-6 5-8	8-1 8-3	10-3 10-6	12-6 12-9	14-6 14-10
	Hem-Fir #1	7-8	12-0	15-9 15-10	19-3 19-6	22-3 22-7	7-7 7-8	11-1 11-3	14-1 14-3	17-2 17-5	19-11 20-2
19.2	Douglas fir-larch SS	7-9	12-3	16-1	20-7	25-0	7-9	12-3	15-10 16-1	19-5 19-9	22-6 22-10
	Douglas fir-larch #2	7-4	10-11 11-0	13-9 14-0	16-10 17-1	19-6 19-10	6-8 6-9	9-9 9-1	12-4 12-6	15-1 15-3	17-6 17-9
	Douglas fir-larch #3	5-7 5-9	8-3 8-5	10-5 10-8	12-9 13-1	14-9 15-2	5-0 5-2	7-4 7-7	9-4 9-7	11-5 11-8	13-2 13-6
	Hem-Fir #1	7-2	11-4	14-4 14-7	17-7 17-9	20-4 20-7	6-11 7-0	16-2 16-3	12-10 13-0	15-8 15-11	18-2 18-5
24	Douglas fir-larch SS	7-3	11-4	15-0	19-1	22-6 22-10	7-3	11-3 11-4	14-2 14-5	17-4 17-8	20-1 20-5
	Douglas fir-larch #2	6-8 6-9	9-9 9-10	12-4 12-6	15-1 15-3	17-6 17-9	5-11 6-0	8-8 8-10	11-0 11-2	13-6 13-8	15-7 15-10
	Douglas fir-larch #3	5-0 5-2	7-4 7-7	9-4 9-7	11-5 11-8	13-2 13-6	4-6 4-7	6-7 6-9	8-4 8-7	10-2 10-5	11-10 12-1
	Hem-Fir #1	6-8	10-2 10-3	12-10 13-0	15-8 15-11	18-2 18-5	6-2 6-3	9-1 9-2	11-6 11-8	14-0 14-3	16-3 16-6

(Portions of Table not shown remain unchanged)

TABLE R802.5.1(6)
RAFTER SPANS FOR COMMON LUMBER SPECIES
 (Ground snow load = 50 psf, ceiling attached to rafters, L/Δ = 240)

RAFTER SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
		2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
		Maximum rafter spans ^a									
		(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
12	Douglas fir-larch SS	7-8	12-1	15-11	20-3	24-8	7-8	12-1	15-1	20-3	24-0 <u>24-5</u>
	Douglas fir-larch #2	7-3	11-3 <u>11-5</u>	14-3 <u>14-5</u>	17-5 <u>17-8</u>	20-2 <u>20-5</u>	7-1 <u>7-3</u>	10-5 <u>10-7</u>	13-2 <u>13-4</u>	16-1 <u>16-4</u>	18-8 <u>18-11</u>
	Douglas fir-larch #3	5-10 <u>6-0</u>	8-6 <u>8-9</u>	10-9 <u>11-0</u>	13-2 <u>13-6</u>	15-3 <u>15-7</u>	5-5 <u>5-6</u>	7-10 <u>8-1</u>	10-0 <u>10-3</u>	12-2 <u>12-6</u>	14-1 <u>14-6</u>
	Hem-Fir #1	7-1	11-2	14-8	18-1 <u>18-4</u>	21-0 <u>21-3</u>	7-1	10-10 <u>11-0</u>	13-9 <u>13-11</u>	16-9 <u>17-0</u>	19-5 <u>19-9</u>
16	Douglas fir-larch SS	7-0	11-0	14-5	18-5	22-5	7-0	11-0	14-5	17-11 <u>18-3</u>	20-10 <u>21-2</u>
	Douglas fir-larch #2	6-7	9-9 <u>9-10</u>	12-4 <u>12-6</u>	15-1 <u>15-3</u>	17-6 <u>17-9</u>	6-2 <u>6-3</u>	9-0 <u>9-2</u>	11-5 <u>11-7</u>	13-11 <u>14-2</u>	16-2 <u>16-5</u>
	Douglas fir-larch #3	5-0 <u>5-2</u>	7-4 <u>7-7</u>	9-4 <u>9-7</u>	11-5 <u>11-8</u>	13-2 <u>13-6</u>	4-8 <u>4-9</u>	6-10 <u>7-0</u>	8-8 <u>8-10</u>	10-6 <u>10-10</u>	12-3 <u>12-6</u>
	Hem-Fir #1	6-5	10-2	12-10 <u>13-0</u>	15-8 <u>15-11</u>	18-2 <u>18-5</u>	6-5	9-5 <u>9-6</u>	11-11 <u>12-1</u>	14-6 <u>14-9</u>	16-10 <u>17-1</u>
19.2	Douglas fir-larch SS	6-7	10-4	13-7	17-4	20-6 <u>20-11</u>	6-7	10-4	13-5 <u>13-7</u>	16-5 <u>16-8</u>	19-0 <u>19-4</u>
	Douglas fir-larch #2	6-1 <u>6-2</u>	8-11 <u>9-0</u>	11-3 <u>11-5</u>	13-9 <u>13-11</u>	15-11 <u>16-2</u>	5-7 <u>5-8</u>	8-3 <u>8-4</u>	10-5 <u>10-7</u>	12-9 <u>12-11</u>	14-9 <u>15-0</u>
	Douglas fir-larch #3	4-7 <u>4-8</u>	6-9 <u>6-11</u>	8-6 <u>8-9</u>	10-5 <u>10-8</u>	12-1 <u>12-4</u>	4-3 <u>4-4</u>	6-3 <u>6-4</u>	7-11 <u>8-1</u>	9-7 <u>9-10</u>	11-2 <u>11-5</u>
	Hem-Fir #1	6-1	9-3 <u>9-5</u>	11-9 <u>11-11</u>	14-4 <u>14-6</u>	16-7 <u>16-10</u>	5-10 <u>5-11</u>	8-7 <u>8-8</u>	10-10 <u>11-0</u>	13-3 <u>13-5</u>	15-5 <u>15-7</u>
24	Douglas fir-larch SS	6-1	9-7	12-7	15-10 <u>16-1</u>	18-4 <u>18-8</u>	6-1	9-6 <u>9-7</u>	12-0 <u>12-2</u>	14-8 <u>14-11</u>	17-0 <u>17-3</u>
	Douglas fir-larch #2	5-5 <u>5-6</u>	7-11 <u>8-1</u>	10-1 <u>10-3</u>	12-4 <u>12-6</u>	14-3 <u>14-6</u>	5-0 <u>5-1</u>	7-4 <u>7-6</u>	9-4 <u>9-5</u>	11-5 <u>11-7</u>	13-2 <u>13-5</u>
	Douglas fir-larch #3	4-1 <u>4-3</u>	6-0 <u>6-2</u>	7-7 <u>7-10</u>	9-4 <u>9-6</u>	10-9 <u>11-1</u>	3-10 <u>3-11</u>	5-7 <u>5-8</u>	7-1 <u>7-3</u>	8-7 <u>8-10</u>	10-0 <u>10-3</u>
	Hem-Fir #1	5-8	8-3 <u>8-5</u>	10-6 <u>10-8</u>	12-10 <u>13-0</u>	14-10 <u>15-1</u>	5-3 <u>5-4</u>	7-8 <u>7-9</u>	9-9 <u>9-10</u>	11-10 <u>12-0</u>	13-9 <u>13-11</u>

(Portions of Table not shown remain unchanged)

TABLE R802.5.1(7)
RAFTER SPANS FOR 70 PSF GROUND SNOW LOAD
 (Ceiling not attached to rafters, L/Δ = 180)

RAFTER SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
		2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
		Maximum rafter spans ^a									
		(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
12	Douglas fir-larch SS	7-7	11-0	15-8	19-5 <u>19-9</u>	22-6 <u>22-10</u>	7-7	11-10	15-0 <u>15-3</u>	18-3 <u>18-7</u>	21-2 <u>21-7</u>
	Douglas fir-larch #2	6-8 <u>6-9</u>	9-9 <u>9-10</u>	12-4 <u>12-6</u>	15-1 <u>15-3</u>	17-6 <u>17-9</u>	6-3 <u>6-4</u>	9-2 <u>9-4</u>	11-8 <u>11-9</u>	14-2 <u>14-5</u>	16-6 <u>16-8</u>
	Douglas fir-larch #3	5-0 <u>5-2</u>	7-4 <u>7-7</u>	9-4 <u>9-7</u>	11-5 <u>11-8</u>	13-2 <u>13-6</u>	4-9 <u>4-10</u>	6-11 <u>7-1</u>	8-9 <u>9-0</u>	10-9 <u>11-0</u>	12-5 <u>12-9</u>

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
			Maximum rafter spans ^a									
			(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
	Hem-Fir	#1	6-11 <u>7-0</u>	10-2 <u>10-3</u>	12-10 <u>13-0</u>	15-8 <u>15-11</u>	18-2 <u>18-5</u>	6-6 <u>6-7</u>	9-7 <u>9-8</u>	12-1 <u>12-3</u>	14-10 <u>15-0</u>	17-2 <u>17-5</u>
16	Douglas fir-larch	SS	6-10	10-9	13-9 <u>14-0</u>	16-10 <u>17-1</u>	19-6 <u>19-10</u>	6-10	10-3 <u>10-5</u>	13-0 <u>13-2</u>	15-10 <u>16-1</u>	18-4 <u>18-8</u>
	Douglas fir-larch	#2	5-9 <u>5-10</u>	8-5 <u>8-7</u>	10-8 <u>10-10</u>	13-1 <u>13-3</u>	15-2 <u>15-4</u>	5-5 <u>5-6</u>	7-11 <u>8-1</u>	10-1 <u>10-3</u>	12-4 <u>12-6</u>	14-3 <u>14-6</u>
	Douglas fir-larch	#3	4-4 <u>4-6</u>	6-4 <u>6-6</u>	8-1 <u>8-3</u>	9-10 <u>10-1</u>	11-5 <u>11-9</u>	4-1 <u>4-3</u>	6-0 <u>6-2</u>	7-7 <u>7-10</u>	9-4 <u>9-6</u>	10-9 <u>11-1</u>
	Hem-Fir	#1	6-0 <u>6-1</u>	8-9 <u>8-11</u>	11-2 <u>11-3</u>	13-7 <u>13-9</u>	15-9 <u>16-0</u>	5-8 <u>5-9</u>	8-3 <u>8-5</u>	10-6 <u>10-8</u>	12-10 <u>13-0</u>	14-10 <u>15-1</u>
19.2	Douglas fir-larch	SS	6-5 <u>6-6</u>	9-11 <u>10-1</u>	12-7 <u>12-9</u>	15-4 <u>15-7</u>	17-9 <u>18-1</u>	6-5 <u>6-6</u>	9-4 <u>9-6</u>	11-10 <u>12-0</u>	14-5 <u>14-8</u>	16-9 <u>17-1</u>
	Douglas fir-larch	#2	5-3 <u>5-4</u>	7-8 <u>7-10</u>	9-9 <u>9-11</u>	11-11 <u>12-1</u>	13-10 <u>14-0</u>	5-0	7-3 <u>7-4</u>	9-2 <u>9-4</u>	11-3 <u>11-5</u>	13-0 <u>13-2</u>
	Douglas fir-larch	#3	4-0 <u>4-1</u>	5-10 <u>6-0</u>	7-4 <u>7-7</u>	9-0 <u>9-3</u>	10-5 <u>10-8</u>	3-9 <u>3-10</u>	5-6 <u>5-7</u>	6-11 <u>7-1</u>	8-6 <u>8-8</u>	9-10 <u>10-1</u>
	Hem-Fir	#1	5-6 <u>5-7</u>	8-0 <u>8-2</u>	10-2 <u>10-3</u>	12-5 <u>12-7</u>	14-5 <u>14-7</u>	5-2 <u>5-3</u>	7-7 <u>7-8</u>	9-7 <u>9-8</u>	11-8 <u>11-10</u>	13-7 <u>13-9</u>
24	Douglas fir-larch	SS	6-0	8-10 <u>9-0</u>	11-3 <u>11-5</u>	13-9 <u>13-11</u>	15-11 <u>16-2</u>	5-9 <u>5-10</u>	8-4 <u>8-6</u>	10-7 <u>10-9</u>	12-11 <u>13-2</u>	15-0 <u>15-3</u>
	Douglas fir-larch	#2	4-8 <u>4-9</u>	6-11 <u>7-0</u>	8-9 <u>8-10</u>	10-8 <u>10-10</u>	12-4 <u>12-6</u>	4-5 <u>4-6</u>	6-6 <u>6-7</u>	8-3 <u>8-4</u>	10-0 <u>10-2</u>	11-8 <u>11-10</u>
	Douglas fir-larch	#3	3-7 <u>3-8</u>	5-2 <u>5-4</u>	6-7 <u>6-9</u>	8-1 <u>8-3</u>	9-4 <u>9-7</u>	3-4 <u>3-5</u>	4-11 <u>5-0</u>	6-3 <u>6-4</u>	7-7 <u>7-9</u>	8-10 <u>9-0</u>
	Hem-Fir	#1	4-11 <u>5-0</u>	7-2 <u>7-3</u>	9-1 <u>9-2</u>	11-1 <u>11-3</u>	12-10 <u>13-0</u>	4-7 <u>4-8</u>	6-9 <u>6-10</u>	8-7 <u>8-8</u>	10-6 <u>10-7</u>	12-2 <u>12-4</u>

(Portions of Table not shown remain unchanged)

TABLE R802.5.1(8)
RAFTER SPANS FOR 70 PSF GROUND SNOW LOAD
(Ceiling attached to rafters, L/Δ = 240)

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
			Maximum rafter spans ^a									
			(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
12	Douglas fir-larch	SS	6-10	10-9	14-3	18-2	22-1	6-10	10-9	14-3	18-2	21-2 <u>21-7</u>
	Douglas fir-larch	#2	6-6	9-9 <u>9-10</u>	12-4 <u>12-6</u>	15-1 <u>15-3</u>	17-6 <u>17-9</u>	6-3 <u>6-4</u>	9-2 <u>9-4</u>	11-8 <u>11-9</u>	14-2 <u>14-5</u>	16-6 <u>16-8</u>
	Douglas fir-larch	#3	5-0 <u>5-2</u>	7-4 <u>7-7</u>	9-4 <u>9-7</u>	11-5 <u>11-8</u>	13-2 <u>13-6</u>	4-9 <u>4-10</u>	6-11 <u>7-1</u>	8-9 <u>9-0</u>	10-9 <u>11-0</u>	12-5 <u>12-9</u>
	Hem-Fir	#1	6-4	10-0	12-10 <u>13-0</u>	15-8 <u>15-11</u>	18-2 <u>18-5</u>	6-4	9-7 <u>9-8</u>	12-1 <u>12-3</u>	14-10 <u>15-0</u>	17-2 <u>17-5</u>
16	Douglas fir-larch	SS	6-3	9-10	12-11	16-6	19-6 <u>19-10</u>	6-3	9-10	12-11	15-10 <u>16-1</u>	18-4 <u>18-8</u>
	Douglas fir-larch	#2	5-9 <u>5-10</u>	8-5 <u>8-7</u>	10-8 <u>10-10</u>	13-1 <u>13-3</u>	15-2 <u>15-4</u>	5-5 <u>5-6</u>	7-11 <u>8-1</u>	10-1 <u>10-3</u>	12-4 <u>12-6</u>	14-3 <u>14-6</u>

RAFTER SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
		2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
		Maximum rafter spans ^a									
		(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
	Douglas fir-larch #3	4-4 4-6	6-4 6-6	8-1 8-3	9-10 10-1	11-5 11-9	4-1 4-3	6-0 6-2	7-7 7-10	9-4 9-6	10-9 11-1
	Hem-Fir #1	5-9	8-9 8-11	11-2 11-3	13-7 13-9	15-9 16-0	5-8 5-9	8-3 8-5	10-6 10-8	12-10 13-0	14-10 15-1
19.2	Douglas fir-larch SS	5-10	9-3	12-2	15-4 15-6	17-9 18-1	5-10	9-3	11-10 12-0	14-5 14-8	16-9 17-1
	Douglas fir-larch #2	5-3 5-4	7-8 7-10	9-9 9-11	11-11 12-1	13-10 14-0	5-0	7-3 7-4	9-2 9-4	11-3 11-5	13-0 13-2
	Douglas fir-larch #3	4-0 4-1	5-10 6-0	7-4 7-7	9-0 9-3	10-5 10-8	3-9 3-10	5-6 5-7	6-11 7-	8-6 8-8	9-10 10-1
	Hem-Fir #1	5-5	8-0 8-2	10-2 10-3	12-5 12-7	14-5 14-7	5-2 5-3	7-7 7-8	9-7 9-8	11-8 11-10	13-7 13-9
24	Douglas fir-larch SS	5-5	8-7	11-3	13-9 13-11	15-11 16-2	5-5	8-4 8-6	10-7 10-9	12-11 13-2	15-0 15-3
	Douglas fir-larch #2	4-8 4-9	6-11 7-0	8-9 8-10	10-8 10-10	12-4 12-6	4-5 4-6	6-6 6-7	8-3 8-4	10-0 10-2	11-8 11-10
	Douglas fir-larch #3	3-7 3-8	5-2 5-4	6-7 6-9	8-1 8-3	9-4 9-7	3-4 3-5	4-11 5-0	6-3 6-4	7-7 7-9	8-10 9-0
	Hem-Fir #1	4-11 5-0	7-2 7-3	9-1 9-2	11-1 11-3	12-10 13-0	4-7 4-8	6-9 6-10	8-7 8-8	10-6 10-7	12-2 12-4

(Portions of Table not shown remain unchanged)

Reason: Between 1991 and 1997, the standard for deriving sawn lumber design values, ASTM D1990, was slightly revised. As a result, bending design values for sawn lumber were re-calculated which led to slight increases to design values of some grades of certain species. Revised design values for Select Structural, #2, and #3 grades of Douglas fir-Larch and #1 grade of Hem-Fir all increased by 25 psi. Design values in the design value supplements to the 1997 NDS and the *Span Tables for Joist & Rafters* were all revised, as were the spans in the 2001 WFCM and AWC's on-line span calculator.

It was recently pointed out that span tables incorporated into the 2000 IBC and 2000 IRC were based on span tables pre-dating the revised design values. This proposal revises the IRC span table spans for Select Structural, #2, and #3 grades of Douglas fir-Larch and #1 grade of Hem-Fir using the slightly higher bending values. These spans will be in agreement with current span tables being used by the design community.

Cost Impact: The code change will not increase the cost of construction.

RB248-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R502.3.1(1)T-RB-PITTS.doc

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Table R502.3.3(1), Table R502.3.3(2)

Proponent: Dennis Pitts, American Wood Council (dpitts@awc.org)

Revise as follows:

TABLE R502.3.3(1)
CANTILEVER SPANS FOR FLOOR JOISTS SUPPORTING LIGHT-FRAME
EXTERIOR BEARING WALL AND ROOF ONLY^{a, b, c, f, g, h}
(Floor Live Load \leq 40 psf, Roof Live Load \leq 20 psf)

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

- a. Tabulated values are for clear-span roof supported solely by exterior bearing walls.
- b. Spans are based on No. 2 Grade lumber of Douglas fir-larch, hem-fir, ~~southern pine~~ and spruce-pine-fir for repetitive (three or more) members.

(Portions of Table not shown remain unchanged)

TABLE R502.3.3(2)
CANTILEVER SPANS FOR FLOOR JOISTS SUPPORTING EXTERIOR BALCONY^{a, b, e, f}

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

- a. Spans are based on No. 2 Grade lumber of Douglas fir-larch, hem-fir, ~~southern pine~~ and spruce-pine-fir for repetitive (three or more) members.

(Portions of Table not shown remain unchanged)

Reason: It is likely the design values for wider width southern pine lumber will change in early 2013. This proposal will eliminate the use of these tables with southern pine. It is the proponent's intent to find a solution that will allow for the continued use of southern pine with this table, but that will only be possible once the new design values are certified. In the meantime, this change to footnote "b" will prohibit the unintended use of these spans with southern pine lumber.

Cost Impact: The code change will not increase the cost of construction.

RB249-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R502.3.3(1)T-RB-PITTS.doc

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Table R502.5(1), Table R502.5(2), Table R802.4(1), Table R802.4(2), Table R802.5.1(1) through R802.5.1(8)

Proponent: Dennis Pitts, American Wood Council (dpitts@awc.org)

Revise as follows:

TABLE R502.5(1)
GIRDER SPANS^{a,b} AND HEADER SPANS^{a,b} FOR EXTERIOR BEARING WALLS
 (Maximum spans for Douglas fir-larch, hem-fir, southern pine and spruce-pine-fir^b and required number of jack studs)

(Portions of Table not shown remain unchanged)

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

- Spans are given in feet and inches.
- No. 1 or better grade lumber shall be used for Southern Pine 2x4s. Other tabulated values assume #2 grade lumber.
- Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.
- NJ - Number of jack studs required to support each end. Where the number of required jack studs equals one, the header is permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header.
- Use 30 psf ground snow load for cases in which ground snow load is less than 30 psf and the roof live load is equal to or less than 20 psf.

TABLE R502.5(2)
GIRDER SPANS^{a,b} AND HEADER SPANS^{a,b} FOR INTERIOR BEARING WALLS
 (Maximum spans for Douglas fir-larch, hem-fir, southern pine and spruce-pine-fir^b and required number of jack studs)

(Portions of Table not shown remain unchanged)

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

- Spans are given in feet and inches.
- No. 1 or better grade lumber shall be used for Southern Pine 2x4s. Other tabulated values assume #2 grade lumber.
- Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.
- NJ - Number of jack studs required to support each end. Where the number of required jack studs equals one, the header is permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header.

Revise as follows:

TABLE R802.4(1)
CEILING JOIST SPANS FOR COMMON LUMBER SPECIES
 (Uninhabitable attics without storage, live load = 10 psf, $L/\Delta = 240$)

CEILING JOIST SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 5 psf			
		2x4	2x6	2x8	2x10
		Maximum ceiling joist spans			
		(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
12	Southern pine #2	12-5 11-10	19-6	25-8	Note a
	Southern pine #3	11-6 9-8	17-0	21-8	25-7
16	Southern pine #2	11-3 10-9	17-8	23-4	Note a
	Southern pine #3	10-0 8-5	14-9	18-9	22-2
19.2	Southern pine #2	10-7 10-2	16-8	21-11	Note a

CEILING JOIST SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 5 psf			
		2x4	2x6	2x8	2x10
		Maximum ceiling joist spans			
		(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
	Southern pine #3	<u>9-1</u> <u>7-8</u>	13-6	17-2	20-3
24	Southern pine #2	<u>9-10</u> <u>9-1</u>	15-6	20-1	23-11
	Southern pine #3	<u>8-2</u> <u>6-10</u>	12-0	15-4	18-1

(Portions of Table not shown remain unchanged)

TABLE R802.4(2)
CEILING JOIST SPANS FOR COMMON LUMBER SPECIES
(Uninhabitable attics without storage, live load = 20 psf, $L/\Delta = 240$)

CEILING JOIST SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf			
		2x4	2x6	2x8	2x10
		Maximum ceiling joist spans			
		(feet-inches)	(feet-inches)	(feet-inches)	(feet-inches)
12	Southern pine #2	<u>9-10</u> <u>9-1</u>	15-6	20-1	23-11
	Southern pine #3	<u>8-2</u> <u>6-10</u>	12-0	15-4	18-1
16	Southern pine #2	<u>8-11</u> <u>7-10</u>	13-6	17-5	20-9
	Southern pine #3	<u>7-1</u> <u>5-11</u>	10-5	13-3	15-8
19.2	Southern pine #2	<u>8-5</u> <u>7-2</u>	12-3	15-10	18-11
	Southern pine #3	<u>6-5</u> <u>5-5</u>	9-6	12-1	14-4
24	Southern pine #2	<u>7-8</u> <u>6-5</u>	11-0	14-2	16-11
	Southern pine #3	<u>5-9</u> <u>4-10</u>	8-6	10-10	12-10

(Portions of Table not shown remain unchanged)

TABLE R802.5.1(1)
RAFTER SPANS FOR COMMON LUMBER SPECIES
(Roof live load = 20 psf, ceiling not attached to rafters, $L/\Delta = 180$)

RAFTER SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
		2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
		Maximum rafter spans ^a									
		(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
12	Southern Pine #2	<u>10-10</u> <u>10-2</u>	17-0	22-5	Note b	Note b	<u>10-6</u> <u>8-9</u>	15-1	19-5	23-2	Note b
	Southern Pine #3	<u>9-1</u> <u>7-8</u>	13-6	17-2	20-3	24-1	<u>7-11</u> <u>6-8</u>	11-8	14-10	17-6	20-11
16	Southern Pine #2	<u>9-10</u> <u>8-9</u>	15-1	19-5	23-2	Note b	<u>9-1</u> <u>7-7</u>	13-0	16-10	20-1	23-7

RAFTER SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
		2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
		Maximum rafter spans ^a									
		(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
	Southern Pine #3	7-11 6-8	11-8	14-10	17-6	20-11	6-10 5-9	10-1	12-10	15-2	18-1
19.2	Southern Pine #2	9-3 8-0	13-9	17-9	21-2	24-10	8-4 6-11	11-11	15-4	18-4	21-6
	Southern Pine #3	7-3 6-1	10-8	13-7	16-0	19-1	6-3 5-3	9-3	11-9	13-10	16-6
24	Southern Pine #2	8-7 7-2	12-3	15-10	18-11	22-2	7-5 6-2	10-8	13-9	16-5	19-3
	Southern Pine #3	6-5 5-5	9-6	12-1	14-4	17-1	5-7 4-8	8-3	10-6	12-5	14-9

(Portions of Table not shown remain unchanged)

TABLE R802.5.1(2)
RAFTER SPANS FOR COMMON LUMBER SPECIES
 (Roof live load = 20 psf, ceiling attached to rafters, L/Δ = 240)

RAFTER SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
		2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
		Maximum rafter spans ^a									
		(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
12	Southern Pine #2	9-10 9-5	15-6	20-5	Note b	Note b	9-10 8-9	15-1	19-5	23-2	Note b
	Southern Pine #3	9-4 7-8	13-6	17-2	20-3	24-1	7-11 6-8	11-8	14-10	17-6	20-11
16	Southern Pine #2	8-11 8-7	14-1	18-6	23-2	Note b	8-11 7-7	13-0	16-10	20-1	23-7
	Southern Pine #3	7-11 6-8	11-8	14-10	17-6	20-11	6-10 5-9	10-1	12-10	15-2	18-1
19.2	Southern Pine #2	8-5 8-0	13-3	17-5	21-2	24-10	8-4 6-11	11-11	15-14	18-4	21-6
	Southern Pine #3	7-3 6-1	10-8	13-7	16-0	19-1	6-3 5-3	9-3	11-9	13-10	16-6
24	Southern Pine #2	7-10 7-2	12-3	15-10	18-11	22-2	7-5 6-2	10-8	13-9	16-5	19-3
	Southern Pine #3	6-5 5-5	9-6	12-1	14-4	17-1	5-7 4-8	8-3	10-6	12-5	14-9

(Portions of Table not shown remain unchanged)

TABLE R802.5.1(3)
RAFTER SPANS FOR COMMON LUMBER SPECIES
 (Ground snow load = 30 psf, ceiling not attached to rafters, L/Δ = 180)

RAFTER SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf				DEAD LOAD = 20 psf			
		2x4	2x6	2x8	2x10	2x4	2x6	2x8	2x10
		Maximum rafter spans ^a							
		(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
12	Southern Pine #2	9-6 8-5	14-5	18-8	22-3	Note b	9-0 7-6	12-11	16-8
	Southern Pine #3	7-7 6-4	11-2	14-3	16-10	20-0	6-9 5-8	10-0	12-9

16	Southern Pine	#2	8-7 <u>7-3</u>	12-6	16-2	19-3	22-7	7-10 <u>6-6</u>	11-2	14-5	17-3	20-2
	Southern Pine	#3	6-7 <u>5-6</u>	9-8	12-4	14-7	17-4	5-10 <u>4-11</u>	8-8	11-0	13-0	15-6
19.2	Southern Pine	#2	7-11 <u>6-8</u>	11-5	14-9	17-7	20-7	7-4 <u>6-0</u>	10-2	13-2	15-9	18-5
	Southern Pine	#3	6-0 <u>5-0</u>	8-10	11-3	13-4	15-10	5-4 <u>4-6</u>	7-11	10-1	11-11	14-2
24	Southern Pine	#2	7-4 <u>6-0</u>	10-2	13-2	15-9	18-5	6-4 <u>5-4</u>	9-2	11-9	14-1	16-6
	Southern Pine	#3	5-4 <u>4-6</u>	7-11	10-1	11-11	14-2	4-9 <u>4-0</u>	7-1	9-0	10-8	12-8

(Portions of Table not shown remain unchanged)

TABLE R802.5.1(4)
RAFTER SPANS FOR COMMON LUMBER SPECIES
(Ground snow load = 50 psf, ceiling not attached to rafters, L/Δ = 180)

RAFTER SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
		2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
		Maximum rafter spans ^a									
		(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
12	Southern Pine #2	8-0 <u>6-10</u>	11-9	15-3	18-2	21-3	7-7 <u>6-4</u>	10-11	14-1	16-10	19-9
	Southern Pine #3	6-2 <u>5-2</u>	9-2	11-8	13-9	16-4	5-9 <u>4-10</u>	8-5	10-9	12-9	15-2
16	Southern Pine #2	7-4 <u>6-0</u>	10-2	13-2	15-9	18-5	6-7 <u>5-6</u>	9-5	12-2	14-7	17-1
	Southern Pine #3	5-4 <u>4-6</u>	7-11	10-1	11-11	14-2	4-11 <u>4-2</u>	7-4	9-4	11-0	13-1
19.2	Southern Pine #2	6-6 <u>5-5</u>	9-4	12-0	14-4	16-10	6-0 <u>5-0</u>	8-8	11-2	13-4	15-7
	Southern Pine #3	4-11 <u>4-1</u>	7-3	9-2	10-10	12-11	4-6 <u>3-10</u>	6-8	8-6	10-1	12-0
24	Southern Pine #2	5-10 <u>4-10</u>	8-4	10-9	12-10	15-1	5-5 <u>4-6</u>	7-9	10-0	11-11	13-11
	Southern Pine #3	4-4 <u>3-8</u>	6-5	8-3	9-9	11-7	4-4 <u>3-5</u>	6-0	7-7	9-0	10-8

(Portions of Table not shown remain unchanged)

TABLE R802.5.1(5)
RAFTER SPANS FOR COMMON LUMBER SPECIES
(Ground snow load = 30 psf, ceiling attached to rafters, L/Δ = 240)

RAFTER SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
		2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
		Maximum rafter spans ^a									
		(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
12	Southern Pine #2	8-7 <u>8-3</u>	13-6	17-10	22-3	Note b	8-7 <u>7-6</u>	12-11	16-8	19-11	23-4
	Southern Pine #3	7-7 <u>6-4</u>	11-2	14-3	16-10	20-0	6-9 <u>5-8</u>	10-0	12-9	15-1	17-11
16	Southern Pine #2	7-10 <u>7-3</u>	12-3	16-2	19-3	22-7	7-10 <u>6-6</u>	11-2	14-5	17-3	20-2
	Southern Pine #3	6-7 <u>5-6</u>	9-8	12-4	14-7	17-4	5-10 <u>4-11</u>	8-8	11-0	13-0	15-6

19.2	Southern Pine	#2	<u>7-4</u> <u>6-8</u>	11-5	14-9	17-7	20-7	<u>7-4</u> <u>6-0</u>	10-2	13-2	15-9	18-5
	Southern Pine	#3	<u>6-0</u> <u>5-0</u>	8-10	11-3	13-4	15-10	<u>5-4</u> <u>4-6</u>	7-11	10-1	11-11	14-2
24	Southern Pine	#2	<u>6-10</u> <u>6-0</u>	10-2	13-2	15-9	18-5	<u>6-4</u> <u>5-4</u>	9-2	11-9	14-1	16-6
	Southern Pine	#3	<u>5-4</u> <u>4-6</u>	7-11	10-1	11-11	14-2	<u>4-9</u> <u>4-0</u>	7-1	9-0	10-8	12-8

(Portions of Table not shown remain unchanged)

TABLE R802.5.1(6)
RAFTER SPANS FOR COMMON LUMBER SPECIES
 (Ground snow load = 50 psf, ceiling attached to rafters, L/Δ = 240)

RAFTER SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
		2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
		Maximum rafter spans ^a									
		(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
12	Southern Pine #2	<u>7-3</u> <u>6-10</u>	11-5	15-0	18-2	21-3	<u>7-3</u> <u>6-4</u>	10-11	14-1	16-10	19-9
	Southern Pine #3	<u>6-2</u> <u>5-2</u>	9-2	11-8	13-9	16-4	<u>5-9</u> <u>4-10</u>	8-5	10-9	12-9	15-2
16	Southern Pine #2	<u>6-7</u> <u>6-0</u>	10-2	13-2	15-9	18-5	<u>6-7</u> <u>5-6</u>	9-5	12-2	14-7	17-1
	Southern Pine #3	<u>5-4</u> <u>4-6</u>	7-11	10-1	11-11	14-2	<u>4-11</u> <u>4-2</u>	7-4	9-4	11-0	13-1
19.2	Southern Pine #2	<u>6-2</u> <u>5-5</u>	9-4	12-0	14-4	16-10	<u>6-0</u> <u>5-0</u>	8-8	11-2	13-4	15-7
	Southern Pine #3	<u>4-11</u> <u>4-1</u>	7-3	9-2	10-10	12-11	<u>4-6</u> <u>3-10</u>	6-8	8-6	10-1	12-0
24	Southern Pine #2	<u>5-9</u> <u>4-10</u>	8-4	10-9	12-10	15-1	<u>5-5</u> <u>4-6</u>	7-9	10-0	11-11	13-11
	Southern Pine #3	<u>4-4</u> <u>3-8</u>	6-5	8-3	9-9	11-7	<u>4-4</u> <u>3-5</u>	6-0	7-7	9-0	10-18

(Portions of Table not shown remain unchanged)

TABLE R802.5.1(7)
RAFTER SPANS FOR 70 PSF GROUND SNOW LOAD
 (Ceiling not attached to rafters, L/Δ = 180)

RAFTER SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
		2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
		Maximum rafter spans ^a									
		(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
12	Southern Pine #2	<u>7-4</u> <u>6-0</u>	10-2	13-2	15-9	18-5	<u>6-8</u> <u>5-7</u>	9-7	12-5	14-10	17-5
	Southern Pine #3	<u>5-4</u> <u>4-6</u>	7-11	10-1	11-11	14-2	<u>5-4</u> <u>4-3</u>	7-5	9-6	11-3	13-4
16	Southern Pine #2	<u>6-2</u> <u>5-2</u>	8-10	11-5	13-7	16-0	<u>5-10</u> <u>4-10</u>	8-4	10-9	12-10	15-1
	Southern Pine #3	<u>4-8</u> <u>3-11</u>	6-10	8-9	10-4	12-3	<u>4-4</u> <u>3-8</u>	6-5	8-3	9-9	11-7
19.2	Southern Pine #2	<u>5-7</u> <u>4-8</u>	8-1	10-5	12-5	14-7	<u>5-4</u> <u>4-5</u>	7-7	9-10	11-9	13-9

	Southern Pine	#3	4-3 <u>3-7</u>	6-3	8-0	9-5	11-2	4-0 <u>3-4</u>	5-11	7-6	8-10	10-7
24	Southern Pine	#2	5-0 <u>4-3</u>	7-3	9-4	11-1	13-0	4-9 <u>4-0</u>	6-10	8-9	10-6	12-4
	Southern Pine	#3	3-9 <u>3-2</u>	5-7	7-1	8-5	10-0	3-7 <u>3-0</u>	5-3	6-9	7-11	9-5

(Portions of Table not shown remain unchanged)

TABLE R802.5.1(8)
RAFTER SPANS FOR 70 PSF GROUND SNOW LOAD
(Ceiling attached to rafters, $L/\Delta = 240$)

RAFTER SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2x4	2x6	2x8	2x10	2x12	2x4	2x6	2x8	2x10	2x12
			Maximum rafter spans ^a									
			(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)	(feet – inches)
12	Southern Pine	#2	6-6 <u>6-0</u>	10-2	13-2	15-9	18-5	6-6 <u>5-7</u>	9-7	12-5	14-10	17-5
	Southern Pine	#3	5-4 <u>4-6</u>	7-11	10-1	11-11	14-2	5-1 <u>4-3</u>	7-5	9-6	11-3	13-4
16	Southern Pine	#2	5-11 <u>5-2</u>	8-10	11-5	13-7	16-0	5-10 <u>4-10</u>	8-4	10-9	12-10	15-1
	Southern Pine	#3	4-8 <u>3-11</u>	6-10	8-9	10-4	12-3	4-4 <u>3-8</u>	6-5	8-3	9-9	11-7
19.2	Southern Pine	#2	5-6 <u>4-8</u>	8-1	10-5	12-5	14-7	5-4 <u>4-5</u>	7-7	9-10	11-9	13-9
	Southern Pine	#3	4-3 <u>3-7</u>	6-3	8-0	9-5	11-2	4-0 <u>3-4</u>	5-11	7-6	8-10	10-7
24	Southern Pine	#2	5-0 <u>4-3</u>	7-3	9-4	11-1	13-0	4-9 <u>4-0</u>	6-10	8-9	10-6	12-4
	Southern Pine	#3	3-9 <u>3-2</u>	5-7	7-1	8-5	10-0	3-7 <u>3-0</u>	5-3	6-9	7-11	9-5

(Portions of Table not shown remain unchanged)

Reason: New design values for 2x4 Southern Pine #2 and all lower grades (i.e. #3, Stud, Construction, Standard, and Utility) were certified by the American Lumber Standards Committee Board of Review (BOR) on January 11, 2012, and became effective on June 1, 2012. This proposed change to multiple tables of the IRC reflects lower spans resulting from the newly certified design values. It is anticipated the Board of Review will certify new design values for other widths and grades of southern pine in early 2013. The use of the phrase “no change” is intended to mean that, as of the January 3, 2013 code change deadline, there are no revisions to these table entries. Further, it is likely there will be changes affecting these entries during the time period of the Group B development cycle. If new design values are certified and there is time prior to the IRC Committee hearings, AWC will prepare a floor modification to amend all the affected spans. Alternatively, the revised span tables will be developed for consideration during the Final Action Hearings. Regardless, approval of these spans by the Committee will allow the greatest degree of flexibility to further modify the spans at the Final Action Hearings.

In October 2012, the ICC membership approved code changes S281-12 and S283-12. These changes established a link between changes made to span tables in the IRC to identical IBC span tables. Since design values for wider width southern pine lumber were not available for the IBC Group A development cycle, S281-12 and S283-12 instruct ICC staff to extract the appropriate tables from the 2015 IRC. This will ensure that the 2015 IBC and 2015 IRC have identical state-of-the-art spans for southern pine.

Cost Impact: The code change will not increase the cost of construction.

RB250-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R502.5(1)T-RB-PITTS.doc

RB251 – 13

R502.5, Table R502.5(3) (NEW)

Proponent: Brian Foley, P.E., Fairfax County, VA, representing Virginia Building and Code Officials Association (brian.foley@fairfaxcounty.gov), Lynn Underwood, Norfolk, VA, representing Virginia Building and Code Officials Association

Revise as follows:

R502.5 Allowable girder and header spans. The allowable spans of girders and headers fabricated of dimension lumber shall not exceed the values set forth in Tables R502.5(1) and through ~~R502.5(2)~~ R502.5(3).

TABLE R502.5(3)
GIRDER AND HEADER SPANS^a FOR OPEN PORCHES
(Maximum span for Douglas fir-larch, hem-fir, southern pine and spruce-pine-fir^b)

SIZE	SUPPORTING ROOF						SUPPORTING FLOOR	
	GROUND SNOW LOAD ^c (psf)							
	30		50		70			
	DEPTH OF PORCH ^d (feet)							
	8	14	8	14	8	14	8	14
2-2 x 6	7-6	5-8	6-2	4-8	5-4	4-0	6-4	4-9
2-2 x 8	10-1	7-7	8-3	6-2	7-1	5-4	8-5	6-4
2-2 x 10	12-4	9-4	10-1	7-7	8-9	6-7	10-4	7-9
2-2 x 12	14-4	10-10	11-8	8-10	10-1	7-8	11-11	9-0

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa

a. Spans are given in feet and inches.

b. Tabulated values assume #2 grade lumber, wet service and incising for refractory species.

Use 30 psf ground snow load for cases in which ground snow load is less than 30 psf and the roof live load is equal to or less than 20 psf.

c. Porch width is measured horizontally from building face to the centerline of the header. For widths between those shown, spans are permitted to be interpolated.

Reason: The *International Residential Code* (IRC) regulates the size of headers in Chapter 5. Tables R502.5(1) and (2) has categories of building width that begins at 20 feet. Choosing porch header sizes based on those tables would produce oversize sections. To comply, the builder must construct the porch of an oversized header or seek an engineering solution to use the actual header size required.

This code change proposal provides a table based on post construction to support headers for porches with an 8 foot or 14 foot width. The span lengths in the table were based on the 2005 AF&PA/NDS and the species which are commonly identified in other IRC tables similarly to the other span tables in the code.

Cost Impact: The code change proposal will not increase the cost of construction.

RB251-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R502.5-RB-FOLEY.doc

RB252 – 13

R301.2.2.2.5, R404.1.9.2, R502.5, Table R502.5(1), Table R502.5(2), R602.3, R602.7, Table R602.7.1

Proponent: ~~DP~~ Dennis Pitts, American Wood Council (dpitts@awc.org)

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Revise as follows:

R301.2.2.2.5 Irregular buildings. The seismic provisions of this code shall not be used for irregular structures located in Seismic Design Categories C, D₀, D₁ and D₂. Irregular portions of structures shall be designed in accordance with accepted engineering practice to the extent the irregular features affect the performance of the remaining structural system. When the forces associated with the irregularity are resisted by a structural system designed in accordance with accepted engineering practice, design of the remainder of the building shall be permitted using the provisions of this code. A building or portion of a building shall be considered to be irregular when one or more of the following conditions occur:

3. When the end of a *braced wall panel* occurs over an opening in the wall below and ends at a horizontal distance greater than 1 foot (305 mm) from the edge of the opening. This provision is applicable to shear walls and *braced wall panels* offset in plane and to *braced wall panels* offset out of plane as permitted by the exception to Item 1 above.

Exception: For wood light-frame wall construction, one end of a *braced wall panel* shall be permitted to extend more than 1 foot (305 mm) over an opening not more than 8 feet (2438 mm) wide in the wall below provided that the opening includes a header in accordance with the following:

1. The building width, loading condition and framing member species limitations of Table ~~R502.5(1)~~ R602.7(1) shall apply; and

(Portions of text not shown remain unchanged)

Revise as follows:

R404.1.9.2 Masonry piers supporting floor girders. Masonry piers supporting wood girders sized in accordance with Tables ~~R502.5(1)~~ R602.7(1) and ~~R502.5(2)~~ R602.7(2) shall be permitted in accordance with this section. Piers supporting girders for interior bearing walls shall have a minimum nominal dimension of 12 inches (305 mm) and a maximum height of 10 feet (3048 mm) from top of footing to bottom of sill plate or girder. Piers supporting girders for exterior bearing walls shall have a minimum nominal dimension of 12 inches (305 mm) and a maximum height of 4 feet (1220 mm) from top of footing to bottom of sill plate or girder. Girders and sill plates shall be anchored to the pier or footing in accordance with Section R403.1.6 or Figure R404.1.5(1). Floor girder bearing shall be in accordance with Section R502.6.

Revise as follows:

R502.5 Allowable girder spans. The allowable spans of girders fabricated of dimension lumber shall not exceed the values set forth in ~~Tables R502.5(1) and R502.5(2)~~ Tables R602.7(1) and R602.7(2)

TABLE R502.5(4) R602.7(1)
GIRDER SPANS^a AND HEADER SPANS^a FOR EXTERIOR BEARING WALLS
 (Maximum spans for Douglas fir-larch, hem-fir, southern pine and spruce-pine-fir^b and required number of jack studs)

GIRDERS AND HEADERS SUPPORTING	SIZE	GROUND SNOW LOAD (psf) ^o																	
		30						50						70					
		Building width ^c (feet)																	
		20		28		36		20		28		36		20		28		36	
		Span	NJ ^d	Span	NJ ^d	Span	NJ ^d	Span	NJ ^d	Span	NJ ^d	Span	NJ ^d	Span	NJ ^d	Span	NJ ^d	Span	NJ ^d
Roof and ceiling	<u>1-2 x 8</u>	<u>4-6</u>	1	<u>3-10</u>	1	<u>3-5</u>	1	<u>3-9</u>	1	<u>3-2</u>	1	<u>2-10</u>	2	=	=	=	=	=	=
	<u>1-2 x 10</u>	<u>5-8</u>	1	<u>4-11</u>	1	<u>4-4</u>	1	<u>4-9</u>	1	<u>4-1</u>	1	<u>3-7</u>	2	=	=	=	=	=	=
	<u>1-2 x 12</u>	<u>6-11</u>	1	<u>5-11</u>	2	<u>5-3</u>	2	<u>5-9</u>	2	<u>4-8</u>	2	<u>3-8</u>	2	=	=	=	=	=	=
	2-2 x 4	3-6	1	3-2	1	2-10	1	3-2	1	2-9	1	2-6	1	2-10	1	2-6	1	2-3	1
	2-2 x 6	5-5	1	4-8	1	4-2	1	4-8	1	4-1	1	3-8	2	4-2	1	3-8	2	3-3	2
	2-2 x 8	6-10	1	5-11	2	5-4	2	5-11	2	5-2	2	4-7	2	5-4	2	4-7	2	4-1	2
	2-2 x 10	8-5	2	7-3	2	6-6	2	7-3	2	6-3	2	5-7	2	6-6	2	5-7	2	5-0	2
	2-2 x 12	9-9	2	8-5	2	7-6	2	8-5	2	7-3	2	6-6	2	7-6	2	6-6	2	5-10	3
	3-2 x 8	8-4	1	7-5	1	6-8	1	7-5	1	6-5	2	5-9	2	6-8	1	5-9	2	5-2	2
	3-2 x 10	10-6	1	9-1	2	8-2	2	9-1	2	7-10	2	7-0	2	8-2	2	7-0	2	6-4	2
	3-2 x 12	12-2	2	10-7	2	9-5	2	10-7	2	9-2	2	8-2	2	9-5	2	8-2	2	7-4	2
	4-2 x 8	9-2	1	8-4	1	7-8	1	8-4	1	7-5	1	6-8	1	7-8	1	6-8	1	5-11	2
	4-2 x 10	11-8	1	10-6	1	9-5	2	10-6	1	9-1	2	8-2	2	9-5	2	8-2	2	7-3	2
4-2 x 12	14-1	1	12-2	2	10-11	2	12-2	2	10-7	2	9-5	2	10-11	2	9-5	2	8-5	2	
Roof, ceiling and one center-bearing floor	<u>1-2 x 8</u>	<u>3-11</u>	1	<u>3-5</u>	1	<u>3-0</u>	1	<u>3-7</u>	1	<u>3-0</u>	2	<u>2-8</u>	2	=	=	=	=	=	=
	<u>1-2 x 10</u>	<u>5-0</u>	2	<u>4-4</u>	2	<u>3-10</u>	2	<u>4-6</u>	2	<u>3-11</u>	2	<u>3-4</u>	2	=	=	=	=	=	=
	<u>1-2 x 12</u>	<u>5-10</u>	2	<u>4-9</u>	2	<u>4-2</u>	2	<u>5-5</u>	2	<u>4-2</u>	2	<u>3-4</u>	2	=	=	=	=	=	=
	2-2 x 4	3-1	1	2-9	1	2-5	1	2-9	1	2-5	1	2-2	1	2-7	1	2-3	1	2-0	1
	2-2 x 6	4-6	1	4-0	1	3-7	2	4-1	1	3-7	2	3-3	2	3-9	2	3-3	2	2-11	2
	2-2 x 8	5-9	2	5-0	2	4-6	2	5-2	2	4-6	2	4-1	2	4-9	2	4-2	2	3-9	2
	2-2 x 10	7-0	2	6-2	2	5-6	2	6-4	2	5-6	2	5-0	2	5-9	2	5-1	2	4-7	3
	2-2 x 12	8-1	2	7-1	2	6-5	2	7-4	2	6-5	2	5-9	3	6-8	2	5-10	3	5-3	3
	3-2 x 8	7-2	1	6-3	2	5-8	2	6-5	2	5-8	2	5-1	2	5-11	2	5-2	2	4-8	2
	3-2 x 10	8-9	2	7-8	2	6-11	2	7-11	2	6-11	2	6-3	2	7-3	2	6-4	2	5-8	2
	3-2 x 12	10-2	2	8-11	2	8-0	2	9-2	2	8-0	2	7-3	2	8-5	2	7-4	2	6-7	2
	4-2 x 8	8-1	1	7-3	1	6-7	1	7-5	1	6-6	1	5-11	2	6-10	1	6-0	2	5-5	2
	4-2 x 10	10-1	1	8-10	2	8-0	2	9-1	2	8-0	2	7-2	2	8-4	2	7-4	2	6-7	2
	4-2 x 12	11-9	2	10-3	2	9-3	2	10-7	2	9-3	2	8-4	2	9-8	2	8-6	2	7-7	2
	Roof, ceiling and one clear span floor	<u>1-2 x 8</u>	<u>3-6</u>	1	<u>3-0</u>	1	<u>2-8</u>	1	<u>3-5</u>	1	<u>2-11</u>	1	<u>2-7</u>	2	=	=	=	=	=
<u>1-2 x 10</u>		<u>4-6</u>	1	<u>3-10</u>	1	<u>3-3</u>	1	<u>4-4</u>	1	<u>3-9</u>	1	<u>3-1</u>	2	=	=	=	=	=	=
<u>1-2 x 12</u>		<u>5-6</u>	1	<u>4-2</u>	2	<u>3-3</u>	2	<u>5-4</u>	2	<u>3-11</u>	2	<u>3-1</u>	2	=	=	=	=	=	=
2-2 x 4		2-8	1	2-4	1	2-1	1	2-7	1	2-3	1	2-0	1	2-5	1	2-1	1	1-10	1
2-2 x 6		3-11	1	3-5	2	3-0	2	3-10	2	3-4	2	3-0	2	3-6	2	3-1	2	2-9	2
2-2 x 8		5-0	2	4-4	2	3-10	2	4-10	2	4-2	2	3-9	2	4-6	2	3-11	2	3-6	2
2-2 x 10		6-1	2	5-3	2	4-8	2	5-11	2	5-1	2	4-7	3	5-6	2	4-9	2	4-3	3
2-2 x 12		7-1	2	6-1	3	5-5	3	6-10	2	5-11	3	5-4	3	6-4	2	5-6	3	5-0	3
3-2 x 8		6-3	2	5-5	2	4-10	2	6-1	2	5-3	2	4-8	2	5-7	2	4-11	2	4-5	2
3-2 x 10		7-7	2	6-7	2	5-11	2	7-5	2	6-5	2	5-9	2	6-10	2	6-0	2	5-4	2
3-2 x 12		8-10	2	7-8	2	6-10	2	8-7	2	7-5	2	6-8	2	7-11	2	6-11	2	6-3	2
4-2 x 8		7-2	1	6-3	2	5-7	2	7-0	1	6-1	2	5-5	2	6-6	1	5-8	2	5-1	2

GIRDERS AND HEADERS SUPPORTING	SIZE	GROUND SNOW LOAD (psf) ^o																	
		30				50				70									
		Building width ^c (feet)																	
		20		28		36		20		28		36		20		28		36	
		Span	NJ ^d	Span	NJ ^d	Span	NJ ^d	Span	NJ ^d	Span	NJ ^d	Span	NJ ^d	Span	NJ ^d	Span	NJ ^d	Span	NJ ^d
		4-2 x 10	8-9	2	7-7	2	6-10	2	8-7	2	7-5	2	6-7	2	7-11	2	6-11	2	6-2
	4-2 x 12	10-2	2	8-10	2	7-11	2	9-11	2	8-7	2	7-8	2	9-2	2	8-0	2	7-2	2

(Portion of Table not shown remain unchanged)

TABLE R602.5(2) R602.7(2)
GIRDER SPANS^a AND HEADER SPANS^a FOR INTERIOR BEARING WALLS

(Maximum spans for Douglas fir-larch, hem-fir, southern pine and spruce-pine-fir^b and required number of jack studs)

(Portions of Table not shown remain unchanged)

Revise as follows:

R602.3 Design and construction. Exterior walls of wood-frame construction shall be designed and constructed in accordance with the provisions of this chapter and Figures R602.3(1) and R602.3(2) or in accordance with AF&PA's NDS. Components of exterior walls shall be fastened in accordance with Tables R602.3(1) through R602.3(4). Wall sheathing shall be fastened directly to framing members and, when placed on the exterior side of an exterior wall, shall be capable of resisting the wind pressures listed in Table R301.2(2) adjusted for height and exposure using Table R301.2(3). Wood structural panel sheathing used for exterior walls shall conform to DOC PS 1, DOC PS 2 or, when manufactured in Canada, CSA O437 or CSA O325. All panels shall be identified for grade, bond classification, and Performance Category by a grade mark or certificate of inspection issued by an approved agency and shall conform to the requirements of Table R602.3(3). Wall sheathing used only for exterior wall covering purposes shall comply with Section R703.

Studs shall be continuous from support at the sole plate to a support at the top plate to resist loads perpendicular to the wall. The support shall be a foundation or floor, ceiling or roof diaphragm or shall be designed in accordance with accepted engineering practice.

Exception: Jack studs, trimmer studs and cripple studs at openings in walls that comply with Tables R602.5(4) R602.7(1) and R602.5(2) R602.7(2).

R602.7 Headers. For header spans see Tables R602.5(4), R602.5(2), and R602.7.4 R602.7(1) and R602.7(2).

TABLE R602.7.4
SPANS FOR MINIMUM No. 2 GRADE SINGLE HEADER^{a, b, c, f}

(Portions of Table not shown remain unchanged)

Reason: This change incorporates the single-ply header table into the main header table. The single-ply header is becoming more common for reasons of energy efficiency.

Single-ply header spans are based on #2 grade Hem-Fir design values, the same basis as the multi-ply headers in the main header table.

It also moves the main header tables back to Chapter 6, the wall chapter, since headers and girders are often considered wall elements and the header tables are commonly referenced in wall provisions. This change should make the tables easier to find since they are more often consulted for headers (walls) than for girders (floors).

The subsections and associated figures on single-ply headers, and the subsection, figure, and table on box headers, remain intact and in the same location.

This change will also facilitate the efficient updating of spans for new lumber design values as they become available.

Cost Impact: The code change will not increase the cost of construction.

RB252-13

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Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

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RB253 – 13

R502.6.2, R507.2

Proponent: Dennis Pitts, American Wood Council (dpitts@awc.org)

Revise as follows:

R502.6.2 Joist framing. ~~Joists framing into the side of a wood girder shall be supported by approved framing anchors or on ledger strips not less than nominal 2 inches by 2 inches (51 mm by 51 mm).~~ Where floor joists do not bear on the top of supporting wood members, approved connectors shall be used. Connectors shall not transfer gravity loads solely through the bottom half of the supporting beam, girder, or header.

R507.2 Joist framing. Where decks joists do not bear on the top of supporting wood members, approved connectors shall be used. Connectors shall not transfer gravity loads solely through the bottom half of the supporting beam, girder, or header.

Reason: Joist hangers or other framing connections attached solely through the bottom half of beams, girders, or headers can cause splitting failures. The tendency to split increases as the distance between the top fastener and the loaded bottom edge of the member decreases. Correctly designed and installed hangers will be fastened at or near the top edge of members to avoid this splitting failure. Connections below the neutral axis for other than light loads should be avoided (see the *National Design Specification (NDS) for Wood Construction*, Table 11.5.1C, footnote 2).

Cost Impact: The code change will not increase the cost of construction.

RB253-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

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RB254 – 13

R502.10

Proponent: Rick Davidson, City of Maple Grove, MN, representing Association of Minnesota Building Officials (rdavidson@maplegrovern.gov)

Revise as follows:

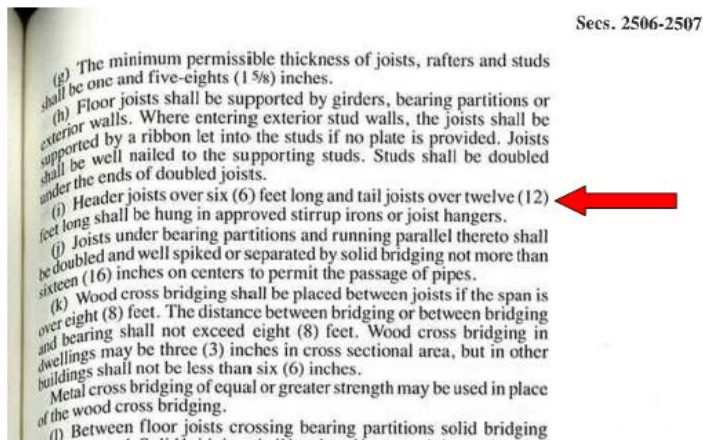
R502.10 Framing of openings. Openings in floor framing shall be framed with a header and trimmer joists. When the header joist span does not exceed 4 feet (1219 mm), the header joist may be a single member the same size as the floor joist. Single trimmer joists may be used to carry a single header joist that is located within 3 feet (914 mm) of the trimmer joist bearing. When the header joist span exceeds 4 feet (1219 mm), the trimmer joists and the header joist shall be doubled and of sufficient cross section to support the floor joists framing into the header. ~~Approved hangers shall be used for the header joist to trimmer joist connections when the header joist span exceeds 6 feet (1829 mm). Tail joists over 12 feet (3658 mm) long shall be supported at the header by framing anchors or on ledger strips not less than 2 inches by 2 inches (51 mm by 51 mm).~~

Reason: There is conflicting language in the code regarding the support of framing members at floor openings. R502.10 requires **header joists** be provided with approved hangers only when they exceed 6 feet in length and that **joists** to be supported on framing anchors or ledger strips only when they are over 12 feet long.

The conflict is that R502.6 requires **all** joists, beams, and girders to have not less than 1.5 inches of bearing regardless of length. Applying the existing language literally, a ten foot long joist framed into a stairway opening at one end and into the face of a beam at the other would require a joist hanger where it connects to the beam but not at the stairway header. The loads are assumed to be distributed evenly along the joist. Either the code should require all joists to meet the same requirements or it should exclude all joists 12 feet or less in length from needing hangers. This proposal deletes the language applicable to framing at openings and applies the bearing requirements for all joists as per R502.3. As an aside, the language requiring hangers only for tail joists over 12 feet in length was tracked back to the 1927 *Uniform Building Code*.

For information only:

R502.6 Bearing. The ends of each joist, beam or girder shall have not less than 1.5 inches (38 mm) of bearing on wood or metal and not less than 3 inches (76 mm) on masonry or concrete except where supported on a 1-inch by 4-inch (25.4 mm by 102 mm) ribbon strip and nailed to the adjacent stud or by the use of approved joist hangers. The bearing on masonry or concrete shall be direct, or a sill plate of 2-inch-minimum (51 mm) nominal thickness shall be provided under the joist, beam or girder. The sill plate shall provide a minimum nominal bearing area of 48 square inches (3086 square mm).



Cost Impact: The code change proposal will not increase the cost of construction.

RB254-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

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RB255 – 13

R503.2.1, R602.3, R604.1, R803.2.1

Proponent: Lisa Reiheld, CSA Group (lisa.reiheld@csagroup.org)

Revise as follows:

R503.2.1 Identification and grade. Wood structural panel sheathing used for structural purposes shall conform to DOC PS 1, DOC PS 2 ~~or, when manufactured in Canada,~~ CSA O437 or CSA O325. All panels shall be identified for grade, bond classification, and Performance Category by a grade *mark* or certificate of inspection issued by an *approved agency*. The Performance Category value shall be used as the “nominal panel thickness” or “panel thickness” whenever referenced in this code.

Revise as follows:

R602.3 Design and construction. Exterior walls of woodframe construction shall be designed and constructed in accordance with the provisions of this chapter and Figures R602.3(1) and R602.3(2) or in accordance with AF&PA's NDS. Components of exterior walls shall be fastened in accordance with Tables R602.3(1) through R602.3(4). Wall sheathing shall be fastened directly to framing members and, when placed on the exterior side of an exterior wall, shall be capable of resisting the wind pressures listed in Table R301.2(2) adjusted for height and exposure using Table R301.2(3). Wood structural panel sheathing used for exterior walls shall conform to DOC PS 1, DOC PS 2 ~~or, when manufactured in Canada,~~ CSA O437 or CSA O325. All panels shall be identified for grade, bond classification, and Performance Category by a grade mark or certificate of inspection issued by an approved agency and shall conform to the requirements of Table R602.3(3). Wall sheathing used only for exterior wall covering purposes shall comply with Section R703.

Studs shall be continuous from support at the sole plate to a support at the top plate to resist loads perpendicular to the wall. The support shall be a foundation or floor, ceiling or roof diaphragm or shall be designed in accordance with accepted engineering practice.

Exception: Jack studs, trimmer studs and cripple studs at openings in walls that comply with Tables R502.5(1) and R502.5(2).

R604.1 Identification and grade. Wood structural panels shall conform to DOC PS 1, DOC PS 2 or ANSI/APA PRP 210 ~~or, when manufactured in Canada,~~ CSA O437 or CSA O325. All panels shall be identified by a grade mark or certificate of inspection issued by an *approved agency*.

Revise as follows:

R803.2.1 Identification and grade. Wood structural panels shall conform to DOC PS 1, DOC PS 2 ~~or, when manufactured in Canada,~~ CSA O437 or CSA O325, and shall be identified for grade, bond classification, and Performance Category by a grade mark or certificate of inspection issued by an *approved agency*. Wood structural panels shall comply with the grades specified in Table R503.2.1.1(1).

Reason: The intent should not be specific to what country the product is manufactured in as long as it complies with an accepted standard.

Cost Impact: This code change proposal will not increase the cost of construction.

RB255-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R503.2.1-RB-REIHELD.doc

RB256 – 13

Table R503.2.1.1(1), Chapter 44

Proponent: John Mulder, Intertek Testing Services NA, Inc., representing International Standards Organization Technical Committee 77, *Products in Fibre-reinforced Cement* and self

Revise as follows:

TABLE R503.2.1.1(1) ALLOWABLE SPANS AND LOADS FOR WOOD STRUCTURAL PANELS FOR ROOF AND SUBFLOOR SHEATHING AND COMBINATION SUBFLOOR UNDERLAYMENT^{a,b,c}

- j. Unsupported edges shall have tongue-and-groove joints or shall be supported with blocking unless minimum ¼-inch thick wood panel-type underlayment or fiber-cement underlayment with end and edge joints offset at least 2 inches or 1.5 inches of lightweight concrete or approved cellular concrete is placed over the subfloor or ¾-inch wood finish flooring is installed at right angles to the supports. Fiber-cement underlayment shall comply with ASTM C1288 or ISO 8336 Category C. Allowable uniform live load at maximum span based on deflection of 1/360 of span is 100 psf.
- k. Unsupported edges shall have tongue-and-groove joints or shall be supported with blocking unless minimum ¼-inch thick wood panel-type underlayment or fiber-cement underlayment with end and edge joints offset at least 2 inches or 1.5 inches of lightweight concrete or approved cellular concrete is placed over the subfloor or ¾-inch wood finish flooring is installed at right angles to the supports. Fiber-cement underlayment shall comply with ASTM C1288 or ISO 8336 Category C. Allowable uniform live load at maximum span based on deflection of 1/360 of span is 100 psf, except panels with a span rating of 48 on center are limited to 65 psf total uniform load at maximum span.

(Portions of Table not shown remain unchanged)

Add new standard to Chapter 44 as follows:

ISO

8336 – Fibre-Cement Flat Sheets – Product Specification and Test Methods

Reason: The current table and footnote clearly limit the allowable type of permitted underlayment to wood, lightweight concrete, approved cellular concrete, or wood finish flooring. The table and footnotes as currently worded restrain trade by prohibiting the use of another approved type of underlayment. The inclusion of a reference to “fiber-cement” clarifies an alternative recognized product permitted in this type of Code-compliant subfloor/underlayment application (see attached ICC-ES ESR-1381 [reference Section 4.3], ESR-2280 [reference Sections 4.2.2.1 and 4.2.3.1], and ESR-2292 [reference Section 4.2]).

IBC Table 722.6.2(4) has, as a result of the Group A IBC Code Hearings, been revised to recognize fiber-cement underlayment in subfloor/underlayment combination. The addition of the new referenced ISO standard and “product category” were also approved during the Group A IBC Code Hearings. This proposed revision brings the two building codes (IBC & IRC) and the applicable code sections and standards references into general alignment by allowing fiber-cement underlayment in subfloor/underlayment combination applications.

Performance requirements of ISO 8336, *Fibre-cement flat sheets – Product specification and test methods*, have been harmonized with the performance requirements of ASTM C1288, *Standard Specification for Discrete Non-Asbestos Fiber-Cement Interior Substrate Sheets*. Fiber-cement producers in Mexico, Central and South America, Europe, Asia, Australia and New Zealand currently manufacture and test their fiber-cement products for compliance with ISO 8336. The inclusion of this Standard reference in the IRC will permit manufacturers worldwide to demonstrate product compliance to IRC requirements. The addition of a reference to ISO 8336 in the Code removes a barrier to trade.

Cost Impact: The code change proposal will not increase the cost of construction because the proposed addition of fiber-cement underlayment to the table footnote only provides for the choice and use of a type of underlayment currently used in this type of application and permitted in ICC-ES Evaluation Service Reports.

Analysis: A review of the standard proposed for inclusion in the code, ISO 8336 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

RB -13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R503.2.1.1(1)T-RB-MULDER.doc

RB257 – 13

Table R503.2.1.1(2), Chapter 44

Proponent: John Mulder, Intertek Testing Services NA, Inc., representing International Standards Organization Technical Committee 77, *Products in Fibre-reinforced Cement* and Self

Revise as follows:

TABLE R503.2.1.1(2) ALLOWABLE SPANS FOR SANDED PLYWOOD COMBINATION SUBFLOOR UNDERLAYMENT^a

- a. Plywood continuous over two or more spans and face grain perpendicular to supports. Unsupported edges shall be tongue-and-groove or blocked except where nominal ¼-inch-thick wood panel-type underlayment or fiber-cement underlayment or ¾-inch wood finish floor is used. Fiber-cement underlayment shall comply with ASTM C1288 or ISO 8336 Category C. Allowable uniform live load at maximum span based on deflection of 1/360 of span is 100 psf.

(Portions of Table not shown remain unchanged)

Add new standard to Chapter 44 as follows:

ISO

8336 – Fibre-Cement Flat Sheets – Product Specification and Test Methods

Reason: The current table and footnote clearly limit the allowable type of permitted underlayment to wood or wood finished floor. The table and footnote as currently worded restrains trade by prohibiting the use of another approved type of underlayment. The inclusion of a reference to “fiber-cement” clarifies an alternative recognized product permitted in this type of Code-compliant subfloor/underlayment application (see attached ICC-ES ESR-1381 [reference Section 4.3], ESR-2280 [reference Sections 4.2.2.1 and 4.2.3.1], and ESR-2292 [reference Section 4.2]).

IBC Table 722.6.2(4) has, as a result of the Group A IBC Code Hearings, been revised to recognize fiber-cement underlayment in subfloor/underlayment combination. The addition of the new referenced ISO standard and “product category” were also approved during the Group A IBC Code Hearings. This proposed revision brings the two building codes (IBC & IRC) and the applicable code sections and standards references into general alignment by allowing fiber-cement underlayment in subfloor/underlayment combination applications.

Performance requirements of ISO 8336, *Fibre-cement flat sheets – Product specification and test methods*, have been harmonized with the performance requirements of ASTM C1288, *Standard Specification for Discrete Non-Asbestos Fiber-Cement Interior Substrate Sheets*. Fiber-cement producers in Mexico, Central and South America, Europe, Asia, Australia and New Zealand currently manufacture and test their fiber-cement products for compliance with ISO 8336. The inclusion of this Standard reference in the IRC will permit manufacturers worldwide to demonstrate product compliance to IRC requirements. The addition of a reference to ISO 8336 in the Code removes a barrier to trade.

Cost Impact: The code change proposal will not increase the cost of construction because the proposed addition of fiber-cement underlayment to the table footnote only provides for the choice and use of a type of underlayment currently used in this type of application and permitted in ICC-ES Evaluation Service Reports.

Analysis: A review of the standard proposed for inclusion in the code, ISO 8336 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

RB257-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R503.2.1.1(2)T-RB-MULDER.doc

RB258 – 13

R505, R505.1, R505.1.1, R505.2, R505.2.1, Figure R505.2(1), Table R505.2(1), Figure R505.2(2), Table R505.2(2), R505.2.2, R505.2.3, Table 505.2.3 (NEW), R505.2.4, Table R505.2.4, R505.2.5, R505.2.5.1, Figure R505.2.5.1, R505.2.5.2, R505.2.5.3, Figure R505.2.5.3, R505.3.1, Table R505.3.1(1), R505.3.2, Table R505.3.2(1), Table R505.3.2(2), Table R505.3.2(3), R505.3.3.1, R505.3.4, Table R505.3.4(1), Table R505.3.4(2), Table R505.3.4(3), Table R505.3.4(4), Figure R505.3.4(2), M1308.1, M2101.6, P2603.2

Proponent: Bonnie Manley, P.E., American Iron and Steel Institute (bmanley@steel.org)

Revise as follows:

SECTION R505 COLD-FORMED STEEL FLOOR FRAMING

R505.1 Cold-formed steel floor framing. Elements shall be straight and free of any defects that would significantly affect structural performance. Cold-formed steel floor framing members shall be in accordance ~~comply~~ with the requirements of this section.

R505.1.1 Applicability limits. The provisions of this section shall control the construction of cold-formed steel floor framing for buildings not greater than 60 feet (18 288 mm) in length perpendicular to the joist span, not greater than 40 feet (12 192 mm) in width parallel to the joist span, and less than or equal to three stories above *grade* plane. Cold-formed steel floor framing constructed in accordance with the provisions of this section shall be limited to sites ~~subjected to a maximum~~ where the ultimate design wind speed of 140 is less than 139 miles per hour (6249 m/s), Exposure Category B or C, and ~~a maximum~~ the ground snow load is less than or equal to ~~of~~ 70 pounds per square foot (3.35 kPa).

R505.2 Structural framing. Load-bearing cold-formed steel floor framing members shall be in accordance ~~comply~~ with this section. ~~Figure R505.2(1) and with the dimensional and minimum thickness requirements specified in Tables R505.2(1) and R505.2(2). Tracks shall comply with Figure R505.2(2) and shall have a minimum flange width of $1\frac{3}{4}$ inches (32 mm).~~

R505.2.1 Material. Load-bearing cold-formed steel framing members shall be cold formed to shape from structural quality sheet steel complying with the requirements of ~~one of the following:~~

- ~~1. ASTM A 653: Grades 33 and 50 (Class 1 and 3).~~
- ~~2. ASTM A 792: Grades 33 and 50A.~~
- ~~3. ASTM A 1003: Structural Grades 33 Type H and 50 Type H.~~

FIGURE R505.2.3(1) C-SHAPED SECTION

(Figure remains unchanged)

FIGURE R505.2.3(2) TRACK SECTION

(Figure remains unchanged)

**TABLE R505.2(1)
COLD-FORMED STEEL JOIST SIZES**

MEMBER DESIGNATION ^a	WEB DEPTH (inches)	MINIMUM FLANGE WIDTH (inches)	MAXIMUM FLANGE WIDTH (inches)	MINIMUM LIP SIZE (inches)
550S162-t	5.5	1.625	2	0.5
800S162-t	8	1.625	2	0.5
1000S162-t	10	1.625	2	0.5

1200S162-t	12	1.625	2	0.5
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For SI: 1 inch = 25.4 mm, 1 mil = 0.0254 mm.

- a. The member designation is defined by the first number representing the member depth in 0.01 inch, the letter "S" representing a stud or joist member, the second number representing the flange width in 0.01 inch, and the letter "t" shall be a number representing the minimum base metal thickness in mils [See Table R505.2(2)].

TABLE R505.2.3
COLD-FORMED STEEL JOIST SIZES AND THICKNESSES

MEMBER DESIGNATION^a	WEB DEPTH (inches)	MINIMUM BASE STEEL THICKNESS mil (inches)
550S162-t	5.5	33 (0.0329), 43 (0.0428), 54 (0.0538), 68 (0.0677)
800S162-t	8	33 (0.0329), 43 (0.0428), 54 (0.0538), 68 (0.0677)
1000S162-t	10	43 (0.0428), 54 (0.0538), 68 (0.0677)
1200S162-t	12	43 (0.0428), 54 (0.0538), 68 (0.0677)

For SI: 1 inch = 25.4 mm, 1 mil = 0.0254 mm.

- a. The member designation is defined by the first number representing the member depth in 0.01 inch, the letter "S" representing a stud or joist member, the second number representing the flange width in 0.01 inch, and the letter "t" shall be a number representing the minimum base metal thickness in mils

TABLE R505.2(2)
MINIMUM THICKNESS OF COLD-FORMED STEEL MEMBERS

DESIGNATION THICKNESS (mils)	MINIMUM BASE STEEL THICKNESS (inches)
33	0.0329
43	0.0428
54	0.0538
68	0.0677
97	0.0966

For SI: 1 inch = 25.4 mm, 1 mil = 0.0254 mm.

R505.2.2 Corrosion protection. Load-bearing cold-formed steel framing shall have a metallic coating complying with ASTM A 1003 and one of the following:

1. A minimum of G 60 in accordance with ASTM A 653.
2. A minimum of AZ 50 in accordance with ASTM A 792.

R505.2.3 Dimension, thickness and material grade. Load-bearing cold-formed steel floor framing members shall comply with Figure R505.2.3(1) and with the dimensional and thickness requirements specified in Table R505.2.3. Additionally, all c-shaped sections shall have a minimum flange width of 1.625 inches (41 mm) and a maximum flange width of 2 inches (51 mm). The minimum lip size for c-shaped sections shall be 0.5 inches (13 mm). Track sections shall comply with Figure R505.2.3(2) and shall have a minimum flange width of 1¹/₄ inches (32 mm). Minimum Grade 33 ksi steel shall be used wherever 33 mil and 43 mil thicknesses are specified. Minimum Grade 50 ksi steel shall be used wherever 54 and 68 mil thicknesses are specified.

R505.2.2 R505.2.4 Identification. Load-bearing cold-formed steel framing members shall have a legible label, stencil, stamp or embossment with the following information as a minimum:

1. Manufacturer's identification.
2. Minimum base steel thickness in inches (mm).
3. Minimum coating designation.

4. Minimum yield strength, in kips per square inch (ksi) (MPa).

R505.2.3 Corrosion protection. Load-bearing cold-formed steel framing shall have a metallic coating complying with ASTM A 1003 and one of the following:

1. A minimum of G 60 in accordance with ASTM A 653.
2. A minimum of AZ 50 in accordance with ASTM A 792.

R505.2.4 R505.2.5 Fastening requirements. Screws for steel-to-steel connections shall be installed with a minimum edge distance and center-to-center spacing of $\frac{1}{2}$ inch (12.7 mm), shall be self-drilling tapping, and shall conform to ASTM C 1513. Floor sheathing shall be attached to cold-formed steel joists with minimum No. 8 self-drilling tapping screws that conform to ASTM C 1513. Screws attaching floor-sheathing to cold-formed steel joists shall have a minimum head diameter of 0.292 inch (7.4 mm) with countersunk heads and shall be installed with a minimum edge distance of $\frac{3}{8}$ inch (9.5 mm). Gypsum board ceilings shall be attached to cold-formed steel joists with minimum No. 6 screws conforming to ASTM C 954 or ASTM C 1513 with a bugle head style and shall be installed in accordance with Section R702. For all connections, screws shall extend through the steel a minimum of three exposed threads. All fasteners shall have rust inhibitive coating suitable for the installation in which they are being used, or be manufactured from material not susceptible to corrosion.

Where No. 8 screws are specified in a steel-to-steel connection, the required number of screws in the connection is permitted to be reduced in accordance with the reduction factors in Table R505.2.4 when larger screws are used or when one of the sheets of steel being connected is thicker than 33 mils (0.84 mm). When applying the reduction factor, the resulting number of screws shall be rounded up.

TABLE R505.2.4
SCREW SUBSTITUTION FACTOR

SCREW SIZE	THINNEST CONNECTED STEEL SHEET (mils)	
	33	43
#8	1.0	0.67
#10	0.93	0.62
#12	0.86	0.56

For SI: 1 mil = 0.0254 mm.

R505.2.5 R505.2.6 Web holes, web hole reinforcing and web hole patching. Web holes, web hole reinforcing, and web hole patching shall be in accordance with this section.

R505.2.5.1 R505.2.6.1 Web holes. Web holes in floor joists shall comply with all of the following conditions:

1. Holes shall conform to Figure R505.2.5.1 R505.2.6.1;
2. Holes shall be permitted only along the centerline of the web of the framing member;
3. Holes shall have a center-to-center spacing of not less than 24 inches (610 mm);
4. Holes shall have a web hole width not greater than 0.5 times the member depth, or $2\frac{1}{2}$ inches (64.5 mm);
5. Holes shall have a web hole length not exceeding $4\frac{1}{2}$ inches (114 mm); and
6. Holes shall have a minimum distance between the edge of the bearing surface and the edge of the web hole of not less than 10 inches (254 mm).

Framing members with web holes not conforming to the above requirements shall be reinforced in accordance with Section R505.2.5.2 R505.2.6.2, patched in accordance with Section R505.2.5.3 R505.2.6.3 or designed in accordance with accepted engineering practices.

FIGURE ~~R505.2.5.4~~ R505.2.6.1 FLOOR JOIST WEB HOLES

(Figure remains unchanged)

~~R505.2.5.2~~ R505.2.6.2 Web hole reinforcing. Reinforcement of web holes in floor joists not conforming to the requirements of Section ~~R505.2.5.4~~ R505.2.6.1 shall be permitted if the hole is located fully within the center 40 percent of the span and the depth and length of the hole does not exceed 65 percent of the flat width of the web. The reinforcing shall be a steel plate or C-shape section with a hole that does not exceed the web hole size limitations of Section ~~R505.2.5.4~~ R505.2.6.1 for the member being reinforced. The steel reinforcing shall be the same thickness as the receiving member and shall extend at least 1 inch (25.4 mm) beyond all edges of the hole. The steel reinforcing shall be fastened to the web of the receiving member with No. 8 screws spaced no more than 1 inch (25.4 mm) center-to-center along the edges of the patch with minimum edge distance of $\frac{1}{2}$ inch (12.7 mm).

~~R505.2.5.3~~ R505.2.6.3 Hole patching. Patching of web holes in floor joists not conforming to the requirements in Section ~~R505.2.5.4~~ R505.2.6.1 shall be permitted in accordance with either of the following methods:

1. Framing members shall be replaced or designed in accordance with accepted engineering practices where web holes exceed the following size limits:
 - 1.1. The depth of the hole, measured across the web, exceeds 70 percent of the flat width of the web; or
 - 1.2. The length of the hole measured along the web, exceeds 10 inches (254 mm) or the depth of the web, whichever is greater.
2. Web holes not exceeding the dimensional requirements in Section ~~R505.2.5.3~~ R505.2.6.3, Item 1, shall be patched with a solid steel plate, stud section, or track section in accordance with Figure ~~R505.2.5.3~~ R505.2.6.3. The steel patch shall, as a minimum, be of the same thickness as the receiving member and shall extend at least 1 inch (25 mm) beyond all edges of the hole. The steel patch shall be fastened to the web of the receiving member with No. 8 screws spaced no more than 1 inch (25 mm) center-to-center along the edges of the patch with minimum edge distance of $\frac{1}{2}$ inch (13 mm).

FIGURE ~~R505.2.5.3~~ R505.2.6.3 FLOOR JOIST WEB HOLE PATCH

(Figure remains unchanged)

R505.3.1 Floor to foundation or load-bearing wall connections. Cold-formed steel framed floors shall be anchored to foundations, wood sills or load-bearing walls in accordance with Table R505.3.1(1) and Figure R505.3.1(1), R505.3.1(2), R505.3.1(3), R505.3.1(4), R505.3.1(5) or R505.3.1(6). Anchor bolts shall be located not more than 12 inches (305 mm) from corners or the termination of bottom tracks. Continuous cold-formed steel joists supported by interior load-bearing walls shall be constructed in accordance with Figure R505.3.1(7). Lapped cold-formed steel joists shall be constructed in accordance with Figure R505.3.1(8). End floor joists constructed on foundation walls parallel to the joist span shall be doubled unless a C-shaped bearing stiffener, sized in accordance with Section R505.3.4, is installed web-to-web with the floor joist beneath each supported wall stud, as shown in Figure R505.3.1(9). Fastening of cold-formed steel joists to other framing members shall be in accordance with Section ~~R505.2.4~~ R505.2.5 and Table R505.3.1(2).

TABLE R505.3.1(1)
FLOOR TO FOUNDATION OR BEARING WALL CONNECTION REQUIREMENTS^{a, b}

FRAMING CONDITION	BASIC <u>ULTIMATE</u> WIND SPEED (mph) AND EXPOSURE	
	85110 mph Exposure <u>Category C</u> or less than 110139 mph Exposure <u>Category B</u>	Less than 110139 mph Exposure <u>Category C</u>
Floor joist to wall track of exterior wall per Figure R505.3.1(1)	2-No. 8 screws	3-No. 8 screws
Rim track or end joist to load-bearing wall top track per Figure R505.3.1(1)	1-No. 8 screw at 24 inches o.c.	1-No. 8 screw at 24 inches o.c.
Rim track or end joist to wood sill per Figure R505.3.1(2)	Steel plate spaced at 4 feet o.c. with 4-No. 8 screws and 4-10d or 6-8d common nails	Steel plate spaced at 2 feet o.c. with 4-No. 8 screws and 4-10d or 6-8d common nails
Rim track or end joist to foundation per Figure R505.3.1(3)	$\frac{1}{2}$ inch minimum diameter anchor bolt and clip angle spaced at 6 feet o.c. with 8-No. 8 screws	$\frac{1}{2}$ inch minimum diameter anchor bolt and clip angle spaced at 4 feet o.c. with 8-No. 8 screws
Cantilevered joist to foundation per Figure R505.3.1(4)	$\frac{1}{2}$ inch minimum diameter anchor bolt and clip angle spaced at 6 feet o.c. with 8-No. 8 screws	$\frac{1}{2}$ inch minimum diameter anchor bolt and clip angle spaced at 4 feet o.c. with 8-No. 8 screws
Cantilevered joist to wood sill per Figure R505.3.1(5)	Steel plate spaced at 4 feet o.c. with 4-No. 8 screws and 4-10d or 6-8d common nails	Steel plate spaced at 2 feet o.c. with 4-No. 8 screws and 4-10d or 6-8d common nails
Cantilevered joist to exterior load-bearing wall track per Figure R505.3.1(6)	2-No. 8 screws	3-No. 8 screws

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa, 1 mile per hour = 0.447 m/s, 1 foot = 304.8 mm.

- a. Anchor bolts are to be located not more than 12 inches from corners or the termination of bottom tracks (e.g., at door openings or corners). Bolts extend a minimum of 15 inches into masonry or 7 inches into concrete. Anchor bolts connecting cold-formed steel framing to the foundation structure are to be installed so that the distance from the center of the bolt hole to the edge of the connected member is not less than one and one-half bolt diameters.
- b. All screw sizes shown are minimum.

R505.3.2 Minimum floor joist sizes. Floor joist size and thickness shall be determined in accordance with the limits set forth in Table R505.3.2(4) for single or continuous spans and Tables R505.3.2(2) and R505.3.2(3) for multiple spans. When continuous joist members are used, the interior bearing supports shall be located within 2 feet (610 mm) of mid-span of the cold-formed steel joists, and the individual spans shall not exceed the spans in Table R505.3.2(2) or R505.3.2(3), as applicable R505.3.2. Floor joists shall have a bearing support length of not less than $1\frac{1}{2}$ inches (38 mm) for exterior wall supports and $3\frac{1}{2}$ inches (89 mm) for interior wall supports. Tracks shall be a minimum of 33 mils (0.84 mm) thick except when used as part of a floor header or trimmer in accordance with Section R505.3.8. Bearing stiffeners shall be installed in accordance with Section R505.3.4.

TABLE R505.3.2(1)
ALLOWABLE SPANS FOR COLD-FORMED STEEL JOISTS—
SINGLE OR CONTINUOUS SPANS^{a, b, c, d, e}
33 ksi STEEL

JOIST DESIGNATION	30 PSF LIVE LOAD				40 PSF LIVE LOAD			
	Spacing (inches)				Spacing (inches)			
	12	16	19.2	24	12	16	19.2	24
550S162-33	11'-7"	10'-7"	9'-6"	8'-6"	10'-7"	9'-3"	8'-6"	7'-6"
550S162-43	12'-8"	11'-6"	10'-10"	10'-2"	11'-6"	10'-5"	9'-10"	9'-1"
550S162-54	13'-7"	12'-4"	11'-7"	10'-9"	12'-4"	11'-2"	10'-6"	9'-9"
550S162-68	14'-7"	13'-3"	12'-6"	11'-7"	13'-3"	12'-0"	11'-4"	10'-6"
550S162-97	16'-2"	14'-9"	13'-10"	12'-10"	14'-9"	13'-4"	12'-7"	11'-8"
800S162-33	15'-8"	13'-11"	12'-9"	11'-5"	14'-3"	12'-5"	11'-3"	9'-0"
800S162-43	17'-1"	15'-6"	14'-7"	13'-7"	15'-6"	14'-1"	13'-3"	12'-4"
800S162-54	18'-4"	16'-8"	15'-8"	14'-7"	16'-8"	15'-2"	14'-3"	13'-3"
800S162-68	19'-9"	17'-11"	16'-10"	15'-8"	17'-11"	16'-3"	15'-4"	14'-2"
800S162-97	22'-0"	20'-0"	16'-10"	17'-5"	20'-0"	18'-2"	17'-4"	15'-10"
1000S162-43	20'-6"	18'-8"	17'-6"	15'-8"	18'-8"	16'-11"	15'-6"	13'-11"
1000S162-54	22'-1"	20'-0"	18'-10"	17'-6"	20'-0"	18'-2"	17'-2"	15'-11"
1000S162-68	23'-9"	21'-7"	20'-3"	18'-10"	21'-7"	19'-7"	18'-5"	17'-1"
1000S162-97	26'-6"	24'-1"	22'-8"	21'-0"	24'-1"	21'-10"	20'-7"	19'-1"
1200S162-43	23'-9"	20'-10"	19'-0"	16'-8"	21'-5"	18'-6"	16'-6"	13'-2"
1200S162-54	25'-9"	23'-4"	22'-0"	20'-1"	23'-4"	21'-3"	20'-0"	17'-10"
1200S162-68	27'-8"	25'-1"	23'-8"	21'-11"	25'-1"	22'-10"	21'-6"	21'-1"
1200S162-97	30'-11"	28'-1"	26'-5"	24'-6"	28'-1"	25'-6"	24'-0"	22'-3"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

- Deflection criteria: $L/480$ for live loads, $L/240$ for total loads.
- Floor dead load – 10 psf.
- Table provides the maximum clear span in feet and inches.
- Bearing stiffeners are to be installed at all support points and concentrated loads.
- Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

TABLE R505.3.2(2)
ALLOWABLE SPANS FOR COLD-FORMED STEEL JOISTS—MULTIPLE SPANS^{a, b, c, d, e, f}
STEEL

JOIST DESIGNATION	30 PSF LIVE LOAD				40 PSF LIVE LOAD			
	Spacing (inches)				Spacing (inches)			
	12	16	19.2	24	12	16	19.2	24
550S162-33	12'-1"	10'-5"	9'-6"	8'-6"	10'-9"	9'-3"	8'-6"	7'-6"
550S162-43	14'-5"	12'-5"	11'-4"	10'-2"	12'-9"	11'-11"	10'-1"	9'-0"
550S162-54	16'-3"	14'-1"	12'-10"	11'-6"	14'-5"	12'-6"	11'-5"	10'-2"
550S162-68	19'-7"	17'-9"	16'-9"	15'-6"	17'-9"	16'-2"	15'-2"	14'-1"
550S162-97	21'-9"	19'-9"	18'-7"	17'-3"	19'-9"	17'-11"	16'-10"	15'-4"
800S162-33	14'-8"	11'-10"	10'-4"	8'-8"	12'-4"	9'-11"	8'-7"	7'-2"
800S162-43	20'-0"	17'-4"	15'-9"	14'-1"	17'-9"	15'-4"	14'-0"	12'-0"
800S162-54	23'-7"	20'-5"	18'-8"	16'-8"	21'-0"	18'-2"	16'-7"	14'-10"
800S162-68	26'-5"	23'-1"	21'-0"	18'-10"	23'-8"	20'-6"	18'-8"	16'-9"
800S162-97	29'-6"	26'-10"	25'-3"	22'-8"	26'-10"	24'-4"	22'-6"	20'-2"
1000S162-43	22'-2"	18'-3"	16'-0"	13'-7"	18'-11"	15'-5"	13'-6"	11'-5"

1000S162-54	26'-2"	22'-8"	20'-8"	18'-6"	23'-3"	20'-2"	18'-5"	16'-5"
1000S162-68	31'-5"	27'-2"	24'-10"	22'-2"	27'-11"	24'-2"	22'-1"	19'-9"
1000S162-97	35'-6"	32'-3"	29'-11"	26'-9"	32'-3"	29'-2"	26'-7"	23'-9"
1200S162-43	21'-8"	17'-6"	15'-3"	12'-10"	18'-3"	14'-8"	12'-8"	10'-6"
1200S162-54	28'-5"	24'-8"	22'-6"	19'-6"	25'-3"	21'-11"	19'-4"	16'-6"
1200S162-68	33'-7"	29'-1"	26'-6"	23'-9"	29'-10"	25'-10"	23'-7"	21'-1"
1200S162-97	41'-5"	37'-8"	34'-6"	30'-10"	37'-8"	33'-6"	30'-7"	27'-5"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

- Deflection criteria: $L/480$ for live loads, $L/240$ for total loads.
- Floor dead load = 10 psf.
- Table provides the maximum clear span in feet and inches to either side of the interior support.
- Interior bearing supports for multiple span joists consist of structural (bearing) walls or beams.
- Bearing stiffeners are to be installed at all support points and concentrated loads.
- Interior supports shall be located within 2 feet of mid-span provided that each of the resulting span does not exceed the appropriate maximum span shown in the table above.

TABLE R505.3.2(3)
ALLOWABLE SPANS FOR COLD-FORMED STEEL JOISTS—MULTIPLE SPANS^{a, b, c, d, e, f} .50 ksi
STEEL

JOIST DESIGNATION	30 PSF LIVE LOAD				40 PSF LIVE LOAD			
	Spacing (inches)				Spacing (inches)			
	12	16	19.2	24	12	16	19.2	24
550S162-33	13'-11"	12'-0"	11'-0"	9'-3"	12'-3"	10'-8"	9'-7"	8'-4"
550S162-43	16'-3"	14'-1"	12'-10"	11'-6"	14'-6"	12'-6"	11'-5"	10'-3"
550S162-54	18'-2"	16'-6"	15'-4"	13'-8"	16'-6"	14'-11"	13'-7"	12'-2"
550S162-68	19'-6"	17'-9"	16'-8"	15'-6"	17'-9"	16'-1"	15'-2"	14'-0"
550S162-97	21'-9"	19'-9"	18'-6"	17'-2"	19'-8"	17'-10"	16'-8"	15'-8"
800S162-33	15'-6"	12'-6"	10'-10"	9'-1"	13'-0"	10'-5"	8'-11"	6'-9"
800S162-43	22'-0"	19'-1"	17'-5"	15'-0"	19'-7"	16'-11"	14'-10"	12'-8"
800S162-54	24'-6"	22'-4"	20'-6"	17'-11"	22'-5"	19'-9"	17'-11"	15'-10"
800S162-68	26'-6"	24'-1"	22'-8"	21'-0"	24'-1"	21'-10"	20'-7"	19'-2"
800S162-97	29'-9"	26'-8"	25'-2"	23'-5"	26'-8"	24'-3"	22'-11"	21'-4"
1000S162-43	23'-6"	19'-2"	16'-9"	14'-2"	19'-11"	16'-2"	14'-0"	11'-9"
1000S162-54	28'-2"	23'-10"	21'-7"	18'-11"	24'-8"	20'-11"	18'-9"	18'-4"
1000S162-68	31'-10"	28'-11"	27'-2"	25'-3"	28'-11"	26'-3"	24'-9"	22'-9"
1000S162-97	35'-4"	32'-1"	30'-3"	28'-1"	32'-1"	29'-2"	27'-6"	25'-6"
1200S162-43	22'-11"	18'-5"	16'-0"	13'-4"	19'-2"	15'-4"	13'-2"	10'-6"
1200S162-54	32'-8"	28'-1"	24'-9"	21'-2"	29'-0"	23'-10"	20'-11"	17'-9"
1200S162-68	37'-1"	32'-5"	29'-4"	25'-10"	33'-4"	28'-6"	25'-9"	22'-7"
1200S162-97	41'-2"	37'-6"	35'-3"	32'-9"	37'-6"	34'-1"	32'-1"	29'-9"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

- Deflection criteria: $L/480$ for live loads, $L/240$ for total loads.
- Floor dead load = 10 psf.
- Table provides the maximum clear span in feet and inches to either side of the interior support.
- Interior bearing supports for multiple span joists consist of structural (bearing) walls or beams.
- Bearing stiffeners are to be installed at all support points and concentrated loads.
- Interior supports shall be located within 2 feet of mid-span provided that each of the resulting span does not exceed the appropriate maximum span shown in the table above.

R505.3.3.1 Joist top flange bracing. The top flanges of cold-formed steel joists shall be laterally braced by the application of floor sheathing fastened to the joists in accordance with Section R505.2.4 R505.2.5 and Table R505.3.1(2).

R505.3.4 Bearing stiffeners. Bearing stiffeners shall be installed at each joist bearing location in accordance with this section, except for joists lapped over an interior support not carrying a load-bearing wall above. Floor joists supporting jamb studs with multiple members shall have two bearing stiffeners in accordance with Figure R505.3.4(1). Bearing stiffeners shall be fabricated from a C-shaped, track or clip angle member in accordance with the one of following:

1. C-shaped bearing stiffeners:
 - 1.1. Where the joist is not carrying a load-bearing wall above, the bearing stiffener shall be a minimum 33 mil (0.84 mm) thickness.
 - 1.2. Where the joist is carrying a load-bearing wall above, the bearing stiffener shall be at least the same designation thickness as the wall stud above.
2. Track bearing stiffeners:
 - 2.1. Where the joist is not carrying a load-bearing wall above, the bearing stiffener shall be a minimum 43 mil (1.09 mm) thickness.
 - 2.2. Where the joist is carrying a load-bearing wall above, the bearing stiffener shall be at least one designation thickness greater than the wall stud above.
3. Clip angle bearing stiffeners: Where the clip angle bearing stiffener is fastened to both the web of the member it is stiffening and an adjacent rim track using the fastener pattern shown in Figure R505.3.4(2), the bearing stiffener shall be a minimum 2 inch by 2 inch (51 mm by 51 mm) angle sized in accordance with Tables R505.3.4(1), R505.3.4(2), R505.3.4(3), and R505.3.4(4).

The minimum length of a bearing stiffener shall be the depth of member being stiffened minus $\frac{3}{8}$ inch (9.5 mm). Each bearing stiffener shall be fastened to the web of the member it is stiffening as shown in Figure R505.3.4(2). Each clip angle bearing stiffener shall also be fastened to the web of the adjacent rim track using the fastener pattern shown in Figure R505.3.4(2). No. 8 screws shall be used for C-shaped and track members of any thickness and for clip angle members with a designation thickness less than or equal to 54. No. 10 screws shall be used for clip angle members with a designation thickness greater than 54.

TABLE R505.3.4(1)
CLIP-ANGLE BEARING STIFFENERS
(20-psf equivalent snow load)

JOIST DESIGNATION	MINIMUM THICKNESS (mils) OF 2-INCH × 2-INCH (51 mm × 51 mm) CLIP ANGLE											
	Top floor				Bottom floor in 2-story Middle floor in 3-story				Bottom floor in 3-story			
	Joist spacing (inches)				Joist spacing (inches)				Joist spacing (inches)			
	12	16	19.2	24	12	16	19.2	24	12	16	19.2	24
800S162-33	43	43	43	43	43	54	68	68	68	97	97	—
800S162-43	43	43	43	43	54	54	68	68	97	97	97	97
800S162-54	43	43	43	43	43	54	68	68	68	97	97	—
800S162-68	43	43	43	43	43	43	54	68	54	97	97	—
800S162-97	43	43	43	43	43	43	43	43	43	43	54	97
1000S162-43	43	43	43	43	54	68	97	97	97	—	—	—
1000S162-54	43	43	43	43	54	68	68	97	97	97	—	—
1000S162-68	43	43	43	43	54	68	97	97	97	—	—	—
1000S162-97	43	43	43	43	43	43	43	54	43	68	97	—
1200S162-43	43	54	54	54	97	97	97	97	—	—	—	—
1200S162-54	54	54	54	54	97	97	97	97	—	—	—	—
1200S162-68	43	43	54	54	68	97	97	97	—	—	—	—
1200S162-97	43	43	43	43	43	54	68	97	97	—	—	—

For SI: 1 mil = 0.254 mm, 1 inch = 25.4 mm, 1 pound per square foot = 0.0479

TABLE R505.3.4(2)
CLIP ANGLE BEARING STIFFENERS
(30 psf equivalent snow load)

JOIST DESIGNATION	MINIMUM THICKNESS (mils) OF 2-INCH × 2-INCH (51 mm × 51 mm) CLIP ANGLE											
	Top floor				Bottom floor in 2-story Middle floor in 3-story				Bottom floor in 3-story			
	Joist spacing (inches)				Joist spacing (inches)				Joist spacing (inches)			
	12	16	19.2	24	12	16	19.2	24	12	16	19.2	24
800S162-33	43	43	43	43	54	68	68	97	97	97	97	—
800S162-43	43	43	43	54	68	68	68	97	97	97	97	—
800S162-54	43	43	43	43	54	68	68	97	97	97	—	—
800S162-68	43	43	43	43	43	54	68	97	68	97	97	—
800S162-97	43	43	43	43	43	43	43	43	43	43	68	97
1000S162-43	54	54	54	54	68	97	97	97	97	—	—	—
1000S162-54	54	54	54	54	68	97	97	97	97	—	—	—
1000S162-68	43	43	54	68	68	97	97	—	97	—	—	—
1000S162-97	43	43	43	43	43	43	54	68	54	97	—	—
1200S162-43	54	68	68	68	97	97	97	—	—	—	—	—
1200S162-54	68	68	68	68	97	97	—	—	—	—	—	—
1200S162-68	68	68	68	68	97	97	97	—	—	—	—	—
1200S162-97	43	43	43	43	54	68	97	—	97	—	—	—

For SI: 1 mil = 0.254 mm, 1 inch = 25.4 mm, 1 pound per square foot = 0.0479

TABLE R505.3.4(3)
CLIP ANGLE BEARING STIFFENERS (50 psf equivalent snow load)

JOIST DESIGNATION	MINIMUM THICKNESS (mils) OF 2-INCH × 2-INCH (51 mm × 51 mm) CLIP ANGLE											
	Top floor				Bottom floor in 2-story Middle floor in 3-story				Bottom floor in 3-story			
	Joist spacing (inches)				Joist spacing (inches)				Joist spacing (inches)			
	12	16	19.2	24	12	16	19.2	24	12	16	19.2	24
800S162-33	54	54	54	54	68	97	97	97	97	—	—	—
800S162-43	68	68	68	68	97	97	97	97	—	—	—	—
800S162-54	54	68	68	68	97	97	97	97	—	—	—	—
800S162-68	43	43	54	54	68	97	97	97	97	—	—	—
800S162-97	43	43	43	43	43	43	43	54	54	68	97	—
1000S162-43	97	68	68	68	97	97	97	97	—	—	—	—
1000S162-54	97	97	68	68	97	97	97	—	—	—	—	—
1000S162-68	68	97	97	97	97	—	—	—	—	—	—	—
1000S162-97	43	43	43	43	54	68	97	97	—	—	—	—
1200S162-43	97	97	97	97	—	—	—	—	—	—	—	—
1200S162-54	—	97	97	97	—	—	—	—	—	—	—	—
1200S162-68	97	97	97	97	—	—	—	—	—	—	—	—
1200S162-97	54	68	68	97	97	—	—	—	—	—	—	—

For SI: 1 mil = 0.254 mm, 1 inch = 25.4 mm, 1 pound per square foot = 0.0479

TABLE R505.3.4(4)
CLIP ANGLE BEARING STIFFENERS
(70 psf equivalent snow load)

JOIST DESIGNATION	MINIMUM THICKNESS (mils) OF 2-INCH x 2-INCH (51 mm x 51 mm) CLIP ANGLE											
	Top floor				Bottom floor in 2-story Middle floor in 3-story				Bottom floor in 3-story			
	Joist spacing (inches)				Joist spacing (inches)				Joist spacing (inches)			
	12	16	19.2	24	12	16	19.2	24	12	16	19.2	24
800S162-33	68	68	68	68	97	97	97	97	—	—	—	—
800S162-43	97	97	97	97	97	97	97	—	—	—	—	—
800S162-54	97	97	97	97	97	—	—	—	—	—	—	—
800S162-68	68	68	68	97	97	97	97	—	—	—	—	—
800S162-97	43	43	43	43	43	54	68	97	97	97	—	—
1000S162-43	97	97	97	97	—	—	—	—	—	—	—	—
1000S162-54	—	97	97	97	—	—	—	—	—	—	—	—
1000S162-68	97	97	—	—	—	—	—	—	—	—	—	—
1000S162-97	68	68	68	68	97	97	—	—	—	—	—	—
1200S162-43	97	97	97	97	—	—	—	—	—	—	—	—
1200S162-54	—	—	—	—	—	—	—	—	—	—	—	—
1200S162-68	—	—	—	—	—	—	—	—	—	—	—	—
1200S162-97	97	97	97	—	—	—	—	—	—	—	—	—

For SI: 1 mil = 0.0254 mm, 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

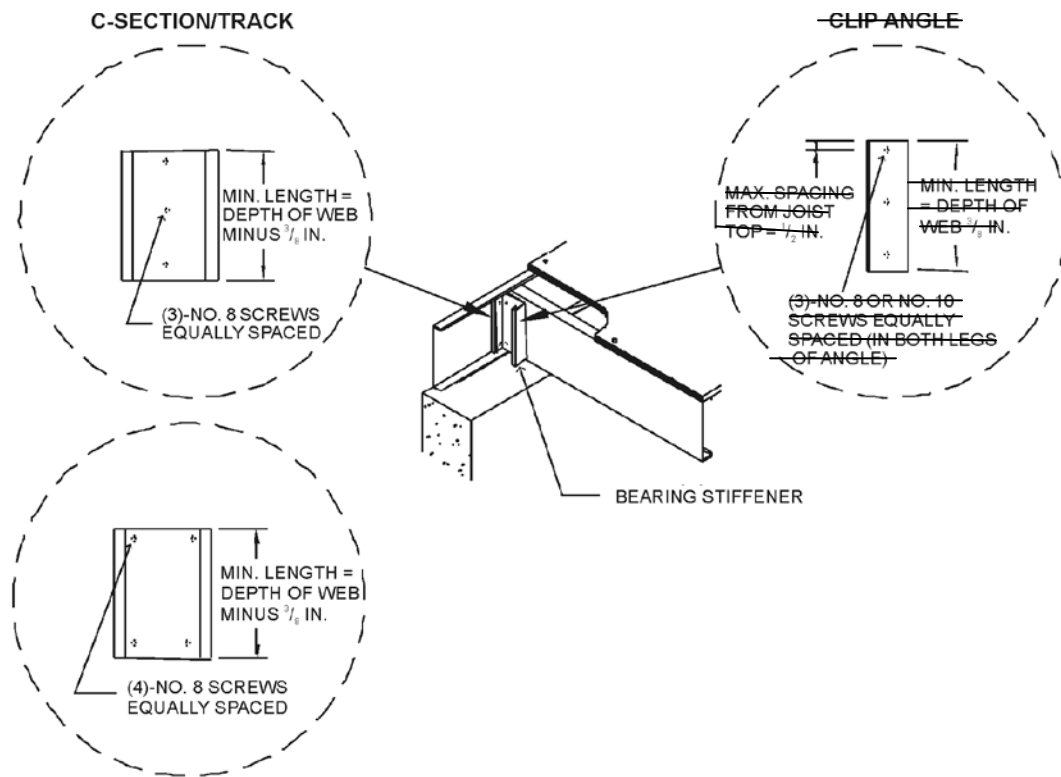


FIGURE R505.3.4(2)
BEARING STIFFENER

Revise as follows:

M1308.1 Drilling and notching. Wood-framed structural members shall be drilled, notched or altered in accordance with the provisions of Sections R502.8, R602.6, R602.6.1 and R802.7. Holes in load-bearing members of cold-formed steel light-frame construction shall be permitted only in accordance with Sections ~~R505.2.5~~ R505.2.6, R603.2.5 and R804.2.5. In accordance with the provisions of Sections R505.3.5, R603.3.4 and R804.3.4, cutting and notching of flanges and lips of load-bearing members of cold-formed steel light frame construction shall not be permitted. Structural insulated panels (SIPs) shall be drilled and notched or altered in accordance with the provisions of Section R613.7.

Revise as follows:

M2101.6 Drilling and notching. Wood-framed structural members shall be drilled, notched or altered in accordance with the provisions of Sections R502.8, R602.6, R602.6.1 and R802.7. Holes in load bearing members of cold-formed steel light-frame construction shall be permitted only in accordance with Sections ~~R505.2.5~~ R505.2.6, R603.2.5 and R804.2.5. In accordance with the provisions of Sections R505.3.5, R603.3.4 and R804.3.4, cutting and notching of flanges and lips of load-bearing members of cold-formed steel light frame construction shall not be permitted. Structural insulated panels (SIPs) shall be drilled and notched or altered in accordance with the provisions of Section R613.

Revise as follows:

P2603.2 Drilling and notching. Wood-framed structural members shall not be drilled, notched or altered in any manner except as provided in Sections R502.8, R602.6, R802.7 and R802.7.1. Holes in load-bearing members of cold-formed steel light-frame construction shall be permitted only in accordance with Sections ~~R505.2.5~~ R505.2.6, R603.2.5 and R804.2.5. In accordance with the provisions in Sections R505.3.5, R603.3.4 and R804.3.4, cutting and notching of flanges and lips of load-bearing members of cold-formed steel light frame construction shall not be permitted. Structural insulated panels (SIPs) shall be drilled and notched or altered in accordance with the provisions of Section R613.7.

Reason: This proposal is one in a series intended to both update and streamline the cold-formed steel (CFS) light frame construction provisions of the IRC. The revisions are based upon recommendations made by the AISI Committee on Framing Standards (COFS) Prescriptive Methods Subcommittee, which is responsible for the requirements' base document -- AISI S230, *Standard for Cold-Formed Steel Framing – Prescriptive Method for One and Two Family Dwellings*. For the most part, the changes are editorial in nature and work to focus the cold-formed steel solutions presented in the IRC on the most popular and readily available options. The changes also align the cold-formed steel provisions with the latest reference standards, including AISI S230-07 w/S3-12, *Standard for Cold-Formed Steel Framing – Prescriptive Method for One and Two Family Dwellings*, 2007, with Supplement 3, 2012.

Changes specific to Section R505 include the following:

- **R505:** Title correction.
- **R505.1:** The wind speeds are updated to reflect "ultimate" design wind speeds from ASCE 7-10 and editorial adjustments are made to the language. The design wind speeds are changed based upon the following direct conversion table, which was incorporated into AISI S230-07 w/S3-12:

ASCE 7-10 Wind Speed (mph)	110	115	126	139	152	164	177	190
AISI S230 Wind Speed (mph)	85	90	100	110	120	130	140	150

- **R505.2:** Requirements are relocated to new Section R505.2.3, which is specific to dimension, thickness and material grade.
- **R505.2.1:** The references to ASTM A653 and ASTM A792 are deleted. Since these materials are included under ASTM A1003, they do not need to be repeated in this section.
- **R505.2.2:** The corrosion protection requirements are relocated from Section R505.2.3 for better flow in section.
- **R505.2.3:** Requirements from Section R505.2 are relocated into new section on dimension, thickness and material grade and Table R505.2(1) and Table R505.2(2) are combined into new Table R505.2.3. The minimum flange width, maximum flange width, and minimum lip size are moved into the charging language for the table, since these properties do not vary based upon the member designation. Also, to further streamline the provisions, the most popular and readily available grade-thickness combinations are retained and the less popular and readily available grade-thickness combinations are

removed. For Grade 33 ksi steel, 33 and 43 mil thicknesses are specified; while, for Grade 50 ksi steel, 54 mil and 68 mil thicknesses are specified. This language is added to Section R505.2.3. Finally, the reference to 97 mil product is deleted. It is very uncommon in residential construction, and, if need be, the user can still use AISI S230, where solutions include 97 mil product.

- **R505.2.5:** The title is fixed to match others in section and the screw substitution factor is eliminated. This is seldom used in prescriptive design and adds complexity to the provisions.
- **Figure R505.2.6.3:** Title correction.
- **Table R505.3.1(1):** The wind speeds are updated to reflect “ultimate” design wind speeds from ASCE 7-10 and editorial corrections are made to column titles.
- **R505.3.2:** The multi-span joist tables are deleted from the IRC – Tables R505.3.2(2) and R505.3.2(3). These add volume and complexity, but do not provide significant improvement over the single-span tables. Rather, the single span table, Table R505.3.2, can be used conservatively for continuous spans. If the user wants, they can go to AISI S230 for a multi-span solution. To be consistent with changes in other sections, Table R505.3.2 now applies to both Grade 33 ksi and Grade 50 ksi. For Grade 33 ksi steel, 33 and 43 mil thicknesses are specified; while, for Grade 50 ksi steel, 54 mil and 68 mil thicknesses are specified. This language is added to a new table note. Please note that, while Grade 50 ksi steel is now required for 54 mil and 68 mil product, no changes are made to the allowable span spacing, thus resulting in additional conservatism. Also, the reference to 97 mil product is deleted.
- **R505.3.4:** The option for clip angle bearing stiffeners is deleted, including Tables R505.3.4(1) through R505.3.4(4) and the clip angle option shown in Figure R505.3.4(2). The option is quite limited in its application after references to the 97 mil product are removed. The user can go to AISI S230, if they want to utilize clip angle bearing stiffeners.
- **M1308.1, M2101.6, and P2603.2:** Cross-references are updated in each of these sections.

Cost Impact: The code change proposal will not increase the cost of construction.

RB258-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

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RB259 – 13

R506.2.2

Proponent: Stephen S. Szoke, P.E./Portland Cement Association/Portland Cement Association

Revise as follows:

R506.2.2 Base. A 4-in. thick (102 mm) base course consisting of clean graded sand, gravel, crushed stone, crushed concrete, or crushed blast furnace slag passing a 2-inch (51 mm) sieve shall be placed on the prepared subgrade when the slab is below grade.

Exception: A base course is not required when the concrete slab is installed on well-drained or sand-gravel mixture soils classified as Group I according to the United Soil Classification System in accordance with Table R405.1.

Reason: Concrete is commonly recycled by crushing the concrete for use as aggregate. The aggregate is sometimes used in new concrete, but the most use of this aggregate formed from crushed concrete is for base materials. The use of crushed concrete as base material for slab on ground construction is permitted in American Concrete Institute 332 *Residential Code Requirements for Structural Concrete* and is cited as an acceptable practice in the commentary of the ICC *International Green Construction Code* commentary. However, since crushed concrete is not specifically cited in the IRC several building code departments have resisted the use of crushed concrete as base material for slab on ground construction. This change specifically adds crushed concrete to the list of acceptable materials and helps assure that this sustainable building practice, the use of crushed concrete in lieu of virgin aggregates, is permissible in the IRC.

Cost Impact: This change will not increase the cost of construction.

RB259-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R506.2.2-RB-SZKE.doc

RB260 – 13

R507.2.3

Proponent: Hoyt D Jeter, Eagle Eye Consulting Engineers, representing Washington Association of Building Officials Technical Code Development Committee (hoytjeter@centurytel.net)

Revise as follows:

R507.2.3 Deck lateral load connection. The lateral load connection required by Section R507.1 shall be permitted to be in accordance with Figure R507.2.3. Where the lateral load connection is provided in accordance with Figure 507.2.3, hold-down tension devices shall be installed in not less than two locations per deck, within 24" of each end of the deck. Each device shall have an allowable stress design capacity of not less than 1500 pounds (6672 N).

Reason: Currently the IRC does not specify where the hold-down connection devices must be placed. The purpose of this code change is to provide clear guidance as to where to locate the lateral load hold-down devices for decks. To maximize the efficiency of the hold downs they should be placed as far apart as possible near the ends of the deck. Deck joist framing typically is not spaced greater than 24" on center so 24 " was selected as the upper limit to place these hold downs.

Cost Impact: The code change proposal will not increase the cost of construction, it will decrease the cost.

RB260-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R507.2.3 #1-RB-JETER.doc

RB261 – 13

R507.2.3

Proponent: Hoyt D Jeter, Eagle Eye Consulting Engineers, representing Washington Association of Building Officials Technical Code Development Committee (hoytjeter@centurytel.net)

Revise as follows:

R507.2.3 Deck lateral load connection. The lateral load connection required by Section R507.1 shall be permitted to be in accordance with Figure R507.2.3. Where the lateral load connection is provided in accordance with Figure 507.2.3, hold-down tension devices shall be installed in not less than two locations per deck, and each device shall have an allowable stress design capacity of not less than 1500 pounds (6672 N).

Exception: Hold-down tension devices are not required for decks no more than 30 inches above grade at any point.

Reason: The requirement to provide lateral load connections for attached decks was introduced into the code to insure that live loads (usually resulting from human activity on the deck) will not cause failure of the deck ledger connection thereby allowing the deck to pull-away from the primary structure. Taken literally, all decks, even if they are 6" above grade, must be provided with lateral load connection devices (i.e. hold-downs). The exemption to install lateral load connection devices for decks 30" or less above grade was chosen because that is the same height at which the code currently exempts guardrails. The proposed exception does not exclude the requirement to adequately connect the deck ledger to the primary structure, as required elsewhere in the code.

Cost Impact: The code change proposal will decrease the cost of construction.

RB261-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R507.2.3 #2-JETER.doc

RB262 – 13

R507.2.3, Figure R507.2.3(2) (NEW)

Proponent: Hoyt Jeter, Eagle Eye Consulting Engineers, representing Washington Association of Building Officials Technical Code Development Committee (hoytjeter@centurytel.net)

Revise as follows:

R507.2.3 Deck lateral load connection. The lateral load connection required by Section R507.1 shall be permitted to be in accordance with Figures R507.2.3(1) or R507.2.3(2). Where the lateral load connection is provided in accordance with Figure R507.2.3(1), hold-down tension devices shall be installed in not less than two locations per deck, and each device shall have an allowable stress design capacity of not less than 1500 pounds (6672 N). Where the lateral load connections is provided in accordance with Figure R507.2.3(2), the hold-down tension devices shall be installed in not less than 4 locations per deck, and each device shall have an allowable stress design capacity of not less than 750 pounds (3336 N).

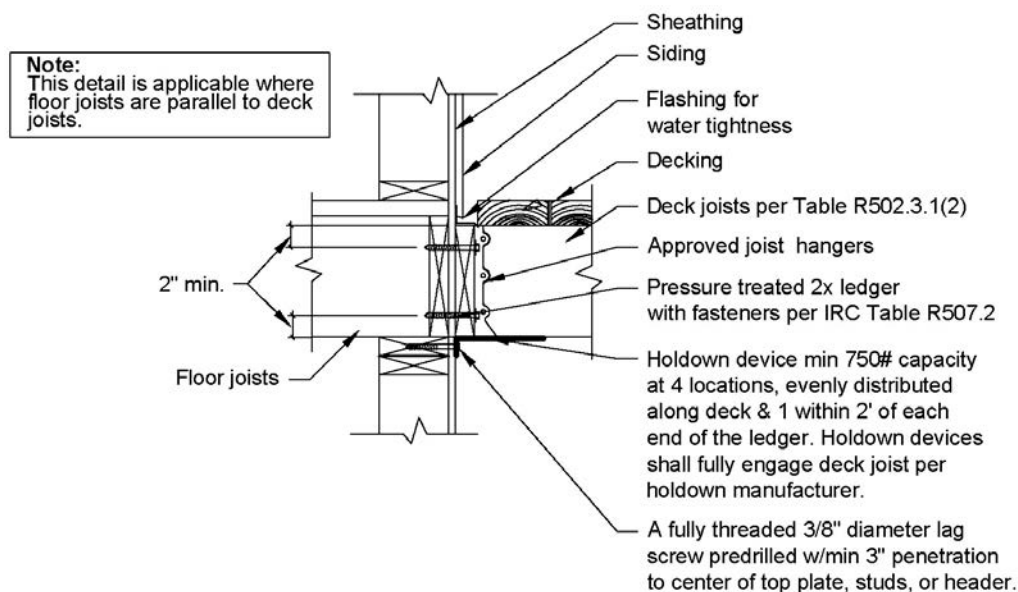


FIGURE R507.2.3(2)

Reason: This proposal provides an alternative prescriptive method to achieve an acceptable lateral load connection for residential decks. For new or replacement decks on existing homes, builders or homeowners must often remove interior sheet rock on ceilings in order to install hold-down tension devices as required by Figure 507.2.3. This proposal achieves an acceptable lateral load connection between the deck and primary structure by permitting the installation of surface mounted hold-down connection devices spread out along the length of the ledger and precludes the need to make expensive and unnecessary ceiling repairs.

Typical deck failures occur because joists separate from the joist-hangers which are fastened to the ledger. This is due to the lack of an adequate tension connection between the joist and the hanger at this joint. This proposal provides a better connection between at least 4 joists and the primary structure thereby reducing the potential failure of the joist to joist-hanger connection and better support from complete collapse of the deck and will reduce the chance of injury.

Cost Impact: The code change proposal will not increase the cost of construction, it will decrease the cost.

RB262-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R507.2.3 #3-JETER.doc

RB263 – 13

R507.1, R507.2.3, Figure R507.2.3

Proponent: Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee and Virginia Building and Code Officials Association (bajnaic@chesterfield.gov)

Revise as follows:

R507.1 Decks. Where supported by attachment to an exterior wall, decks shall be positively anchored to the primary structure and designed for both vertical and lateral loads.

Exception: Design for lateral loads, and connectors in accordance with Section R507.3, shall not be required for decks that do not require guards in accordance with Section R312.1.1, provided that the deck ledger is connected to the band joist in accordance with Section R507.2.

Such attachment shall not be accomplished by the use of toenails or nails subject to withdrawal. Where positive connection to the primary building structure cannot be verified during inspection, decks shall be self-supporting. For decks with cantilevered framing members, connections to exterior walls or other framing members, shall be designed and constructed to resist uplift resulting from the full live load specified in Table R301.5 acting on the cantilevered portion of the deck.

~~R507.2.3~~ R507.3 Deck lateral load connection. The lateral load connection required by Section R507.1 shall be permitted to be in accordance with Figure R507.2-3. Where the lateral load connection is provided in accordance with figure 507.2-3, hold-down tension devices shall be installed in not less than two locations per deck, and each device shall have an allowable stress design capacity of not less than 1500 pounds (6672 N).

FIGURE ~~507.2-3~~ 507.3 DECK ATTACHMENT FOR LATERAL LOADS

(Figure remains unchanged)

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

The provisions for deck design and attachment to the house have evolved in recent years. The IRC is now very strong on appropriate attachment to the main structure, as it should be. However, the specific provision in R507.1 that requires design for lateral loads, and the prescriptive hold-down tension connector alternative of R507.2.3, seem overly conservative for decks that are at grade, when these decks do not even require guardrails. For at-grade decks, the lag screw/bolt connections from deck ledger to band joist required by R507.2 are adequate. Elevated decks would still be required to be designed for lateral loads in accordance with R507.1 or the prescriptive hold-down tension devices specified in R507.2.3 (figure included below for convenience).

The renumbering of current Section R507.2.3 to R507.3 is necessary because current Section R507.2.3 serves as a prescriptive alternative to the requirement for design for lateral loads in R507.1. The purpose of the exception is to retain the requirement for ledger-to-band joist lags or bolts in current R507.2, R507.2.1, and R507.2.2, but exempt low decks from the prescriptive hold-down tension devices (or design for lateral load) in current section R507.2.3. Moving current R507.2.3 to its own section allows easier reference to the lag/screw connection requirements.

Cost Impact: The code change proposal could reduce the cost of construction. It could reduce the cost of construction.

RB263-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R507.1-RB-BAJNAI-BCAC.doc

RB264 – 13

R507.1, R507.4 (NEW), R507.5 (NEW), Figure R507.5 (NEW), Table R507.5 (NEW), R507.5.1, R507.6, Figure R507.6 (NEW), Table R507.6 (NEW), R507.7 (NEW), R507.8 (NEW), R507.8.1 (NEW), Figure R507.8.1 (NEW), R507.8.2 (NEW), Figure R507.8.2 (NEW)

Proponent: Brian Foley, P.E. Fairfax County, VA, representing Virginia Building and Code Officials Association (brian.foley@fairfaxcounty.gov), Glenn Mathewson, M.C.P., North American Deck and Railing Association, Randy Shackleford, P.E., Simpson Strong-Tie

Revise as follows:

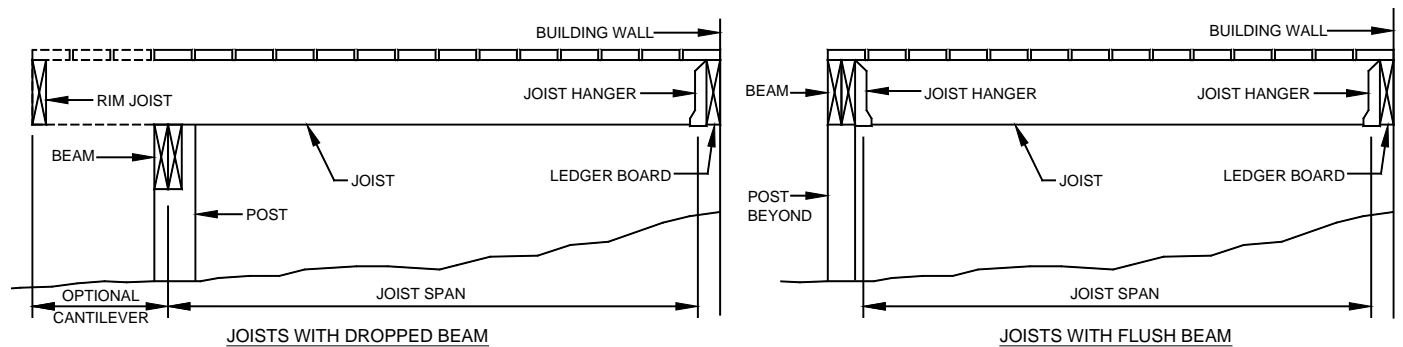
R507.1 Decks. Wood decks shall be in accordance with this section. Where supported by attachment to an exterior wall, decks shall be positively anchored to the primary structure and designed for both vertical and lateral loads. Such attachment shall not be accomplished by the use of toenails or nails subject to withdrawal. Where positive connection to the primary building structure cannot be verified during inspection, decks shall be self-supporting. For decks with cantilevered framing members, connections to exterior walls or other framing members, shall be designed and constructed to resist uplift resulting from the full live load specified in Table R301.5 acting on the cantilevered portion of the deck. The use of other grades, species, loading, materials and conditions not described herein shall be permitted be in accordance with Section R301.

R507.4 Decking. Wood decking shall be at least a nominal 2-inch (51 mm) in thickness and placed at an angle between 45 and 90 degrees to deck joists spaced a maximum of 24-inches (610 mm) on-center. Wood decking shall be attached to each supporting member with a minimum of (2)8d threaded nails or (2)#8 wood screws.

Exceptions:

1. Wood decking with a minimum nominal thickness of 1 $\frac{1}{4}$ inches (32 mm) shall be permitted to be installed at 90 degrees to deck joists spaced a maximum of 24 inches (610 mm) on center and not less than 45 degrees to deck joists spaced a maximum of 16 inches (406 mm) on center.
2. Wood/plastic composite decking in accordance with Section R507.3.

R507.5 Allowable deck joist spans. Spans for wood deck joists, as shown in Figure R507.5, shall be in accordance with Table R507.5. Deck joist shall be permitted to cantilever a maximum of one-fourth of the joist span.



**FIGURE R507.5
TYPICAL DECK JOIST SPANS**

TABLE R507.5
DECK JOIST SPANS FOR COMMON LUMBER SPECIES (ft.-in.)

SPECIES ^a	SIZE	SPACING OF DECK JOISTS WITH NO CANTILEVER ^b (in.)			SPACING OF DECK JOISTS WITH CANTILEVERS ^c (in.)		
		12	16	24	12	16	24
Southern pine	2 x 6	10-4	9-5	7-10	7-1	7-1	7-1
	2 x 8	13-8	12-5	10-2	10-9	10-9	10-2
	2 x 10	17-5	15-10	13-1	15-6	15-6	13-1
	2 x 12	18-0	18-0	15-5	18-0	18-0	15-5
Douglas fir-larch ^d , hem-fir ^d , spruce-pine-fir ^d	2 x 6	9-6	8-8	7-2	6-3	6-3	6-3
	2 x 8	12-6	11-1	9-1	9-5	9-5	9-1
	2 x 10	15-8	13-7	11-1	13-7	13-7	11-1
	2 x 12	18-0	15-9	12-10	18-0	15-9	12-10
Redwood, western cedars, ponderosa pine ^e , red pine ^e	2 x 6	8-10	8-0	7-0	5-7	5-7	5-7
	2 x 8	11-8	10-7	8-8	8-6	8-6	8-6
	2 x 10	14-11	13-0	10-7	12-3	12-3	10-7
	2 x 12	17-5	15-1	12-4	16-5	15-1	12-4

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

- No. 2 grade with wet service factor.
- Ground snow load, live load = 40 psf, dead load = 10 psf, $L/\Delta = 360$.
- Ground snow load, live load = 40 psf, dead load = 10 psf, $L/\Delta = 360$ at main span, $L/\Delta = 180$ at cantilever with a 220 pound point load applied to end.
- Includes incising factor.
- Northern species with no incising factor

R507.5.1 Lateral restraint at supports. Joist ends and bearing locations shall be provided with lateral restraint to prevent rotation. Where lateral restraint is provided by joist hangers or blocking between joists, their depth shall equal not less than 60 percent of the joist depth. Where lateral restraint is provided by rim joists, they shall be secured to the end of each joist with a minimum of (3)10d threaded nails or (3)#10x3 inch (76 mm) long wood screws.

R507.6 Deck Beams. Spans for deck beams, as shown in Figure R507.6, shall be in accordance with Table R507.6. Beam plies shall be fastened with two rows of 10d threaded nails minimum at 16 inches (406 mm) on center along each edge. Beams shall be permitted to cantilever at each end up to one-fourth of the beam span. Splices of multi-span beams shall be located at interior post locations.

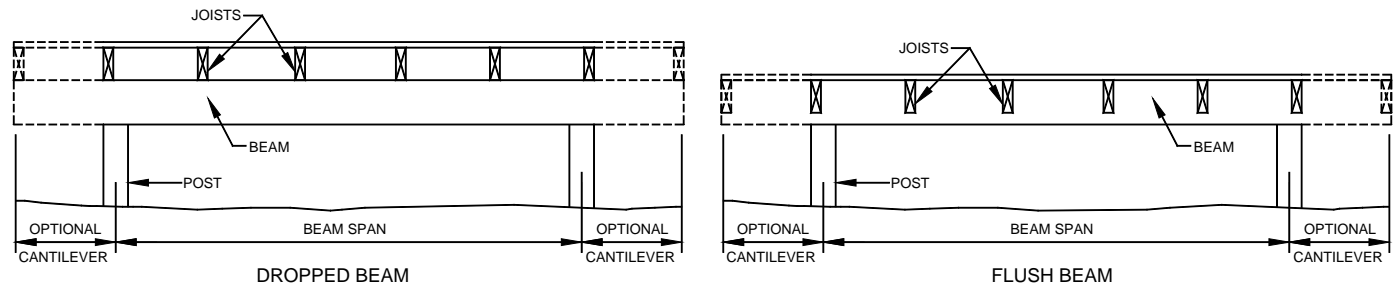


FIGURE R507.6
TYPICAL DECK BEAM SPANS

TABLE R507.6
DECK BEAM SPAN LENGTHS (ft.-in.)^{a, b}

SPECIES ^c	SIZE ^d	DECK JOIST SPAN (ft.) LESS THAN OR EQUAL TO:						
		6	8	10	12	14	16	18
Southern pine	2-2x6	7-1	6-2	5-6	5-0	4-8	4-4	4-1
	2-2x8	9-2	7-11	7-1	6-6	6-0	5-7	5-3
	2-2x10	11-10	10-3	9-2	8-5	7-9	7-3	6-10
	2-2x12	13-11	12-0	10-9	9-10	9-1	8-6	8-0
	3-2x6	8-7	7-8	6-11	6-3	5-10	5-5	5-2
	3-2x8	11-4	9-11	8-11	8-1	7-6	7-0	6-7
	3-2x10	14-5	12-10	11-6	10-6	9-9	9-1	8-7
	3-2x12	17-5	15-1	13-6	12-4	11-5	10-8	10-1
Douglas fir-larch ^e , hem-fir ^e , spruce- pine-fir ^e , redwood, western cedars, ponderosa pine ^f , red pine ^f	3x6 or 2-2x6	5-5	4-8	4-2	3-10	3-6	3-1	2-9
	3x8 or 2-2x8	6-10	5-11	5-4	4-10	4-6	4-1	3-8
	3x10 or 2-2x10	8-4	7-3	6-6	5-11	5-6	5-1	4-8
	3x12 or 2-2x12	9-8	8-5	7-6	6-10	6-4	5-11	5-7
	4x6	6-5	5-6	4-11	4-6	4-2	3-11	3-8
	4x8	8-5	7-3	6-6	5-11	5-6	5-2	4-10
	4x10	9-11	8-7	7-8	7-0	6-6	6-1	5-8
	4x12	11-5	9-11	8-10	8-1	7-6	7-0	6-7
	3-2x6	7-4	6-8	6-0	5-6	5-1	4-9	4-6
	3-2x8	9-8	8-6	7-7	6-11	6-5	6-0	5-8
	3-2x10	12-0	10-5	9-4	8-6	7-10	7-4	6-11
	3-2x12	13-11	12-1	10-9	9-10	9-1	8-6	8-1

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

- Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220 pound point load applied at the end.
- Beams supporting deck joists from one side only.
- No 2 grade, wet service factor.
- Beam depth shall be greater than or equal to depth of joists with a flush beam condition.
- Includes incising factor.
- Northern species with no incising factor.

R507.7 Deck joist and deck beam bearing. The ends of each joist and beam shall have not less than 1.5 inches (38 mm) of bearing on wood or metal and not less than 3 inches (76 mm) on concrete or masonry for the entire width of the beam. Joist framing into the side of a ledger board or beam shall be supported by approved joist hangers. Beam bearing at deck posts shall be in accordance with Section R507.8.1.

R507.8 Deck posts. For single level wood decks with beams sized in accordance with Table R507.6, posts shall be a minimum nominal 6x6 with a maximum height of 14 feet (5486 mm) measured to the underside of the beam.

Exception: Nominal 4x4 or 4x6 posts shall be permitted with a maximum height of 8 feet (2438 mm).

R507.8.1 Deck post to deck beam. Deck beams shall be attached to deck posts in accordance with Figure R507.8.1. Post to beam connections shall be constructed to resist lateral displacement. Manufactured post-to-beam connectors shall be sized for the post and beam sizes. All bolts shall have washers under the head and nut.

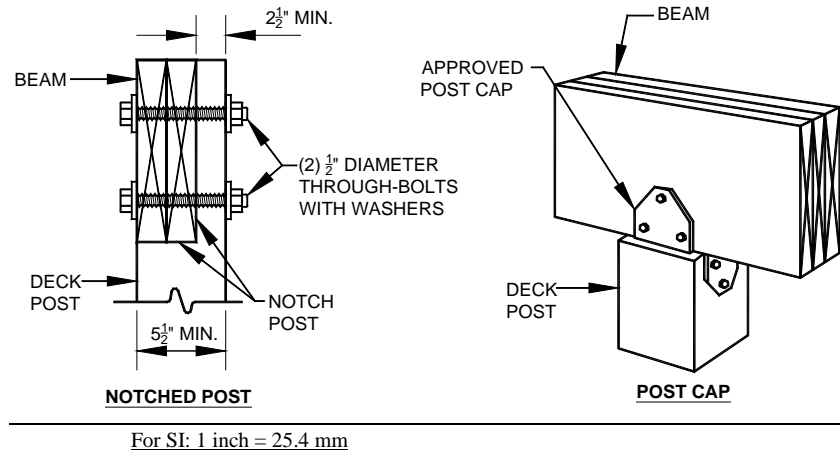


FIGURE R507.8.1
DECK BEAM TO DECK POST

R507.8.2 Deck post to deck footing. Posts shall bear on footings in accordance with Section R403 and Figure R507.8.2.

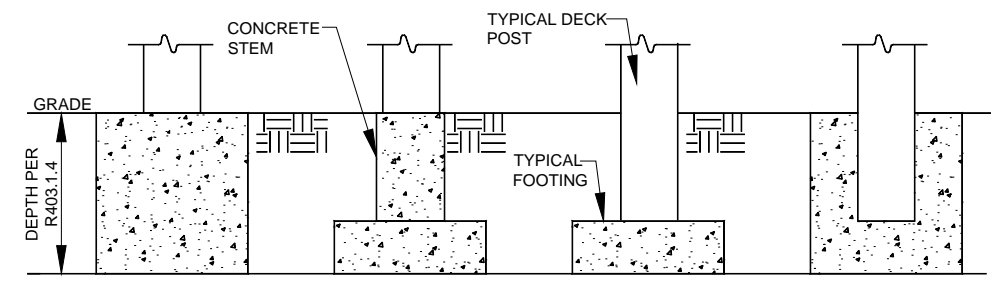


FIGURE R507.8.2
TYPICAL DECK POSTS TO DECK FOOTINGS

Reason: Wood decks are the most prolific structure to be constructed to a residential dwelling, yet there is very little guidance in the IRC regarding the structural capacity of the joists, beams and posts. The existing span tables in Chapter 5 do not address wood decks due to the differences in their design considerations. Some builders and code officials often rely on span tables developed by AHJs or the DCA6 published by the American Wood Council, while others have nothing to refer to.

With the permission of the American Wood Council, we have provided in this proposal their span tables for typical joists and beams and height requirements for typical posts based on the most common wood species and grade used throughout the country. Attachment and bearing requirements are also provided to give the user guidance on how these elements connect. With the existing provisions already in Section 507, the IRC user would be able to design and construct a safe wood deck.

Careful attention was given to ensure these new provisions did not and could not deter the construction of decks composed of other materials and in different configurations and conditions.

Cost Impact: The code change proposal will not increase the cost of construction.

RB264-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R507.1-RB-FOLEY.doc

RB265 – 13

R507.2, Table 507.2, R507.2.1, R507.2.2, R507.2.3 (NEW)

Proponent: Glenn Mathewson, North American Deck and Railing Association, representing The Colorado Chapter of the International Code Council, (GlennMathewson@nadra.org)

Revise as follows:

R507.2 Deck ledger connection to band joist. For decks supporting a total design load of 50 pounds per square foot (2394 Pa) [40 pounds per square foot (1915 Pa) live load plus 10 pounds per square foot (479 Pa) dead load], the connection between a deck ledger of pressure-preservative-treated Southern Pine, incised pressure-preservative-treated Hem-Fir, or approved decay-resistant species, and a 2-inch (51 mm) nominal lumber band joist bearing on a sill plate or wall plate shall be constructed with ½-inch (12.7 mm) lag screws or bolts with washers in accordance with Table R507.2. Lag screws, bolts and washers shall be hot-dipped galvanized or stainless steel. Deck ledger connections to band joists shall be in accordance with this section and Table R507.2, Table R507.2.1, Figure R507.2.1(1) and Figure R507.2.1(2). For other grades, species, connection details, and loading conditions, decks shall be designed in accordance with section R301.

R507.2.1 Placement of lag screws or bolts in deck ledgers and band joists. The lag screws or bolts in deck ledgers and band joists shall be placed in accordance with Table R507.2.1 and Figures R507.2.1(1) and R507.2.1(2).

R507.2.1 Ledger details. Deck ledgers installed in accordance with section R507.2 shall be a minimum 2 x 8 nominal, pressure-preservative-treated or approved, naturally durable, No. 2 grade or better lumber. Deck ledgers installed in accordance with section R507.2 shall not support concentrated loads from beams or girders. Deck ledgers shall not be supported on stone or masonry veneer.

R507.2.2 Alternate deck ledger connections. ~~Deck ledger connections not conforming to Table R507.2 shall be designed in accordance with accepted engineering practice. Girders supporting deck joists shall not be supported on deck ledgers or band joists. Deck ledgers shall not be supported on stone or masonry veneer.~~

R507.2.2 Band joist details. Band joists attached by a ledger in accordance with section R507.2 shall be a minimum 2-inch-nominal, solid-sawn, spruce-pine-fir lumber or a minimum 1 x 9.5 dimensional, Douglas fir, laminated veneer lumber. Band joists attached by a ledger in accordance with section R507.2 shall be fully supported by a wall or sill plate below.

R707.2.3 Ledger to band joist fastener details. Fasteners used in deck ledger connections in accordance with Table R507.2 shall be hot-dipped galvanized or stainless steel and shall be installed in accordance with Table R507.2.1 and Figure R507.2.1(1) and Figure R507.2.1(2).

TABLE R507.2
FASTENER SPACING FOR A SOUTHERN PINE OR HEM-FIR DECK LEDGER AND
A 2-INCH-NOMINAL SOLID-SAWN SPRUCE-PINE-FIR BAND JOIST^{c,f,g}
DECK LEDGER CONNECTION TO BAND JOIST^{c,d,e}
(Deck live load = 40 psf, deck dead load = 10 psf, snow load ≤ 40 psf)

JOIST SPAN	JOIST SPAN						
	6' and less	6'1" to 8'	8'1" to 10'	10'1" to 12'	12'1" to 14'	14'1" to 16'	16'1" to 18'
Connection details	On-center spacing of fasteners ^{d,e}						
½ inch diameter lag screw with ^{15/32} inch maximum sheathing ^a	30	23	18	15	13	11	10

1/2 inch diameter bolt with 15/32 inch maximum sheathing	36	36	34	29	24	21	19
1/2 inch diameter bolt with 15/32 1 inch maximum sheathing and 1/2 inch washers ^{b, h}	36	36	29	24	21	18	16

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm. 1 pound per square foot = 0.0479 kPa.

- a. The tip of the lag screw shall fully extend beyond the inside face of the band joist.
- b. The maximum gap between the face of the ledger board and face of the wall sheathing shall be 1/2 inch.
- b. Up to 1/2-inch thickness of stacked washers shall be permitted to substitute for up to 1/2-inch of allowable sheathing thickness.
- c. Ledgers shall be flashed in accordance with Section R703.8 to prevent water from contacting the house band joist.
- d. Lag screws and bolts shall be staggered in accordance with Section R507.2.4.
- e. Deck ledger shall be minimum 2 x 8 pressure-preservative-treated No. 2 grade lumber, or other approved materials as established by standard engineering practice.
- f. When solid-sawn pressure-preservative-treated deck ledgers are attached to a minimum 1-inch-thick engineered wood product (structural composite lumber, laminated veneer lumber or wood structural panel band joist), the ledger attachment shall be designed in accordance with accepted engineering practice.
- g. A minimum 1 x 9 1/2 Douglas Fir laminated veneer lumber rimboard shall be permitted in lieu of the 2-inch nominal band joist
- h d. Wood structural panel sheathing, gypsum board sheathing, fiberboard, lumber, or foam sheathing not exceeding 1 inch in thickness shall be permitted. The maximum distance between the face of the ledger board and the face of the band joist shall be 1 inch.
- e. Snow load shall not be assumed to act concurrently with live load.

Reason: The prescriptive ledger bolting provisions are very specific, yet difficult to understand and somewhat contradictory between the language in Section R507.2 and that of Table R507.2. Overall, this code modification proposal does not intend to change the application of the current provisions.

--Footnote "h" is the only place where the description of the type of sheathing permitted is provided. However, footnote "h" is only referenced in one of the three connection methods in the table. This has been corrected to reflect that the various sheathing types are allowed under all methods by placing the footnote reference in the main title of the table.

--Fiberboard ("black celotex®" or "thermoply®" for example) and lumber sheathing (diagonal wood sheathing) is likely to be encountered in deck construction on existing homes. The current provision provides a blanket approval of "foam sheathing" which includes varying compositions and performance levels without regard. Under that consideration, fiberboard and lumber should certainly be acceptable up to the same maximum thickness.

--Footnote "b" and "h" are discussing the same topic but with different points of references. This is confusing, and has been corrected.

--Why list various engineered wood products in footnote f and reference what we already know about engineered alternatives. This is unnecessary text. They are alternatives and need to be approved under R104.11 or R301.

--In the current language, the description of allowable species for ledger material is not consistent between the section language, table title and table footnotes. The Section refers to decay resistant properties of PPT pine or hem-fir, and then continues with an ambiguous reference to "approved decay-resistant species" leaving it to the building official to decide. The Table heading, however, refers only to the pine and hem-fir and not the use of decay-resistant species. It is further confused with the references in the table footnotes for use of any PPT, No 2 grade lumber species or engineering. There is no consistency and it is not user friendly. The proposed language makes use of the IRC-defined term "naturally durable lumber" as opposed to "decay-resistant" and clearly explains the materials allowed under this connection method in the body of the code as opposed to footnotes in a table.

--"Rim Board" is a registered trademark of APA. The use of the term "rimboard" in discussions unique to engineered wood products used as band joists infers that said engineered band joist must be one rated by APA. The IRC does not require engineered lumber band joists to be APA rated "Rim Board". It is simply too similar to a proprietary trademark to be appropriate terminology for the IRC, when the industry- and IRC-wide term "band joist" is available for use.

--The description of the allowable materials for the home's band joist are described in the Section, the Table title and then again in the footnotes. As with the ledger material, this is now described only in the body of the code section.

--The current language would prohibit the connection of a deck ledger to a band joist that was larger in it's narrow cross-section than 2-inches, thus the term "minimum" has been moved in front of this size description.

Prohibition to supporting beams/girders on ledgers and band joist after the sentence about "engineering practice" and under the heading of "alternate deck ledger connections" is misleading. A design professional should not be prohibited from making such design. The intent has been presented more clearly in this proposal, that simply the fastening schedule does not anticipate concentrated loads from beams.

Cost Impact: This code change proposal will not increase the cost of construction.

RB265-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R507.2-RB-MATHEWSON.doc

RB266 – 13

R202, Table R301.5, R311.7.5.4, R311.7.8.1, R377.7.8.4, R312.1.4, R317.4, R317.4.1, R317.4.2, R318.1, R507.3, R507.3.1, R507.3.2 (NEW), R507.3.3 (NEW), R507.3.4 (NEW), R507.3.5 (NEW), R507.3.6 (NEW), Index

Proponent: Marcelo M Hirschler, GBH International (gbhint@aol.com)

Revise as follows:

TABLE R301.5
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS
(in pounds per square foot)

USE	LIVE LOAD
Guardrails Guards and handrails ^d	200 ⁿ
Guardrail Guard in-fill components ^f	50 ⁿ

R311.7.5.4 Exterior ~~wood/plastic~~ plastic composite stair treads. ~~Wood/plastic~~ Plastic composite stair treads shall comply with the provisions of Section R507.3.

R311.7.8.1 Height. Handrail height, measured vertically from the sloped plane adjoining the tread nosing, or finish surface of ramp slope, shall be not less than 34 inches (864 mm) and not more than 38 inches (965 mm).

Exceptions:

1. The use of a volute, turnout or starting easing shall be allowed over the lowest tread.
2. When handrail fittings or bendings are used to provide continuous transition between flights, transitions at winder treads, the transition from handrail to guardrail guard, or used at the start of a flight, the handrail height at the fittings or bendings shall be permitted to exceed the maximum height.

R311.7.8.4 Exterior ~~wood/plastic~~ plastic composite handrails. ~~Wood/plastic~~ Plastic composite exterior handrails shall comply with the ~~provisions~~ requirements of Section R507.3.

R312.1.4 Exterior ~~wood/plastic~~ plastic composite guards. ~~Wood/plastic~~ Plastic composite exterior guards shall comply with the ~~provisions~~ requirements of Section ~~R317.4~~ R507.3.

~~R317.4 Wood/plastic composites.~~ ~~Wood/plastic composites used in exterior deck boards, stair treads, handrails and guardrail systems shall bear a label indicating the required performance levels and demonstrating compliance with the provisions of ASTM D 7032.~~

R317.4 Plastic composites. Plastic composite exterior deck boards, stair treads, guards and handrails containing wood, cellulosic or other biodegradable materials shall comply with the provisions of Section R507.3.

~~R317.4.1 Labeling.~~ ~~Deck boards and stair treads shall bear a label that indicates compliance to ASTM D 7032 and includes the allowable load and maximum allowable span. Handrails and guardrail systems or their packaging shall bear a label that indicates compliance to ASTM D7032 and includes the maximum allowable span.~~

~~R317.4.2 Installation.~~ ~~Wood/plastic composites shall be installed in accordance with the manufacturer's instructions.~~

R318.1 Subterranean termite control methods. In areas subject to damage from termites as indicated by Table R301.2(1), methods of protection shall be one of the following methods or a combination of these methods:

1. Chemical termiticide treatment, as provided in Section R318.2.
2. Termite baiting system installed and maintained according to the *label*.
3. Pressure-preservative-treated wood in accordance with the provisions of Section R317.1.
4. Naturally durable termite-resistant wood.
5. Physical barriers as provided in Section R318.3 and used in locations as specified in Section R317.1.
6. Cold-formed steel framing in accordance with Sections R505.2.1 and R603.2.1.
7. Plastic composite exterior deck boards, stair treads, guards and handrails in accordance with the provisions of Section R507.3.

Revise as follows:

R507 **EXTERIOR DECKS**

~~**R507.3 Wood/plastic composites.** Wood/plastic composites used in exterior deck boards, stair treads, handrails and guardrail systems shall bear a label indicating the required performance levels and demonstrating compliance with the provisions of ASTM D 7032.~~

R507.3 Plastic composite deck boards, stair treads, guards and handrails. Plastic composite deck boards, stair treads, guards and hand rails shall comply with Section R507.3.1 through R507.3.6.

~~**R507.3.1 Installation of wood/plastic composites.** Wood/plastic composites shall be installed in accordance with the manufacturer's instructions.~~

R507.3.1 General. Plastic composites shall consist either of wood/plastic composites or of plastic lumber. Plastic composite exterior deck boards, stair treads, guards and handrails shall comply with the requirements of ASTM D7032 and with the additional requirements of Section R507.3.

R507.3.2 Labeling. Plastic composite deck boards and stair treads, or their packaging, shall bear a *label* that indicates compliance with ASTM D7032 and includes the allowable load and maximum allowable span, determined in accordance with ASTM D7032. Plastic composite handrails and guards, or their packaging, shall bear a *label* that indicates compliance with ASTM D7032 and includes the allowable load and maximum allowable span, determined in accordance with ASTM D7032.

R507.3.3 Flame Spread Index. Plastic composite deck boards, stair treads, guards and handrails shall exhibit a flame spread index not exceeding 200 when tested in accordance with ASTM E84 or UL 723 with the test specimen remaining in place during the test.

Exception: Plastic composites determined to be noncombustible.

R507.3.4 Decay resistance. Plastic composite deck boards, stair treads, guards and handrails containing wood, cellulosic or other biodegradable materials shall be termite and decay resistant in accordance with ASTM D7032.

R507.3.5 Termite resistance. Where required by Section 318, plastic composite deck boards, stair treads, guards and handrails containing wood, cellulosic or other biodegradable materials shall be termite resistant in accordance with ASTM D7032.

R507.3.6 Installation of plastic composites. Plastic composite deck boards, stair treads, guards and handrails shall be installed in accordance with this code and the manufacturers' instructions.

Revise as follows:

PLASTIC COMPOSITE. A generic designation that refers to wood/plastic composites and plastic lumber.

WOOD/PLASTIC COMPOSITE. A composite material made primarily from wood or cellulose-based materials and plastic.

Revise Index as follows:

Guardrails Guards 312

Reason: This proposal recommends permitting the use of plastic composites for exterior applications as deck boards, stair treads, handrails and guards. The term "plastic composites" is a designation that was accepted by the IBC to incorporate wood/plastic composites and plastic lumber.

Both plastic composites and plastic lumber are products made of plastic materials with added fibrous materials to provide stiffness. There are some differences between the two, but they are relatively subtle. Wood plastic composites contain wood materials, or cellulosic materials, (normally over 50%) as the primary fiber that provides the stiffness. On the other hand plastic lumber materials contain primarily plastic (normally over 50%) and use a variety of materials to provide stiffness, often fiberglass. Acceptance Criteria AC 174, Acceptance Criteria for Deck Board Span Ratings and Guardrail Systems (Guards and Handrails) is used for both types of materials and it requires compliance with requirements in specification ASTM D7032, Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite Deck Boards and Guardrail Systems (Guards or Handrails), presently referenced in the IBC, the IRC and in the IWUIC.

Numerous plastic lumber decks are used throughout the US, but the IRC does not reference them. The IBC 2015 will reference plastic composite deck boards, stair treads, handrails and guards and the requirements are similar to those proposed here and the language is also consistent.

Flame spread index: wood materials normally comply with a flame spread index of no more than 200. ASTM D7032 also requires materials to comply with a flame spread index of no more than 200 when tested to ASTM E84. However, it does not have the additional requirements that the material stay in place, which is important for plastic materials and was adopted by the IBC.

The reasons for the specific requirements in the proposal are as follows:

1. The language is changed from wood/plastic composites to plastic composites.
2. All of the requirements are incorporated into section R507 (on decks) and specifically into section R507.3.
3. The requirements are technically identical to those in the IBC.
4. A definition for plastic composite is added to section 202 and the definition of wood/plastic composite, which is now no longer necessary and would cause confusion, is deleted from Section 202.
5. The information on labeling is redundant in R317 and it is being deleted as it is included in R507.3 and R317.4 sends the user to R507.3 for requirements.
6. A new subsection for plastic composites is being added to R318.1 to deal with termites.
7. The designation "guardrail" is being replaced by "guard" throughout.

For information purposes, the new section on plastic composites in the IBC reads as follows:

IBC SECTION 2612 - PLASTIC COMPOSITES

2612.1 General. Plastic composites shall consist either of wood/plastic composites or of plastic lumber. Plastic composites shall comply with the provisions of this code and with the additional requirements of Section 2612.

2612.2 Labeling and identification. Packages and containers of plastic composites used in exterior applications shall bear a label showing the manufacturer's name, product identification and information sufficient to determine that the end use will comply with the code requirements.

2612.2.1 The label for plastic composites used in exterior applications as deck boards, stair treads, handrails and guardrail systems shall indicate the required performance levels and demonstrate compliance with the provisions of ASTM D7032.

2612.2.2 Loading. The label for plastic composites used in exterior applications as deck boards, stair treads, handrails and guardrail systems shall indicate the type and magnitude of the load determined in accordance with ASTM D7032.

2612.3 Flame Spread Index. Plastic composites shall exhibit a flame spread index not exceeding 200 when tested in accordance with ASTM E84 or UL 723 with the test specimen remaining in place during the test.

Exception: materials determined to be noncombustible in accordance with Section 703.5.

2612.4 Termite and Decay resistance. Plastic composites containing wood, cellulosic or other biodegradable materials shall be termite and decay resistant as determined in accordance with ASTM D7032.

2612.5 Construction requirements. Plastic composites shall be permitted to be used as exterior deck boards, stair treads, handrails and guardrail systems in buildings of Class VB construction.

2612.5.1 Span rating. Plastic composites used as exterior deck boards shall have a span rating determined in accordance with ASTM D7032.

2612.5.3 Handrails and Guards. Plastic composite handrail systems shall comply with Section 1012. Plastic composite guardrail

systems shall comply with Section 1013.

2612.6 Plastic composite decking, handrails, and guards. *Plastic composite decking, handrails, and guardrail systems shall be installed in accordance with this code and the manufacturers' instructions.*

Cost Impact: This code change proposal will not increase the cost of construction.

RB266-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R507-RB-HIRSCHLER.doc

RB267 – 13

R202, Table R301.5, R311.7.5.4, R311.7.8.1, R311.7.8.4, R312.1.4, R317.4, R317.4.1, R317.4.2, R318.1, R507, R507.3, R507.3.1, R507.3.2 (NEW), R507.3.3 (NEW), R507.3.4 (NEW), R507.3.5 (NEW), INDEX B

Proponent: John Woestman, Kellen Company, representing Composite Lumber Manufacturers Association (CLMA) (jwoestman@kellencompany.com)

Revise as follows:

TABLE R301.5
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS
(in pounds per square foot)

USE	LIVE LOAD
Uninhabitable attics without storage ^b	10
Uninhabitable attics with limited storage ^{b, g}	20
Habitable attics and attics served with fixed stairs	30
Balconies (exterior) and decks ^e	40
Fire escapes	40
Guardrails Guards and handrails ^d	200 ^h
Guardrail Guard in-fill components ^f	50 ^h
Passenger vehicle garages ^a	50 ^a
Rooms other than sleeping room	40
Sleeping rooms	30
Stairs	40 ^c

For SI: 1 pound per square foot = 0.0479 kPa, 1 square inch = 645 mm²,
1 pound = 4.45 N.

- Elevated garage floors shall be capable of supporting a 2,000-pound load applied over a 20-square-inch area.
- Uninhabitable attics without storage are those where the maximum clear height between joists and rafters is less than 42 inches, or where there are not two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches high by 24 inches in width, or greater, within the plane of the trusses. This live load need not be assumed to act concurrently with any other live load requirements.
- Individual stair treads shall be designed for the uniformly distributed live load or a 300-pound concentrated load acting over an area of 4 square inches, whichever produces the greater stresses.
- A single concentrated load applied in any direction at any point along the top.
- See Section R502.2.2 for decks attached to exterior walls.
- Guard in-fill components (all those except the handrail), balusters and panel fillers shall be designed to withstand a horizontally applied normal load of 50 pounds on an area equal to 1 square foot. This load need not be assumed to act concurrently with any other live load requirement.
- Uninhabitable attics with limited storage are those where the maximum clear height between joists and rafters is 42 inches or greater, or where there are two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses.
The live load need only be applied to those portions of the joists or truss bottom chords where all of the following conditions are met:
 - The attic area is accessible from an opening not less than 20 inches in width by 30 inches in length that is located where the clear height in the attic is a minimum of 30 inches.

2. The slopes of the joists or truss bottom chords are no greater than 2 inches vertical to 12 units horizontal.
3. Required insulation depth is less than the joist or truss bottom chord member depth.
The remaining portions of the joists or truss bottom chords shall be designed for a uniformly distributed concurrent live load of not less than 10 lb/ft².
- h. Glazing used in handrail assemblies and guards shall be designed with a safety factor of 4. The safety factor shall be applied to each of the concentrated loads applied to the top of the rail, and to the load on the in-fill components. These loads shall be determined independent of one another, and loads are assumed not to occur with any other live load.

Revise definitions as follows:

PLASTIC COMPOSITE. A generic designation that refers to wood/plastic composites and plastic lumber.

~~**WOOD/PLASTIC COMPOSITE.** A composite material made primarily from wood or cellulose-based materials and plastic.~~

Revise as follows:

R311.7.5.4 Exterior ~~wood/plastic composite~~ stair treads. ~~Wood/plastic~~ Plastic composite exterior stair treads shall comply with the ~~provisions requirements of this section and~~ Section R507.3.

R311.7.8.1 Height. Handrail height, measured vertically from the sloped plane adjoining the tread nosing, or finish surface of ramp slope, shall be not less than 34 inches (864 mm) and not more than 38 inches (965 mm).

Exceptions:

1. The use of a volute, turnout or starting easing shall be allowed over the lowest tread.
2. When handrail fittings or bendings are used to provide continuous transition between flights, transitions at winder treads, the transition from handrail to guardrail guard, or used at the start of a flight, the handrail height at the fittings or bendings shall be permitted to exceed the maximum height.

R311.7.8.4 Exterior ~~wood/plastic composite~~ handrails. ~~Wood/plastic~~ Plastic composite exterior handrails shall comply with the ~~provisions requirements of~~ Section R507.3.

R312.1.4 Exterior ~~wood/plastic composite~~ guards. ~~Wood/plastic~~ Plastic composite exterior guards shall comply with the ~~provisions requirements of Section R317.4~~ Section R507.3.

~~**R317.4 Wood/plastic composites.** Wood/plastic composites used in exterior deck boards, stair treads, handrails and guardrail systems shall bear a label indicating the required performance levels and demonstrating compliance with the provisions of ASTM D 7032.~~

~~**R317.4.1 Labeling.** Deck boards and stair treads shall bear a label that indicates compliance to ASTM D 7032 and includes the allowable load and maximum allowable span. Handrails and guardrail systems or their packaging shall bear a label that indicates compliance to ASTM D 7032 and includes the maximum allowable span.~~

~~**R317.4.2 Installation.** Wood/plastic composites shall be installed in accordance with the manufacturer's instructions.~~

R317.4 Plastic composites. Plastic composite exterior deck boards, stair treads, guards, and handrails containing wood, cellulosic or other biodegradable materials shall comply with the requirements of Section R507.3.

R318.1 Subterranean termite control methods. In areas subject to damage from termites as indicated by Table R301.2(1), methods of protection shall be one of the following methods or a combination of these methods:

1. Chemical termiticide treatment, as provided in Section R318.2.

2. Termite baiting system installed and maintained according to the *label*.
3. Pressure-preservative-treated wood in accordance with the provisions of Section R317.1.
4. Naturally durable termite-resistant wood.
5. Physical barriers as provided in Section R318.3 and used in locations as specified in Section R317.1.
6. Cold-formed steel framing in accordance with Sections R505.2.1 and R603.2.1.
7. Plastic composite exterior deck boards, stair treads, guards, and handrails in accordance with the provisions of Section 507.3.4.

Revise as follows:

SECTION R507 **EXTERIOR DECKS**

~~R507.3 Wood/plastic composites.~~ ~~Wood/plastic composites used in exterior deck boards, stair treads, handrails and guardrail systems shall bear a label indicating the required performance levels and demonstrating compliance with the provisions of ASTM D 7032.~~

~~R507.3.1 Installation of wood/plastic composites.~~ ~~Wood/plastic composites shall be installed in accordance with the manufacturer's instructions.~~

R507.3 Plastic composite deck boards, stair treads, guards, or handrails. Plastic composite exterior deck boards, stair treads, guards, and handrails shall comply with the requirements of ASTM D7032 and the requirements of Section 507.3.

R507.3.1 Labeling. Plastic composite deck boards and stair treads, or their packaging, shall bear a label that indicates compliance to ASTM D7032 and includes the allowable load and maximum allowable span determined in accordance with ASTM D7032. Plastic or composite handrails and guards, or their packaging, shall bear a label that indicates compliance to ASTM D7032 and includes the maximum allowable span determined in accordance with ASTM D7032.

R507.3.2 Flame Spread Index. Plastic composites deck boards, stair treads, guards, and handrails shall exhibit a flame spread index not exceeding 200 when tested in accordance with ASTM E84 or UL 723 with the test specimen remaining in place during the test.

Exception: Plastic composites determined to be noncombustible.

R507.3.3 Decay resistance. Plastic composite deck boards, stair treads, guards, and handrails, containing wood, cellulosic, or other biodegradable materials shall be decay resistant in accordance with ASTM D7032.

R507.3.4 Termite resistance. Where required by Section 318, plastic composite deck boards, stair treads, guards, and handrails containing wood, cellulosic, or other biodegradable materials shall be termite resistant in accordance with ASTM D7032.

507.3.5 Installation of plastic composites. Plastic composite deck boards, stair treads, guards, and handrails shall be installed in accordance with this code and the manufacturer's instructions.

Revise as follows:

INDEX

B

Building Planning

GuardrailsGuards. R312 (update index editorially)

Reason: This code proposal focuses on plastic composite (i.e. wood /plastic composite or plastic lumber) exterior deck boards, stair treads, guards, and handrails. This proposal:

1. In Section R507.3, incorporates the technical revisions approved for the 2015 IBC for plastic composite exterior deck boards, stair treads, guards, and handrails with text revised to be more clear and concise.
2. Revises the name of the Section 507 to Exterior Decks to help make it clear these requirements apply to exterior construction.
3. Updates / revises pointers in the IRC that point to Section R507.3.
4. Adds a pointer for termite resistance in Section R318.1.
5. Revises all guardrail / guardrails references to guard / guards for consistency of the IRC, and consistency to the IBC.
6. Proposes a definition for "plastic composites" which includes wood / plastic composites and plastic lumber. Deletes the definition of wood / plastic composites as the term is self-explanatory, especially in the context of exterior deck boards, stair treads, guards, and handrails.
7. In R317, refers to requirements in R507.3 and deletes un-needed text.
8. Editorially replaces the word "provisions" with "requirements" as "requirements" seems to convey stronger mandatory actions than "provisions".

ASTM D7032 is currently referenced in R507.3, and this proposal expands specific references to D7032, and expands the scope of materials required to comply with D7032. In addition to requirements in the IRC applicable to deck boards, stair treads, guards, and handrails, D7032 has become the standard to which these plastic lumber and wood /plastic composite exterior deck boards, stair treads, guards, and handrails are tested to evaluate and verify compliance to code requirements.

ASTM D7032 includes deck-related performance evaluations and performance requirements such as flexural tests, bio-degradation tests, fire performance tests, creep recovery tests, mechanical fastener holding tests, and slip resistance tests. The standard also includes consideration of the effects of temperature, moisture, concentrated loads, freeze-thaw resistance tests, UV resistance, and duration of load on deck boards, stair treads, guards, and handrails.

There should be no cost increase to construction as these products comply with these requirements through ICC ES AC174. There may be a slight reduction in the cost of construction as these changes to the IRC are expected to help clarify code requirements.

Cost Impact: The code change proposal will not increase the cost of construction.

RB267-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

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RB268 – 13

R507 (NEW)

Proponent: Charles S. Bajnai, Chesterfield County, VA, representing self (bajnaic@chesterfield.gov), Randy Shackelford, Simpson Strong Tie (rshackelford@strongtie.com)

Add new text as follows:

SECTION R507 **DECKS**

R507.1 Wood decks. Typical wood decks shall be designed and constructed in accordance with this section. Other grades, species, loading, materials and conditions not described herein shall be permitted in accordance with Section 301. Loading for large concentrated loads, such as hot tubs, is beyond the scope of this section.

R507.2 Requirements. Deck construction shall be capable of accommodating applied loads and transmitting them to the supporting structural elements. Figure R507.2 is intended for purposes of identifying typical parts, and not to limit the design.

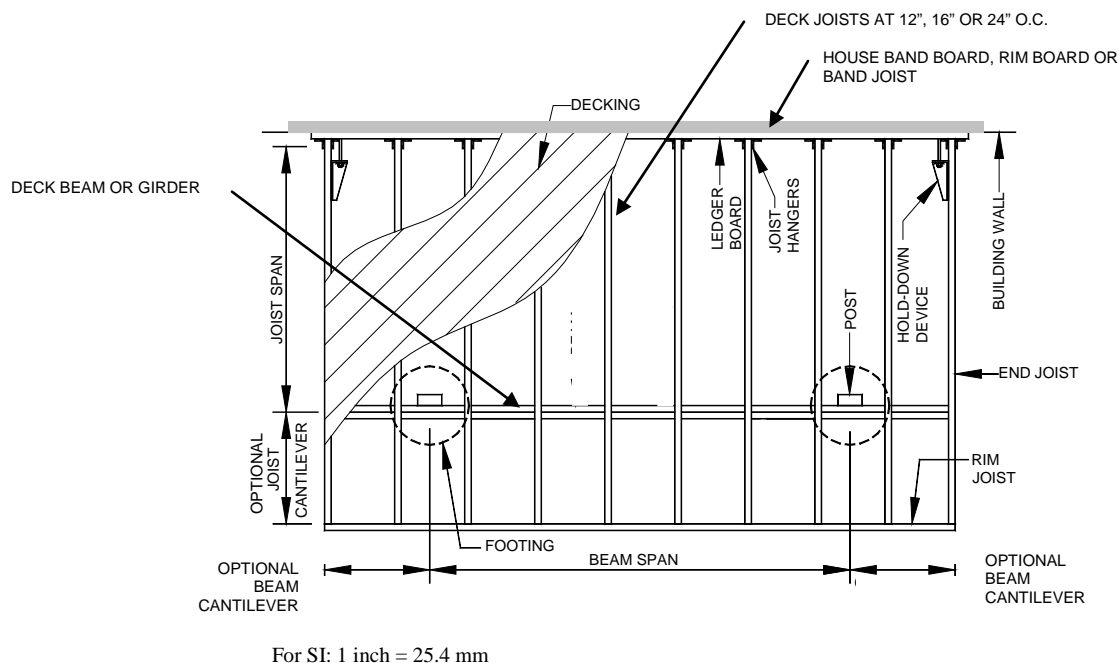


FIGURE R507.2
DECK CONSTRUCTION

R507.3 Materials. Materials used in the construction of a deck shall comply with the provisions of this section.

R507.3.1 Preservative-treated lumber. All lumber for decks shall be either naturally durable, minimum No.2 grade dimension lumber and identified in accordance with Section R502.1 or, preservative-treated in accordance with Section R317. All lumber in contact with the ground shall be identified as suitable for ground contact.

R507.3.2 Wood Decking. Wood decking shall comply with any of the following materials:

1. Wood decking with a minimum nominal thickness of 1 $\frac{1}{4}$ inches (32 mm) shall be installed at 90 degrees to deck joists that are spaced at a maximum of 16 inches (406 mm) on center and up to 45 degrees when spaced at a maximum of 12 inches (305 mm) on center.
2. Wood decking with a nominal 2 inch (51 mm) thickness shall be installed at an angle between 45 and 90 degrees to deck joists that are spaced at a maximum of 24 inches (610 mm) on center.
3. Wood decking shall be attached to each supporting member with a minimum of (2)8d threaded nails or (2)#8 wood screws.

R507.3.3 Wood/plastic composites. Wood/plastic composites used as exterior deck boards, stair treads, handrails and guardrail systems shall be permitted in accordance with manufacturer's instructions.

R507.3.4 Metal guardrail systems. Metal guardrail and handrail systems shall be permitted in accordance with the manufacturer's instructions.

R507.3.5 Fasteners and connectors. Nails, bolts with nuts and washers, screws and connectors shall be coated in accordance with Section R317.3. Proprietary fasteners shall be permitted provided they are compatible with the pressure-preservative-treated lumber being used. Fasteners and connectors within 300 feet of salt water shoreline shall be stainless steel.

R507.3.6 Flashing. Flashing shall be corrosion-resistant metal of minimum nominal 0.019 inch (0.5 mm) thickness or approved non-metallic material.

R507.4 Deck joists. Spans for typical wood deck joist configurations, as shown in Figure R507.4, shall be in accordance with Table R507.4. Deck joists shall be permitted to cantilever a maximum of one-fourth of the joist span.

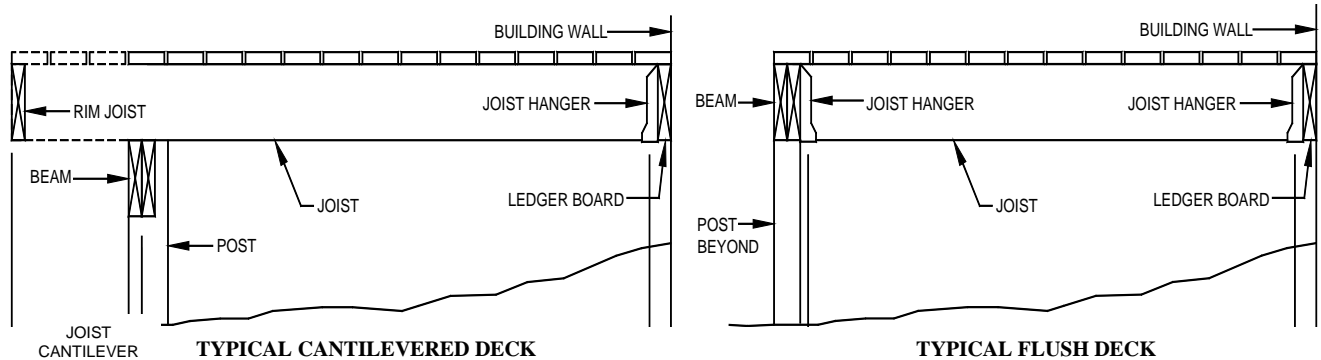


FIGURE R507.4

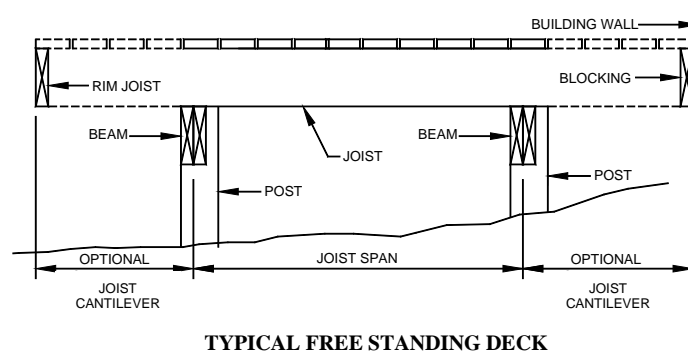


TABLE R507.4
MAXIMUM DECK JOIST SPANS FOR COMMON LUMBER SPECIES (ft.-in.)

<u>SPECIES^a</u>	<u>SIZE</u>	<u>MAXIMUM SPACING OF DECK JOISTS WITH NO CANTILEVER^b (in.)</u>			<u>MAXIMUM SPACING OF DECK JOISTS WITH CANTILEVERS^c (in.)</u>		
		<u>12</u>	<u>16</u>	<u>24</u>	<u>12</u>	<u>16</u>	<u>24</u>
<u>Southern pine</u>	<u>2 x 6</u>	<u>10-4</u>	<u>9-5</u>	<u>7-10</u>	<u>7-1</u>	<u>7-1</u>	<u>7-1</u>
	<u>2 x 8</u>	<u>13-8</u>	<u>12-5</u>	<u>10-2</u>	<u>10-9</u>	<u>10-9</u>	<u>10-2</u>
	<u>2 x 10</u>	<u>17-5</u>	<u>15-10</u>	<u>13-1</u>	<u>15-6</u>	<u>15-6</u>	<u>13-1</u>
	<u>2 x 12</u>	<u>18-0</u>	<u>18-0</u>	<u>15-5</u>	<u>18-0</u>	<u>18-0</u>	<u>15-5</u>
<u>Douglas fir-larch^d, hem-fir^d spruce-pine-fir^d</u>	<u>2 x 6</u>	<u>9-6</u>	<u>8-8</u>	<u>7-2</u>	<u>6-3</u>	<u>6-3</u>	<u>6-3</u>
	<u>2 x 8</u>	<u>12-6</u>	<u>11-1</u>	<u>9-1</u>	<u>9-5</u>	<u>9-5</u>	<u>9-1</u>
	<u>2 x 10</u>	<u>15-8</u>	<u>13-7</u>	<u>11-1</u>	<u>13-7</u>	<u>13-7</u>	<u>11-1</u>
	<u>2 x 12</u>	<u>18-0</u>	<u>15-9</u>	<u>12-10</u>	<u>18-0</u>	<u>15-9</u>	<u>12-10</u>
<u>Redwood, western cedars, ponderosa pine^e, red pine^e</u>	<u>2 x 6</u>	<u>8-10</u>	<u>8-0</u>	<u>7-0</u>	<u>5-7</u>	<u>5-7</u>	<u>5-7</u>
	<u>2 x 8</u>	<u>11-8</u>	<u>10-7</u>	<u>8-8</u>	<u>8-6</u>	<u>8-6</u>	<u>8-6</u>
	<u>2 x 10</u>	<u>14-11</u>	<u>13-0</u>	<u>10-7</u>	<u>12-3</u>	<u>12-3</u>	<u>10-7</u>
	<u>2 x 12</u>	<u>17-5</u>	<u>15-1</u>	<u>12-4</u>	<u>16-5</u>	<u>15-1</u>	<u>12-4</u>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

- No. 2 grade with wet service factor.
- Deck joists shall be designed to carry the deck live load in Table R301.5 or the ground snow load, which ever is greater. This table is based on ground snow load or live load = 40 psf, dead load = 10 psf, L/Δ = 360.
- Deck joists shall be designed to carry the deck live load in Table R301.5 or the ground snow load, which ever is greater. This table is based on ground snow load or live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220 pound point load applied to end.
- Includes incising factor.
- Northern species with no incising factor

R507.4.1 Joist bearing. Joist ends shall be provided with vertical and rotational support. The ends of joists shall have a minimum of 1.5 inches (38 mm) of bearing on a wood ledger board or on metal hangers. Where rotational support is provided by joist hangers or blocking between joists, their depth shall equal not less than 60 percent of the joist depth. Where rotational support is provided by rim joists, they shall be secured to the end of each joist with a minimum of (3)10d threaded nails or (3)#10x3 inch (76 mm) long wood screws. For free-standing decks, rotational support of the joist ends adjacent to the building wall shall be permitted by a rim joist or full depth nominal 2x blocking toe nailed at each end with (3)10d nails.

R507.5 Deck Beams. The maximum span for deck beams, as shown in Figure R507.2, shall be in accordance Table R507.5. Beams shall be permitted to cantilever at each end up to one-fourth of the beam span. The plies of a multi-ply beam shall be fastened with a minimum of two rows of 10d threaded nails at 16 inches (406 mm) on center along each edge. Splices of multi-span beams shall be located at interior post locations.

TABLE R507.5
MAXIMUM BEAM SPAN LENGTHS^a

<u>SPECIES</u>	<u>SIZE^b</u>	<u>MAIN JOIST SPAN (ft.) LESS THAN OR EQUAL TO:</u>						
		<u>6</u>	<u>8</u>	<u>10</u>	<u>12</u>	<u>14</u>	<u>16</u>	<u>18</u>
<u>Southern pine</u>	<u>2-2x6</u>	<u>7-1</u>	<u>6-2</u>	<u>5-6</u>	<u>5-0</u>	<u>4-8</u>	<u>4-4</u>	<u>4-1</u>
	<u>2-2x8</u>	<u>9-2</u>	<u>7-11</u>	<u>7-1</u>	<u>6-6</u>	<u>6-0</u>	<u>5-7</u>	<u>5-3</u>
	<u>2-2x10</u>	<u>11-10</u>	<u>10-3</u>	<u>9-2</u>	<u>8-5</u>	<u>7-9</u>	<u>7-3</u>	<u>6-10</u>
	<u>2-2x12</u>	<u>13-11</u>	<u>12-0</u>	<u>10-9</u>	<u>9-10</u>	<u>9-1</u>	<u>8-6</u>	<u>8-0</u>
	<u>3-2x6</u>	<u>8-7</u>	<u>7-8</u>	<u>6-11</u>	<u>6-3</u>	<u>5-10</u>	<u>5-5</u>	<u>5-2</u>
	<u>3-2x8</u>	<u>11-4</u>	<u>9-11</u>	<u>8-11</u>	<u>8-1</u>	<u>7-6</u>	<u>7-0</u>	<u>6-7</u>
	<u>3-2x10</u>	<u>14-5</u>	<u>12-10</u>	<u>11-6</u>	<u>10-6</u>	<u>9-9</u>	<u>9-1</u>	<u>8-7</u>

	3-2x12	17-5	15-1	13-6	12-4	11-5	10-8	10-1
	3x6 or 2-2x6	5-5	4-8	4-2	3-10	3-6	3-1	2-9
	3x8 or 2-2x8	6-10	5-11	5-4	4-10	4-6	4-1	3-8
	3x10 or 2-2x10	8-4	7-3	6-6	5-11	5-6	5-1	4-8
	3x12 or 2-2x12	9-8	8-5	7-6	6-10	6-4	5-11	5-7
Douglas fir-larch ^c	4x6	6-5	5-6	4-11	4-6	4-2	3-11	3-8
spruce-pine-fir ^c	4x8	8-5	7-3	6-6	5-11	5-6	5-2	4-10
redwood ^c	4x10	9-11	8-7	7-8	7-0	6-6	6-1	5-8
western cedars ^c	4x12	11-5	9-11	8-10	8-1	7-6	7-0	6-7
ponderosa pine ^d	3-2x6	7-4	6-8	6-0	5-6	5-1	4-9	4-6
red pine ^d	3-2x8	9-8	8-6	7-7	6-11	6-5	6-0	5-8
	3-2x10	12-0	10-5	9-4	8-6	7-10	7-4	6-11
	3-2x12	13-11	12-1	10-9	9-10	9-1	8-6	8-1

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

a. Deck beams shall be designed to carry the deck live load in Table R301.5 or the ground snow load, which ever is greater. This table is based on ground snow load or live load = 40 psf, dead load = 10 psf, $L/\Delta = 360$ at main span, $L/\Delta = 180$ at cantilever with a 220 pound point load applied to end. No 2 grade, wet service factor.

b. Beam depth shall be greater than or equal to depth of joists with a flush beam condition.

c. Includes incising factor.

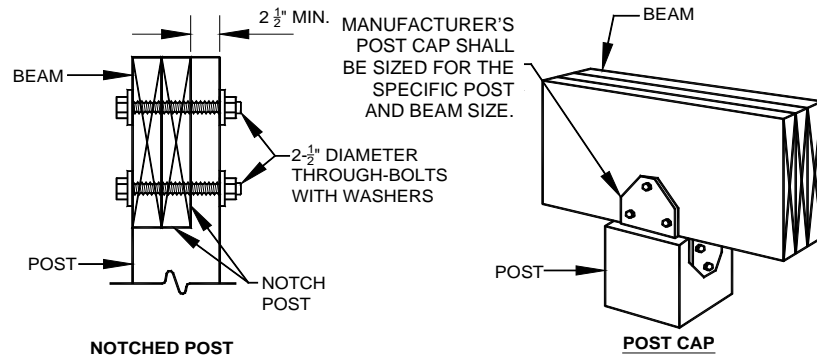
d. Northern species with no incising factor.

R507.5.1 Beam bearing. Single-ply beams and multi-ply beams shall have all of their bearing directly on wood posts or on an approved metal post cap in accordance with Figure R507.6.1 and not less than 3 inches (76 mm) on concrete or masonry.

R507.6 Deck posts. For typical single level wood decks, posts shall be measured from the top of the footing to the underside of the beam. The maximum height of the post shall be in accordance with the following:

1. Posts comprised of a minimum nominal 4x4 shall be permitted to a maximum height of 8 feet (2438 mm).
2. Posts comprised of a minimum nominal 6x6 shall be permitted to a maximum height of 14 feet (5486 mm).
3. Posts comprised of southern pine, of 4x4 or 4x6, grade #2 shall be permitted to a maximum height of 10 feet (3048 mm).
4. Posts comprised of southern pine, of 6x6 shall be permitted to a maximum height of 18 feet (5486 mm).

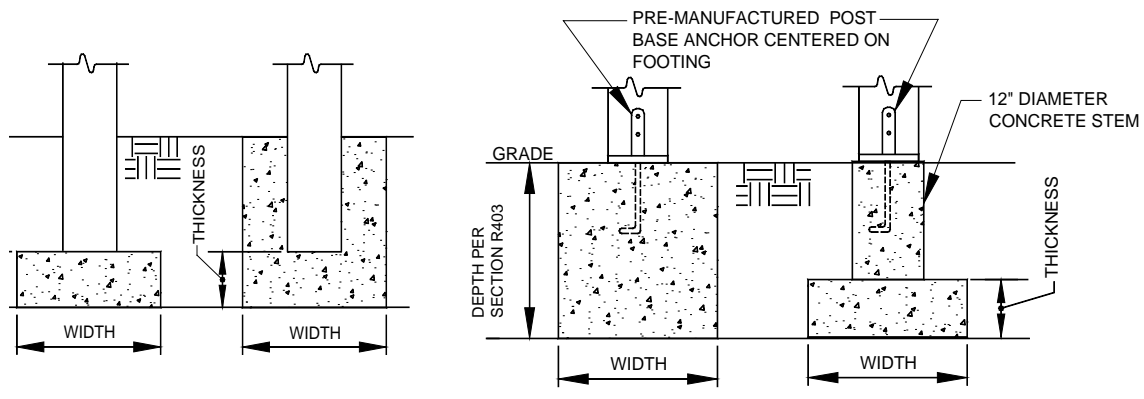
R507.6.1 Deck post to deck beam connection. Deck beams shall be attached to deck posts in accordance with Figure R507.6.1. Post to beam connections shall be constructed to resist lateral displacement. Manufactured post-to-beam connectors shall be sized for the post and beam sizes. All bolts shall have washers under the head and nut.



For SI: 1 inch = 25.4 mm

**FIGURE R507.6.1
TYPICAL BEAM BEARING**

R507.7 Deck footings. Deck footings shall be constructed in accordance with Section R403 and Figure R507.7. The size of the footing shall be adequate for the load applied by the posts.



**FIGURE R507.7
TYPICAL DECK FOOTINGS**

R507.7.1 Footing depth. The minimum depth of footings shall be in accordance with Section R403.1.4 or as approved by the building official. A deck footing within 4 feet of the house shall be sit at least to the depth of the house footing.

R507.7.2 Post connection to footing. Where the top of the footings are at or above grade, the posts shall be prevented from being displaced by a connector between the post and the concrete. Where the top of the footings are below grade the post shall be permitted to sit on top of the footing or may be embedded in the concrete.

R507.8 Deck ledger connection to the building.. The connection between a deck ledger and the building shall be in accordance with this section.

R507.8.1 Deck ledger connection to band joist. The deck ledger shall be connected to a 2-inch nominal lumber band joist with ½-inch lag screws or bolts with washers in accordance with Table R507.8.1 and Figure R507.8.1(1). The bolts or lag screws shall be spaced in accordance with Figure R507.8.1(2). As an alternative to the detail in Figure R507.8.1, the ledger boards shall be permitted to be offset from the band joist a maximum distance of ½ inch (13 mm) with the installation of stacked washers. The exterior wall finish shall be removed prior to installation of the ledger board. Flashing at a door threshold shall be installed to prevent water intrusion from rain or melting ice and snow.

R507.8.2 Deck ledger connection to concrete foundation walls. A ledger board shall be connected to a concrete or solid masonry foundation wall with approved ½ inch (13 mm) diameter expansion anchors at a spacing specified in Table R507.8.1(1) and as shown in Figure R507.8.2. Expansion anchors shall be installed per the manufacturer.

R507.8.3 Ledger board to hollow masonry foundation wall. A ledger board shall be connected to a hollow masonry foundation wall with approved ½ inch (13 mm) diameter epoxy anchors at a spacing

specified in Table R507.8.1(1) and as shown in Figure R507.8.3. Epoxy anchors shall be installed per the manufacturer.

R507.8.4 Alternate connections. An approved engineered wood rim board with a minimum thickness of 1 inch (25 mm) shall be permitted to substitute for a 2x lumber band joist provided it was designed and manufactured to support a deck. A ledger board attachment to a masonry or stone veneer, ribbon board of open web floor trusses, band joist of a cantilevered floor and other conditions not addressed herein shall be designed in accordance with accepted engineering practice, or the deck shall be free-standing in accordance with Section R507.10.

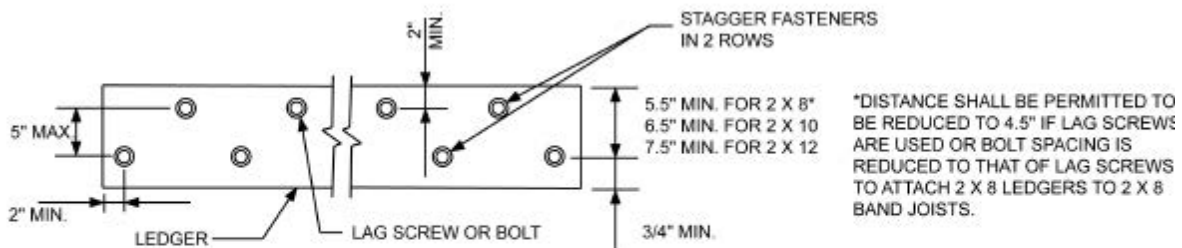
TABLE R507.8.1(1)
FASTENER SPACING

FASTENER	BAND BOARD	JOIST SPAN						
		≤6'	≥ 6'-8'	≥ 8'-10'	≥ 10'-12'	≥ 12'-14'	≥ 14'-16'	≥ 16'-18'
<u>½" lag screws</u> ^a	<u>1" min. engineered wood product</u>	<u>24"</u>	<u>18"</u>	<u>14"</u>	<u>12"</u>	<u>10"</u>	<u>9"</u>	<u>8"</u>
	<u>2x lumber</u>	<u>30"</u>	<u>23"</u>	<u>18"</u>	<u>15"</u>	<u>13"</u>	<u>11"</u>	<u>10"</u>
<u>½" through bolts</u>	<u>1" min. engineered wood product</u>	<u>24"</u>	<u>18"</u>	<u>14"</u>	<u>12"</u>	<u>10"</u>	<u>9"</u>	<u>8"</u>
	<u>2x lumber</u>	<u>36"</u>	<u>36"</u>	<u>34"</u>	<u>29"</u>	<u>24"</u>	<u>21"</u>	<u>19"</u>
<u>½" through bolts and ½" stacked washers</u> ^b	<u>1" min. engineered wood product</u>	<u>24"</u>	<u>18"</u>	<u>14"</u>	<u>12"</u>	<u>10"</u>	<u>9"</u>	<u>8"</u>
	<u>2x lumber</u>	<u>36"</u>	<u>36"</u>	<u>29"</u>	<u>24"</u>	<u>21"</u>	<u>18"</u>	<u>16"</u>
<u>Expansion anchors</u>	-	<u>36"</u>	<u>36"</u>	<u>34"</u>	<u>29"</u>	<u>24"</u>	<u>21"</u>	<u>19"</u>
<u>Epoxy anchors</u>	-	<u>32"</u>	<u>32"</u>	<u>32"</u>	<u>24"</u>	<u>24"</u>	<u>16"</u>	<u>16"</u>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm

a. The tip of the lag screw shall fully extend beyond the inside face of the band board.

b. The maximum gap between the face of the ledger board and face of the wall sheathing shall be ½ inches (13 mm).



For SI: 1 inch = 25.4 mm.

FIGURE R507.8.1(1)
PLACEMENT OF LAG SCREWS AND BOLTS IN LEDGERS

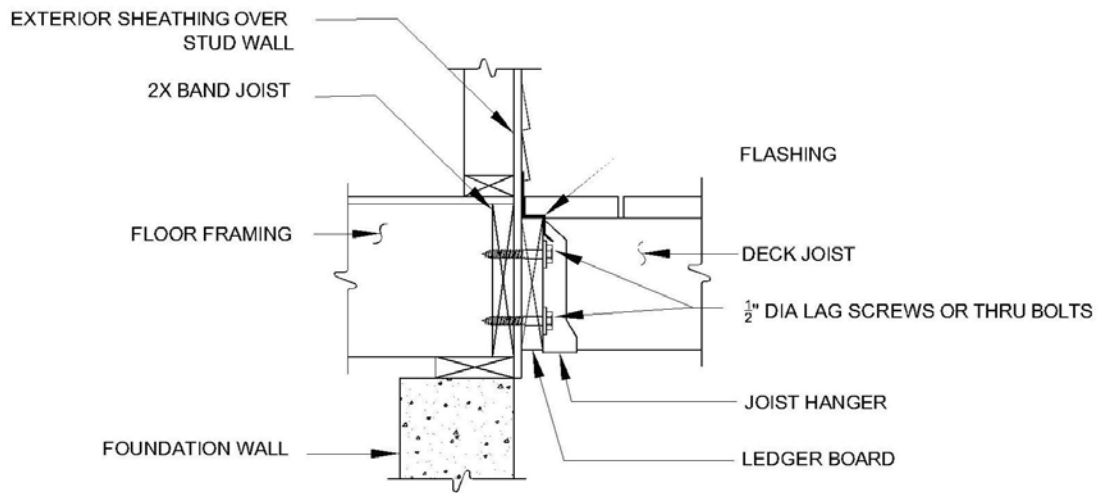


FIGURE R507.8.1(2)
LEDGER BOARD TO BAND BOARD ATTACHMENT

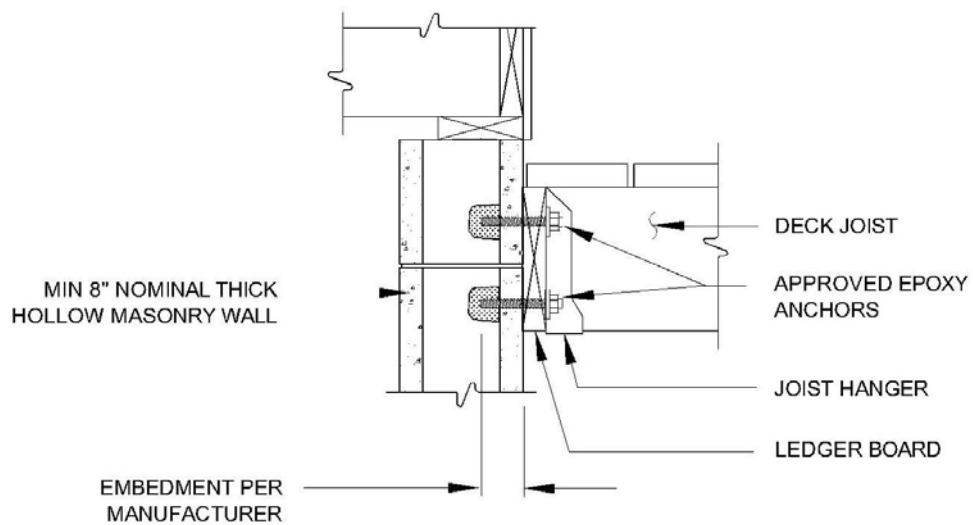


FIGURE R507.8.2
LEDGER BOARD TO SOLID FOUNDATION WALL ATTACHMENT

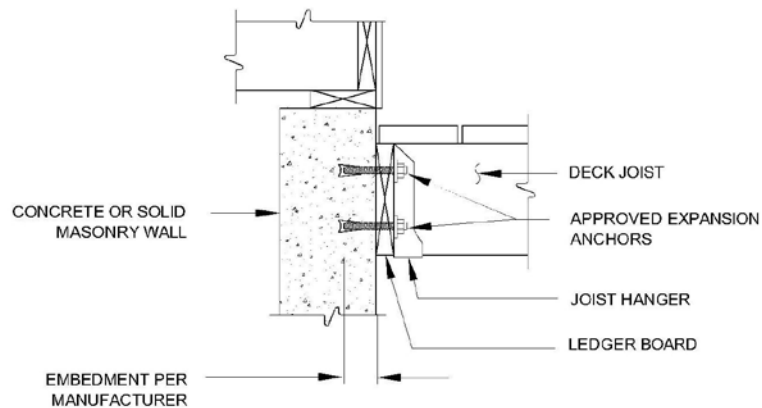
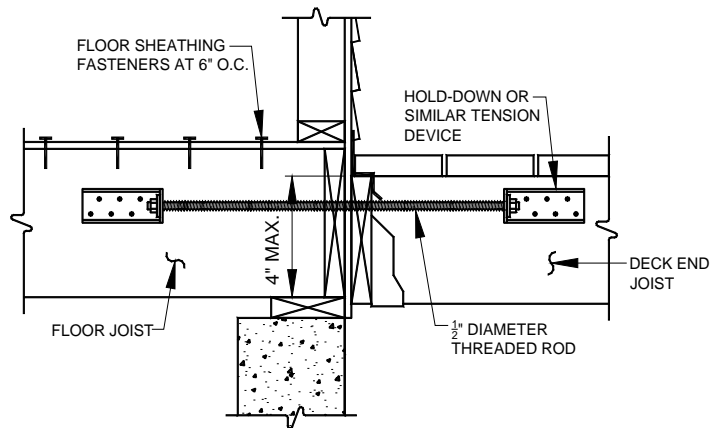


FIGURE R507.8.3
LEDGER BOARD TO HOLLOW MASONRY FOUNDATION WALL ATTACHMENT

R507.9.3 Attachment to resist lateral load. A lateral load connection is required by Section R507.2. The following options shall be deemed to comply; other design solutions are permitted in accordance with R301.

R507.9.3.1 Connection at parallel joists. Where floor joists and deck joists are parallel, a hold-down or similar tension device with a minimum capacity of 1,500 pounds (6672 N) at each end joist as shown in Figures R507.3.1(1) and R507.9.3.1(2) shall be permitted. Floor sheathing to floor joists fasteners shall be permitted to be substituted with two reinforcing angles on each side of the joist with a minimum capacity of 375 pounds (1668 N).



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm

FIGURE R507.9.3.1(1)
CONNECTION AT PARALLEL JOISTS

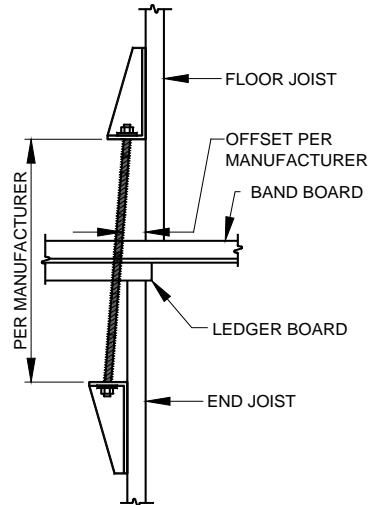
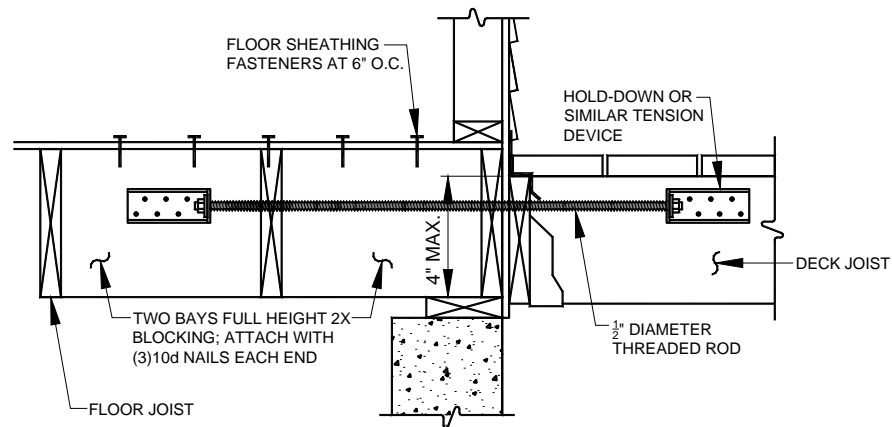


FIGURE R507.9.3.1(2)
OFFSET AT PARALLEL JOISTS

R507.9.3.2 Connection at perpendicular joists. Where floor joists and deck joists are perpendicular, provide a hold-down or similar tension device with a minimum capacity of 1,500 pounds (6672 N) at each end joist and blocking between floor joists as shown in Figure R507.9.3.2. Floor sheathing to floor joists fasteners shall be permitted to be substituted with two reinforcing angles on each side of the joist with a minimum capacity of 375 pounds (1668 N).



For SI: 1 inch = 25.4 mm

FIGURE R507.9.3.2
LATERAL SUPPORT WHERE INTERIOR JOIST PERPENDICULAR TO DECK

R507.10 Free-standing decks. As shown in Figure R507.10, free-standing decks shall have an additional beam and posts adjacent the building exterior wall in place of a ledger board attachment. The beam shall be sized in accordance with Section R507.6 and shall be located adjacent the exterior wall or at a maximum distance equal to the allowable joist cantilever.

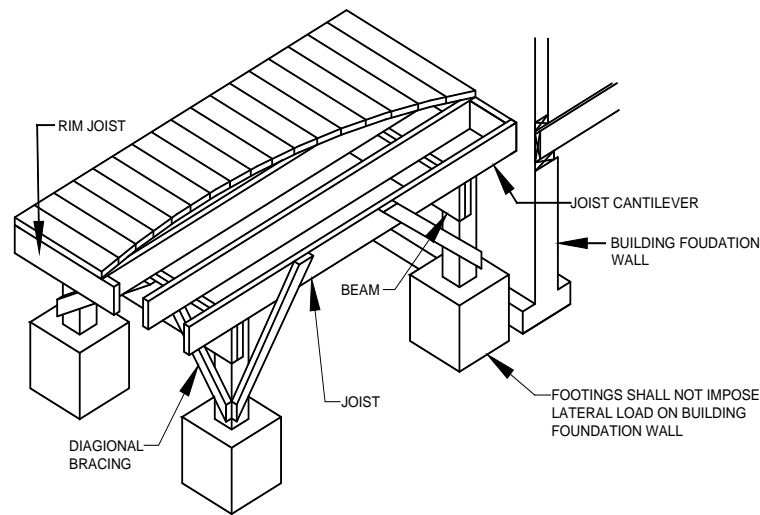


FIGURE R507.10
FREE-STANDING DECK

R507.10.1 Diagonal bracing. Diagonal bracing shall be installed on free-standing decks greater than 30 inches (762 mm) above grade in accordance with Figure R507.10.1. Bracing shall be placed at a 45 degree angle at each post location in the parallel and perpendicular directions to the beam. Bracing shall be a minimum of nominal 2x4 lumber and shall be fastened to framing with one 1/2 inch (9 mm) diameter through bolt with washers at each end. The diagonal brace shall be a minimum of 2 feet long measured as shown in Figure R507.10.1 or at least 1/3 the height of the deck above grade.

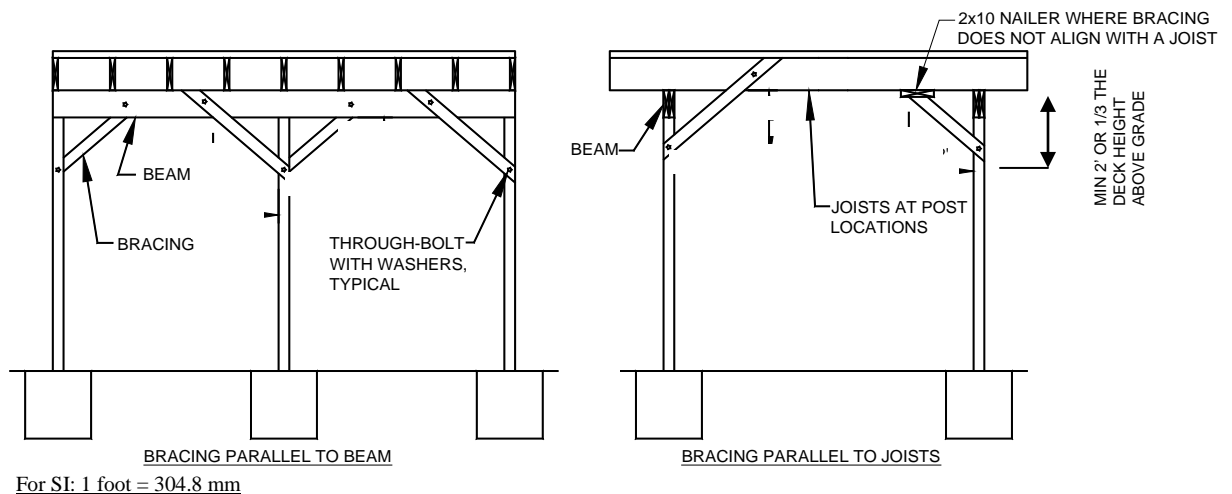
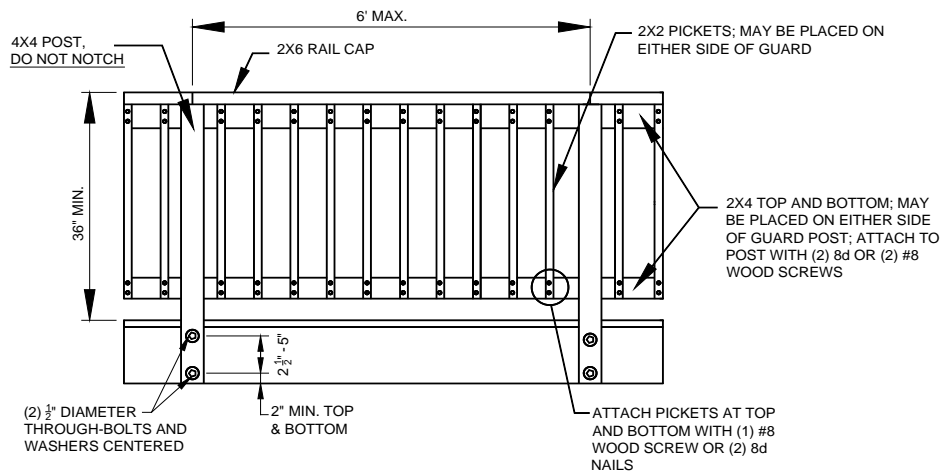


FIGURE R507.10.1
FREE-STANDING DECK DIAGONAL BRACING

R507.12 Deck guards. Deck guards shall be designed and constructed in accordance with Sections R301.5 and R312. Other materials and construction techniques shall be permitted in accordance with Section R301.

R507.12.1 Guard construction. Where the guard requirements of Sections R301.5 and R312 are met using the details shown in Figures R507.12.1(1) through R507.12.1(3), guard posts shall be attached to the inside or outside face of the rim joist or end joist. Hold-down anchors shall have a minimum capacity of 1,800 pounds (8006 N).



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm

FIGURE R507.12.1(1)
DECK GUARD

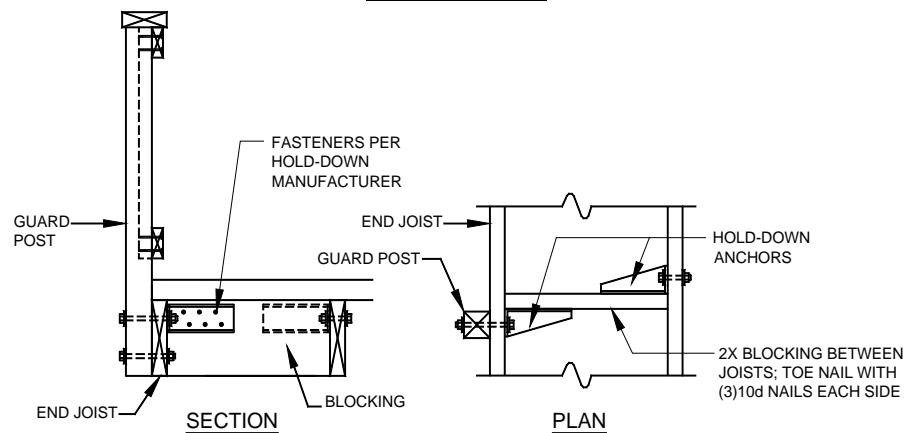


FIGURE R507.12.1(2)
GUARD POST TO END JOIST

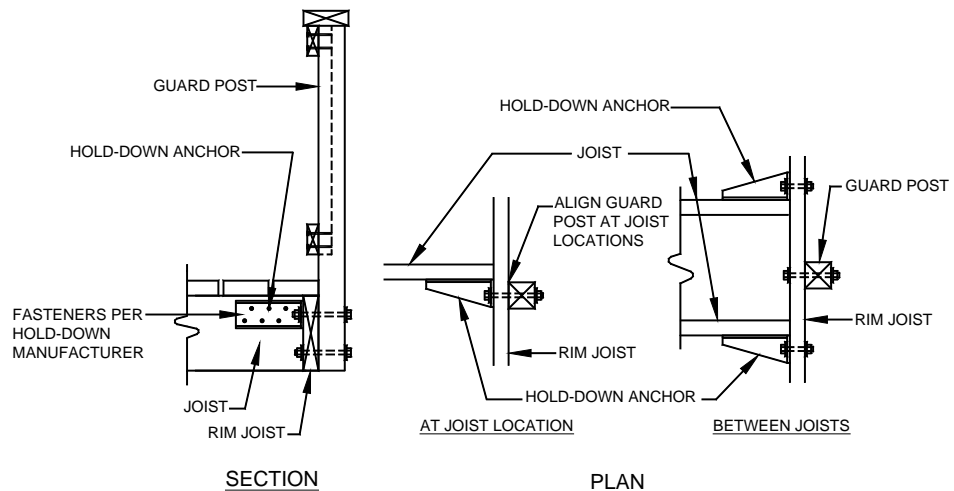
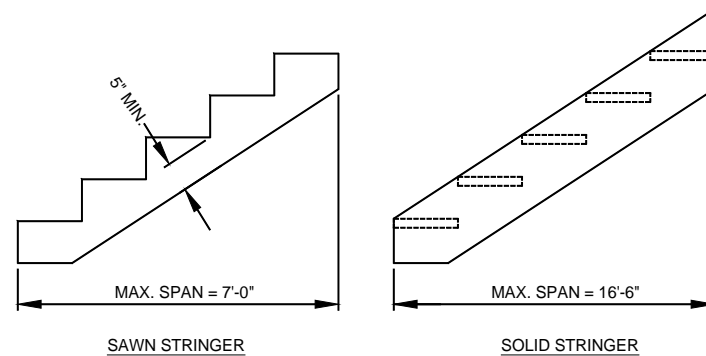


FIGURE R507.12.1(3)
GUARD POST TO RIM JOIST

R507.13 Deck stairs. Deck stairs shall be constructed in accordance with this section and Section R311.7. Where a flight of stairs has a vertical rise greater than that allowed per Section R311.7.3, an intermediate landing shall be provided in accordance with Section R311.7.6 and designed as a free-standing deck in accordance with Section R507.10.

R507.13.1 Stair stringers. Stair stringers shall be constructed of sawn nominal 2x12 members at 18 inches (457 mm) on center with a throat dimension of 5 inches (127 mm) and a maximum span length as shown in Figure R507.13.1. Stairs with a width equal to 36 inches (914 mm) shall be permitted to be constructed with two solid 2x12 stringers with a maximum span length as shown in Figure R507.13.1.



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm

FIGURE R507.13.1
STAIR STRINGER REQUIREMENTS

R507.13.2 Stringer bearing. Stringers shall be attached to posts or bear on joist hangers attached to the deck structure and on footings at grade in accordance with Figure R507.13.2. Joist hangers shall be specifically designed to accommodate sloped connections and shall have a minimum capacity of 625 pounds (2780 N). Reinforcing angles at rim joist locations only shall have a minimum capacity of 325 pounds (1446 N).

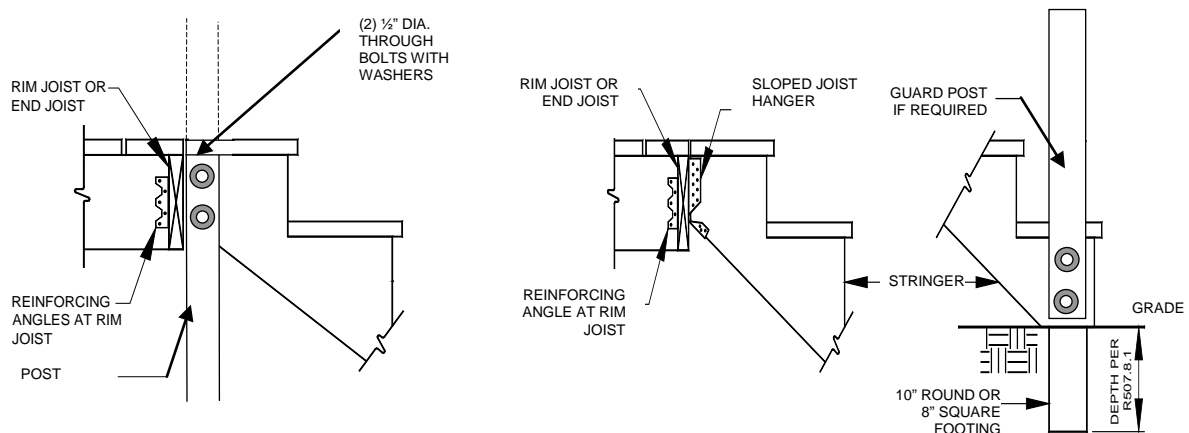


FIGURE R507.13.2
STRINGER BEARING

R507.13.3 Treads and risers. Stair treads shall be constructed in accordance with Section R311.7 and Figure R507.13.3. Treads shall be composed of nominal 2x6 lumber. Treads of stairs constructed with

solid stringers shall be permitted to be composed of span rated decking. Risers shall be permitted to be composed of nominal 1x lumber. Openings in risers shall not allow the passage of a 4 inch (102 mm) diameter sphere.

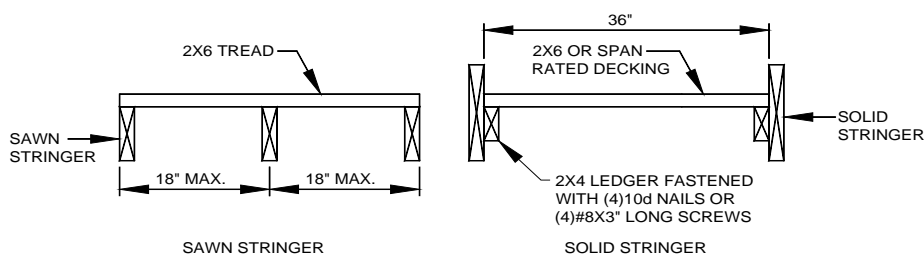
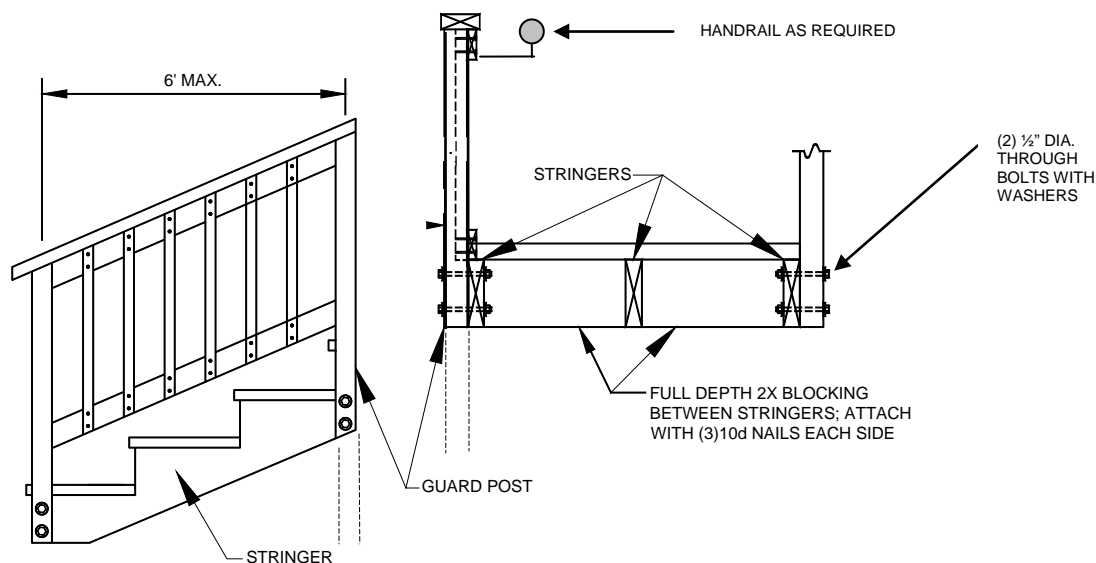


FIGURE R507.13.3
TREAD REQUIREMENTS

R507.13.4 Stair guard. Guards for stairs shall be as required per Section R312.1.1 and constructed in accordance with Section R507.12. The attachment of a stair guard post to the stringers shall be constructed in accordance with Figure R507.13.4.



For SI: 1 foot = 304.8 mm

FIGURE R507.13.4
STAIR GUARD CONNECTION

R507.13.5 Stair handrails. When required, handrails for stairs shall be as required per Section R311.7.8. When required and where the top guard rail does not comply with the handrail grip-size requirements in Section R311.7.8.3, a separate, conforming handrail shall be required.

R507.13.6 Ramps. Ramps from decks shall be as required in Section R311.8. Details for stringers, guards and handrails shall be similar to those for stairs.

Reason: With the increasing attention being paid to deck safety, the 2012 IRC took a major step forward by establishing a new Section R507 that covers deck construction. However, Section R507 consists almost entirely of connection details for anchoring the deck to the house, and does not provide any prescriptive requirements for building the deck itself. Some information is completely missing, like joist spans for naturally durable wood species, joist spans for wet lumber, beam spans, post sizes, bracing, footings and stair stringer spans.

Currently about one-third of the building permits pulled in our county are for decks. A significant number of these decks are built by homeowners or “handymen”, rather than professional deck or home builders. Since the current code provides them no prescriptive guidelines, many jurisdictions across the country have tried to help either by creating locally developed deck guides or by directing the homeowner/builder to the *Prescriptive Residential Wood Deck Construction Guide (DCA6)*, a free document published by the American Wood Council (AWC).

Background on the *DCA6*: it is a document that originated in August 2006 when an ad-hoc task group was created to address prescriptive provisions for residential wood deck construction. While not a true consensus standard committee, the group was fairly balanced with representatives of ICC, AWC, home builders, municipal representative from Fairfax County, VA, construction hardware manufacturers, and the truss industry represented. The provisions of the *DCA6* gather requirements from throughout the IRC into one place, whether they be prescriptive requirements already contained in other sections, or new solutions derived from the performance provisions. A *Commentary* is also included in the document, to give the user an understanding of the data and/or experience upon which the provision is based.

While deck guides written outside the code development process have served a purpose, we think it is important that a set of deck construction provisions be contained in the IRC itself.

This submittal is based largely upon the provisions of the *DCA6*, with the intent to create a simple yet complete deck code section that provides prescriptive methods for safe deck construction. The submittal is presented in a simplified format so that it can be used by building officials, builders, inspectors and homeowners. The proponents recognize that every possible construction detail or condition is not covered by this submittal – the intent is to provide permitted methods for meeting the code, and not to preclude the use of other construction methods or materials that can always be approved by the authority having jurisdiction using R104.11 or R301.

I have been privy to several other alternate deck proposals that are being considered for the 2015 IRC. My thought is that these proposals are well intentioned, but essential components were omitted for political reasons. Along with members of industry, I have developed what I believe to be a cleaner, more organized, more complete proposal with most of the same provisions of these other drafts and *DCA6* without the worry that some provisions might be politically improper to some constituents.

In conclusion, the average deck builder, plan reviewer and inspector have nothing in the IRC to help them with a deck design. Homeowners and non-professionals need to have simple prescriptive methods for building a safe deck, and we believe this proposal provides those guidelines.

Bibliography:

DCA6. <http://www.awc.org/publications/DCA/DCA6/DCA6-09.pdf>

Cost Impact: The code change proposal may increase the cost of construction.

RB268-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

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RB269 – 13

R602.1 (NEW), R602.1.5 (NEW), R602.1.6 (NEW), R602.3

Proponent: Dennis Pitts, American Wood Council (dpitts@awc.org)

Revise as follows:

R602.1 General. Wood and wood-based products used for load-supporting purposes shall conform to the applicable provisions of this section.

~~R602.1~~ R602.1.1 Identification. ~~Sawn Lumber.~~ ~~Load-bearing dimension Sawn lumber for studs, plates and headers shall be identified by a grade mark of a an accredited lumber grading or inspection agency that has been approved and have design values certified by an accreditation body that complies with DOC PS 20. In lieu of a grade mark, a certification of inspection issued by a lumber grading or inspection agency meeting the requirements of this section shall be accepted.~~

R602.1.5 Wood structural panels. Wood structural panel sheathing shall conform to DOC PS 1, DOC PS 2 or, when manufactured in Canada, CSA O437 or CSA O325. All panels shall be identified for grade, bond classification, and Performance Category by a grade mark or certificate of inspection issued by an approved agency.

R602.1.6 Particleboard. Particleboard shall conform to ANSI A208.1. Particleboard shall be identified by the grade mark or certificate of inspection issued by an approve agency.

R602.1.7 Fiberboard. Fiberboard shall conform to ASTM C208. Fiberboard sheathing, when used structurally, shall be identified by an approved agency as conforming to ASTM C208.

R602.3 Design and construction. Exterior walls of wood frame construction shall be designed and constructed in accordance with the provisions of this chapter and Figures R602.3(1) and R602.3(2) or in accordance with AF&PA's NDS. Components of exterior walls shall be fastened in accordance with Tables R602.3(1) through R602.3(4). Wall sheathing shall be fastened directly to framing members and, when placed on the exterior side of an exterior wall, shall be capable of resisting the wind pressures listed in Table R301.2(2) adjusted for height and exposure using Table R301.2(3). ~~Wood structural panel sheathing used for exterior walls shall conform to DOC PS 1, DOC PS 2 or, when manufactured in Canada, CSA O437 or CSA O325. All panels shall be identified for grade, bond classification, and Performance Category by a grade mark or certificate of inspection issued by an approved agency and~~ shall conform to the requirements of Table R602.3(3). Wall sheathing used only for exterior wall covering purposes shall comply with Section R703. Studs shall be continuous from support at the sole plate to a support at the top plate to resist loads perpendicular to the wall. The support shall be a foundation or floor, ceiling or roof diaphragm or shall be designed in accordance with accepted engineering practice.

Reason: The change is intended to clarify the process by which lumber design values are certified and recognized in the code. The current process, which has been used since 1970, relies on the internationally recognized U.S.Department of Commerce Voluntary Product Standard PS20. Because the current format of the section can be incorrectly interpreted to place a number of wood products under the identification requirements of PS20, a new format is proposed that clearly states this standard is only for sawn lumber. The format proposed is nearly identical to what is used in Section 2302 of the International Building Code. Wood products other than sawn lumber have unique manufacturing standards, design value development, and quality control criteria. This new format clarifies that these other wood products must comply with specific product standards. Product standards that are currently buried in Section R602.3, Design and construction, are relocated into R602.1.

Cost Impact: The code change will not increase the cost of construction.

RB269-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.1 (NEW)-RB-PITTS.doc

RB270 – 13

R602.3, R602.4

Proponent: Dennis St. Denis, D & L Quality Homes, representing self (lstdenis2@cogeco.ca)

Revise as follows:

R602.3 Design and construction. Exterior walls of woodframe construction shall be designed and constructed in accordance with the provisions of this chapter and Figures R602.3(1) and R602.3(2) or in accordance with AF&PA's NDS. Components of exterior walls shall be fastened in accordance with Tables R602.3(1) through R602.3(4). Wall sheathing shall be fastened directly to framing members and, when placed on the exterior side of an exterior wall shall be capable of resisting the wind pressures listed in Table R301.2(2) adjusted for height and exposure using Table R301.2(3). Wood structural panel sheathing used for exterior walls shall conform to DOC PS 1, DOC PS 2 or, when manufactured in Canada, CSA O437 or CSA O325. All panels shall be identified for grade, bond classification, and performance Category by a grade mark or certificate of inspection issued by an approved agency and shall conform to the requirements of Table R602.3(3). Wall sheathing used only for exterior wall covering purposes shall comply with Section R703.

Studs shall be continuous from support at the sole plate to a support at the top plate to resist loads perpendicular to the wall. The support shall be a foundation or floor, ceiling or roof diaphragm or shall be designed in accordance with accepted engineering practice. Load Bearing Warning Signs shall be installed on every second stud along the full length of the load bearing wall, at a height of 5 feet and attached with screws or nails.

Exception: Jack studs, trimmer studs and cripple studs at openings in walls that comply with Tables R502.5(1) and R502.5(2).

R602.4 Interior load-bearing walls. Interior load-bearing walls shall be constructed, framed and fireblocked and Load Bearing Warning Signs installed as specified for exterior walls.

Reason: Load Bearing Walls and Load Points are being removed by homeowners and contractors during renovations and also being cut into by sub-contractors during new home construction or renovations without knowing what the possible outcome can be. The resulting problems are people being severely injured, ceilings and/or roofs collapsing and fatalities. All of this can be avoided if these SAFETY WARNING SIGNS were enforced as a building code.

Cost Impact: This code change proposal will increase the cost of construction.

RB270-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.3-RB-STDENIS.doc

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Table R602.3(1), Table R602.3(2), Table R602.3(3), Table R602.3.1, R602.3.5, Table R602.10.1.3, Table R602.10.3(1), Table R602.10.4, R602.10.4.1, Table R602.10.5, Table R602.10.6.1, Table R602.10.6.4, R602.10.6.5.1, R602.10.8.2, R602.12, R612.2, R613.2, Table R613.5(1), Table R613.5(2)

Proponent: Gary J. Ehrlich, P.E., National Association of Home Builders (NAHB); Jay Crandell, P.E., ARES Consulting; Ed Keith, P.E., APA – The Engineered Wood Association

Revise as follows:

**TABLE R602.3(1)
FASTENER SCHEDULE FOR STRUCTURAL MEMBERS**

- f. For regions having basic wind speed of ~~140~~ 140 mph or greater, 8d deformed (2½" x 0.120) nails shall be used for attaching plywood and wood structural panel roof sheathing to framing within minimum 48-inch distance from gable end walls, if mean roof height is more than 25 feet, up to 35 feet maximum.
- g. For regions having basic wind speed of ~~400~~ 130 mph or less, nails for attaching wood structural panel roof sheathing to gable end wall framing shall be spaced 6 inches on center. When basic wind speed is greater than ~~400~~130 mph, nails for attaching panel roof sheathing to intermediate supports shall be spaced 6 inches on center for minimum 48-inch distance from ridges, eaves and gable end walls; and 4 inches on center to gable end wall framing.

(Portions of Table not shown remain unchanged)

**TABLE R602.3(2)
ALTERNATE ATTACHMENTS TO TABLE 602.3(1)**

- g. Specified alternate attachments for roof sheathing shall be permitted for windspeeds less than ~~400~~ 130 mph. Fasteners attaching wood structural panel roof sheathing to gable end wall framing shall be installed using the spacing listed for panel edges.

(Portions of Table not shown remain unchanged)

**TABLE R602.3(3)
REQUIREMENTS FOR WOOD STRUCTURAL PANEL WALL
SHEATHING USED TO RESIST WIND PRESSURES^{a,b,c}**

MINIMUM NAIL		MINIMUM WOOD STRUCTURAL PANEL SPAN RATING	MINIMUM NOMINAL PANEL THICKNESS (inches)	MAXIMUM WALL STUD SPACING (inches)	PANEL NAIL SPACING		MAXIMUM ULTIMATE DESIGN WIND SPEED V_{ult} (mph)		
							Wind Exposure Category		
Size	Penetration (inches)				B	C	D		
6d Common (2.0" x 0.113")	1.5	24/0	3/8	16	6	12	140 <u>140</u>	90 <u>130</u>	85 <u>115</u>
				24	6	12	140 <u>140</u>	90 <u>115</u>	85 <u>110</u>
8d Common (2½" x 0.131")	1.75	24/16	7/16	16	6	12	130 <u>170</u>	110 <u>140</u>	105 <u>135</u>
				24	6	12	140 <u>140</u>	90 <u>115</u>	85 <u>110</u>

For SI: 1 Inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

- a. Panel strength axis parallel or perpendicular to supports. Three-ply plywood sheathing with studs spaced more than 16 inches on center shall be applied with panel strength axis perpendicular to supports.
- b. Table is based on wind pressures acting toward and away from building surfaces per Section R301.2. Lateral bracing requirements shall be in accordance with Section R602.10.
- c. Wood structural panels with span ratings of Wall-16 or Wall-24 shall be permitted as an alternate to panels with a 24/0 span rating. Plywood siding rated 16 o.c. or 24 o.c. shall be permitted as an alternative to panels with a 24/16 span rating. Wall-16 and Plywood siding 16 o.c. shall be used with studs spaced a maximum of 16 inches on center.

TABLE R602.3.1
MAXIMUM ALLOWABLE LENGTH OF WOOD WALL STUDS EXPOSED TO
WIND SPEEDS OF 40 ~~90~~ 130 MPH OR LESS IN SEISMIC DESIGN CATEGORIES A, B, C, D₀, D₁ and
D₂^{b, c}

(Portions of table not shown remain unchanged)

R602.3.5 Braced wall panel uplift load path. *Braced wall panels* located at exterior walls that support roof rafters or trusses (including stories below top story) shall have the framing members connected in accordance with one of the following:

1. Fastening in accordance with Table R602.3(1) where:
 - 1.1. The ~~basic~~ ultimate design wind speed does not exceed ~~90~~ 115 mph (~~40~~ 51 m/s), the wind exposure category is B, the roof pitch is 5:12 or greater, and the roof span is 32 feet (9754 mm) or less, or
 - 1.2. The net uplift value at the top of a wall does not exceed 100 plf. The net uplift value shall be determined in accordance with Section R802.11 and shall be permitted to be reduced by 60 plf (86 N/mm) for each full wall above.
2. Where the net uplift value at the top of a wall exceeds 100 plf (146 N/mm), installing *approved* uplift framing connectors to provide a continuous load path from the top of the wall to the foundation or to a point where the uplift force is 100 plf (146 N/mm) or less. The net uplift value shall be as determined in Item 1.2 above.
3. Wall sheathing and fasteners designed in accordance with accepted engineering practice to resist combined uplift and shear forces.

TABLE R602.10.1.3
BRACED WALL LINE SPACING

APPLICATION	CONDITION	BUILDING TYPE	BRACED WALL LINE SPACING CRITERIA	
			Maximum Spacing	Exception to Maximum Spacing
Wind Bracing	85 mph to < 110 mph <u>Ultimate Design Wind</u> <u>Speed 100 mph to <</u> <u>140 mph</u>	Detached, townhouse	60 feet	None

(Portions of Table not shown remain unchanged)

TABLE R602.10.3(1)
BRACING REQUIREMENTS BASED ON WIND SPEED

TABLE R602.10.3(1)
BRACING REQUIREMENTS BASED ON WIND SPEED







<ul style="list-style-type: none"> EXPOSURE CATEGORY B 30 FOOT MEAN ROOF HEIGHT 10 FOOT WALL HEIGHTS 2 BRACED WALL LINES 			MINIMUM TOTAL LENGTH (FEET) OF BRACED WALL PANELS REQUIRED ALONG EACH BRACED WALL LINE ^a			
Ultimate Design Wind Speed (mph)	Story Location	Braced Wall Line Spacing (feet)	Method LIB ^b	Method GB	Methods DWB, WSP, SFB, PBS, PCP, HPS, CS-SFB ^c	Methods CS-WSP, CS-G, CS-PF
≤110		10	3.5	3.5	2.0	1.5
		20	6.0	6.0	3.5	3.0
		30	8.5	8.5	5.0	4.5
		40	11.5	11.5	6.5	5.5
		50	14.0	14.0	8.0	7.0
		60	16.5	16.5	9.5	8.0
		10	6.5	6.5	3.5	3.0
		20	11.5	11.5	6.5	5.5
		30	16.5	16.5	9.5	8.0
		40	21.5	21.5	12.5	10.5
		50	26.5	26.5	15.5	13.0
		60	31.5	31.5	18.0	15.5
		10	NP	9.5	5.5	4.5
		20	NP	17.0	10.0	8.5
		30	NP	24.5	14.0	12.0
		40	NP	32.0	18.5	15.5
		50	NP	39.5	22.5	19.0
		60	NP	46.5	26.5	23.0
≤115		10	3.5	3.5	2.0	2.0
		20	6.5	6.5	3.5	3.5
		30	9.5	9.5	5.5	4.5
		40	12.5	12.5	7.0	6.0
		50	15.0	15.0	9.0	7.5
		60	18.0	18.0	10.5	9.0
		10	7.0	7.0	4.0	3.5
		20	12.5	12.5	7.5	6.5
		30	18.0	18.0	10.5	9.0
		40	23.5	23.5	13.5	11.5
		50	29.0	29.0	16.5	14.0
		60	34.5	34.5	20.0	17.0
		10	NP	10.0	6.0	5.0
		20	NP	18.5	11.0	9.0
		30	NP	27.0	15.5	13.0
		40	NP	35.0	20.0	17.0
		50	NP	43.0	24.5	21.0
		60	NP	51.0	29.0	25.0

TABLE R602.10.3(1)-continued
BRACING REQUIREMENTS BASED ON WIND SPEED


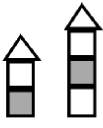

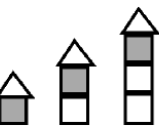
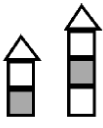


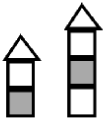

<ul style="list-style-type: none"> • <u>EXPOSURE CATEGORY B</u> • <u>30 FOOT MEAN ROOF HEIGHT</u> • <u>10 FOOT WALL HEIGHTS</u> • <u>2 BRACED WALL LINES</u> 			<u>MINIMUM TOTAL LENGTH (FEET) OF BRACED WALL PANELS REQUIRED ALONG EACH BRACED WALL LINE^a</u>			
<u>Ultimate Design Wind Speed (mph)</u>	<u>Story Location</u>	<u>Braced Wall Line Spacing (feet)</u>	<u>Method LIB^b</u>	<u>Method GB</u>	<u>Methods DWB, WSP, SFB, PBS, PCP, HPS, CS-SFB^c</u>	<u>Methods CS-WSP, CS-G, CS-PF</u>
<u>≤120</u>		<u>10</u>	<u>4.0</u>	<u>4.0</u>	<u>2.5</u>	<u>2.0</u>
		<u>20</u>	<u>7.0</u>	<u>7.0</u>	<u>4.0</u>	<u>3.5</u>
		<u>30</u>	<u>10.5</u>	<u>10.5</u>	<u>6.0</u>	<u>5.0</u>
		<u>40</u>	<u>13.5</u>	<u>13.5</u>	<u>8.0</u>	<u>6.5</u>
		<u>50</u>	<u>16.5</u>	<u>16.5</u>	<u>9.5</u>	<u>8.0</u>
		<u>60</u>	<u>19.5</u>	<u>19.5</u>	<u>11.5</u>	<u>9.5</u>
		<u>10</u>	<u>7.5</u>	<u>7.5</u>	<u>4.5</u>	<u>3.5</u>
		<u>20</u>	<u>14.0</u>	<u>14.0</u>	<u>8.0</u>	<u>7.0</u>
		<u>30</u>	<u>20.0</u>	<u>20.0</u>	<u>11.5</u>	<u>9.5</u>
		<u>40</u>	<u>25.5</u>	<u>25.5</u>	<u>15.0</u>	<u>12.5</u>
		<u>50</u>	<u>31.5</u>	<u>31.5</u>	<u>18.0</u>	<u>15.5</u>
		<u>60</u>	<u>37.5</u>	<u>37.5</u>	<u>21.5</u>	<u>18.5</u>
		<u>10</u>	<u>NP</u>	<u>11.0</u>	<u>6.5</u>	<u>5.5</u>
		<u>20</u>	<u>NP</u>	<u>20.5</u>	<u>11.5</u>	<u>10.0</u>
		<u>30</u>	<u>NP</u>	<u>29.0</u>	<u>17.0</u>	<u>14.5</u>
		<u>40</u>	<u>NP</u>	<u>38.0</u>	<u>22.0</u>	<u>18.5</u>
		<u>50</u>	<u>NP</u>	<u>47.0</u>	<u>27.0</u>	<u>23.0</u>
		<u>60</u>	<u>NP</u>	<u>55.5</u>	<u>32.0</u>	<u>27.0</u>
<u>≤130</u>		<u>10</u>	<u>4.5</u>	<u>4.5</u>	<u>2.5</u>	<u>2.5</u>
		<u>20</u>	<u>8.5</u>	<u>8.5</u>	<u>5.0</u>	<u>4.0</u>
		<u>30</u>	<u>12.0</u>	<u>12.0</u>	<u>7.0</u>	<u>6.0</u>
		<u>40</u>	<u>15.5</u>	<u>15.5</u>	<u>9.0</u>	<u>7.5</u>
		<u>50</u>	<u>19.5</u>	<u>19.5</u>	<u>11.0</u>	<u>9.5</u>
		<u>60</u>	<u>23.0</u>	<u>23.0</u>	<u>13.0</u>	<u>11.0</u>
		<u>10</u>	<u>8.5</u>	<u>8.5</u>	<u>5.0</u>	<u>4.5</u>
		<u>20</u>	<u>16.0</u>	<u>16.0</u>	<u>9.5</u>	<u>8.0</u>
		<u>30</u>	<u>23.0</u>	<u>23.0</u>	<u>13.5</u>	<u>11.5</u>
		<u>40</u>	<u>30.0</u>	<u>30.0</u>	<u>17.5</u>	<u>15.0</u>
		<u>50</u>	<u>37.0</u>	<u>37.0</u>	<u>21.5</u>	<u>18.0</u>
		<u>60</u>	<u>44.0</u>	<u>44.0</u>	<u>25.0</u>	<u>21.5</u>
		<u>10</u>	<u>NP</u>	<u>13.0</u>	<u>7.5</u>	<u>6.5</u>
		<u>20</u>	<u>NP</u>	<u>24.0</u>	<u>13.5</u>	<u>11.5</u>
		<u>30</u>	<u>NP</u>	<u>34.5</u>	<u>19.5</u>	<u>17.0</u>
		<u>40</u>	<u>NP</u>	<u>44.5</u>	<u>25.5</u>	<u>22.0</u>
		<u>50</u>	<u>NP</u>	<u>55.0</u>	<u>31.5</u>	<u>26.5</u>
		<u>60</u>	<u>NP</u>	<u>65.0</u>	<u>37.5</u>	<u>31.5</u>

TABLE R602.10.3(1)-continued
BRACING REQUIREMENTS BASED ON WIND SPEED

<ul style="list-style-type: none"> • <u>EXPOSURE CATEGORY B</u> • <u>30 FOOT MEAN ROOF HEIGHT</u> • <u>10 FOOT WALL HEIGHTS</u> • <u>2 BRACED WALL LINES</u> 			<u>MINIMUM TOTAL LENGTH (FEET) OF BRACED WALL PANELS REQUIRED ALONG EACH BRACED WALL LINE^a</u>			
<u>Ultimate Design Wind Speed (mph)</u>	<u>Story Location</u>	<u>Braced Wall Line Spacing (feet)</u>	<u>Method LIB^b</u>	<u>Method GB</u>	<u>Methods DWB, WSP, SFB, PBS, PCP, HPS, CS-SFB^c</u>	<u>Methods CS-WSP, CS-G, CS-PF</u>
<u><140</u>		<u>10</u>	<u>5.5</u>	<u>5.5</u>	<u>3.0</u>	<u>2.5</u>
		<u>20</u>	<u>10.0</u>	<u>10.0</u>	<u>5.5</u>	<u>5.0</u>
		<u>30</u>	<u>14.0</u>	<u>14.0</u>	<u>8.0</u>	<u>7.0</u>
		<u>40</u>	<u>18.0</u>	<u>18.0</u>	<u>10.5</u>	<u>9.0</u>
		<u>50</u>	<u>22.5</u>	<u>22.5</u>	<u>13.0</u>	<u>11.0</u>
		<u>60</u>	<u>26.5</u>	<u>26.5</u>	<u>15.0</u>	<u>13.0</u>
		<u>10</u>	<u>10.0</u>	<u>10.0</u>	<u>6.0</u>	<u>5.0</u>
		<u>20</u>	<u>18.5</u>	<u>18.5</u>	<u>11.0</u>	<u>9.0</u>
		<u>30</u>	<u>27.0</u>	<u>27.0</u>	<u>15.5</u>	<u>13.0</u>
		<u>40</u>	<u>35.0</u>	<u>35.0</u>	<u>20.0</u>	<u>17.0</u>
		<u>50</u>	<u>43.0</u>	<u>43.0</u>	<u>24.5</u>	<u>21.0</u>
		<u>60</u>	<u>51.0</u>	<u>51.0</u>	<u>29.0</u>	<u>25.0</u>
		<u>10</u>	<u>NP</u>	<u>15.0</u>	<u>8.5</u>	<u>7.5</u>
		<u>20</u>	<u>NP</u>	<u>27.5</u>	<u>16.0</u>	<u>13.5</u>
		<u>30</u>	<u>NP</u>	<u>39.5</u>	<u>23.0</u>	<u>19.5</u>
		<u>40</u>	<u>NP</u>	<u>51.5</u>	<u>29.5</u>	<u>25.0</u>
		<u>50</u>	<u>NP</u>	<u>63.5</u>	<u>36.5</u>	<u>31.0</u>
		<u>60</u>	<u>NP</u>	<u>75.5</u>	<u>43.0</u>	<u>36.5</u>

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 mile per hour = 0.447 m/s.

a. Linear interpolation shall be permitted.

b. Method LIB shall have gypsum board fastened to at least one side with nails or screws in accordance with Table R602.3(1) for exterior sheathing or Table R702.3.5 for interior gypsum board. Spacing of fasteners at panel edges shall not exceed 8 inches.

c. Method CS-SFB does not apply where the ultimate design wind speed is greater than 130 mph.

TABLE R602.10.4
BRACING METHODS

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 degree = 0.0175 rad, 1 pound per square foot = 47.8 N/m², 1 mile per hour = 0.447 m/s.

- Adhesive attachment of wall sheathing, including Method GB, shall not be permitted in Seismic Design Categories C, D₀, D₁ and D₂.
- Applies to panels next to garage door opening when supporting gable end wall or roof load only. May only be used on one wall of the garage. In Seismic Design Categories D₀, D₁ and D₂, roof covering dead load may not exceed 3 psf.
- Garage openings adjacent to a Method CS-G panel shall be provided with a header in accordance with Table R502.5(1). A full height clear opening shall not be permitted adjacent to a Method CS-G panel.
- Method CS-SFB does not apply in Seismic Design Categories D₀, D₁ and D₂ and in areas where the ultimate design wind speed exceeds ~~400~~ 130 mph.
- Method applies to detached one- and two-family dwellings in Seismic Design Categories D₀ through D₂ only.

(Portions of Table not shown remain unchanged)

R602.10.4.1 Mixing methods. Mixing of bracing methods shall be permitted as follows:

- Mixing intermittent bracing and continuous sheathing methods from story to story shall be permitted.
- Mixing intermittent bracing methods from *braced wall line* to *braced wall line* within a story shall be permitted. Within Seismic Design Categories A, B and C or in regions where the basic ultimate design wind speed is less than or equal to ~~400~~ 130 mph (~~45~~ 58 m/s), mixing of intermittent

bracing and continuous sheathing methods from *braced wall line* to braced wall line within a story shall be permitted.

3. Mixing intermittent bracing methods along a *braced wall line* shall be permitted in Seismic Design Categories A and B, and detached dwellings in Seismic Design Category C provided the length of required bracing in accordance with Table R602.10.3(1) or R602.10.3(3) is the highest value of all intermittent bracing methods used.
4. Mixing of continuous sheathing methods CS-WSP, CS-G and CS-PF along a *braced wall line* shall be permitted.
5. In Seismic Design Categories A and B, and for detached one- and two-family dwellings in Seismic Design Category C, mixing of intermittent bracing methods along the interior portion of a *braced wall line* with continuous sheathing methods CS-WSP, CS-G and CS-PF along the exterior portion of the same *braced wall line* shall be permitted. The length of required bracing shall be the highest value of all intermittent bracing methods used in accordance with Table R602.10.3(1) or R602.10.3(3) as adjusted by Tables R602.10.3(2) and R602.10.3(4), respectively. The requirements of Section R602.10.7 shall apply to each end of the continuously sheathed portion of the *braced wall line*.

**TABLE R602.10.5
MINIMUM LENGTH OF BRACED WALL PANELS**

METHOD (See Table R602.10.4)		MINIMUM LENGTH (inches)					CONTRIBUTING LENGTH (inches)
		Wall Height					
		8 feet	9 feet	10 feet	11 feet	12 feet	
ABW	SDC A, B, and C, <u>Ultimate design</u> wind speed <140-140 mph	28	32	34	38	42	48
	SDC D ₀ , D ₁ and D ₂ , <u>Ultimate design</u> wind speed <140-140 mph	32	32	34	NP	NP	

(Portions of Table not shown remain unchanged)

**TABLE R602.10.6.1
MINIMUM HOLD-DOWN FORCES FOR METHOD ABW BRACED WALL PANELS**

SEISMIC DESIGN CATEGORY AND WIND SPEED	SUPPORTING/ STORY	HOLD DOWN FORCE (pounds)				
		Height Of Braced Wall Panel				
		8 feet	9 feet	10 feet	11 feet	12 feet
SDC A, B, and C <u>Ultimate design</u> wind speed <140 140 mph	One story	1,800	1,800	1,800	2,000	2,200
	First of two stories	3,000	3,000	3,000	3,300	3,600
SDC D ₀ , D ₁ , and D ₂ <u>Ultimate design</u> wind speed <140 140 mph	One story	1,800	1,800	1,800	NP	NP
	First of two stories	3,000	3,000	3,000	NP	NP

**TABLE R602.10.6.4
TENSION STRAP CAPACITY FOR RESISTING WIND PRESSURES
PERPENDICULAR TO METHODS PFH, PFG, AND CS-PF BRACED WALL PANELS**

TABLE R602.10.6.4
TENSION STRAP CAPACITY FOR RESISTING WIND PRESSURES
PERPENDICULAR TO METHODS PFH, PFG, AND CS-PF BRACED WALL PANELS

MINIMUM WALL STUD FRAMING NOMINAL SIZE AND GRADE	MAXIMUM PONY WALL HEIGHT (feet)	MAXIMUM TOTAL WALL HEIGHT (feet)	MAXIMUM OPENING WIDTH (feet)	TENSION STRAP CAPACITY REQUIRED (pounds) ^{a,b}					
				Ultimate Design Wind Speed V _{ult.} (mph)					
				110	115	130	110	115	130
				Exposure B			Exposure C		
2 X 4 No. 2 Grade	0	10	18	1,000	1,000	1,000	1,000	1,000	1,050
			9	1,000	1,000	1,000	1,000	1,000	1,750
	1	10	16	1,000	1,025	2,050	2,075	2,500	3,950
			18	1,000	1,275	2,375	2,400	2,850	DR
			9	1,000	1,000	1,475	1,500	1,875	3,125
	2	10	16	1,775	2,175	3,525	3,550	4,125	DR
			18	2,075	2,500	3,950	3,975	DR	DR
			9	1,150	1,500	2,650	2,675	3,175	DR
	2	12	16	2,875	3,375	DR	DR	DR	DR
			18	3,425	3,975	DR	DR	DR	DR
			9	2,275	2,750	DR	DR	DR	DR
	4	12	12	3,225	3,775	DR	DR	DR	DR
2 X 6 Stud Grade	2	12	9	1,000	1,000	1,700	1,700	2,025	3,050
			16	1,825	2,150	3,225	3,225	3,675	DR
			18	2,200	2,550	3,725	3,750	DR	DR
	4	12	9	1,450	1,750	2,700	2,725	3,125	DR
			16	2,050	2,400	DR	DR	DR	DR
			18	3,350	3,800	DR	DR	DR	DR
			9	1,450	1,750	2,700	2,725	3,125	DR

For SI: 1 Inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

a. DR = design required.

b. Straps shall be installed in accordance with manufacturer's recommendations.

R602.10.6.5.1 Length of bracing. The length of bracing along each *braced wall line* shall be the greater of that required by the ultimate design wind speed and *braced wall line* spacing in accordance with Table R602.10.3(1) as adjusted by the factors in the Table R602.10.3(2) or the Seismic Design Category and *braced wall line* length in accordance with Table R602.10.6.5. Angled walls shall be permitted to be counted in accordance with Section R602.10.1.4, and *braced wall panel* location shall be in accordance with Section R602.10.2.2. The seismic adjustment factors in Table R602.10.3(4) shall not be applied to the length of bracing determined using Table R602.10.6.5. In no case shall the minimum total length of bracing in a *braced wall line*, after all adjustments have been taken, be less than 48 inches (1219 mm) total.

R602.10.8.2 Connections to roof framing. Top plates of exterior *braced wall panels* shall be attached to rafters or roof trusses above in accordance with Table R602.3(1) and this section. Where required by this section, blocking between rafters or roof trusses shall be attached to top plates of *braced wall panels* and to rafters and roof trusses in accordance with Table R602.3(1). A continuous band, rim, or header joist or roof truss parallel to the *braced wall panels* shall be permitted to replace the blocking required by this section. Blocking shall not be required over openings in continuously-sheathed *braced wall lines*. In addition to the requirements of this section, lateral support shall be provided for rafters and ceiling joists in accordance with Section R802.8 and for trusses in accordance with Section R802.10.3. Roof ventilation shall be provided in accordance with Section R806.1.

1. For Seismic Design Categories A, B and C and ultimate design wind speeds less than ~~400~~ 130 mph (~~45~~ 58 m/s) where the distance from the top of the *braced wall panel* to the top of the rafters

or roof trusses above is 9¼ inches (235 mm) or less, blocking between rafters or roof trusses shall not be required. Where the distance from the top of the *braced wall panel* to the top of the rafters or roof trusses above is between 9¼ inches (235 mm) and 15¼ inches (387 mm), blocking between rafters or roof trusses shall be provided above the *braced wall panel* in accordance with Figure R602.10.8.2(1).

2. For Seismic Design Categories D₀, D₁ and D₂ or ultimate design wind speeds of ~~400~~ 130 mph (~~45~~ 58 m/s) or greater, where the distance from the top of the *braced wall panel* to the top of the rafters or roof trusses is 15¼ inches (387 mm) or less, blocking between rafters or roof trusses shall be provided above the *braced wall panel* in accordance with Figure R602.10.8.2(1).
3. Where the distance from the top of the *braced wall panel* to the top of rafters or roof trusses exceeds 15¼ inches (387 mm), the top plates of the *braced wall panel* shall be connected to perpendicular rafters or roof trusses above in accordance with one or more of the following methods:
 - 3.1. Soffit blocking panels constructed in accordance with Figure R602.10.8.2(2);
 - 3.2. Vertical blocking panels constructed in accordance with Figure R602.10.8.2(3);
 - 3.3. Full-height engineered blocking panels designed in accordance with the AF&PA WFCM; or
 - 3.4. Blocking, blocking panels, or other methods of lateral load transfer designed in accordance with accepted engineering practice.

R602.12 Simplified wall bracing. Buildings meeting all of the conditions listed in items 1-8 shall be permitted to be braced in accordance with this section as an alternative to the requirements of Section R602.10. The entire building shall be braced in accordance with this section; the use of other bracing provisions of R602.10, except as specified herein, shall not be permitted.

1. There shall be no more than two stories above the top of a concrete or masonry foundation or basement wall. Permanent wood foundations shall not be permitted.
2. Floors shall not cantilever more than 24 inches (607 mm) beyond the foundation or bearing wall below.
3. Wall height shall not be greater than 10 feet (2743 mm).
4. The building shall have a roof eave-to-ridge height of 15 feet (4572 mm) or less.
5. All exterior walls shall have gypsum board with a minimum thickness of ½ inch (12.7 mm) installed on the interior side fastened in accordance with Table R702.3.5.
6. The structure shall be located where the basic ultimate design wind speed is less than or equal to ~~90~~ 115 mph (~~40~~ 51 m/s), and the Exposure Category is A or B.
7. The structure shall be located in Seismic Design Category A, B or C for detached one- and two-family dwellings or Seismic Design Category A or B for townhouses.
8. Cripple walls shall not be permitted in two-story buildings.

R612.2 Performance. Exterior windows and doors shall be designed to resist the design wind loads specified in Table R301.2(2) adjusted for height and exposure in accordance with Table R301.2(3) or determined in accordance with ASCE 7 using the allowable stress design load combinations of ASCE 7. Design wind loads for exterior glazing not part of a labeled assembly shall be permitted to be determined in accordance with Chapter 24 of the *International Building Code*.

R613.2 Applicability limits. The provisions of this section shall control the construction of exterior structural insulated panel walls and interior load-bearing structural insulated panel walls for buildings not greater than 60 feet (18 288mm) in length perpendicular to the joist or truss span, not greater than 40 feet (12 192 mm) in width parallel to the joist or truss span and not greater than two stories in height with each wall not greater than 10 feet (3048 mm) high. All exterior walls installed in accordance with the provisions of this section shall be considered as load-bearing walls. Structural insulated panel walls constructed in accordance with the provisions of this section shall be limited to sites subjected to a maximum ultimate design wind speed (V_{ult}) of ~~420~~ 155 miles per hour (~~54~~ 69 m/s), Exposure A or B or ~~440~~ 140 miles per hour (~~49~~ 63 m/s) Exposure C, and a maximum ground snow load of 70 pounds per foot (3.35 kPa), and Seismic Design Categories A, B and C.

TABLE R613.5(1)
MINIMUM THICKNESS FOR SIP WALL SUPPORTING SIP OR LIGHT-FRAME ROOF ONLY (inches)

TABLE R613.5(1)
MINIMUM THICKNESS FOR SIP WALL SUPPORTING SIP OR LIGHT-FRAME ROOF ONLY (inches)

ULTIMATE DESIGN WIND SPEED V_{ult} (mph)		SNOW LOAD (psf)	BUILDING WIDTH (ft)															
Exp. B	Exp. C		24			28			32			36			40			
			Wall Height (ft)			Wall Height (ft)			Wall Height (ft)			Wall Height (ft)			Wall Height (ft)			
			8	9	10	8	9	10	8	9	10	8	9	10	8	9	10	
110	--	20	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
		30	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
		50	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
		70	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	6.5	4.5	4.5	6.5
115	--	20	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
		30	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
		50	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	6.5	
		70	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	6.5	4.5	4.5	DR	4.5	4.5	DR
130	110	20	4.5	4.5	6.5	4.5	4.5	6.5	4.5	4.5	6.5	4.5	4.5	DR	4.5	4.5	DR	
		30	4.5	4.5	6.5	4.5	4.5	6.5	4.5	4.5	DR	4.5	4.5	DR	4.5	4.5	DR	
		50	4.5	4.5	DR	4.5	4.5	DR	4.5	4.5	DR	4.5	6.5	DR	4.5	DR	DR	
		70	4.5	4.5	DR	4.5	DR	DR	4.5	DR	DR	4.5	DR	DR	DR	DR	DR	DR
140	120	20	4.5	6.5	DR	4.5	6.5	DR	4.5	DR	DR	4.5	DR	DR	4.5	DR	DR	
		30	4.5	6.5	DR	4.5	DR	DR	4.5	DR	DR	4.5	DR	DR	4.5	DR	DR	
		50	4.5	DR	DR	4.5	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR
		70	4.5	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR

For SI: 1 Inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 mile per hour = 0.447 m/s.

DR = design required.

a. Design Assumptions:

Deflection criteria: $L/240$.

Roof load: 7 psf.

Ceiling load: 5 psf.

Wind loads based on Table R301.2(2).

Strength axis of facing material applied vertically.

TABLE R613.5(2)
MINIMUM THICKNESS FOR SIP WALL SUPPORTING SIP OR LIGHT-FRAME ONE STORY AND ROOF ONLY (inches)

TABLE R613.5(2)
MINIMUM THICKNESS FOR SIP WALL SUPPORTING SIP OR LIGHT-FRAME ONE STORY AND ROOF ONLY (inches)

ULTIMATE DESIGN WIND SPEED V_{ult} (mph)		SNOW LOAD (psf)	BUILDING WIDTH (ft)														
Exp. B	Exp. C		24			28			32			36			40		
			Wall Height (ft)			Wall Height (ft)			Wall Height (ft)			Wall Height (ft)			Wall Height (ft)		
			8	9	10	8	9	10	8	9	10	8	9	10	8	9	10
110	--	20	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	6.5	4.5	4.5	DR	4.5	4.5	DR
		30	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	6.5	4.5	4.5	DR	4.5	6.5	DR
		50	4.5	4.5	4.5	4.5	4.5	6.5	4.5	4.5	DR	4.5	DR	DR	DR	DR	DR
		70	4.5	4.5	6.5	4.5	4.5	DR	4.5	DR	DR	DR	DR	DR	DR	DR	DR
115	--	20	4.5	4.5	4.5	4.5	4.5	6.5	4.5	4.5	DR	4.5	4.5	DR	4.5	DR	DR
		30	4.5	4.5	4.5	4.5	4.5	6.5	4.5	4.5	DR	4.5	6.5	DR	4.5	DR	DR

ULTIMATE DESIGN WIND SPEED V _{ult} (mph)		SNOW LOAD (psf)	BUILDING WIDTH (ft)															
Exp. B	Exp. C		24			28			32			36			40			
			Wall Height (ft)			Wall Height (ft)			Wall Height (ft)			Wall Height (ft)			Wall Height (ft)			
			8	9	10	8	9	10	8	9	10	8	9	10	8	9	10	
120	--	50	4.5	4.5	6.5	4.5	4.5	DR	4.5	DR	DR	4.5	DR	DR	DR	DR	DR	DR
		70	4.5	4.5	DR	4.5	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR
		20	4.5	4.5	6.5	4.5	4.5	DR	4.5	4.5	DR	4.5	DR	DR	4.5	DR	DR	DR
		30	4.5	4.5	DR	4.5	4.5	DR	4.5	6.5	DR	4.5	DR	DR	DR	DR	DR	DR
130	110	50	4.5	4.5	DR	4.5	DR	DR	4.5	DR	DR	DR	DR	DR	DR	DR	DR	DR
		70	4.5	DR	DR	4.5	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR
		20	4.5	6.5	DR	4.5	DR	DR	4.5	DR	DR	DR	DR	DR	DR	DR	DR	DR
		30	4.5	DR	DR	4.5	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR
		50	4.5	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR
		70	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR	DR

For SI: 1 Inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 mile per hour = 0.447 m/s.

DR = design required.

a. Design Assumptions:

Deflection criteria: $L/240$.

Roof load: 7 psf.

Ceiling load: 5 psf.

Second floor live load: 30 psf.

Second floor dead load: 10 psf.

Second floor dead load from walls: 10 psf.

Wind loads based on Table R301.2(2).

Strength axis of facing material applied vertically.

Reason: The purpose of this code change is to bring the wind provisions of the IRC in line with the 2012 IBC and ASCE 7-10. As a result of the schedule changes implemented during the 2009-2010 ICC code development cycle, there was not sufficient time to revise the IRC to fully implement the new ultimate wind speed basis of ASCE 7-10 and the 2012 IBC, due to the extent of prescriptive IRC provisions and tables which are directly related to basic wind speed. New maps based on the ASCE 7-10 ultimate wind speed data but converted back down to nominal (ASD) basis were provided in the IRC. This has led to a fair amount of confusion among those stakeholders who work with both codes.

A working group of stakeholders including NAHB, the major material associations, ASCE, and the Insurance Institute for Business and Home Safety developed a series of IRC proposals to implement the new ultimate wind speed basis. This proposal updates the Chapter 6 provisions, including triggers in the wall bracing provisions, the wind bracing table, the header strap for the portal frames, and the structural insulated panel applicability limits and design tables. It is noted that the changes necessary to update the appropriate Section R603 cold-formed steel provisions are contained in a separate AISI proposal which comprehensively revises the cold-formed steel provisions. The changes necessary to update the appropriate Section R611 above-grade concrete wall provisions are contained in a separate PCA proposal.

Cost Impact: This code change proposal will not increase the cost of construction.

RB271-13

Public Hearing: Committee:

AS

AM

D

Assembly:

ASF

AMF

DF

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RB272 – 13

Table R602.3(1)

Proponent: Dennis Pitts, American Wood Council (dpitts@awc.org)

Revise as follows:

Table R602.3(1)
FASTENING SCHEDULE FOR STRUCTURAL MEMBERS

ITEM	DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENER ^{a, b, c}	SPACING OF FASTENERS
Roof			
1	Blocking between ceiling joists or rafters to top plate, toe nail	3-8d 4-8d box (2½" x 0.113"); or 3-8d common (2½" x 0.131"); or 3-10d box (3" x 0.128"); or 3-3" x 0.131" nails	—
2	Ceiling joists to top plate, toe nail	3-8d 4-8d box (2½" x 0.113"); or 3-8d common (2½" x 0.131"); or 3-10d box (3" x 0.128"); or 3-3" x 0.131" nails	—
3	Ceiling joist not attached to parallel rafter, laps over partitions, face nail	3-10d 4-10d box (3" x 0.128"); or 3-16d common (3½" x 0.162"); or 4-3" x 0.131" nails	—
4	Collar tie to rafter, face nail or 1 1/4" x 20 gage ridge strap	3-10d 4-10d box (3" x 0.128"); or 3-10d common (3" x 0.148"); or 4-3" x 0.131" nails	—
5	Rafter or roof truss to plate, toe nail	3-16d box nails (3½" x 0.135"); or 3-10d common nails (3" x 0.148"); or 4-10d box (3" x 0.128"); or 4-3" x 0.131" nails	2 toe nails on one side and 1 toe nail on opposite side of each rafter or truss ^j
6	Roof rafters to ridge, valley or hip rafters: toe nail face nail	4-16d box (3½" x 0.135"); or 3-10d common (3½" x 0.148"); or 4-10d box (3" x 0.128"); or 4-3" x 0.131" nails 3-16d box (3½" x 0.135") 2-16d common (3½" x 0.162"); or 3-10d box (3" x 0.128"); or 3-3" x 0.131" nails	<u>Toenail</u> <u>Endnail</u>
Wall			
7	Built-up studs—face nail	10d (3" x 0.128") 16d common (3½" x 0.162") 10d box (3" x 0.128"); or 3" x 0.131" nails	24" o.c. 16" o.c.
8	Abutting studs at intersecting wall corners, face nail	16d box (3 ½" x 0.135"); or 3" x 0.131" nails 16d common (3½" x 0.162")	12" o.c. 16" o.c.
9	Built-up header, two pieces with 1/2" spacer	16d (3½" x 0.135") 16d common (3½" x 0.162") 16d box (3½" x 0.135")	16" o.c. along each edge 12" o.c. along each edge

ITEM	DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENER ^{a, b, c}	SPACING OF FASTENERS
10	Continued header, two pieces	16d (3½" x 0.135") <u>16d common (3½" x 0.162")</u> <u>16d box (3½" x 0.135")</u>	16" o.c. along each edge <u>12" o.c. along each edge</u>
11	Continuous header to stud, toe nail	4-8d 5-8d box (2½" x 0.113"); or <u>4-8d common (2½" x 0.131"); or</u> <u>4-10d box (3" x 0.128")</u>	—
12	Double studs, face nail	10d (3" x 0.128") <u>16d common (3½" x 0.162")</u> <u>10d box (3" x 0.128"); or</u> <u>3" x 0.131" nails</u>	24" o.c. <u>16" o.c.</u>
13	Double top plates, face nail	10d (3" x 0.128") <u>16d common (3½" x 0.162")</u> <u>10d box (3" x 0.128"); or</u> <u>3" x 0.131" nails</u>	24" o.c. <u>16" o.c.</u> <u>12" o.c.</u>
14	Double top plates, minimum 24-inch offset of end joints, face nail in lapped area	8-16d (3½" x 0.135") <u>8-16d common (3½" x 0.162"); or</u> <u>12-16d box (3½" x 0.135"); or</u> <u>12-10d box (3" x 0.128"); or</u> <u>12-3" x 0.131" nails</u>	—
15	Sole plate to joist or blocking, face nail	16d (3½" x 0.135") <u>16d common (3½" x 0.162")</u> <u>16d box (3½" x 0.135"); or</u> <u>3" x 0.131" nails</u>	16" o.c. <u>12" o.c.</u>
16	Sole plate to joist or blocking at braced wall panels	<u>3-16d box (3½" x 0.135"); or</u> <u>2-16d common (3½" x 0.162"); or</u> <u>4-3" x 0.131" nails</u>	16" o.c.
17	Stud to sole plate, toe nail	3-8d 4-8d box (2½" x 0.113"); or 2-16d 3-16d box (3½" x 0.135"); or <u>4-8d common (2½" x 0.131"); or</u> <u>4-10d box (3" x 0.128"); or</u> <u>4-3" x 0.131" nails</u>	—
18	Top or sole plate to stud, end nail	2-16d 3-16d box (3½" x 0.135"); or <u>2-16d common (3½" x 0.162"); or</u> <u>3-10d box (3" x 0.128"); or</u> <u>3-3" x 0.131" nails</u>	—
19	Top plates, laps at corners and intersections, face nail	2-10d 3-10d box (3" x 0.128"); or <u>2-16d common (3½" x 0.162"); or</u> <u>3-3" x 0.131" nails</u>	—
20	1" brace to each stud and plate, face nail	2-8d 3-8d box (2½" x 0.113"); or <u>2-8d common (2½" x 0.131"); or</u> <u>2-10d box (3" x 0.128")</u> 2 staples 1¾"	—
21	1" x 6" sheathing to each bearing, face nail	2-8d 3-8d box (2½" x 0.113"); or <u>2-8d common (2½" x 0.131"); or</u> <u>2-10d box (3" x 0.128")</u> 2 staples 1¾"	—
22	1" x 8" sheathing to each bearing, face nail	2-8d 3-8d box (2½" x 0.113"); or <u>3-8d common (2½" x 0.131"); or</u> <u>3-10d box (3" x 0.128")</u> 3 staples 1¾"	—

ITEM	DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENER ^{a, b, c}	SPACING OF FASTENERS
23	Wider than 1" x 8" sheathing to each bearing, face nail	3-8d 4-8d box (2½" x 0.113"); or 3-8d common (2½" x 0.131"); or 3-10d box (3" x 0.128") 4 staples 1¾"	—
Floor			
24	Joist to sill or girder, toe nail	3-8d 4-8d box (2½" x 0.113"); or 3-8d common (2½" x 0.131"); or 3-10d box (3" x 0.128"); or 3-3" x 0.131" nails	—
25	Rim joist to top plate, toe nail (roof applications also)	8d box (2½" x 0.113") 8d common (2½" x 0.131"); or 10d box (3" x 0.128"); or 3" x 0.131" nails	4" o.c. 6" o.c.
26	Rim joist or blocking to sill plate, toe nail	8d box (2½" x 0.113") 8d common (2½" x 0.131"); or 10d box (3" x 0.128"); or 3" x 0.131" nails	4" o.c. 6" o.c.
27	1" x 6" subfloor or less to each joist, face nail	2-3-8d box (2½" x 0.113"); or 2-8d common (2½" x 0.131"); or 3-10d box (3" x 0.128") 2 staples 1¾"	—
28	2" subfloor to joist or girder, blind and face nail	2-16d 3-16d box (3½" x 0.135"); or 2-16d common (3½" x 0.162")	—
29	2" planks (plank & beam - floor & roof)	2-16d 3-16d box (3½" x 0.135"); or 2-16d common (3½" x 0.162")	at each bearing
30	Built-up girders and beams, 2-inch lumber layers	10d (3" x 0.128") 20d common (4" x 0.192"); or 10d box (3" x 0.128"); or 3" x 0.131" nails And: 2-20d common (4" x 0.192"); or 3-10d box (3" x 0.128"); or 3-3" x 0.131" nails	Nail each layer as follows: 32" o.c. at top and bottom and staggered. Two nails at ends and at each splice. 24" o.c. face nail at top and bottom staggered on opposite sides Face nail at ends and at each splice
31	Ledger strip supporting joists or rafters	3-16d 4-16d box (3½" x 0.135"); or 3-16d common (3½" x 0.162"); or 4-10d box (3" x 0.128"); or 4-3" x 0.131" nails	At each joist or rafter

(Portions of Table not shown remain unchanged)

Reason: This proposed change seeks greater consistency between the IRC Table R602.3(1) wood frame nailing schedule and IBC Table 2304.9.1, as it will appear in the 2015 edition of the IBC (see S265). This proposed change results in minimum size and number of fasteners per connection to be substantially the same between the IRC and the IBC creating increased consistency of minimum nailing requirements for wood frame construction. Proposed nailing requirements are also clearer because the exact dimensions of commonly used power driven, box, and common nail sizes are shown in the table.

Complete consistency between the actual nailing specified in the two codes is not achieved by this proposal. One reason is because the proposed revisions retain the currently tabulated IRC nail sizes, such as 2-1/2" long x 0.113" diameter box nails, as an option. While the smaller nail size in the IRC table does not appear in IBC Table 2304.9.1, retention of the smaller nail size was judged as important for continuity from one code edition to another.

In several cases, the IRC minimum nailing remains unchanged by this proposal except for addition of IBC nailing options. For instance, the base nailing of the following remain unchanged: Item 5, Rafter or roof truss to plate; Item 6, Roof rafters to ridge, valley or hip rafters; Item 8, Abutting studs at intersecting wall corners; and Item 16, Sole plate to joist or blocking at braced wall

panels. In all other cases, there is an increase in number of smaller nails by 1 or there is a reduced spacing in order to maintain a minimum connection of approximately equal strength to that provided by the IBC nailing. Reference design values in accordance with NDS for wood construction for the various applications are compared in the following Table 1 – Reference Nail Values for Proposed Minimum Nailing. All values are based on normal load duration and calculated assuming framing with Specific Gravity equal to 0.42.

Table 1 – Reference Nail Values for Proposed Minimum Nailing

	DESCRIPTION	NUMBER AND TYPE OF FASTENER		REFERENCE LATERAL VALUE	REFERENCE WITHDRAWAL VALUE
Roof					
1	Blocking between ceiling joists or rafters to top plate, toe nail	4-8d box (2 ½" x 0.113"); or 3-8d common (2.5" x 0.131"); or 3-10d box (3" x 0.128"); or 3-3" x 0.131" nails	--	200 lb 186 lb 195 lb 204 lb	
2	Ceiling joists to top plate, toe nail	4-8d box (2 ½" x 0.113"); or 3-8d common (2.5" x 0.131"); or 3-10d box (3" x 0.128"); or 3-3" x 0.131" nails	--	200 lb 186 lb 195 lb 204 lb	72 lb 63 lb 75 lb 78 lb
3	Ceiling joist not attached to parallel rafter, laps over partitions, face nail	4-10d box (3"x0.128"); or 3-16d common (3.5" x 0.162"); or 4-3" x 0.131" nails	—	316 lb 360 lb 328 lb	
4	Collar tie to rafter, face nail or 1 1/4" x 20 gage ridge strap	4 -10d box (3"x0.128"); or 3-10d common (3" x 0.148"); or 4-3" x 0.131" nails	—	316 lb 300 lb 328 lb	
5	Rafter or roof truss to plate, toe nail	3-16d box nails (3 ½" x 0.135"); or 3-10d common nails (3" x 0.148"); or 4-10d box (3" x 0.128"); or 4-3" x 0.131 nails		219 lb 240 lb 260 lb 272 lb	93 lb 87 lb 100 lb 104 lb
6	Roof rafters to ridge, valley or hip rafters	4-16d box (3 ½" x 0.135"); or 3-10d common (3.5" x 0.148"); or 4-10d box (3" x 0.128"); or 4-3" x 0.131" nails 3-16d box (3 ½" x 0.135") 2-16d common (3.5" x 0.162"); or 3-10d box (3" x 0.128"); or 3-3" x 0.131" nails	Toenail Endnail	292 lb 240 lb 260 lb 272 lb 198 lb 180 lb 178 lb 185 lb	
Wall					
7	Built-up studs—face nail	16d common (3.5" x 0.162") 10d box (3" x 0.128"); or 3" x 0.131" nails	24" o.c. 16" o.c.	60 plf 59 plf 62 plf	
8	Abutting studs at intersecting wall corners, face nail	16d box (3 ½" x 0.135"); or 3" x 0.131" nails 16d common (3.5" x 0.162")	12" o.c. 16" o.c.	88 plf 82 plf 90 plf	
9	Built-up header, two pieces with 1/2" spacer	16d common (3.5" x 0.162") 16d box (3.5" x 0.135")	16" o.c. 12" o.c.	90 plf 88 plf	
10	Continued header, two pieces	16d common (3.5" x 0.162") 16d box (3.5" x 0.135")	16" o.c. 12" o.c.	90 plf 88 plf	
11	Continuous header to stud, toe nail	5-8d box (2 ½" x 0.113"); or 4-8d common (2.5" x 0.131"); or 4-10d box (3" x 0.128")	—	250 lb 248 lb 260 lb	
12	Double studs, face nail	16d common (3.5" x 0.162") 10d box (3" x 0.128"); or 3" x 0.131" nails	24" o.c. 16" o.c.	60 plf 59 plf 62 plf	
13	Double top plates, face nail	16d common (3.5" x 0.162") 10d box (3" x 0.128"); or 3" x 0.131" nails	16" o.c. 12" o.c.	90 plf 79 plf 82 plf	
14	Double top plates, minimum 24-inch offset of end joints, face nail in lapped area	8-16d common (3.5" x 0.162"); or 12-16d box (3.5" x 0.135"); or 12-10d box (3" x 0.128"); or 12-3" x 0.131" nails	—	960 lb 1056 lb 948 lb 984 lb	

15	Sole plate to joist or blocking, face nail	16d common (3.5" x 0.162") 16d box (3.5" x 0.135"); or 3" x 0.131" nails	16" o.c. 12" o.c.	90 plf 88 plf 82 plf	
16	Sole plate to joist or blocking at braced wall panels	3-16d box (31/2" x 0.135"); or 2-16d common (3.5" x 0.162"); or 4-3" x 0.131" nails	16" o.c.	264 lb 240 lb 328 lb	
17	Stud to sole plate, toe nail	4-8d box (21/2" x 0.113"); or 3-16d box (31/2" x 0.135"); or 4-8d common (2.5" x 0.131"); or 4-10d box (3" x 0.128"); or 4-3" x 0.131" nails	—	200 lb 219 lb 248 lb 260 lb 272 lb	
18	Top or sole plate to stud, end nail	3-16d box (31/2" x 0.135"); or 2-16d common (3.5" x 0.162"); or 3-10d box (3" x 0.128"); or 3-3" x 0.131" nails	—	198 lb 180 lb 178 lb 185 lb	
19	Top plates, laps at corners and intersections, face nail	3-10d box (3" x 0.128"); or 2-16d common (3.5" x 0.162"); or 3-3" x 0.131" nails	—	237 lb 240 lb 246 lb	
20	1" brace to each stud and plate, face nail	3-8d box (21/2" x 0.113"); or 2-8d common (2.5" x 0.131"); or 2-10d box (3" x 0.128") 2 staples 13/4"	--	171 lb 140 lb 136 lb	94.5 lb 73.5 lb 90 lb
21	1" x 6" sheathing to each bearing, face nail	3-8d box (21/2" x 0.113"); or 2-8d common (2.5" x 0.131"); or 2-10d box (3" x 0.128") 2 staples 13/4"	--	171 lb 140 lb 136 lb	94.5 lb 73.5 lb 90 lb
22	1" x 8" sheathing to each bearing, face nail	3-8d box (21/2" x 0.113"); or 3-8d common (2.5" x 0.131"); or 3-10d box (3" x 0.128") 3 staples 13/4"	--	171 lb 140 lb 136 lb	94.5 lb 73.5 lb 90 lb
23	Wider than 1" x 8" sheathing to each bearing, face nail	4-8d box (21/2" x 0.113"); or 3-8d common (2.5" x 0.131"); or 3-10d box (3" x 0.128") 4 staples 13/4"	--	228 lb 210 lb 204 lb	126 lb 110 lb 135 lb
Floor					
24	Joist to sill or girder, toe nail	4-8d box (21/2" x 0.113"); or 3-8d common (2.5" x 0.131"); or 3-10d box (3" x 0.128"); or 3-3" x 0.131" nails	—	200 lb 186 lb 195 lb 204 lb	
25	Rim joist to top plate, toe nail (roof applications also)	8d box (21/2" x 0.113") 8d common (2.5" x 0.131"); or 10d box (3" x 0.128"); or 3" x 0.131" nails	4" o.c. 6" o.c.	150 plf 124 plf 130 plf 136 plf	
26	Rim joist or blocking to sill plate, toe nail	8d box (2 1/2" x 0.113") 8d common (2.5" x 0.131"); or 10d box (3" x 0.128"); or 3" x 0.131" nails	4" o.c. 6" o.c.	150 plf 124 plf 130 plf 136 plf	
27	1" x 6" subfloor or less to each joist, face nail	3-8d box (21/2" x 0.113"); or 2-8d common (2.5" x 0.131"); or 3-10d box (3" x 0.128") 2 staples 13/4"	--	171 lb 140 lb 136 lb	94.5 lb 73.5 lb 90 lb
28	2" subfloor to joist or girder, blind and face nail	3-16d box (31/2" x 0.135"); or 2-16d common (3.5" x 0.162")	—	264 lb 240 lb	
29	2" planks (plank & beam - floor & roof)	3-16d box (31/2" x 0.135"); or 2-16d common (3.5" x 0.162")	at each bearing	264 lb 240 lb	
30	Built-up girders and beams, 2-inch lumber layers	20d common (4" x 0.192"); or 10d box (3" x 0.128"); or 3" x 0.131" nails And: 2-20d common (4" x 0.192"); or 3-10d box (3" x 0.128"); or 3-3" x 0.131" nails	32" o.c. 24" o.c. Face nail at ends and each splice	108 plf 79 plf 82 plf 288 lb 237 lb 246 lb	
31	Ledger strip supporting joists	4-16d box (31/2" x 0.135"); or	At each	352 lb	

	or rafters	3-16d common (3.5" x 0.162"); or 4-10d box (3" x 0.128"); or 4-3" x 0.131" nails	joist or rafter	360 lb 316 lb 328 lb	
<i>Remainder of Table Unchanged</i>					

In addition to increasing the number of smaller nails to approximate the IBC prescribed nailing for consistency, the number of nails and spacing was considered in view of loads resisted by the prescribed fastening. For example, the stud to plate connection is evaluated against wind loads as follows:

110 mph wind, exposure B (pressure is 29.1 psf per ASCE 7 and Table R301.2(2))

10 ft stud height and stud spacing of 2 ft o.c. (tributary area is 5 ft x 2 ft = 10 ft²)

Connection load is 29.1 psf x 10 ft² = 291 lb

2 -16d box (3.5" x 0.135") design value adjusted for wind = 211 lb < 291 lb (No good)

3 -16d box (3.5" x 0.135") design value adjusted for wind = 317 lb > 291 lb (ok)

Low resistance of IRC minimum nailing relative to loads is found in connection details such as sole plate to joist and top plate to top plate, particularly where loads are based on the upper end of IRC limits (e.g. wind pressures associated with 110 mph Exposure B and 10' stud heights). In many cases, it is observed that the increased strength of the IBC minimum fastening provides a better match to loads than the IRC fastening schedule. However, it is also noted that some minimum nailing requirements are recommended as good practice and are not strictly associated with a standard minimum load or calculation basis.

Cost Impact: The code change will increase the cost of construction.

RB272-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R602.3(1)T #1-RB-PITTS.doc

RB273 – 13

Table R602.3(1)

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

TABLE R602.3(1)
FASTENER SCHEDULE FOR STRUCTURAL MEMBERS

ITEM	DESCRIPTION OF BUILDING MATERIALS	DESCRIPTION OF FASTENER ^{b,c,e}	SPACING OF FASTENERS	
			Edges (inches) ⁱ	Intermediate supports (inches) ^{c,e}
Wood structural panels, subfloor, roof and interior wall sheathing to framing and particleboard wall sheathing to framing (See Table R602.3(3) for wood structural panel exterior wall sheathing to wall framing)				

(Portions of Table not shown remain unchanged)

Reason: This proposal clarifies the code as to the attachment requirements for wood structural panel exterior wall sheathing. The column heading in Table R602.3(1) provides wall attachment requirements for *interior* applications only. The attachment requirements for *exterior* applications vary with the wind loading on the walls and are located in Table R602.3(3). As Table R602.3(3) is relatively new, it can be seen that the proper attachment for *exterior* wood structural panel sheathing application could be easily overlooked, as the *exterior* recommendation used to be a part of this table as well. Note also that the attachment schedule for interior wood structural panel sheathing in Table R602.3(1) is NOT conservative in that for many configurations more nails are required to resist the applied wind loads.

Note that this is not a technical change. It simply clarifies the existing intent of the code by providing proper references.

Cost Impact: The code change will not increase the cost of construction.

RB273-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R602.3(1)T #1-RB-KEITH.doc

RB274 – 13

Table R602.3(1), Table R602.10.3(4)

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

**TABLE R602.3(1)
FASTENER SCHEDULE FOR STRUCTURAL MEMBERS**

ITEM	DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENER ^{a,b,c}	SPACING OF FASTENERS
14	Double top plates <u>plate splice for SDCs A-D₂ with seismic braced wall line spacing < 25' - a, minimum 24-inch offset of end joints, and face nail in lapped area on each side of the splice</u>	8-16d (3-1/2" x 0.135")	-
	Double top plate splice SDCs D ₀ , D ₁ , or D ₂ ; and braced wall line spacing ≥ 25' – a minimum 24" offset of end joints and face nail in lapped area on each side of the splice.	12-16d (3-1/2" x 0.135")	-

(Portions of Table not shown remain unchanged)

**TABLE R602.10.3(4)
SEISMIC ADJUSTMENT FACTORS TO THE REQUIRED LENGTH OF WALL BRACING**

- c. The length-to width ratio for the floor/roof *diaphragm* shall not exceed 3:1. The top plate lap splice nailing shall be a minimum of 12-16d nails on each side of the splice in accordance with Table R602.3(1), item 14.

(Portions of Table not shown remain unchanged)

Reason: The IRC has two separate requirements for double top plate splices. In the existing 2012 IRC Table R602.3(1), Item 14, the requirement for the double top plate splice is a minimum 24 inches offset at the splice between the top and bottom plates, attached with (8) 16d nails. This is in conflict with the requirement in Table R602.10.3(4), Footnote c. This footnote requires the use of (12) 16d nails on each side of the splice. To correct this conflict, this proposal splits Item 14 of R602.3(1) into two separate line items, to differentiate the appropriate number of nails. In addition, the language was cleaned up to indicate that the fasteners are required on each side of the splice location.

A corresponding change is proposed for Footnote c of Table R602.10.3(4) referring the user back to Table R602.3(1) for splice-plate attachment guidance.

We understand that there is a code change proposal being forwarded that will completely rewrite this table of the code. If this proposal is recommended for approval, we will work with the proponents of the rewrite to insure this is incorporated seamlessly.

Cost Impact: The code change proposal will not increase the cost of construction.

RB274-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.3(1)T #2-RB-KEITH.doc

RB275 – 13

Table R602.3(1)

Proponent: Jay Crandell, ARES Consulting, representing Foam Sheathing Committee / American Chemistry Council (Jcrandell@aresconsulting.biz)

Revise as follows:

TABLE R602.3(1)
FASTENER SCHEDULE FOR STRUCTURAL MEMBERS

ITEM	DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENER ^{a, b, c}	SPACING OF FASTENERS
17	Stud to <u>Top or sole plate to stud</u> , toe nail	3-8d (2 ¹ / ₂ " × 0.113") or 2-16d (3 ¹ / ₂ " × 0.135")	— —

(Portions of Table not shown remain unchanged)

Reason: A similar proposal was approved for the 2015 IBC (S267-11/12) to correct an inconsistency in the conventional connection table. The code already provides a toenail connection option for the stud to bottom (sole) plate connection. This code change proposal makes requirements consistent for connection of the stud to the top plate and uses the same wording for consistency of terms. Toe nail connections provide a better uplift load path than end nails, so this option should be provided for both ends of the stud, not just at the bottom end of the stud. End nail connections are already included for both top or sole plate to stud connections in line item 18 of the existing table.

Cost Impact: This code change proposal will not increase the cost of construction.

RB275-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R602.3(1)T-RB-CRANDELL.doc

RB276 – 13

Table R602.3 (1)

Proponent: Brian Johnson, representing self

Revise as follows:

TABLE 602.3(1)
FASTENER SCHEDULE FOR STRUCTURAL MEMBERS

ITEM	DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENER ^{a,b,c}	SPACING OF FASTENERS
Floor			
<u>30</u>	<u>Joist to Band Joist</u>	<u>3 – 16d common (3 ½" x 0.162")</u> <u>4 – 3" x 0.131" nails</u> <u>4 – 3" x 14 gage staples</u>	<u>face nail</u>

(Portions of Table not shown remain unchanged)

Reason: Text is taken directly from item #29 from the IBC prescriptive connection table, Table 2304.9.1; IRC does not list a nailing requirement for this item. The desire is to have IBC 2308 and IRC be essentially similar.

I believe this nailing is typically done by framers, so the addition to the code is merely to aid inspectors, and thus will not increase the cost of construction.

If the tables were split into two different tables at the separation between floor and sheathing nailing, it would not require the entire list every time a new correction is added.

Cost Impact: The code change proposal will not increase the cost of construction.

RB276-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.3(1)T-RB-JOHNSON.doc

RB277 – 13

Table R602.3(1), Table R703.4

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

**TABLE R602.3(1)
FASTNER SCHEDULE FOR STRUCTURAL MEMBERS**

ITEM	DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENER	SPACING OF FASTENERS
32	<u>Water-repellent siding (weighing less than 11 psf) attachment to Wood Structural Panel sheathing, either direct or over foam insulation</u> ^k	Ring shank nail (0.148" min. dia.)	12" o.c. (per 12" of siding width) ^l
		Smooth or screw shank nail (0.148" min. dia.)	3" o.c. (per 12" of siding width) ^l
		Vinyl siding nail (0.120" min. dia.)	3" o.c. (per 12" of siding width) ^l
		#6 screw (0.138" min. dia.)	12" o.c. (per 12" of siding width) ^l
		#8 screw (0.164" min. dia.)	16" o.c. (per 12" of siding width) ^l

(Portions of table not shown remain unchanged)

- k. Fastener length shall be sufficient to penetrate back side of the minimum 7/16" WSP sheathing by at least ¼".
- l. Spacing of fasteners is per 12" of siding width. For other siding widths, multiply SPACING OF FASTENERS above by a factor of 12/s, where s is the siding width in inches. For example, if 8" lap siding, multiply SPACING OF FASTENERS above by 12/8 or 1.5. Fastener spacing shall never be greater than the manufacturer's minimum recommendations.

Revise as follows:

**TABLE R703.4
WEATHER-RESISTANT SIDING ATTACHMENT AND MINIMUM THICKNESS**

SIDING MATERIAL	NOMINAL THICKNESS ^a (inches)	JOINT TREATMENT	WATER-RESISTIVE BARRIER REQUIRED	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS ^{b, c, d}					
				<u>Wood or wood structural panel sheathing into stud</u>	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud	Direct to studs	Number or spacing of fasteners

(Portions of Table not shown remain unchanged)

- d. Nails or staples shall be aluminum, galvanized, or rust-preventative coated and shall be driven into the studs where fiberboard, gypsum or foam plastic sheathing backing is used. Where wood or wood structural panel sheathing is used, fasteners shall be driven into studs unless otherwise permitted to be driven into sheathing in accordance with the siding manufacturer's installation instructions or Table R602.3(1).

Reason:

1. With the elimination of the term "nailable sheathing" in Chapter 7 last cycle, users of Table R703.4 are left without guidance on how to attach siding products to wood structural panel sheathing alone. Additionally, the trend toward the use of non-structural foam sheathing over structural sheathing has led to the development of the proposal for Item 32 above. It provides attachment recommendations for any siding products with an applied weight of less than 11 psf direct to wood structural panel sheathing or through any thicknesses of foam sheathing without having to penetrate the wall framing. This can be essential when attaching siding through thicker foam insulation panels as actually finding the framing with fasteners can be a challenge.

Footnote k requires the fastener used to penetrate the wood structural panel sheathing back side by at least ¼ inch. This will ensure that the cylindrical shank of the fastener is engaged in the wood structural panel, providing the maximum withdrawal capacity. This also provides the user with the maximum flexibility when selecting fasteners. For example, when attaching vinyl siding over 2 inches of foam sheathing into 7/16-inch wood structural panel sheathing, the fastener can be any length greater than $(1/8" + 2" + 7/16" + 1/4") = 2-13/16$ inches, so a 3-inch long nail should work. For a smooth shank nail, a 10d Common nail (3" x 0.148") meets both the length and diameter requirements. If 1 inch of penetration was required in the stud, a nail of $(1/8" + 2" + 7/16" + 1") = 3-9/16$ inches would be required. As such, 20d box nail (4" x 0.148") or some specialty nail would be required.

Footnote I provides the methodology for adjusting the fastener spacing to accommodate lap siding greater or less than 12 inches in width. The adjustment calls for 12" to be divided by the siding width. The fastener spacing provided for in Item 32 is then multiplied by this factor.

The above proposal is based on ASCE 7-10 V_{ult} , <140 miles per hour, maximum 30 ft building height, Exposure C or less.

The table was developed based on the principle of engineering mechanics and confirmed by full-scale wind tunnel tests at the Insurance Institute for Business & Home Safety (IBHS) Research Center in Chester County, South Carolina. The wind tunnel test report is available at http://www.apawood.org/TechnicalPapers/IBHS_WindTunnelTestReport.pdf or by contacting the APA help desk at help@apawood.org.

2. Footnote d to Table R703.4 was changes to add proposed item 32 to the list of information sources available for nailing direct to wood structural panel sheathing.

Cost Impact: This code change proposal will not increase the cost of construction.

RB277-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.3(1)T-RB-KEITH.doc

RB278 – 13

Table R602.3(1)

Proponent: Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee and Virginia Building and Code Officials Association (bajnaic@chesterfield.gov)

Revise as follows:

Table R602.3(1)
FASTENING SCHEDULE FOR STRUCTURAL MEMBERS

ITEM	DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENER a, b, c	SPACING AND LOCATION OF FASTENERS
Roof			
1	Blocking between ceiling joists or rafters to top plate, tee nail	3-8d (2 ½" x 0.113")	<u>at each end, toe nail</u>
2	Ceiling joists to top plate, tee nail	3-8d (2 ½" x 0.113")	<u>per joist, toe nail</u>
3	Ceiling joist not attached to parallel rafter laps over partitions, face nail (see Section R802.3.1, R802.3.2, Table R802.5.1(9))	3-10d (3" x 0.128")	<u>Face nail</u>
4	Ceiling joist attached to parallel rafter (heel joint) (see Section R802.3.1, R802.3.2, Table R802.5.1(9))	Per Table R802.5.1(9)	<u>Face nail</u>
45	Collar tie to rafter, face nail or 1 1/4" x 20 gage ridge strap to rafter	3-10d (3" x 0.128")	<u>Face nail</u>
56	Rafter or roof truss to plate, tee nail	3-16d box nails (3 ½" x 0.135") _i or 3-10d common nails (3" x 0.148")	2 toe nails on one side and 1 toe nail on opposite side of each rafter or truss ⁱ
67	Roof rafters to ridge, valley or hip rafters: <u>or, roof rafter to minimum 2-inch ridge beam</u> tee nail face nail	4-16d (3 ½" x 0.135") 3-16d (3 ½" x 0.135")	<u>Toe nail</u> <u>End nail</u>
Wall			
78	Built-up studs — face nail Stud to stud (not at braced wall panels)	10d (3" x 0.128")	24" o.c. <u>face nail</u>
89	Abutting studs at intersecting wall corners, face nail Stud to stud and abutting studs at intersecting wall corners (at braced wall panels)	16d (3 ½" x 0.135")	12" o.c. <u>face nail</u>
910	Built-up header, two pieces with 1/2" spacer Built-up header (2-inch to 2-inch header)	16d (3 ½" x 0.135")	16" o.c. <u>along each edge face nail</u>
40	Continued header, two pieces	16d (3 ½" x 0.135")	16" o.c. along each edge
11	Continuous header to stud, tee nail	4-8d (2 ½" x 0.113")	<u>Toe nail</u>
42	Double studs, face nail	40d (3" x 0.128")	24" o.c.
4312	Double top plates, face nail Top plate to top plate	10d (3" x 0.128")	24" o.c. <u>face nail</u>
4413	Double top plates, minimum 24-inch offset of end joints, face nail in lapped area Top plate to top plate, at end joints	8-16d (3 ½" x 0.135")	<u>Face nail on each side of end joint (minimum 24" lap splice length each side of end joint)</u>
4514	Sole plate to joist or blocking, face nail Bottom plate to joist, rim joist, band joist or blocking (not at braced wall panels)	16d (3 ½" x 0.135")	16" o.c. <u>face nail</u>

46 15	Sole plate to joist or blocking at braced wall panels Bottom plate to joist, rim joist, band joist or blocking at braced wall panels	3-16d (3½" × 0.135")	16" o.c. <u>face nail</u>	
47 16	Stud to sole bottom plate, toe nail	3-8d (2½" × 0.113") or 2-16d (3½" × 0.135")	<u>Toe nail</u> <u>End nail</u>	
48 17	Top or sole bottom plate to stud, end nail	2-16d (3½" × 0.135")	<u>End nail</u>	
49 18	Top plates, laps at corners and intersections, face nail	2-10d (3" × 0.128")	<u>Face nail</u>	
20 19	1" brace to each stud and plate, face nail	2-8d (2½" × 0.113") 2 staples 1¾"	<u>Face nail</u> --	
21 20	1" × 6" sheathing to each bearing, face nail	2-8d (2½" × 0.113") 2 staples, 1" crown, 16 ga., 1¾" long	<u>Face nail</u> --	
22	1" × 8" sheathing to each bearing, face nail	2-8d (2½" × 0.113") 3 staples 1¾"	-- --	
23 21	Wider than 1" × 8" sheathing to each bearing, <u>face nail 1" × 8" and wider sheathing to each bearing</u>	1"× 8": ____ 2-8d (2½" × 0.113") ____ 3 staples, 1" crown, 16 ga., 1¾" long Wider than 1"× 8": ____ 3-8d (2½" × 0.113") ____ 4 staples, 1" crown, 16 ga., 1¾" long	<u>Face nail</u> --	
Floor				
24 22	Joist to sill, <u>top plate</u> , or girder, toe nail	3-8d (2½" × 0.113")	<u>Toe nail</u>	
25 23	Rim joist to <u>top plate</u> , toe nail (roof applications also) Rim joist, band joist, or blocking to sill or top plate (roof application also)	8d (2½" × 0.113")	6" o.c. <u>toe nail</u>	
26	Rim joist or blocking to <u>sill plate</u> , toe nail	8d (2½" × 0.113")	6" o.c.	
27 24	1" × 6" subfloor or less to each joist, face nail	2-8d (2½" × 0.113") 2 staples, 1" crown, 16 ga., 1¾" long	<u>Face nail</u>	
28 25	2" subfloor to joist or girder, blind and face nail	2-16d (3½" × 0.135")	<u>Blind and face nail</u>	
29 26	2" planks (plank & beam - floor & roof)	2-16d (3½" × 0.135")	at each bearing, <u>face nail</u>	
30 27	Built-up girders and beams, 2-inch lumber layers	10d (3" × 0.128")	Nail each layer as follows: 32" o.c. at top and bottom and staggered. Two nails at ends and at each splice.	
31 28	Ledger strip supporting joists or rafters	3-16d (3½" × 0.135")	At each joist or rafter, <u>face nail</u>	
29	Joist to <u>band joist or rim joist</u>	4-10d (3" × 0.128")	<u>End nail</u>	
30	<u>Bridging to joist</u>	2-10d (3" × 0.128")	<u>Each end, toenail</u>	
ITEM	DESCRIPTION OF BUILDING MATERIALS	DESCRIPTION OF FASTENER ^{b,c,e}	SPACING OF FASTENERS	
			Edges (inches) ⁱ	Intermediate supports ^{c,e} (inches)
Wood structural panels, subfloor, roof and interior wall sheathing to framing and particleboard wall sheathing to framing				
32 31	3/8" - 1/2"	6d common (2" × 0.113") nail (subfloor wall) ^j 8d common (2½" × 0.131") nail (roof) ^f	6	12 ^g

3332 3433	$19/32"$ - $1"$ $1 1/8"$ - $1 1/4"$	8d common nail ($2 1/2" \times 0.131"$) 10d common ($3" \times 0.148"$) nail; or 8d ($2 1/2" \times 0.131"$) deformed nail	6 6	12^g 12
Other wall sheathingⁿ				
3534	$1/2"$ structural cellulosic fiberboard sheathing	$1 1/2"$ galvanized roofing nail, $7/16"$ crown or head diameter , or $1"$ crown staple 16 ga., $1 1/4"$ long	3	6
3635	$25/32"$ structural cellulosic fiberboard sheathing	$1 3/4"$ galvanized roofing nail, $7/16"$ crown head diameter , or $1"$ crown staple 16 ga., $1 1/2"$ long	3	6
3736	$1/2"$ gypsum sheathing ^d	$1 1/2"$ galvanized roofing nail; staple galvanized, $1 1/2"$ long; $1 1/4"$ screws, Type W or S	7	7
3837	$5/8"$ gypsum sheathing ^d	$1 3/4"$ galvanized roofing nail; staple galvanized, $1 5/8"$ long; $1 5/8"$ screws, Type W or S	7	7
Wood structural panels, combination subfloor underlayment to framing				
3938	$3/4"$ and less	6d deformed ($2" \times 0.120"$) nail; or 8d common ($2 1/2" \times 0.131"$) nail	6	12
4039	$7/8"$ - $1"$	8d common ($2 1/2" \times 0.131"$) nail; or 8d deformed ($2 1/2" \times 0.120"$) nail	6	12
4440	$1 1/8"$ - $1 1/4"$	10d common ($3" \times 0.148"$) nail; or 8d deformed ($2 1/2" \times 0.120"$) nail	6	12

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s; 1 Ksi = 6.895 MPa.

- All nails are smooth-common, box or deformed shanks except where otherwise stated. Nails used for framing and sheathing connections shall have minimum average bending yield strengths as shown: 80 ksi for shank diameter of 0.192 inch (20d common nail), 90 ksi for shank diameters larger than 0.142 inch but not larger than 0.177 inch, and 100 ksi for shank diameters of 0.142 inch or less.
- Staples are 16 gage wire and have a minimum 7/16-inch on diameter crown width.
- Nails shall be spaced at not more than 6 inches on center at all supports where spans are 48 inches or greater.
- Four-foot by 8-foot or 4-foot by 9-foot panels shall be applied vertically.
- Spacing of fasteners not included in this table shall be based on Table R602.3(2).
- For regions having basic wind speed of 110 mph or greater, 8d deformed ($2 1/2" \times 0.120"$) nails shall be used for attaching plywood and wood structural panel roof sheathing to framing within minimum 48-inch distance from gable end walls, if mean roof height is more than 25 feet, up to 35 feet maximum.
- For regions having basic wind speed of 100 mph or less, nails for attaching wood structural panel roof sheathing to gable end wall framing shall be spaced 6 inches on center. When basic wind speed is greater than 100 mph, nails for attaching panel roof sheathing to intermediate supports shall be spaced 6 inches on center for minimum 48-inch distance from ridges, eaves and gable end walls; and 4 inches on center to gable end wall framing.
- Gypsum sheathing shall conform to ASTM C 1396 and shall be installed in accordance with GA 253. Fiberboard sheathing shall conform to ASTM C 208.
- Spacing of fasteners on floor sheathing panel edges applies to panel edges supported by framing members and required blocking and at all floor perimeters only. Spacing of fasteners on roof sheathing panel edges applies to panel edges supported by framing members and required blocking. Blocking of roof or floor sheathing panel edges perpendicular to the framing members need not be provided except as required by other provisions of this code. Floor perimeter shall be supported by framing members or solid blocking.
- Where a rafter is fastened to an adjacent parallel ceiling joist in accordance with this schedule, provide two toe nails on one side of the rafter and toe nails from the ceiling joist to top plate in accordance with this schedule. The toe nail on the opposite side of the rafter shall not be required.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

This proposed change is the second part of an effort by the ICC Building Code Action Committee to create a consistent format for the conventional wood frame fastener schedules in the IBC and the IRC. The revised descriptions in this proposed change were approved in the corresponding Table 2304.9.1 of the IBC (see S265). The row descriptions and organization of the IBC table (and now proposed in this IRC table) will be substantially the same, allowing for ease of use.

Complete consistency between the actual fastening specified in the two codes was beyond the scope of the committee work. In the approved IBC table some changes were made in order to provide alternatives currently permitted in the IRC, and to establish some common nail equivalents. No substantial changes are proposed to the IRC fastening, since the existing table generally permits the substitution of box nails for common nails, and the current fastening is well established. Rather, changes have been limited to the ordering, modification, addition, or combining of the fastening descriptions for clarity and consistency.

Cost Impact: The code change proposal will not increase the cost of construction.

RB278-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.3(1)-RB-BAJNAI-BCAC.doc

RB279 – 13

Table R602.3(1)

Proponent: Dennis Pitts, American Wood Council (dpitts@awc.org)

Revise as follows:

TABLE R602.3(1)
FASTENER SCHEDULE FOR STRUCTURAL MEMBERS

ITEM	DESCRIPTION OF BUILDING MATERIALS	DESCRIPTION OF FASTENER ^{b, c, e}	SPACING OF FASTENERS	
			Edges (inches) ⁱ	Intermediate supports ^{c, e} (inches)
Wood structural panels, subfloor, roof and interior wall sheathing to framing and particleboard wall sheathing to framing				
32	3/8" - ½"	6d common (2" × 0.113") nail (subfloor wall) ^j 8d common (2 ½" × 0.131") nail (roof) ^f	6	12 ^g

f. For regions having basic wind speed of 110 mph or greater, 8d deformed (2 1/2" x 0.120) nails shall be used for attaching plywood and wood structural panel roof sheathing to framing within minimum 48-inch distance from gable end walls, if mean roof height is more than 25 feet, up to 35 feet maximum.

(Portions of Table not shown remain unchanged)

Reason: Footnote "f" is proposed for deletion to remove a conflict with wind limitations of R301.2.1.1. The remainder of Table R602.3(1) and footnotes remain unchanged by this proposal.

Currently, R301.2.1.1 states that "The wind provisions of this code shall not apply to the design of buildings where wind design is required in accordance with Figure R301.2(4)B or where the basic wind speed from Figure R301.2(4)A equals or exceeds 110 miles per hour (49 m/s)." In areas where basic wind speed equals or exceeds 110 mph, design is required in accordance with various standards which include the Wood Frame Construction Manual (WFCM). Footnote "f" could potentially cause confusion and misapplication of the prescribed nailing (6" at edges and 12" at intermediate supports) in 110 mph and greater areas. For example, nail spacing for sheathing attachment at the perimeter edge zone could be as small as 4" at edges and 4" at intermediate supports when determined in accordance WFCM Table 3.10 for 140 mph, Exposure B (equivalent to IRC 110 mph, Exposure B).

Cost Impact: The code change will not increase the cost of construction.

RB279-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R602.3(1)T #2-RB-PITTS.docE

RB280 – 13

Table R602.3(2), Chapter 44

Proponent: John Mulder, Intertek Testing Services NA, Inc., representing International Standards Organization Technical Committee 77, *Products in Fibre-reinforced Cement* and Self

Revise as follows:

**TABLE R602.3(2)
ALTERNATE ATTACHMENTS TO TABLE R602.3(1)**

Nominal Material Thickness (inches)	Description of Fasteners and Length (inches)	Spacing of Fasteners	
		Edges (inches)	Body of panel (inches)
Floor underlayment; plywood-hardboard-particleboard ^f -fiber-cement ^h			
Fiber-cement			
1/4	3d, corrosion-resistant, ring shank nails (finished flooring other than tile)	3	6
	Staple 18 ga., 7/8 long, 1/4 crown (finished flooring other than tile)	3	6
	1 1/4 long x .121 shank x .375 head diameter corrosion-resistant (galvanized or stainless steel) roofing nails (for tile finish)	8	8
	1 1/4 long, No. 8 x .375 head diameter, ribbed wafer-head screws (for tile finish)	8	8

h. Fiber-cement underlayment shall conform to ASTM C1288 or ISO 8336, Category C

Add new standard to Chapter 44 as follows:

ISO

ISO 8336 – Fibre-Cement Flat Sheets – Products Specification and Test Methods

Reason: The current table clearly limits the allowable type of permitted underlayment to wood panel-type product. The table as currently worded restrains trade by prohibiting the use of another approved type of underlayment. The inclusion of a reference to “fiber-cement” clarifies an alternative recognized product permitted in this type of Code-compliant subfloor/underlayment application (see ICC-ES ESR-1381 [reference Section 4.3], ESR-2280 [reference Sections 4.2.2.1 and 4.2.3.1 and Table 3], and ESR-2292 [reference Section 4.2]).

IBC Table 722.6.2(4) has, as a result of the Group A IBC Code Hearings, been revised to recognize fiber-cement underlayment in subfloor/underlayment combination. The addition of the new referenced ISO standard and “product category” were also approved during the Group A IBC Code Hearings. This proposed revision brings the two building codes (IBC & IRC) and the applicable code sections and standards references into general alignment by allowing fiber-cement underlayment in subfloor/underlayment combination applications.

Performance requirements of ISO 8336, *Fibre-cement flat sheets – Product specification and test methods*, have been harmonized with the performance requirements of ASTM C1288, *Standard Specification for Discrete Non-Asbestos Fiber-Cement Interior Substrate Sheets*. Fiber-cement producers in Mexico, Central and South America, Europe, Asia, Australia and New Zealand currently manufacture and test their fiber-cement products for compliance with ISO 8336. The inclusion of this Standard reference in the IRC will permit manufacturers worldwide to demonstrate product compliance to IRC requirements. The addition of a reference to ISO 8336 in the Code removes a barrier to trade.

Cost Impact: The code change proposal will not increase the cost of construction because the proposed addition of fiber-cement underlayment to the table footnote only provides for the choice and use of a type of underlayment currently used in this type of application and permitted in ICC-ES Evaluation Service Reports.

Analysis: A review of the standard proposed for inclusion in the code, ISO 8336 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

RB280-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R602.3(2)-T-RB-MULDER.doc

RB281 – 13

Table R602.3(5)

Proponent: Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee and Virginia Building and Code Officials Association

Revise as follows:

TABLE R602.3(5) SIZE, HEIGHT AND SPACING OF WOOD STUDS^a

- a. Listed heights are distances between points of lateral support placed perpendicular to the plane of the wall. Increases in unsupported height are permitted where justified by analysis in compliance with exception 2 of Section R602.3.1 or designed in accordance with accepted engineering practice.

(Portions of Table not shown remain unchanged)

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

The BCAC discussed what was inferred by "...where justified by analysis." meant. The conclusion was that this footnote should say that stud wall can be increased above 10 feet when the wall is compliant with exception 2 of Section R602.3.1 – in which case an engineered solution is not required.

Cost Impact: The code change proposal will not increase the cost of construction.

RB281-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.3(5)-RB-BAJNAI-BCAC.doc

RB282 – 13

Table R602.3.1

Proponent: James Bela, Oregon Earthquake Awareness

Revise as follows:

TABLE R602.3.1
MAXIMUM ALLOWABLE LENGTH OF WOOD WALL STUDS EXPOSED TO WIND SPEEDS OF 100
MPH OR LESS
IN SEISMIC DESIGN CATEGORIES A, B, C ^{b,c}, D₀ ^{b,c}, D₁ ^{b,c}, and D₂ ^{b,c}

- c. Dimension Lumber grades for wood wall studs shall be minimum Construction grade lumber. Utility, standard, stud and No. 3 grade lumber of any species are not permitted.

(Portions of Table not shown remain unchanged)

Reason: (a) Wood is an orthotropic material; and it therefore exhibits “unique and independent material properties” in 3 different orthogonal directions. Trees, unfortunately, also produce naturally occurring but “strength reducing characteristics” in sawn lumber: such as knots, shakes, and splits. Therefore wall studs at the MAXIMUM ALLOWABLE LENGTH limits will have their performances, in actuality, determined by this combination or mixture of “clear wood and strength reducing characteristics.”

[<http://bssc.nibs.org/client/assets/files/bssc/Topic13-SeismicDesignofWoodStructuresNotes.pdf>]

(b) All of the SEISMIC DESIGN CATEGORIES (C, D₀, D₁ and D₂) are at risk to experience damaging intensities of earthquake shaking; and they are not, as too often is incorrectly assumed, *guarantees* of “low - to moderate - to high” earthquake loading (comparable to other external loadings that one might anticipate and design for – such as snow load. See IRC-14-3 FIG. R301.2(2) SEISMIC DESIGN CATEGORIES SITE CLASS D.doc for a full discussion on the systemic errors and fundamental flaws in designating SEISMIC DESIGN CATEGORIES under the USGS National Seismic Hazard Maps (as incorporated now into ASCE 7-10).

Since earthquake damage results from multiple factors: Strength of shaking, Length of shaking, Type of soil, Type of building materials, and Type of building “lateral force resisting system” – WOOD WALL STUDS should exhibit the same lumber grade.

See Buildings and earthquakes—Which stands? Which falls?

http://www.iris.edu/hq/files/programs/education_and_outreach/retrm/tm_100112_haiti/BuildingsInEQs_2.pdf

(c) Finally, since the lower SEISMIC DESIGN CATEGORIES downgrade the expected earthquake effects; they permit fewer lateral force resisting elements in walls (and also allow brittle elements (gypsum sheathing) rather than ductile elements (nailed wood shear walls: alternately referred to as “braced wall panels” in the IRC).

Summary: Above 10 ft in height, where we are beginning to push the limits of a “prescriptive code,” WOOD WALL STUDS should all exhibit the same engineering properties of “minimum construction grade lumber” – in order to ensure both adequate and reasonable earthquake safety performance.

STUD *LIGHT* . . . is no match for earthquakes!

See Graphic: Damage to wood stud wall – 1994 Northridge EQ



See also: IRC-14-3 FIG. R301.2(2) SEISMIC DESIGN CATEGORIES SITE CLASS D.doc

Cost Impact: The code change proposal will not increase the cost of construction.

RB282-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.3.1T-RB-BELA.doc

RB283 – 13

R602.3.1, Table R602.3.1

Proponent: Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee and Virginia Building and Code Officials Association (bajnaic@chesterfield.gov)

Revise as follows:

R602.3.1 Stud size, height and spacing. The size, height and spacing of studs shall be in accordance with Table R602.3(5).

Exceptions:

1. Utility grade studs shall not be spaced more than 16 inches (406 mm) on center, shall not support more than a roof and ceiling, and shall not exceed 8 feet (2438 mm) in height for exterior walls and load-bearing walls or 10 feet (3048 mm) for interior nonload-bearing walls.
2. ~~Studs more than 10 feet in height which are in accordance with Table R602.3.1.~~
Where snow loads do not exceed 25 pounds per square foot, walls exposed to wind loads of 100 mph or less shall be permitted over 12 feet tall for either supporting a roof load with not more than 6' of tributary length, or for a gable end wall. The studs shall be a minimum 2x6 at 16 inches on center with a maximum height of 18 feet or 2x6 at 12 inches on center with a maximum height of 20 feet. Openings shall be permitted with jack studs supporting the header in accordance with Section R602.7 and double king studs outboard of the jacks on each side of the opening. If any portion of the two-story wall is required to be a qualified braced wall panel to achieve compliance with Section R602.10.2 for either floor, then the wall shall be designed by a registered design professional in accordance with the International Building Code.

TABLE R602.3.1

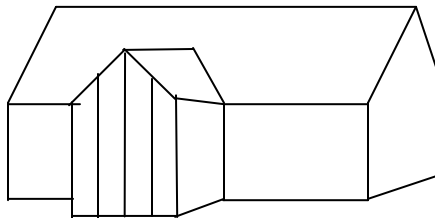
MAXIMUM ALLOWABLE LENGTH OF WOOD STUDS EXPOSE TO WIND SPEEDS OF 100 MPH OR LESS IN SEISMIC DESIGN CATEGORIES A, B, C, D₀, D₁, and D₂^{b,e}

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

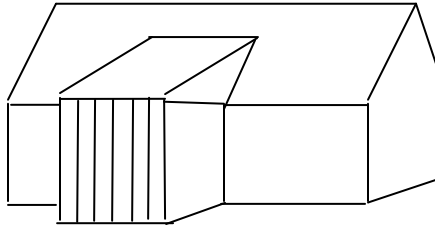
Table R602.3.1 has been the source of a lot of confusion. The footnote b is seldom read or understood. This change is submitted to:

1. Eliminate the table - the source of the confusion
2. Provide clarification as to where it can be applied (see the three options below)
3. Write in code language the requirements for when tall studs can be used.
4. To say that you cannot use these tall studs where the wall is an integral part of the wall bracing system.

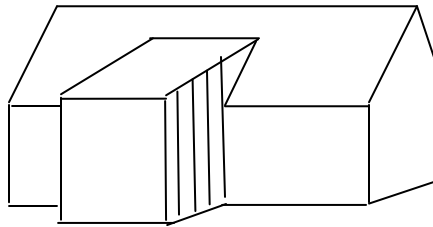
Tall studs could be used for two-story gable ended wall supporting nothing more than self weight.



Tall studs could be used for a two-story projection where the roof framing runs perpendicular to the wall so long as the overbuilt roof has a trib length of 6' or less



Tall studs could be used for a two-story projection where the roof framing runs parallel to the wall such that it was supporting nothing more than self weight



Cost Impact: The code change proposal will not increase the cost of construction.

RB283-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.3.1-RB-BAJNAI-BCAC.doc

RB284 – 13

R602.3.2

Proponent: Edward L. Keith, P.E., APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

R602.3.2 Top plate. Wood stud walls shall be capped with a double top plate installed to provide overlapping at corners and intersections with bearing partitions. End joints in top plates shall be offset at least 24 inches (610 mm). Joints in plates need not occur over studs. Plates shall be not less than 2-inches (51 mm) nominal thickness and have a width at least equal to the width of the studs.

Exception: ~~A single top plate may be installed in stud walls, provided the plate is adequately tied at joints, corners and intersecting walls by a minimum 3-inch by 6-inch by a 0.036-inch-thick (76 mm by 152 mm by 0.914 mm) galvanized steel plate that is nailed to each wall or segment of wall by six 8d nails on each side provided the rafters or joists are centered over the studs with a tolerance of no more than 1 inch (25 mm). The top plate may be omitted over lintels that are adequately tied to adjacent wall sections with steel plates or equivalent as previously described.~~

Exception: A single top plate used as an alternative to a double top plate shall comply with the following:

1. The top plate shall be tied at corners an intersecting walls with a 3-inch by 6-inch by 0.036-inch-thick (76 mm by 152 mm by .0914 mm) galvanized steel plate or equivalent.
2. The steel plate tie at corners and intersecting walls shall be natiled to each wall or segment of wall with six 8d (2-1/2" x 0.113") nails on each side of the joint.
3. Splices in the top plate at butt joints shall be tied with a 3-inch by 12-inch by 0.036-inch-thick (76 mm by 304 mm by 0.914 mm) galvanized steel plate or equivalent.
4. The steel plate tie at butt joints shall be nailed to each segment of wall with twelve 8d (2-1/2" x 0.113") nails on each side of the joint.
5. The rafters or joists shall be centered over the studs with a tolerance of not more than 1-inch (25 mm).
6. Omission of the top plate is permitted over headers where the headers are adequately tied to adjacent wall sections in accordance with Items 1 and 2 for header connections at corners and intersections, and Items 3 and 4 for header connections made along a single wall line.

Reason: This is a companion item to S284-12/13 adopted in Portland in the October Final Action Hearing.

Item 14 of the 2012 IRC Table R602.3(1) establishes the minimum capacity required to insure an adequate tension splice in top plates. Aside from simply providing continuity between wall segments, the top-plate splice also acts as a tension tie (often called a collector or drag strut) to distribute the roof and floor shear loads into the bracing elements often spaced as much as 20 feet apart. Assuming spruce-pine-fir top plates the Table R602.3(1), item 14 requires a top-plate splice with eight 16d box nails on each side of the splice. In accordance with the NDS Table 11N, assuming SPF plates and a duration of load of 1.6 for lateral loads, the design capacity of the item 14 connection is (88 lb/nail x 8 nails x 1.6 dol =) 1126 lbs.

While sufficient for intersections and corners the *3-inch by 6-inch by a 0.036-inch-thick (76 mm by 152 mm by 0.914 mm) galvanized steel plate that is nailed to each wall or segment of wall by six 8d nails on each side...* only provides about 600 lbf tension capacity (NDS Table 11P, SPF framing, box nails: 60 lbf/nail x 6 nails x 1.6 dol = 576 lbf). This is about ½ of what is requires in Table R602.3(1), item 14. As such, the splice plate requirement for in-line butt joints in single top plate systems should be twice what is currently required:

"...at least the equivalent of 3-inch by 12-inch by a 0.036-inch-thick (76 mm by 304 mm by 0.914 mm) galvanized steel plate that is nailed to each wall or segment of wall by twelve 8d (2-1.2" x 0.113") nails on each side..."

As a matter of clarification the type of nail to be used was described as only the penny-weight was specified. This is in keeping with current code style guidelines. I also specified which splice type was appropriate for headers when present. As these are neither corners nor intersections, it is clear that the butt-joint splice was the appropriate reference.

In addition, the reference to "a minimum" was deleted in favor of "at least the equivalent of" as it seemed more appropriate. "Lintels" was also changed in favor of "headers", as lintels is a term more often associated with concrete construction where headers is more commonly used in wood construction.

Cost Impact: The code change proposal will not increase the cost of construction.

RB284-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.3.2-RB-KEITH.doc

RB285 – 13

Figure R602.7.2

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

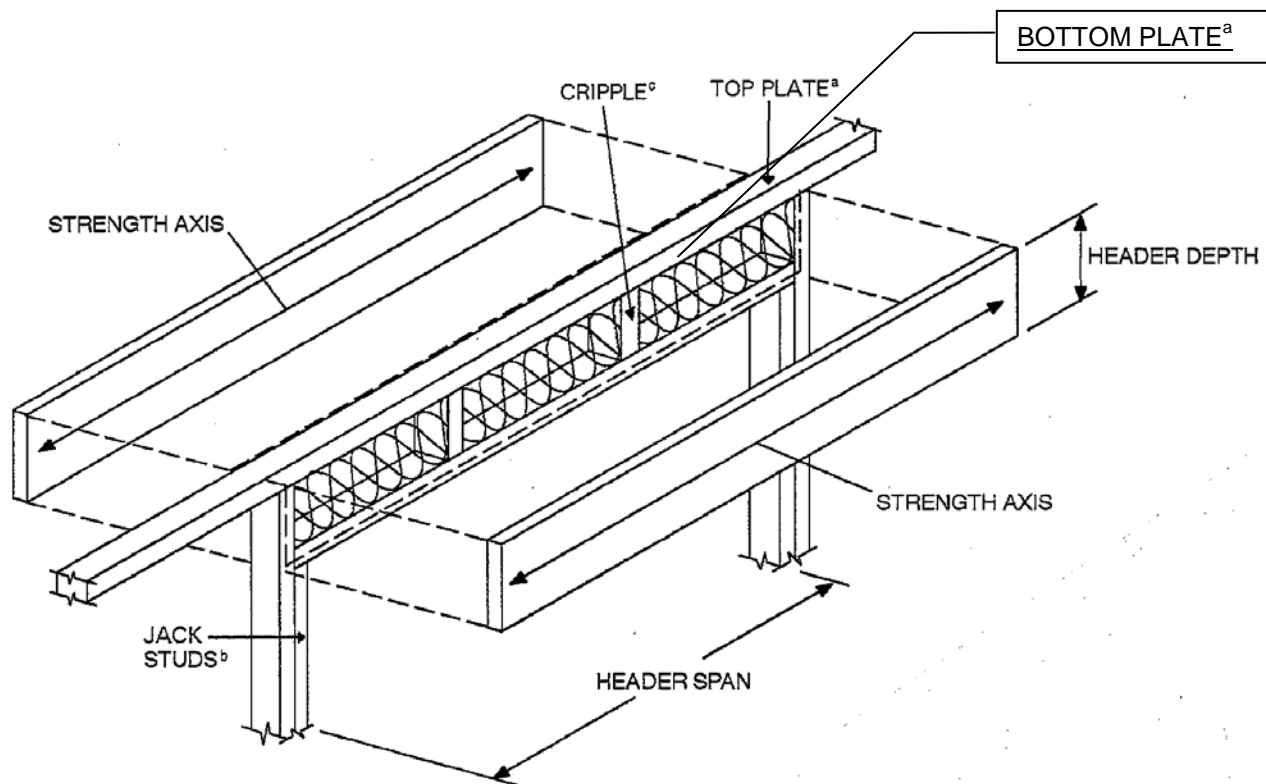


FIGURE R602.7.2
TYPICAL WOOD STRUCTURAL PANEL BOX HEADER CONSTRUCTION

- a. The top and bottom plates shall be continuous over at header location.

(Portions of Figure not shown remain unchanged)

Reason: This proposal requires that the bottom plate, as defined by part I of this proposal, be continuous at the header locations as well as the top plate. The bottom plate acts as a tension cord in a box beam and it is important that it be continuous. In fact, it is more important for gravity loads that the bottom plate to be continuous than it is for top plate continuity. This proposal requires both important elements of the box beam to be continuous so that under wind uplift loads the top chord will be continuous as well.

Cost Impact: The code change proposal will not increase the cost of construction.

RB285-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

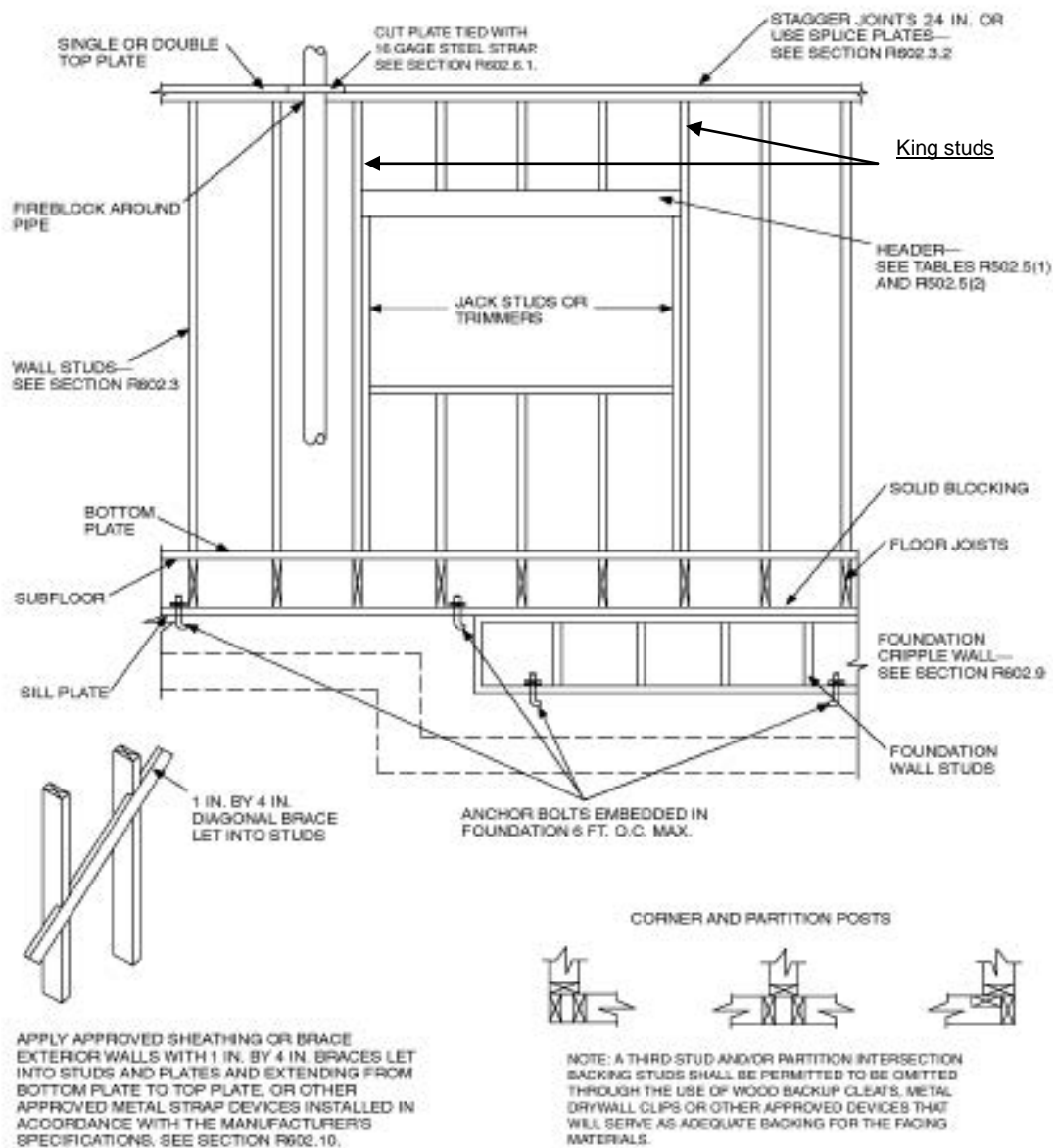
R602.7.2F-RB-KEITH.doc

RB286 – 13

Figure R602.3(2), R602.7.4 (New)

Proponent: Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee and Virginia Building and Code Officials Association (bajnaic@chesterfield.gov)

Revise as follows:



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

FIGURE R602.3(2)
FRAMING DETAILS

602.7.4 Supports for headers. Headers shall be supported on each end with one or more jack studs in accordance with Table R502.5(1) or Table R502.5(2). A king stud shall be adjacent to the jack stud on each end of the header and nailed at each end of the header with 4-16d nails.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

The code is silent about how headers should be supported to prevent header rotation. The king studs should be used to stabilize the header with nails on each end.

Cost Impact: The code change proposal will not increase the cost of construction.

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Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.7.4 (NEW)-RB-BAJNAI-BCAC.doc

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R602.7, R602.7.1, Table R602.7.1, Table R602.7.1(2) (NEW)

Proponent: Jay Crandell, P.E., ARES Consulting, representing self (jcrandell@aresconsulting.biz)

Revise as follows:

R602.7 Headers. For header spans see Tables R502.5(1), R502.5(2), and R602.7.1(1).

R602.7.1 Single member headers. Single headers shall be framed with a single flat 2-inch-nominal (51 mm) member or wall plate not less in width than the wall studs on the top and bottom of the header in accordance with Figures R602.7.1(1) and R602.7.1(2). The number of king studs required at each end of a single member header shall comply with Table R602.7.1(2). The total number of king studs provided at both ends of a single member header need not exceed the number of layout studs displaced by the wall opening.

TABLE R602.7.1(1)
SPANS FOR MINIMUM No.2 GRADE SINGLE HEADER^{a, b, c, f}

SINGLE HEADERS SUPPORTING	SIZE	WOOD SPECIES	GROUND SNOW LOAD (psf)								
			≤ 20 ^d			30			50		
			Building Width (feet) ^e								
			20	28	36	20	28	36	20	28	36
Roof and ceiling	2 × 8	Spruce-Pine-Fir Hem-Fir <u>or Southern Pine</u> Douglas-Fir <u>or Southern Pine</u>	4-10	4-2	3-8	4-3	3-8	3-3	3-7	3-0	2-8
			5-1	4-4	3-10	4-6	3-10	3-5	3-9	3-2	2-10
			5-3	4-6	4-0	4-7	3-11	3-6	3-10	3-3	2-11
	2 × 10	Spruce-Pine-Fir <u>or Southern Pine</u> Hem-Fir Douglas-Fir <u>or Southern Pine</u>	6-2	5-3	4-8	5-5	4-8	4-2	4-6	3-11	3-1
			6-6	5-6	4-11	5-8	4-11	4-4	4-9	4-1	3-7
			6-8	5-8	5-1	5-10	5-0	4-6	4-11	4-2	3-9
	2 × 12	Spruce-Pine-Fir <u>or Southern Pine</u> Hem-Fir Douglas-Fir <u>or Southern Pine</u>	7-6	6-5	5-9	6-7	5-8	4-5	5-4	3-11	3-1
			7-10	6-9	6-0	6-11	5-11	5-3	5-9	4-8	3-8
			8-1	6-11	6-2	7-2	6-1	5-5	5-11	5-1	4-6
Roof, ceiling and one center-bearing floor	2 × 8	Spruce-Pine-Fir Hem-Fir <u>or Southern Pine</u> Douglas-Fir <u>or Southern Pine</u>	3-10	3-3	2-11	3-9	3-3	2-11	3-5	2-11	2-7
			4-0	3-5	3-1	3-11	3-5	3-0	3-7	3-0	2-8
			4-1	3-7	3-2	4-1	3-6	3-1	3-8	3-2	2-9
	2 × 10	Spruce-Pine-Fir <u>or Southern Pine</u> Hem-Fir Douglas-Fir <u>or Southern Pine</u>	4-11	4-2	3-8	4-10	4-1	3-6	4-4	3-7	2-10
			5-1	4-5	3-11	5-0	4-4	3-10	4-6	3-11	3-4
			5-3	4-6	4-1	5-2	4-5	4-0	4-8	4-0	3-7

	2 x 12	Spruce-Pine-Fir or Southern Pine Hem-Fir Douglas-Fir or Southern Pine	5-8 5-11 6-1	4-2 4-11 5-3	3-4 3-11 4-8	5-5 5-10 6-0	4-0 4-9 5-2	3-6 4-2 4-10	4-9 5-5 5-7	3-6 4-2 4-10	2-10 3-4 4-3
Roof, ceiling and one clear span floor	2 x 8	Spruce-Pine-Fir Hem-Fir or Southern Pine Douglas-Fir or Southern Pine	3-5 3-7 3-8	2-11 3-1 3-2	2-7 2-9 2-10	3-4 3-6 3-7	2-11 3-0 3-1	2-7 2-8 2-9	3-3 3-5 3-6	2-10 2-11 3-0	2-6 2-7 2-9
	2 x 10	Spruce-Pine-Fir or Southern Pine Hem-Fir Douglas-Fir or Southern Pine	4-4 4-7 4-8	3-7 3-11 4-0	2-10 3-5 3-7	4-3 4-6 4-7	3-6 3-10 4-0	2-9 3-3 3-6	4-2 4-4 4-6	3-4 3-9 3-10	2-7 3-1 3-5
	2 x 12	Spruce-Pine-Fir or Southern Pine Hem-Fir Douglas-Fir or Southern Pine	4-11 5-6 5-8	3-7 4-3 4-11	2-10 3-5 4-4	4-9 5-6 5-7	3-6 4-2 4-10	2-9 3-3 4-3	4-6 5-4 5-6	3-4 3-11 4-8	2-7 3-1 4-2

For SI: 1 inch=25.4 mm, 1 pound per square foot = 0.0479 kPa.

a. Spans are given in feet and inches.

b. Table is based on a maximum roof-ceiling dead load of 15 psf.

c. The header is permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header in lieu of the required jack stud.

d. The 20 psf ground snow load condition shall apply only when the roof pitch is 9:12 or greater. In conditions where the ground snow load is 30 psf or less and the roof pitch is less than 9:12, use the 30 psf ground snow load condition.

e. Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.

f. The header shall bear on a minimum of one jack stud at each end.

TABLE R602.7.1(2)
NUMBER OF KING STUDS REQUIRED AT EACH END OF A SINGLE MEMBER HEADER^a

STUD SIZE	OPENING WIDTH (FEET)	BASIC WIND SPEED (MPH) & EXPOSURE CONDITION																	
		85/B			90/B			100/B, 85/C			110/B, 90/C, 85/D			120/B, 100/C, 90/D			130/B, 110/C, 100/D		
		WALL HEIGHT (FEET)																	
		8	9	10	8	9	10	8	9	10	8	9	10	8	9	10	8	9	10
2x4	2	1	1	2	1	1	2	1	2	2	2	2	2	2	3	2	2	3	
	3	1	2	2	1	2	2	2	2	2	2	2	3	2	3	3	2	3	4
	4	1	2	2	2	2	2	2	2	3	2	3	3	2	3	4	3	3	4
	6	2	2	3	2	2	3	2	3	3	3	3	4	3	4	5	4	4	5
	8	2	3	3	2	3	3	3	3	4	3	4	5	4	5	6	4	5	7
	10	2	3	4	3	3	4	3	4	5	4	5	6	4	6	7	5	6	8
2x6	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2	2
	4	1	1	1	1	1	1	1	1	1	1	1	2	1	2	2	2	2	2
	6	1	1	1	1	1	2	1	2	2	1	2	2	2	2	2	2	2	3
	8	1	1	2	1	2	2	2	2	2	2	2	2	2	2	3	2	3	3
	10	1	2	2	1	2	2	2	2	2	2	2	3	2	3	3	3	3	4

For SI: 1 foot = 305 mm, 1 pound per square foot = 0.0479 kPa, 1 mile per hour = 1.609 km/h.

a. Table is based on minimum Stud grade Spruce-Pine-Fir (South) lumber.

Reason: This proposal provides king stud requirements for wall openings spanned by single member headers to ensure structural integrity to compensate for removal of full-height layout studs over the span of the wall opening. The number of king studs required

is based on wind loading only because the jack stud required with single member headers supports gravity loading (as is the case with the header requirements in Chapter 5). This proposal is in response to discussions with a concerned code official subsequent to approval of the single member header provisions last code cycle. The changes to renumbered Table R602.7.1(1) are intended to align with Southern Pine design value changes forthcoming for the respective single member header sizes.

Cost Impact: The code change proposal will increase the cost of construction.

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Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.7-RB-CRANDELL.doc

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R602.7, R602.7.2 (NEW), Table R602.7.2(1) (NEW), Table R602.7.2(2) (NEW), Table R602.7.3(1) (NEW), R602.7.3(2) (NEW), Figure R602.7.2 (NEW)

Proponent: Vladimir Kochkin, NAHB Research Center, Inc. (vkochkin@nahbrc.org), Jay H. Crandell, P.E., ARES Consulting (jcrandell@aresconsulting.biz)

Revise as follows:

R602.7 Headers. For header spans and number of jack studs required, see Tables R502.5(1), R502.5(2), and. For single member header requirements, refer to Section R602.7.1. For rim board header requirements, refer to Section R602.7.2.

R602.7.2 Rim Board Headers. Rim board header size, material, and span shall be in accordance with Tables R602.7.2(1) and R602.7.2(2). Rim board headers shall be constructed in accordance with Figure R602.7.2 and shall be supported at each end by king studs. The number of king studs required to support each end of a rim board header shall comply with greater number from Table R602.7.3(1) and Table R602.7.3(2). For 2x6 walls with a single top plate and for 2x4 walls, the number of king studs shall not be less than two at each end of a two-ply rim board header. The total number of king studs provided at both ends of the rim board header need not exceed the number of layout studs displaced by the wall opening. Each ply of built-up king studs shall be face-nailed to the adjacent ply with 2-10d (3" x 0.128") nails at 16 inches on center. Rim board headers supporting concentrated loads, such as reactions from floor or roof girders or wall opening framing above the rim board header, shall be designed.

TABLE R602.7.2(1)
MAXIMUM ALLOWABLE SPANS FOR SINGLE-PLY RIM BOARD HEADERS^{a,b}

RIM HEADERS SUPPORTING:	SIZE	WOOD SPECIES OR TYPE ^d	GROUND SNOW LOAD (psf)								
			≤ 20 ^e			30			50		
			Building Width (feet)								
			20 ^f	28	36	20	28	36	20	28	36
Roof, ceiling, and wall	2x10	SPF-S, SYP	5-7	4-11	4-5	5-1	4-5	3-8	4-3	3-3	2-7
		HF	5-11	5-2	4-8	5-3	4-7	4-2	4-6	3-11	3-2
		DF	6-1	5-4	4-9	5-5	4-9	4-3	4-8	4-0	3-7
	2x12	SPF-S, SYP	6-10	5-8	4-7	5-11	4-6	3-8	4-3	3-3	2-7
		HF	7-2	6-3	5-6	6-5	5-5	4-5	5-2	3-11	3-2
		DF	7-4	6-5	5-10	6-7	5-9	5-2	5-8	4-11	4-4
	1-1/8"x 9-1/2" 1-1/8"x 11-7/8"	Engr. Wood	4-5	3-10	3-6	3-11	3-5	3-1	3-4	2-11	2-7
			5-6	4-10	4-4	4-11	4-4	3-11	4-2	3-8	3-2
Roof, ceiling, wall, and one center- bearing floor ^e	2x10	SPF-S, SYP	4-11	4-1	3-3	4-10	3-11	3-2	4-4	3-2	2-6
		HF	5-1	4-5	3-11	5-0	4-4	3-9	4-6	3-10	3-1
		DF	5-3	4-6	4-0	5-2	4-5	4-0	4-8	4-0	3-7
	2x12	SPF-S, SYP	5-6	4-1	3-3	5-4	3-11	3-2	4-4	3-2	2-6
		HF	6-3	5-0	3-11	6-1	4-9	3-9	5-3	3-10	3-1
		DF	6-5	5-6	4-11	6-3	5-5	4-10	5-8	4-10	4-3
	1-1/8"x 9-1/2" 1-1/8"x 11-7/8"	Engr. Wood	3-10	3-3	2-11	3-9	3-3	2-11	3-5	2-11	2-6
			4-9	4-1	3-8	4-8	4-0	3-7	4-3	3-7	3-1
Roof, ceiling, wall and one clear span floor ^c	2x10	SPF-S, SYP	4-4	3-3	2-7	4-3	3-2	2-6	4-0	2-11	2-4
		HF	4-7	3-11	3-1	4-6	3-9	3-0	4-4	3-7	2-10
		DF	4-8	4-0	3-7	4-7	4-0	3-6	4-6	3-10	3-5
	2x12	SPF-S, SYP	4-5	3-3	2-7	4-3	3-2	2-6	4-0	2-11	2-4
		HF	5-4	3-11	3-1	5-2	3-9	3-0	4-10	3-7	2-10
		DF	5-8	4-11	4-4	5-7	4-10	4-2	5-6	4-8	3-11
	1-1/8"x 9-1/2" 1-1/8"x 11-7/8"	Engr. Wood	3-5	2-11	2-7	3-4	2-11	2-7	3-3	2-10	2-6
			4-3	3-8	3-2	4-2	3-7	3-1	4-1	3-6	2-11
1-1/4"x 9-1/2" 1-1/4"x 11-7/8"	Engr. Wood	4-11	4-3	3-9	4-10	4-2	3-8	4-9	4-1	3-7	
		5-10	5-0	4-4	5-9	4-11	4-2	5-7	4-10	3-11	

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 pound per square foot = 0.0479 kPa.

- Spans are given in feet and inches.
- Table is based on a maximum roof-ceiling dead load of 15 psf, floor dead load of 10 psf, and floor live load of 40 psf.
- Floor joists framing into rim header shall be attached to the rim header using joist hangers sized to support the joist bearing load or an approved design.
- Solid sawn wood rim members shall be minimum No. 2 grade. Engineered wood rim members shall meet or exceed the following material design properties and comply with applicable usage limitations in accordance with the manufacturer's approved data:
1-1/8" members: $F_b=600$ psi, $F_v=270$ psi, $E=550,000$ psi, $F_{c,perp}=550$ psi
1-1/4" members: $F_b=1,130$ psi, $F_v=355$ psi, $E=660,750$ psi, $F_{c,perp}=680$ psi
- The 20 psf ground snow load condition shall apply only when the roof pitch is 9:12 or greater. In conditions where the ground snow load is 30 psf or less and the roof pitch is less than 9:12, use the 30 psf ground snow load condition.
- To determine the allowable span for rim board headers parallel to floor joists and supporting non-load bearing walls above, use table column for 20 psf ground snow load and 20 ft building width with "roof, ceiling, and wall" support condition.

TABLE R602.7.2(2)
MAXIMUM ALLOWABLE SPANS FOR TWO-PLY RIM BOARD HEADERS^{a,b}

RIM HEADERS SUPPORTING:	SIZE	WOOD SPECIES OR TYPE ^d	GROUND SNOW LOAD (psf)								
			≤ 20 ^e			30			50		
			Building Width (feet)								
			20 ^f	28	36	20	28	36	20	28	36
Roof, ceiling, and wall	2-2x10	see Table R502.5(1)									
	2-2x12	see Table R502.5(1)									
	(2)1-1/8"x 9-1/2"	Engr. Wood	6-3	5-5	4-11	5-7	4-11	4-5	4-9	4-2	3-8
	(2)1-1/8"x 11-7/8"		7-9	6-10	6-2	7-0	6-1	5-6	5-11	5-2	4-7
	(2)1-1/4"x 9-	Engr.	8-4	7-8	7-1	7-9	7-1	6-4	6-11	6-0	5-4

	<u>1/2"</u> <u>(2)1-1/4"x 11-</u> <u>7/8"</u>	<u>Wood</u>	<u>10-5</u>	<u>9-5</u>	<u>8-6</u>	<u>9-8</u>	<u>8-5</u>	<u>7-7</u>	<u>8-2</u>	<u>7-1</u>	<u>6-5</u>
<u>Roof, ceiling,</u> <u>wall, and one</u> <u>center-bearing</u> <u>floor^c</u>	<u>2-2x10</u>	<u>see Table R502.5(1)</u>									
	<u>2-2x12</u>	<u>see Table R502.5(1)</u>									
	<u>(2)1-1/8"x 9-</u> <u>1/2"</u> <u>(2)1-1/8"x 11-</u> <u>7/8"</u>	<u>Engr.</u> <u>Wood</u>	<u>5-5</u> <u>6-9</u>	<u>4-8</u> <u>5-10</u>	<u>4-2</u> <u>5-2</u>	<u>5-4</u> <u>6-8</u>	<u>4-7</u> <u>5-8</u>	<u>4-1</u> <u>5-1</u>	<u>4-9</u> <u>6-0</u>	<u>4-1</u> <u>5-1</u>	<u>3-8</u> <u>4-7</u>
	<u>(2)1-1/4"x 9-</u> <u>1/2"</u> <u>(2)1-1/4"x 11-</u> <u>7/8"</u>	<u>Engr.</u> <u>Wood</u>	<u>7-7</u> <u>9-4</u>	<u>6-9</u> <u>8-0</u>	<u>6-0</u> <u>7-2</u>	<u>7-6</u> <u>9-2</u>	<u>6-7</u> <u>7-10</u>	<u>5-11</u> <u>7-0</u>	<u>6-11</u> <u>8-3</u>	<u>5-11</u> <u>7-1</u>	<u>5-3</u> <u>6-3</u>
<u>Roof, ceiling,</u> <u>wall and one</u> <u>clear span</u> <u>floor^c</u>	<u>2-2x10</u>	<u>see Table R502.5(1)</u>									
	<u>2-2x12</u>	<u>see Table R502.5(1)</u>									
	<u>(2)1-1/8"x 9-</u> <u>1/2"</u> <u>(2)1-1/8"x 11-</u> <u>7/8"</u>	<u>Engr.</u> <u>Wood</u>	<u>4-10</u> <u>6-0</u>	<u>4-2</u> <u>5-9</u>	<u>3-8</u> <u>4-7</u>	<u>4-9</u> <u>5-11</u>	<u>4-1</u> <u>5-1</u>	<u>3-7</u> <u>4-6</u>	<u>4-7</u> <u>5-9</u>	<u>3-11</u> <u>4-11</u>	<u>3-6</u> <u>4-4</u>
	<u>(2)1-1/4"x 9-</u> <u>1/2"</u> <u>(2)1-1/4"x 11-</u> <u>7/8"</u>	<u>Engr.</u> <u>Wood</u>	<u>7-0</u> <u>8-4</u>	<u>6-0</u> <u>7-1</u>	<u>5-4</u> <u>6-4</u>	<u>6-10</u> <u>8-2</u>	<u>5-11</u> <u>7-0</u>	<u>5-3</u> <u>6-3</u>	<u>6-8</u> <u>7-11</u>	<u>5-9</u> <u>6-10</u>	<u>5-1</u> <u>5-11</u>

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 pound per square foot = 0.0479 kPa.

- Spans are given in feet and inches.
- Table is based on a maximum roof-ceiling dead load of 15 psf, floor dead load of 10 psf, and floor live load of 40 psf.
- Floor joists framing into rim header shall be attached to the rim header using joist hangers sized to support the joist bearing load or an approved design.
- For solid sawn wood, refer to Table R502.5(1). Engineered wood rim members shall meet or exceed the following material design properties and comply with applicable usage limitations in accordance with the manufacturer's approved data and usage limitations:
1-1/8" members: F_b=600 psi, F_v=270 psi, E=550,000 psi, F_{c,perp}=550 psi
1-1/4" members: F_b=1,130 psi, F_v=355 psi, E=660,750 psi, F_{c,perp}=680 psi
- The 20 psf ground snow load condition shall apply only when the roof pitch is 9:12 or greater. In conditions where the ground snow load is 30 psf or less and the roof pitch is less than 9:12, use the 30 psf ground snow load condition.
- To determine the allowable span for rim board headers parallel to floor joists and supporting non-load bearing walls above, use table column for 20 psf ground snow load and 20 ft building width with "roof, ceiling, and wall" support condition.

TABLE R602.7.3(1)
NUMBER OF KING STUDS REQUIRED FOR GRAVITY LOAD RESISTANCE^a

KING POST SUPPORTING:	OPENING WIDTH (FEET)	2x4 FRAMING									2x6 FRAMING								
		GROUND SNOW LOAD (PSF)									GROUND SNOW LOAD (PSF)								
		≤ 20 ^b			30			50			≤ 20			30			50		
		BUILDING WIDTH (FEET)									BUILDING WIDTH (FEET)								
		20 ^c	28	36	20	28	36	20	28	36	20	28	36	20	28	36	20	28	36
Roof, ceiling, and wall	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	3	1	1	1	1	1	2	1	2	2	1	1	1	1	1	1	1	1	1
	4	1	1	2	1	2	2	2	2	2	1	1	1	1	1	1	1	1	1
	6	2	2	2	2	2	3	2	3	3	1	1	1	1	1	1	1	2	2
	8	2	2	3	2	3	3	3	4	5	1	1	2	1	2	2	2	2	2
	10	2	3	3	3	3	4	4	5	6	1	2	2	1	2	2	2	2	3
12	3	3	4	3	4	5	4	5	6	1	2	2	2	2	2	2	3	3	
Roof, ceiling, wall, and one center- bearing floor ^c	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	3	1	1	2	1	1	2	1	2	2	1	1	1	1	1	1	1	1	1
	4	1	2	2	1	2	2	2	2	3	1	1	1	1	1	1	1	1	1
	6	2	2	3	2	2	3	2	3	4	1	1	2	1	1	2	1	2	2
	8	2	3	4	2	3	4	3	4	5	1	2	2	1	2	2	2	2	2
	10	3	4	4	3	4	5	3	5	6	2	2	2	2	2	2	2	2	3
12	3	4	5	3	4	5	4	5	7	2	2	3	2	2	3	2	3	3	
Roof, ceiling, wall and one clear span floor ^c	2	1	1	1	1	1	2	1	1	2	1	1	1	1	1	1	1	1	1
	3	1	2	2	1	2	2	1	2	2	1	1	1	1	1	1	1	1	1
	4	2	2	3	2	2	3	2	2	3	1	1	1	1	1	1	1	1	2
	6	2	3	4	2	3	4	2	3	4	1	2	2	1	2	2	1	2	2
	8	3	4	5	3	4	5	3	4	5	2	2	2	2	2	2	2	2	3
	10	3	5	6	4	5	6	4	5	6	2	2	3	2	2	3	2	3	3
12	4	5	7	4	5	7	4	6	7	2	3	3	2	3	3	2	3	4	

For SI: 1 foot = 305 mm, 1 pound per square foot = 0.0479 kPa.

- Table is based on minimum Stud grade Spruce-Pine-Fir (South) lumber, a maximum roof-ceiling dead load of 15 psf, floor dead load of 10 psf, and floor live load of 40 psf.
- The 20 psf ground snow load condition shall apply only when the roof pitch is 9:12 or greater. In conditions where the ground snow load is 30 psf or less and the roof pitch is less than 9:12, use the 30 psf ground snow load condition.
- To determine the required number of king studs for rim board headers parallel to floor joists and supporting non-load bearing walls above, use table column for 20 psf ground snow load and 20 ft building width with "roof, ceiling, and wall" support condition.

TABLE R602.7.3(2)
NUMBER OF KING STUDS REQUIRED FOR WIND LOAD RESISTANCE^a

STUD SIZE	OPENING WIDTH (FEET)	BASIC WIND SPEED (MPH) & EXPOSURE CONDITION																	
		85/B			90/B			100/B, 85/C			110/B, 90/C, 85/D			120/B, 100/C, 90/D			130/B, 110/C, 100/D		
		WALL HEIGHT (FEET)																	
		8	9	10	8	9	10	8	9	10	8	9	10	8	9	10	8	9	10
2x4	2	1	1	2	1	1	2	1	2	2	2	2	2	2	3	2	2	3	
	3	1	2	2	1	2	2	2	2	2	2	3	2	3	3	2	3	4	
	4	1	2	2	2	2	2	2	2	3	2	3	3	2	3	4	3	4	
	6	2	2	3	2	2	3	2	3	3	3	3	4	3	4	5	4	5	
	8	2	3	3	2	3	3	3	3	4	3	4	5	4	5	6	4	7	
	10	2	3	4	3	3	4	3	4	5	4	5	6	4	6	7	5	8	
	12	3	3	4	3	4	5	4	5	6	4	5	7	5	6	7	6	8	
2x6	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	
	3	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	2	2	
	4	1	1	1	1	1	1	1	1	1	1	2	1	2	2	2	2	2	
	6	1	1	1	1	1	2	1	2	2	1	2	2	2	2	2	2	3	

	8	1	1	2	1	2	2	2	2	2	2	2	2	2	2	3	2	3	3
	10	1	2	2	1	2	2	2	2	2	2	2	3	2	3	3	3	3	4
	12	2	2	2	2	2	2	2	2	3	2	3	3	2	3	4	3	4	4

For SI: 1 foot = 305 mm, 1 pound per square foot = 0.0479 kPa, 1 mile per hour = 1.609 km/h.

a. Table is based on minimum Stud grade Spruce-Pine-Fir (South) lumber.

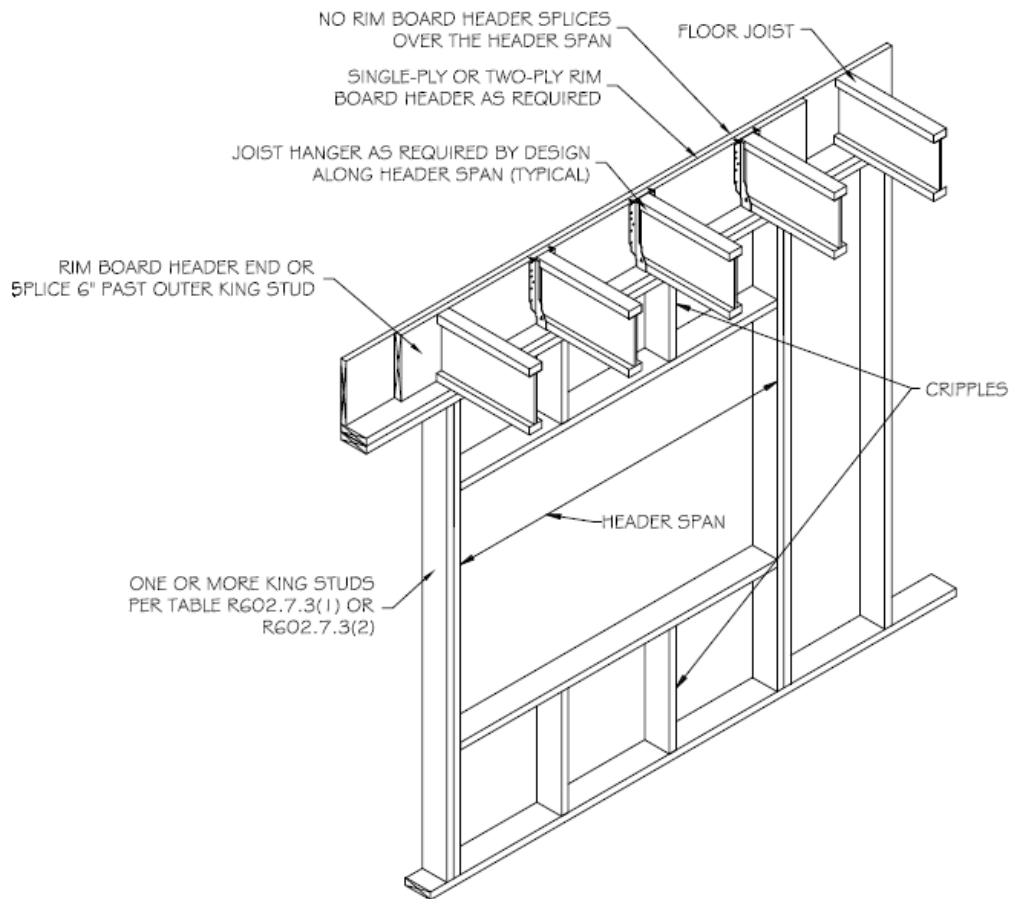


FIGURE R602.7.2
RIM BOARD HEADER CONSTRUCTION

Reason: This proposal adds a rim board header option to promote more resource and energy efficient wall framing. The analysis of rim board headers for this proposal is based on the same methodology applied for the existing IRC provisions for single headers and is consistent with header analysis as applied in the Wood Frame Construction Manual (WFCM). Both solid sawn and engineered wood members are included. King stud requirements are added to ensure adequate support of rim board headers and out-of-plane wind load resistance as this type of header construction uses only king studs which serve as jamb or trimmer studs for the wall opening below.

Cost Impact: The code change proposal will not increase the cost of construction.

RB288-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

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RB289 – 13

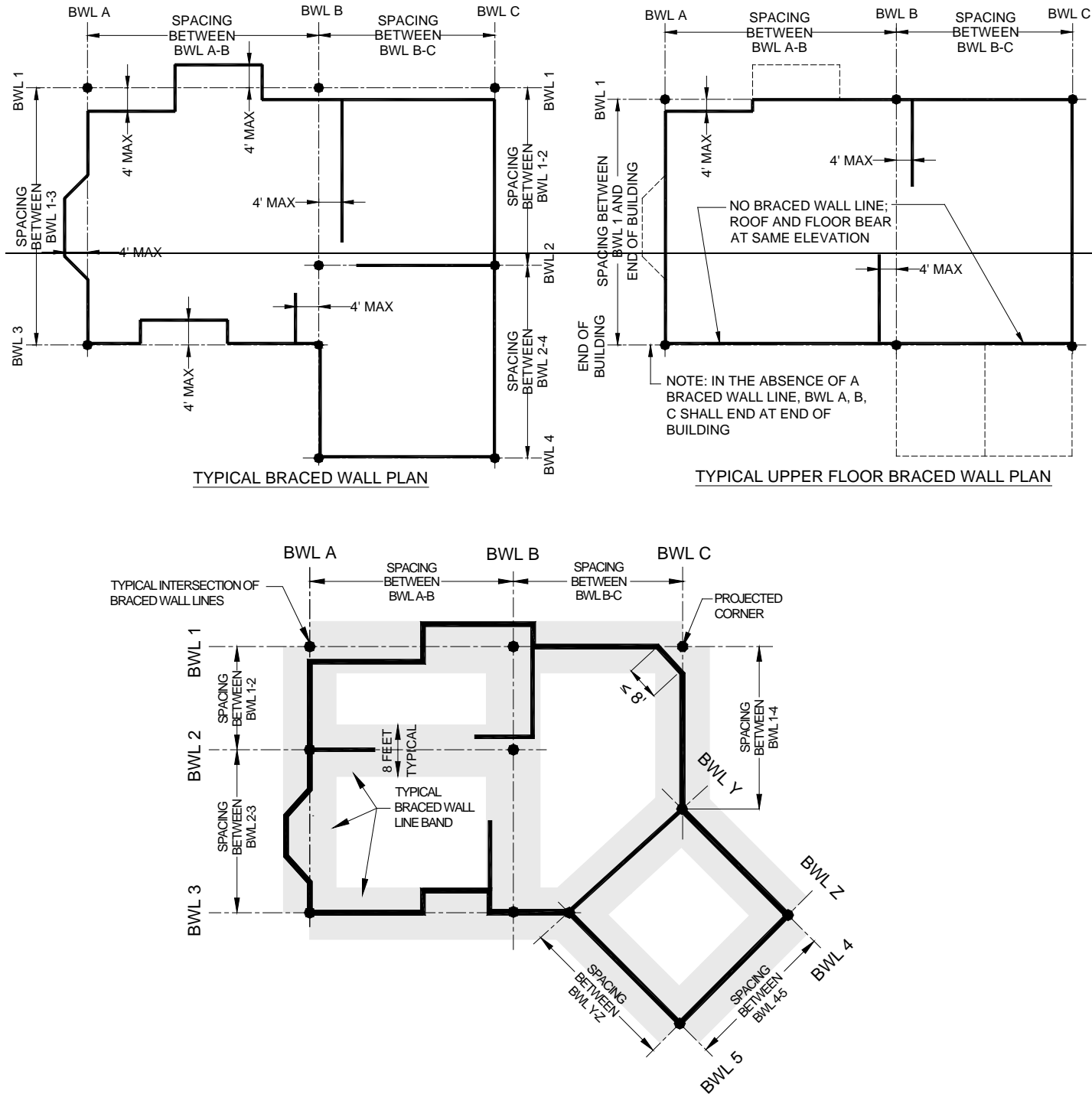
R202, R602.10.1, R602.10.1.1, Figure R602.10.1.1, R602.10.1.2, R602.10.1.3, Table R602.10.1.3, R602.10.1.4

Proponent: Brian Foley, P.E., Fairfax County, VA, representing Virginia Building and Code Officials Association (brian.foley@fairfaxcounty.gov)

Revise as follows:

R602.10.1 Braced wall lines. For the purpose of determining the amount and location of bracing, braced wall lines shall be centerlines of 8 foot (2438 mm) wide bands containing wall bracing as shown in Figure R602.10.1. Braced wall lines shall be designated in the building plan, on each story level and in each plan direction at a spacing in accordance with Table R601.10.1. Braced wall lines shall be placed such that all exterior walls are within the band of a braced wall line and all interior walls containing bracing are within the band of a braced wall line.~~required in each story level of a building, braced wall lines shall be designated as straight lines on the building plan placed in accordance with this section.~~

R602.10.1.1 Length of a braced wall line. The length of a braced wall line shall be the distance between its ends. The end of a braced wall line shall be the intersection with ~~a perpendicular~~ another braced wall line, an angled braced wall line as permitted in Section R602.10.1.2 or an exterior wall as shown in Figure R602.10.1.1.Where design elements of the building plan or elevation create conditions where a braced wall line cannot intersect with another, the end shall extend to the farthest end of the building.



**FIGURE R602.10.1-4
PLACEMENT OF BRACED WALL LINES**

R602.10.1.2 Offsets along a braced wall line. All exterior walls parallel to a braced wall line shall be permitted to offset up to 4 feet (1219 mm) from the designated braced wall line location as shown Figure R602.10.1.1. Interior walls used as bracing shall be permitted to offset up to 4 feet (1219 mm) from a braced wall line through the interior of the building as shown in Figure R602.10.1.1.

~~R602.10.1.3 Spacing of braced wall lines.~~ ~~There shall be a minimum of two braced wall lines in both the longitudinal and transverse direction as shown in Figure R602.10.1.1. Intermediate braced wall lines through the interior of the building shall be permitted. The spacing between parallel braced wall lines shall be in accordance with Table R602.10.1.3.~~

**TABLE R602.10.1.3
BRACED WALL LINE SPACING**

(Portions of Table not shown remain unchanged)

~~R602.10.1.4~~ R602.10.1.2 Angled walls. Any portion of a wall ~~along~~ within the band of a braced wall line shall be permitted to angle out of plane for a maximum diagonal length of 8 feet (2438 mm). Where the angled wall occurs at a corner, the length of the braced wall line shall be measured from the projected corner as shown in Figure R602.10.1.4. Where the diagonal length is greater than 8 feet (2438 mm), it shall be considered a separate braced wall line and shall be braced in accordance with Section R602.10.1.

Revise definition as follows:

BRACED WALL LINE. ~~A straight line~~ The centerline of an 8 foot (2438 mm) wide band through the building plan that represents the location of the lateral resistance provided by the wall bracing.

Reason: Braced wall lines have long been a confusing concept. During over 50 sessions of training on the 2009 and 2012 IRC wall bracing provisions, it is quite clear that users are not easily grasping braced wall lines. Fortunately, training clarifies the concept; however, for the user that is unable to attend training it is much more difficult when he or she is forced to understand braced wall line concepts by merely reading the code provisions.

With no technical modifications, this code change proposal introduces a braced wall line's "band" of bracing. Rather than describe that walls may offset 4 feet on either side of a braced wall line, the proposed concept simply explains that any wall within a braced wall line's 8 foot wide "band" can contribute to the its requirements. Since introducing the "band" to training sessions, students have been able to understand braced wall lines and the braced wall panel contributions quickly and easily.

This is a concept that is similar to the "braced wall bands" from the National Building Code of Canada. The remainder of the proposed language simply clarifies the provisions based on user feedback and questions raised during training.

The new figure merges the concepts from the two existing figures and incorporates the braced wall line "band."

Cost Impact: The code change proposal will not increase the cost of construction.

RB289-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.10.1-RB-FOLEY.doc

RB290 – 13

R602.10.2.2.1

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

R602.10.2.2.1 Location of braced wall panels in Seismic Design Categories D₀, D₁ and D₂. Braced wall panels shall be located at each end of a braced wall line.

Exception: Braced wall panels constructed of Methods WSP or BV-WSP and continuous sheathing methods as specified in Section R602.10.4 shall be permitted to begin no more than 10 feet (3048 mm) from each end of a braced wall line provided each end complies with one of the following:

1. A minimum 24-inch wide (610 mm) panel for Methods WSP, CS-WSP, CS-G, and CS-PF; ~~and 32-inch wide (813 mm) panel for Method CS-SFB~~ is applied to each side of the building corner as shown in Condition 4 of Figure R602.10.7.
2. The end of each braced wall panel closest to the end of the braced wall line shall have a 1,800 lb (8 kN) hold-down device fastened to the stud at the edge of the braced wall panel closest to the corner and to the foundation or framing below as shown in Condition 5 of Figure R602.10.7.
3. For Method BV-WSP, hold-down devices shall be provided in accordance with Table R602.10.6.5 at the ends of each braced wall panel.
4. Each end of the braced wall line without a return corner has a Method ABW or PFH located at the corner of the braced wall line. If Method PFH is used the leg of the portal shall be located directly adjacent to the corner of the wall line.

Reason: The change to Exception 1 removes the reference to Method CS-SFB as a method for meeting the alternative corner attachment requirement for SDCs D₀, D₁, and D₂ because IRC Table R602.10.4, Footnote d clearly does not permit the use of CS-SFB in SDCs D₀, D₁, and D₂. This proposal eliminates conflicting language in the IRC and corrects an error in the code.

The addition of Exception 4 provides for the addition of Methods ABW or PFH to a list of methods to provide alternative corner attachment requirements for SDCs D₀, D₁, and D₂. Both Methods ABW and PFH are anchored to the structure below with mechanical hold downs equal to or in excess of the 1,800 lbf required in Exception 2. Method ABW has a *minimum* hold down requirement of 1,800 lbf and the Method PFH has a hold down requirement of 4,200 lbf. (Note that there is a code change proposal for this cycle that will reduce this hold down requirement to 3,500 lbf. If the 3,500 lbf proposal is accepted the above code change proposed above will still be valid.)

Cost Impact: The code change proposal will not increase the cost of construction.

RB290-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.10.2.2.1 #2-RB-KEITH.doc

RB291 – 13

R602.10.2.2.1

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

R602.10.2.2.1 Location of braced wall panels in Seismic Design Categories D₀, D₁ and D₂. Braced wall panels shall be located at each end of a braced wall line.

Exception: Braced wall panels constructed of Methods WSP or BV-WSP and continuous sheathing methods as specified in Section R602.10.4 shall be permitted to begin no more than 10 feet (3048 mm) from each end of a braced wall line provided each end complies with one of the following:

1. A minimum 24-inch wide (610 mm) panel for Methods WSP, CS-WSP, CS-G, and CS-PF, and 32-inch wide (813 mm) panel for Method CS-SFB is applied to each side of the building corner as shown in Condition 4 of Figure R602.10.7.
2. The end of each braced wall panel closest to the end of the braced wall line shall have a 1,800 lb (8 kN) hold-down device fastened to the stud at the edge of the braced wall panel closest to the corner and to the foundation or framing below as shown in Condition 5 of Figure R602.10.7. For Method BV-WSP, hold-down devices shall be provided in accordance with Table R602.10.6.5 at the ends of each braced wall panel.
- ~~3. For Method BV-WSP, hold-down devices shall be provided in accordance with Table R602.10.6.5 at the ends of each braced wall panel.~~

Reason: Method BV-WSP was removed in Exception 1. As Method BV-WSP requires hold downs at each end of each braced wall panel, it can be used to anchor a braced wall line but it would not be required on each side of the building corner. This method of anchorage would better fit in Exception 2.

The information in Exception 3 was moved up to be a part of Exception 2. Exception 2 requires the use of a 1,800 lbf hold down at the corners of braced wall lines in lieu of a braced wall panels at each end of the braced wall line. Method BV-WSP per IRC Table R602.10.6.5 uses a hold down of 1,900 lbf or greater, exceeding the 1,800 lbf hold down requirement for other bracing methods. Placing the BV-WSP in Exception 2 makes it clear that the 1,800 lbf hold down is not in addition to the required hold downs for BV-WSP in Table R602.10.6.5.

Cost Impact: The code change proposal will not increase the cost of construction.

RB291-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.10.2.2.1 #1-RB-KEITH.doc

RB292 – 13

R602.10.2.2.1

Proponent: Gary J. Ehrlich, P.E., National Association of Home Builders (NAHB) (gehrlich@nahb.org)

Revise as follows:

R602.10.2.2.1 Location of braced wall panels in Seismic Design Categories D0, D1 and D2. Braced wall panels shall be located at each end of a braced wall line.

Exception: Braced wall panels constructed of Methods WSP or BV-WSP and continuous sheathing methods as specified in Section R602.10.4 shall be permitted to begin no more than 10 feet (3048 mm) from each end of a braced wall line provided each end complies with one of the following.

1. A minimum 24-inch-wide (610 mm) panel for Methods WSP, CS-WSP, CS-G, and CS-PF, and 32-inch-wide (813 mm) panel for Method CS-SFB is applied to each side of the building corner as shown in Condition 4 of Figure R602.10.7.
2. The end of each braced wall panel closest to the end of the braced wall line shall have an 1,800 lb (8 kN) hold-down device fastened to the stud at the edge of the braced wall panel closest to the corner and to the foundation or framing below as shown in Condition 5 of Figure R602.10.7.
3. ~~For Method BV-WSP, hold-down devices shall be provided in accordance with Table R602.10.6.5 at the ends of each braced wall panel.~~

Reason: The purpose of this code change is to correct a conflict in the code provisions for Method BV-WSP that was brought to our attention by ICC staff. The lowest capacity hold-down specified in Table R602.10.6.5 is 1900 pounds. Therefore, the only case of a Method BV-WSP panel that doesn't automatically qualify for Exception #2 is a single-story house in SDC D0 with veneer up to the tip of a gable. As such, Exception #3 is generally redundant and can be deleted. For that single-story case, either Exception #1 or Exception #2 would apply.

Cost Impact: The code change proposal will not increase the cost of construction.

RB292-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.10.2.2.1-RB-EHRLICH.doc


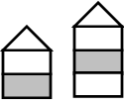

RB293 – 13

Table R602.10.3(1)

Proponent: Brian Foley, P.E., Fairfax County, VA, representing Virginia Building and Code Officials Association (brian.foley@fairfaxcounty.gov)

Revise as follows:

TABLE R602.10.3(1)
BRACING REQUIREMENTS BASED ON WIND SPEED

<ul style="list-style-type: none"> EXPOSURE CATEGORY B 30 FT MEAN ROOF HEIGHT 10 FT EAVE TO RIDGE HEIGHT 10 FT WALL HEIGHT 2 BRACED WALL LINES 			MINIMUM TOTAL LENGTH (FEET) OF BRACED WALL PANELS REQUIRED ALONG EACH BRACED WALL LINE ^a			
Basic Wind Speed (mph)	Story Location	Braced Wall Line Spacing ^c (feet)	Method LIB ^b	Method GB	Methods DWB, WSP, SFB, PBS, PCP, HPS, BV-WSP, ABW, PFH, PFG, CS-SFB ^{ed}	Methods CS-WSP, CS-G, CS-PF
< 110 ^{ed}		10	5.5	5.5	3.0	3.0
		20	10.0	10.0	6.0	5.0
		30	14.5	14.5	8.5	7.0
		40	18.5	18.5	11.0	9.0
		50	23.0	23.0	13.0	11.5
		60	27.5	27.5	15.5	13.5
		10	10.5	10.5	6.0	5.0
		20	19.0	19.0	11.0	9.5
		30	27.5	27.5	16.0	13.5
		40	36.0	36.0	20.5	17.5
		50	44.0	44.0	25.5	21.5
		60	52.5	52.5	30.0	25.5
		10	NP	15.5	9.0	7.5
		20	NP	28.5	16.5	14.0
		30	NP	41.0	23.5	20.0
		40	NP	53.0	30.5	26.0
		50	NP	65.5	37.5	32.0
		60	NP	77.5	44.5	37.5

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm.

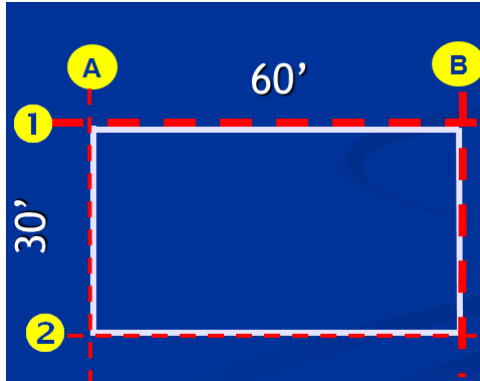
- Linear interpolation shall be permitted.
- Method LIB shall have gypsum board fastened to at least one side with nails or screws per Table R602.3(1) for exterior sheathing or Table R702.3.5 for interior gypsum board. Spacing of fasteners at panel edges shall not exceed 8 inches (203 mm).
- Where a braced wall line has parallel braced wall lines on one or both sides of differing dimensions, the average dimension shall be permitted to be used for braced wall line spacing.
- Method CS-SFB does not apply where the wind speed is greater than 100 mph.

(Portions of Table not shown remain unchanged)

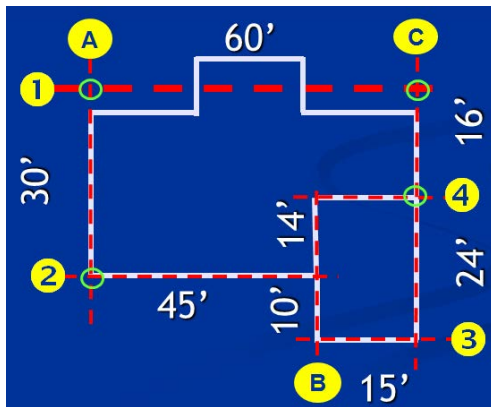
Reason: Table R602.10.3 was developed with the concept of braced wall lines running through the entire building in each plan direction much like the configuration of a simple colonial or ranch house. However, once this table was applied to the reality of today's house designs it was quickly determined that this concept was the exception rather than the rule. The code is silent on what to do when a braced wall line spacing is different on each side. Do you use the greater value? If so, you will be required to provide more bracing than would be necessary. Do you use the lesser value? If so you will be providing less bracing than needed.

To formulate the correct approach, members of the former ICC Ad Hoc Committee on Wall Bracing conferred and blessed the approach provided in this proposal. As footnote c describes, you would use an average spacing much like a designer would use a tributary area when calculating the design of a beam or girder.

Consider the BWL layout of this common ranch below. It's a simple exercise to identify the braced wall line spacing of BWL 1...30 feet. Likewise, the braced wall line spacing of BWL A would be 60 feet. In this case, there is only one adjacent parallel BWL.



However, consider the BWL layout of a more complex house below. The next parallel braced wall line to BWL A is BWL C 60 feet away at the top end and BWL B 45 feet away at the bottom end. To find the value to use in Table R602.10.3(1), you would use the average between 60 and 45 which would equal 52.5 feet. If you were to analyze BWL 4, at the left end, the next parallel braced wall lines would be BWL 1 to the top and BWL 2 to the bottom. At the right end the next parallel braced wall line to the top is BWL 1 and BWL 3 to the bottom. To find the average spacing, you would use 16, 14, 16 and 24 feet for an average spacing of 17.5 feet.



The other changes to this table include adding the braced wall panel methods that were unintentionally omitted during the last code change cycle. It was always the intent of Table R602.10.3(1) to include all of the intermittent methods (except LIB and GB) in the same column.

Cost Impact: The code change proposal will not increase the cost of construction. In cases where an AHJ forced users to base their braced wall line spacing on the largest of all spacings, this will have a positive cost impact considering the proposal, if approved, would require less bracing and thus a lower cost impact.

RB293-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.10.3(1)T-RB-FOLEY.doc

RB294 – 13




Table R602.10.3(1)




Proponent: Louis Wagner, Executive Director, North American Fiberboard Association
(lwagner@fiberboard.org)

Revise as follows:

TABLE R602.10.3(1)
BRACING REQUIREMENTS BASED ON WIND SPEED

<ul style="list-style-type: none"> EXPOSURE CATEGORY B 30 FOOT MEAN ROOF HEIGHT 10 FOOT EAVE-TO-RIDGE HEIGHT 10 FOOT WALL HEIGHT 2 BRACED WALL LINES 			MINIMUM TOTAL LENGTH (FEET) OF BRACED WALL PANELS REQUIRED ALONG EACH BRACED WALL LINE ^a			
Basic Wind Speed (mph)	Story Location	Braced Wall Line Spacing (feet)	Method LIB ^b	Method GB	Methods DWB, WSP, SFB, PBS, PCP, HPS, CS-SFB ^c	Methods CS-WSP, CS-G, CS-PF
≤ 85		10	3.5	3.5	2.0	1.5
		20	6.0	6.0	3.5	3.0
		30	8.5	8.5	5.0	4.5
		40	11.5	11.5	6.5	5.5
		50	14.0	14.0	8.0	7.0
		60	16.5	16.5	9.5	8.0
		10	6.5	6.5	3.5	3.0
		20	11.5	11.5	6.5	5.5
		30	16.5	16.5	9.5	8.0
		40	21.5	21.5	12.5	10.5
		50	26.5	26.5	15.0	13.0
		60	31.5	31.5	18.0	15.5
		10	NP	9.0	5.5	4.5
		20	NP	17.0	10.0	8.5
		30	NP	24.5	14.0	12.0
		40	NP	32.0	18.0	15.5
		50	NP	39.0	22.5	19.0
		60	NP	46.5	26.5	22.5
≤ 90		10	3.5	3.5	2.0	2.0
		20	7.0	7.0	4.0	3.5
		30	9.5	9.5	5.5	5.0
		40	12.5	12.5	7.5	6.0

<ul style="list-style-type: none"> EXPOSURE CATEGORY B 30 FOOT MEAN ROOF HEIGHT 10 FOOT EAVE-TO-RIDGE HEIGHT 10 FOOT WALL HEIGHT 2 BRACED WALL LINES 			MINIMUM TOTAL LENGTH (FEET) OF BRACED WALL PANELS REQUIRED ALONG EACH BRACED WALL LINE ^a			
		50	15.5	15.5	9.0	7.5
		60	18.5	18.5	10.5	9.0
		10	7.0	7.0	4.0	3.5
		20	13.0	13.0	7.5	6.5
		30	18.5	18.5	10.5	9.0
		40	24.0	24.0	14.0	12.0
		50	29.5	29.5	17.0	14.5
		60	35.0	35.0	20.0	17.0
		10	NP	10.5	6.0	5.0
		20	NP	19.0	11.0	9.5
		30	NP	27.5	15.5	13.5
		40	NP	35.5	20.5	17.5
		50	NP	44.0	25.0	21.5
		60	NP	52.0	30.0	25.5
≤ 100		10	4.5	4.5	2.5	2.5
		20	8.5	8.5	5.0	4.0
		30	12.0	12.0	7.0	6.0
		40	15.5	15.5	9.0	7.5
		50	19.0	19.0	11.0	9.5
		60	22.5	22.5	13.0	11.0
		10	8.5	8.5	5.0	4.5
		20	16.0	16.0	9.0	8.0
		30	23.0	23.0	13.0	11.0
		40	29.5	29.5	17.0	14.5
		50	36.5	36.5	21.0	18.0
		60	43.5	43.5	25.0	21.0
		10	NP	12.5	7.5	6.0
		20	NP	23.5	13.5	11.5
		30	NP	34.0	19.5	16.5
		40	NP	44.0	25.0	21.5
		50	NP	54.0	31.0	26.5

<ul style="list-style-type: none"> EXPOSURE CATEGORY B 30 FOOT MEAN ROOF HEIGHT 10 FOOT EAVE-TO-RIDGE HEIGHT 10 FOOT WALL HEIGHT 2 BRACED WALL LINES 			MINIMUM TOTAL LENGTH (FEET) OF BRACED WALL PANELS REQUIRED ALONG EACH BRACED WALL LINE ^a			
		60	NP	64.0	36.5	31.0
< 110°		10	5.5	5.5	3.0	3.0
		20	10.0	10.0	6.0	5.0
		30	14.5	14.5	8.5	7.0
		40	18.5	18.5	11.0	9.0
		50	23.0	23.0	13.0	11.5
		60	27.5	27.5	15.5	13.5
		10	10.5	10.5	6.0	5.0
		20	19.0	19.0	11.0	9.5
		30	27.5	27.5	16.0	13.5
		40	36.0	36.0	20.5	17.5
		50	44.0	44.0	25.5	21.5
		60	52.5	52.5	30.0	25.5
		10	NP	15.5	9.0	7.5
		20	NP	28.5	16.5	14.0
		30	NP	41.0	23.5	20.0
		40	NP	53.0	30.5	26.0
		50	NP	65.5	37.5	32.0
		60	NP	77.5	44.5	37.5

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 mile per hour = 0.447 m/s.

a. Linear interpolation shall be permitted.

b. Method LIB shall have gypsum board fastened to at least one side with nails or screws in accordance with Table R602.3(1) for exterior sheathing or Table R702.3.5 for interior gypsum board. Spacing of fasteners at panel edges shall not exceed 8 inches.

c. Method CS-SFB does not apply where the wind speed is greater than 100 mph.

Reason: There is a logical inconsistency in prohibiting CS-SFB when SFB which uses less bracing material is permitted. CS-SFB has already been penalized by ranking it lower than other continuous sheathings.

Related code changes have been submitted for TABLE R602.10.3(1) Footnote c, TABLE R602.10.3(3) Footnote d and TABLE R602.10.4 Footnote d. All three should be heard together.

Cost Impact: The code change proposal will not increase the cost of construction.

RB294-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

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Table R602.10.3(1), Table R602.10.3(3), Table R602.10.4



Proponent: Dennis Pitts, American Wood Council, representing American Wood Council
(dpitts@awc.org)

Revise as follows:

**TABLE R602.10.3(1)
BRACING REQUIREMENTS BASED ON WIND SPEED**

<ul style="list-style-type: none"> EXPOSURE CATEGORY B 30 FOOT MEAN ROOF HEIGHT 10 FOOT EAVE-TO-RIDGE HEIGHT 10 FOOT WALL HEIGHT 2 BRACED WALL LINES 			MINIMUM TOTAL LENGTH (FEET) OF BRACED WALL PANELS REQUIRED ALONG EACH BRACED WALL LINE ^a			
Basic Wind Speed (mph)	Story Location	Braced Wall Line Spacing (feet)	Method LIB ^b	Method GB	Methods DWB, WSP, SFB, PBS, PCP, HPS, CS-SFB ^c	Methods CS-WSP, CS-G, CS-PF
≤ 85		10	3.5	3.5	2.0	1.5
		20	6.0	6.0	3.5	3.0
		30	8.5	8.5	5.0	4.5
		40	11.5	11.5	6.5	5.5
		50	14.0	14.0	8.0	7.0
		60	16.5	16.5	9.5	8.0
		10	6.5	6.5	3.5	3.0
		20	11.5	11.5	6.5	5.5
		30	16.5	16.5	9.5	8.0
		40	21.5	21.5	12.5	10.5
		50	26.5	26.5	15.0	13.0
		60	31.5	31.5	18.0	15.5
		10	NP	9.0	5.5	4.5
		20	NP	17.0	10.0	8.5
		30	NP	24.5	14.0	12.0
		40	NP	32.0	18.0	15.5
		50	NP	39.0	22.5	19.0
		60	NP	46.5	26.5	22.5
≤ 90		10	3.5	3.5	2.0	2.0
		20	7.0	7.0	4.0	3.5
		30	9.5	9.5	5.5	5.0
		40	12.5	12.5	7.5	6.0

		50	15.5	15.5	9.0	7.5
		60	18.5	18.5	10.5	9.0
		10	7.0	7.0	4.0	3.5
		20	13.0	13.0	7.5	6.5
		30	18.5	18.5	10.5	9.0
		40	24.0	24.0	14.0	12.0
		50	29.5	29.5	17.0	14.5
		60	35.0	35.0	20.0	17.0
		10	NP	10.5	6.0	5.0
		20	NP	19.0	11.0	9.5
		30	NP	27.5	15.5	13.5
		40	NP	35.5	20.5	17.5
		50	NP	44.0	25.0	21.5
		60	NP	52.0	30.0	25.5
≤ 110°		10	4.5	4.5	2.5	2.5
		20	8.5	8.5	5.0	4.0
		30	12.0	12.0	7.0	6.0
		40	15.5	15.5	9.0	7.5
		50	19.0	19.0	11.0	9.5
		60	22.5	22.5	13.0	11.0
		10	8.5	8.5	5.0	4.5
		20	16.0	16.0	9.0	8.0
		30	23.0	23.0	13.0	11.0
		40	29.5	29.5	17.0	14.5
		50	36.5	36.5	21.0	18.0
		60	43.5	43.5	25.0	21.0
		10	NP	12.5	7.5	6.0
		20	NP	23.5	13.5	11.5
		30	NP	34.0	19.5	16.5
		40	NP	44.0	25.0	21.5
		50	NP	54.0	31.0	26.5
		60	NP	64.0	36.5	31.0
< 110°		10	5.5	5.5	3.0	3.0
		20	10.0	10.0	6.0	5.0

		30	14.5	14.5	8.5	7.0
		40	18.5	18.5	11.0	9.0
		50	23.0	23.0	13.0	11.5
		60	27.5	27.5	15.5	13.5
		10	10.5	10.5	6.0	5.0
		20	19.0	19.0	11.0	9.5
		30	27.5	27.5	16.0	13.5
		40	36.0	36.0	20.5	17.5
		50	44.0	44.0	25.5	21.5
		60	52.5	52.5	30.0	25.5
		10	NP	15.5	9.0	7.5
		20	NP	28.5	16.5	14.0
		30	NP	41.0	23.5	20.0
		40	NP	53.0	30.5	26.0
		50	NP	65.5	37.5	32.0
		60	NP	77.5	44.5	37.5



For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 mile per hour = 0.447 m/s.








a. Linear interpolation shall be permitted.




b. Method LIB shall have gypsum board fastened to at least one side with nails or screws in accordance with Table R602.3(1) for exterior sheathing or Table R702.3.5 for interior gypsum board. Spacing of fasteners at panel edges shall not exceed 8 inches.

c. Method CS-SFB does not apply where the wind speed is greater than 100 mph.

TABLE R602.10.3(3)
BRACING REQUIREMENTS BASED ON SEISMIC DESIGN CATEGORY

<ul style="list-style-type: none"> • SOIL CLASS D^b • WALL HEIGHT = 10 FEET • 10 PSF FLOOR DEAD LOAD • 15 PSF ROOF/CEILING DEAD LOAD • BRACED WALL LINE SPACING ≤ 25 FEET 			MINIMUM TOTAL LENGTH (FEET) OF BRACED WALL PANELS REQUIRED ALONG EACH BRACED WALL LINE ^a				
Seismic Design Category	Story Location	Braced Wall Line Length (feet)	Method LIB ^c	Method GB	Methods DWB, SFB, PBS, PCP, HPS, CS-SFB ^d	Method WSP	Methods CS-WSP, CS-G
C (townhouses only)		10	2.5	2.5	2.5	1.6	1.4
		20	5.0	5.0	5.0	3.2	2.7
		30	7.5	7.5	7.5	4.8	4.1
		40	10.0	10.0	10.0	6.4	5.4
		50	12.5	12.5	12.5	8.0	6.8
		10	NP	4.5	4.5	3.0	2.6
		20	NP	9.0	9.0	6.0	5.1
		30	NP	13.5	13.5	9.0	7.7

		40	NP	18.0	18.0	12.0	10.2
		50	NP	22.5	22.5	15.0	12.8
		10	NP	6.0	6.0	4.5	3.8
		20	NP	12.0	12.0	9.0	7.7
		30	NP	18.0	18.0	13.5	11.5
		40	NP	24.0	24.0	18.0	15.3
		50	NP	30.0	30.0	22.5	19.1
D ₀		10	NP	2.8	2.8	1.8	1.6
		20	NP	5.5	5.5	3.6	3.1
		30	NP	8.3	8.3	5.4	4.6
		40	NP	11.0	11.0	7.2	6.1
		50	NP	13.8	13.8	9.0	7.7
		10	NP	5.3	5.3	3.8	3.2
		20	NP	10.5	10.5	7.5	6.4
		30	NP	15.8	15.8	11.3	9.6
		40	NP	21.0	21.0	15.0	12.8
		50	NP	26.3	26.3	18.8	16.0
		10	NP	7.3	7.3	5.3	4.5
		20	NP	14.5	14.5	10.5	9.0
		30	NP	21.8	21.8	15.8	13.4
		40	NP	29.0	29.0	21.0	17.9
		50	NP	36.3	36.3	26.3	22.3
D ₁		10	NP	3.0	3.0	2.0	1.7
		20	NP	6.0	6.0	4.0	3.4
		30	NP	9.0	9.0	6.0	5.1
		40	NP	12.0	12.0	8.0	6.8
		50	NP	15.0	15.0	10.0	8.5
		10	NP	6.0	6.0	4.5	3.8
		20	NP	12.0	12.0	9.0	7.7
		30	NP	18.0	18.0	13.5	11.5
		40	NP	24.0	24.0	18.0	15.3
		50	NP	30.0	30.0	22.5	19.1
		10	NP	8.5	8.5	6.0	5.1

D ₂		20	NP	17.0	17.0	12.0	10.2
		30	NP	25.5	25.5	18.0	15.3
		40	NP	34.0	34.0	24.0	20.4
		50	NP	42.5	42.5	30.0	25.5
		10	NP	4.0	4.0	2.5	2.1
		20	NP	8.0	8.0	5.0	4.3
		30	NP	12.0	12.0	7.5	6.4
		40	NP	16.0	16.0	10.0	8.5
		50	NP	20.0	20.0	12.5	10.6
		10	NP	7.5	7.5	5.5	4.7
		20	NP	15.0	15.0	11.0	9.4
		30	NP	22.5	22.5	16.5	14.0
		40	NP	30.0	30.0	22.0	18.7
		50	NP	37.5	37.5	27.5	23.4
	Cripple wall below one- or two-story dwelling	10	NP	NP	NP	NP	NP
		20	NP	NP	NP	NP	NP
		30	NP	NP	NP	NP	NP
		40	NP	NP	NP	NP	NP
		50	NP	NP	NP	NP	NP
		10	NP	NP	NP	7.5	6.4
		20	NP	NP	NP	15.0	12.8
		30	NP	NP	NP	22.5	19.1
		40	NP	NP	NP	30.0	25.5
		50	NP	NP	NP	37.5	31.9

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 pound per square foot = 0.0479 kPa.




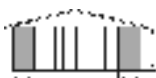
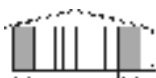






a. Linear interpolation shall be permitted.

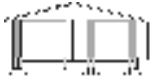
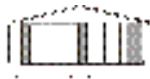




b. Wall bracing lengths are based on a soil site class "D." Interpolation of bracing length between the S_{ds} values associated with the Seismic Design Categories shall be permitted when a site-specific S_{ds} value is determined in accordance with Section 1613.3 of the *International Building Code*.

c. Method LIB shall have gypsum board fastened to at least one side with nails or screws per Table R602.3(1) for exterior sheathing or Table R702.3.5 for interior gypsum board. Spacing of fasteners at panel edges shall not exceed 8 inches.

d. Method CS-SFB applies in SDC-C only. Method CS-SFB does not apply in Seismic Design Categories D₀, D₁, and D₂.

**TABLE R602.10.4
BRACING METHODS**

METHODS, MATERIAL		MINIMUM THICKNESS	FIGURE	CONNECTION CRITERIA ^a	
				Fasteners	Spacing
Intermittent Bracing Method	LIB Let-in-bracing	1 × 4 wood or approved metal straps at 45° to 60° angles for maximum 16 ² stud spacing		Wood: 2-8d common nails or 3-8d (2½" long x 0.113" dia.) nails	Wood: per stud and top and bottom plates
	DWB Diagonal wood boards	¾"(1" nominal) for maximum 24" stud spacing		Metal strap: per manufacturer	Metal: per manufacturer
	DWB Diagonal wood boards	¾"(1" nominal) for maximum 24" stud spacing		2-8d (2½" long x 0.113" dia.) nails or 2 - 1¾" long staples	Per stud
	WSP Wood structural panel (See Section R604)	¾"		Exterior sheathing per Table R602.3(3)	6" edges 12" field
	WSP Wood structural panel (See Section R604)	¾"		Interior sheathing per Table R602.3(1) or R602.3(2)	Varies by fastener
	BV-WSP[®] Wood Structural Panels with Stone or Masonry Veneer (See Section R602.10.6.5)	7/16"	See Figure R602.10.6.5	8d common (2½" x 0.131) nails	4" at panel edges 12" at intermediate supports 4" at braced wall panel end posts
	SFB Structural fiberboard sheathing	½" or 25/32" for maximum 16" stud spacing		1½" long x 0.12" dia. (for ½" thick sheathing) 1¾" long x 0.12" dia. (for 25/32" thick sheathing) galvanized roofing nails or 8d common (2½" long x 0.131" dia.) nails	3" edges 6" field
	GB Gypsum board	½"		Nails or screws per Table R602.3(1) for exterior locations Nails or screws per Table R702.3.5 for interior locations	For all braced wall panel locations: 7" edges (including top and bottom plates) 7" field
	PBS Particleboard sheathing (See Section R605)	3/8" or ½" for maximum 16" stud spacing		For 3/8", 6d common (2" long x 0.113" dia.) nails For ½", 8d common (2½" long x 0.131" dia.) nails	3" edges 6" field
	PCP Portland cement plaster	See Section R703.6 for maximum 16" stud spacing		1½" long, 11 gage, 7/16" dia. head nails or 7/8" long, 16 gage staples	6" o.c. on all framing members
HPS Hardboard panel siding	7/16" for maximum 16" stud spacing		0.092" dia., 0.225" dia. head nails with length to accommodate 1½" penetration into studs	4" edges 8" field	
ABW Alternate braced wall	¾"		See Section R602.10.6.1	See Section R602.10.6.1	

METHODS, MATERIAL		MINIMUM THICKNESS	FIGURE	CONNECTION CRITERIA ^a	
				Fasteners	Spacing
Intermittent Bracing Methods	PFH Portal frame with hold-downs	$\frac{3}{8}$ "		See Section R602.10.6.2	See Section R602.10.6.2
	PFG Portal frame at garage	$\frac{7}{16}$ "		See Section R602.10.6.3	See Section R602.10.6.3
Continuous Sheathing Methods	CS-WSP Continuously sheathed wood structural panel	$\frac{3}{8}$ "		Exterior sheathing per Table R602.3(3)	6" edges 12" field
				Interior sheathing per Table R602.3(1) or R602.3(2)	Varies by fastener
	CS-G^{b, c} Continuously sheathed wood structural panel adjacent to garage openings	$\frac{3}{8}$ "		See Method CS-WSP	See Method CS-WSP
	CS-PF Continuously sheathed portal frame	$\frac{7}{16}$ "		See Section R602.10.6.4	See Section R602.10.6.4
	CS-SFB^d Continuously sheathed structural fiberboard	$\frac{1}{2}$ " or $\frac{25}{32}$ " for maximum 16" stud spacing		$1\frac{1}{2}$ " long \times 0.12" dia. (for $\frac{1}{2}$ " thick sheathing) $1\frac{3}{4}$ " long \times 0.12" dia. (for $\frac{25}{32}$ " thick sheathing) galvanized roofing nails or 8d common ($2\frac{1}{2}$ " long \times 0.131" dia.) nails	3" edges 6" field

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 degree = 0.0175 rad, 1 pound per square foot = 47.8 N/m², 1 mile per hour = 0.447 m/s.

- Adhesive attachment of wall sheathing, including Method GB, shall not be permitted in Seismic Design Categories C, D₀, D₁ and D₂.
- Applies to panels next to garage door opening when supporting gable end wall or roof load only. May only be used on one wall of the garage. In Seismic Design Categories D₀, D₁ and D₂, roof covering dead load may not exceed 3 psf.
- Garage openings adjacent to a Method CS-G panel shall be provided with a header in accordance with Table R502.5(1). A full height clear opening shall not be permitted adjacent to a Method CS-G panel.
- Method CS-SFB does not apply in Seismic Design Categories D₀, D₁ and D₂ and in areas where the wind speed exceeds 100 mph.
- Method applies to detached one- and two-family dwellings in Seismic Design Categories D₀ through D₂ only.

Reason: Footnote c of Table R602.10.3(1), footnote d of Table R602.10.3(3), and footnote d of Table R602.10.4 were added to the 2012 IRC when provisions for the bracing method designated as Continuously-Sheathed Structural Fiberboard (CS-SFB) were combined with Continuously-Sheathed Wood Structural Panels (CS-WSP). Previous provisions in the 2009 IRC section R602.10.5.4 required CS-SFB used in Seismic Design Categories (SDC) D₀, D₁ and D₂ or regions where the basic wind speed exceeds 100 mph to be designed in accordance with accepted engineering practice and the provisions of the of IBC.

With changes to the 2012 IRC section R301.2.1.1 that clarified high-wind thresholds where engineered design and/or use of pre-engineered design provisions, such as those in the WFCM, must be used, Table R602.10.3(1) footnote "c" and the second portion of Table R602.10.4 footnote "d" are not needed. Deletion of these footnotes in combination with changes adopted into 2012 meet the original intent of the 2009 IRC.

The second portion of the change clarifies the intent of Table R602.10.3(3) footnote "d" which could be interpreted to mean that CS-SFB cannot be used in Seismic Design Categories A & B. This literal interpretation would be incorrect.

Cost Impact: The code change proposal will not increase the cost of construction.

RB295-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

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Table R602.10.3(2), Table R602.10.3(4)

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

TABLE R602.10.3(2)
WIND ADJUSTMENT FACTORS TO THE REQUIRED LENGTH OF WALL BRACING

<u>ITEM NUMBER</u>	ADJUSTMENT BASED ON	STORY/ SUPPORTING	CONDITION	ADJUSTMENT FACTOR^{a, b} [multiply length from Table R602.10.3(1) by this factor]	APPLICABLE METHODS
<u>1</u>	Exposure category	One-story structure	B	1.00	All methods
			C	1.20	
			D	1.50	
		Two-story structure	B	1.00	
			C	1.30	
			D	1.60	
		Three-story structure	B	1.00	
			C	1.40	
			D	1.70	
<u>2</u>	Roof eave-to-ridge height	Roof only	≤ 5 feet	0.70	
			10 feet	1.00	
			15 feet	1.30	
			20 feet	1.60	
		Roof + 1 floor	≤ 5 feet	0.85	
			10 feet	1.00	
			15 feet	1.15	
			20 feet	1.30	
		Roof + 2 floors	≤ 5 feet	0.90	
			10 feet	1.00	
			15 feet	1.10	
			20 feet	Not permitted	
<u>3</u>	Wall height adjustment	Any story	8 feet	0.90	
			9 feet	0.95	
			10 feet	1.00	
			11 feet	1.05	

ITEM NUMBER	ADJUSTMENT BASED ON	STORY/ SUPPORTING	CONDITION	ADJUSTMENT FACTOR ^{a, b} [multiply length from Table R602.10.3(1) by this factor]	APPLICABLE METHODS
			≤ 12 feet	1.10	
4	Number of braced wall lines (per plan direction) ^c	Any story	2	1.00	
			3	1.30	
			4	1.45	
			≥ 5	1.60	
5	Additional 800-pound hold-down device	Top story only	Fastened to the end studs of each braced wall panel and to the foundation or framing below	0.80	DWB, WSP, SFB, PBS, PCP, HPS
6	Interior gypsum board finish (or equivalent)	Any story	Omitted from inside face of braced wall panels	1.40	DWB, WSP, SFB, PBS, PCP, HPS, CS-WSP, CS-G, CS-SFB
7	Gypsum board fastening	Any story	4 inches o.c. at panel edges, including top and bottom plates, and all horizontal joints blocked	0.7	GB

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 pound = 4.48 N.


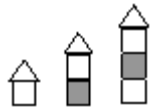

a. Linear interpolation shall be permitted.

b. The total adjustment factor is the product of all applicable adjustment factors.

c. The adjustment factor is permitted to be 1.0 when determining bracing amounts for intermediate braced wall lines provided the bracing amounts on adjacent braced wall lines are based on a spacing and number that neglects the intermediate braced wall line.

TABLE R602.10.3(4)
SEISMIC ADJUSTMENT FACTORS TO THE REQUIRED LENGTH OF WALL BRACING

ITEM NUMBER	ADJUSTMENT BASED ON:	STORY/SUPPORTING	CONDITION	ADJUSTMENT FACTOR ^{a, b} (Multiply length from Table R602.10.3(43) by this factor)	APPLICABLE METHODS
1	Story height (Section 301.3)	Any story	≤ 10 ft	1.0	All methods
			> 10 ft and ≤ 12 ft	1.2	
2	Braced wall line spacing, townhouses in SDC C	Any story	≤ 35 ft	1.0	
			> 35 ft and ≤ 50 ft	1.43	
3	Braced wall line spacing, in SDC D ₀ , D ₁ , D ₂ ^c	Any story	> 25 ft and ≤ 30 ft	1.2	
			> 30 ft and ≤ 35 ft	1.4	
4	Wall dead load	Any story	> 8 psf and < 15 psf	1.0	
			< 8 psf	0.85	
5	Roof/ceiling dead load for wall supporting	Roof only or roof plus one or two stories	≤ 15 psf	1.0	
		Roof plus one or two stories	> 15 psf and ≤ 25 psf	1.1	
		Roof only	> 15 psf and ≤ 25 psf	1.2	

ITEM NUMBER	ADJUSTMENT BASED ON:	STORY/SUPPORTING	CONDITION	ADJUSTMENT FACTOR ^{a,b} (Multiply length from Table R602.10.3(43) by this factor)	APPLICABLE METHODS
6	Walls with stone or masonry veneer, townhouses in SDC C _{d,e}			1.0	All intermittent and continuous methods. All methods
				1.5	
				1.5	
7	Walls with stone or masonry veneer, detached one-and- two-family dwellings in SDC D ₀ -D ₂ ^d	Any story	See Table R602.10.6.5		BV-WSP
8	Interior gypsum board finish (or equivalent)	Any story	Omitted from inside face of <i>braced wall panels</i>	1.5	DWB, WSP, SFB, PBS, PCP, HPS, CS-WSP, CS-G, CS-SFB

For SI: 1 psf = 47,8 N/m².

a. Linear interpolation shall be permitted.

b. The total length of bracing required for a given wall line is the product of all applicable adjustment factors.

c. The length-to-width ratio for the floor/roof *diaphragm* shall not exceed 3:1. The top plate lap splice nailing shall be a minimum of 12-16d nails on each side of the splice.

d. Applies to stone or masonry veneer exceeding the first story height. See Section R602.10.6.5 for requirements when stone or masonry veneer does not exceed the first story height.

e. The adjustment factor for stone or masonry veneer shall be applied to all exterior *braced wall lines* and all *braced wall lines* on the interior of the building, backing or perpendicular to and laterally supported veneered walls.

Reason: This proposal corrects a couple of editorial deficiencies in the table that were discovered by APA and ICC Staff while writing the 2012 IRC Bracing Book. These can be seen in the 6th row (using proposed item numbering) where “C” was left out behind SDC in the “Adjustment based on” column. Also in the last column on the right the annotation “All intermittent and continuous methods” was changed to the format used elsewhere in the column. Note also that the proposal references the correct table in the column heading (**Adjustment Factor**...).

Adding item numbers could also be considered an editorial item. This is a format used in other large tables (e.g., Table R602.3(1)) where making reference to a specific entry is relatively difficult.

Cost Impact: The code change proposal will not increase the cost of construction.

RB296-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R602.10.3(2)T-RB-KEITH.doc

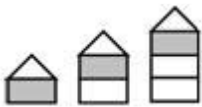




RB297 – 13







Table R602.10.3(3)


Proponent: Randall Shackelford, Simpson Strong-Tie Company (rshackelford@strongtie.com)

Revise as follows:

TABLE R602.10.3(3)
BRACING REQUIREMENTS BASED ON SEISMIC DESIGN CATEGORY

<ul style="list-style-type: none"> • SOIL CLASS D^b • WALL HEIGHT = 10 FEET • 10 PSF FLOOR DEAD LOAD • 15 PSF ROOF/CEILING DEAD LOAD • BRACED WALL LINE SPACING ≤ 25 FEET 			MINIMUM TOTAL LENGTH (FEET) OF BRACED WALL PANELS REQUIRED ALONG EACH BRACED WALL LINE ^a				
Seismic Design Category	Story Location	Braced Wall Line Length (feet) ^c	Method LIB ^{e,f}	Method GB	Methods DWB, SFB, PBS, PCP, HPS, CS-SFB ^{d,g}	Method WSP	Methods CS-WSP, CS-G
C (townhouses only)		10	2.5	2.5	2.5	1.6	1.4
		20	5.0	5.0	5.0	3.2	2.7
		30	7.5	7.5	7.5	4.8	4.1
		40	10.0	10.0	10.0	6.4	5.4
		50	12.5	12.5	12.5	8.0	6.8
		10	NP	4.5	4.5	3.0	2.6
		20	NP	9.0	9.0	6.0	5.1
		30	NP	13.5	13.5	9.0	7.7
		40	NP	18.0	18.0	12.0	10.2
		50	NP	22.5	22.5	15.0	12.8
		10	NP	6.0	6.0	4.5	3.8
		20	NP	12.0	12.0	9.0	7.7
		30	NP	18.0	18.0	13.5	11.5
		40	NP	24.0	24.0	18.0	15.3
		50	NP	30.0	30.0	22.5	19.1
D ₀		10	NP	2.8	2.8	1.8	1.6
		20	NP	5.5	5.5	3.6	3.1
		30	NP	8.3	8.3	5.4	4.6
		40	NP	11.0	11.0	7.2	6.1
		50	NP	13.8	13.8	9.0	7.7
		10	NP	5.3	5.3	3.8	3.2
		20	NP	10.5	10.5	7.5	6.4

		30	NP	15.8	15.8	11.3	9.6
		40	NP	21.0	21.0	15.0	12.8
		50	NP	26.3	26.3	18.8	16.0
		10	NP	7.3	7.3	5.3	4.5
		20	NP	14.5	14.5	10.5	9.0
		30	NP	21.8	21.8	15.8	13.4
		40	NP	29.0	29.0	21.0	17.9
		50	NP	36.3	36.3	26.3	22.3
		10	NP	3.0	3.0	2.0	1.7
		20	NP	6.0	6.0	4.0	3.4
		30	NP	9.0	9.0	6.0	5.1
		40	NP	12.0	12.0	8.0	6.8
		50	NP	15.0	15.0	10.0	8.5
D ₁		10	NP	6.0	6.0	4.5	3.8
		20	NP	12.0	12.0	9.0	7.7
		30	NP	18.0	18.0	13.5	11.5
		40	NP	24.0	24.0	18.0	15.3
		50	NP	30.0	30.0	22.5	19.1
		10	NP	8.5	8.5	6.0	5.1
		20	NP	17.0	17.0	12.0	10.2
		30	NP	25.5	25.5	18.0	15.3
		40	NP	34.0	34.0	24.0	20.4
		50	NP	42.5	42.5	30.0	25.5
D ₂		10	NP	4.0	4.0	2.5	2.1
		20	NP	8.0	8.0	5.0	4.3
		30	NP	12.0	12.0	7.5	6.4
		40	NP	16.0	16.0	10.0	8.5
		50	NP	20.0	20.0	12.5	10.6
		10	NP	7.5	7.5	5.5	4.7
		20	NP	15.0	15.0	11.0	9.4
		30	NP	22.5	22.5	16.5	14.0
		40	NP	30.0	30.0	22.0	18.7
		50	NP	37.5	37.5	27.5	23.4

	10	NP	NP	NP	NP	NP
	20	NP	NP	NP	NP	NP
	30	NP	NP	NP	NP	NP
	40	NP	NP	NP	NP	NP
	50	NP	NP	NP	NP	NP
	10	NP	NP	NP	7.5	6.4
	20	NP	NP	NP	15.0	12.8
	30	NP	NP	NP	22.5	19.1
	40	NP	NP	NP	30.0	25.5
	50	NP	NP	NP	37.5	31.9

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 pound per square foot = 0.0479 kPa.

a. Linear interpolation shall be permitted.

b. Wall bracing lengths are based on a soil site class "D." Interpolation of bracing length between the S_{ds} values associated with the Seismic Design Categories shall be permitted when a site-specific S_{ds} value is determined in accordance with Section 1613.3 of the *International Building Code*.

c. Where the braced wall line length is greater than 50 feet, braced wall lines shall be permitted to be divided into shorter segments having lengths of 50 feet or less, and the amount of bracing within each segment shall be in accordance with this table.

e d. Method LIB shall have gypsum board fastened to at least one side with nails or screws per Table R602.3(1) for exterior sheathing or Table R702.3.5 for interior gypsum board. Spacing of fasteners at panel edges shall not exceed 8 inches.

d e. Method CS-SFB applies in SDC C only.

Reason: The reason for this code change is to clarify that braced wall line lengths longer than 50 feet are permitted when bracing is determined based on Seismic Design Category.

The bracing amount table (R602.10.3(3)) currently specifies bracing only for braced wall line lengths of up to 50 feet. This gives the impression that braced wall line lengths longer than 50 feet are not permitted.

I do not believe this is the intent of this table.

This goes back to the work of the ICC Wall Bracing Committee when all the bracing amounts were converted from percentages sheathed to actual lengths sheathed. In the 2000-2006 IRC, the amount of bracing was just shown as a percentage of the length of the braced wall line. Theoretically, the braced wall line could be as long as the builder wanted it to be, and the amount of bracing would just go up as the length increased.

In an effort to decrease requirement for math calculations, the Wall Bracing Committee converted all percentages to lengths. I think since the spacing of braced wall lines was limited to a maximum of 50 feet, that number was also chosen as the maximum length of braced wall lines.

Theoretically, since the length of braced wall lines is permitted to be taken as the length between perpendicular braced wall lines, one could already divide up a long braced wall line into shorter braced wall lines with length less than 50 feet. But to avoid confusion, I think it is better to specifically clarify that.

Cost Impact: This proposal could lower costs in jurisdictions that were interpreting this table to limit braced wall line lengths to 50 feet by allowing larger houses to be built using IRC provisions instead of having to be designed.

RB297-13

Public Hearing: Committee:

AS

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Assembly:

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RB298 – 13






Table R602.10.3(3)

Proponent: Kevin S. Moore, S.E., Chair of Seismic Subcommittee to Code Advisory Committee, representing National Council of Structural Engineers Associations (ksmoore@sgh.com); Matt Mlakar, Chair of General Engineering Committee, Structural Engineers Association of California

Revise as follows:

Table R602.10.3(3)

BRACING REQUIREMENTS BASED ON SEISMIC DESIGN CATEGORY

<ul style="list-style-type: none"> SOIL CLASS D^b WALL HEIGHT = 10 FEET 10 PSF FLOOR DEAD LOAD 15 PSF ROOF/CEILING DEAD LOAD BRACED WALL LINE SPACING ≤ 25 FEET 			MINIMUM TOTAL LENGTH (FEET) OF BRACED WALL PANELS REQUIRED ALONG EACH BRACED WALL LINE ^a				
Seismic Design Category	Story Location	Braced Wall Line Length (feet)	Method LIB ^c	Method GB	Methods DWB, SFB, PBS, PCP, HPS, CS-SFB ^d	Method WSP	Methods CS-WSP, CS-G
C (townhouses only)		10	2.5	2.5	2.5	1.6 2.0	1.4
		20	5.0	5.0	5.0	3.2 4.0	2.7
		30	7.5	7.5	7.5	4.8 6.0	4.1
		40	10.0	10.0	10.0	6.4 8.0	5.4
		50	12.5	12.5	12.5	8.0 10.0	6.8
		10	NP	4.5	4.5	3.0 3.8	2.6
		20	NP	9.0	9.0	6.0 7.5	5.1
		30	NP	13.5	13.5	9.0 11.3	7.7
		40	NP	18.0	18.0	12.0 15.0	10.2
		50	NP	22.5	22.5	15.0 18.8	12.8
		10	NP	6.0	6.0	4.5 5.6	3.8
		20	NP	12.0	12.0	9.0 11.3	7.7
		30	NP	18.0	18.0	13.5 16.9	11.5
		40	NP	24.0	24.0	18.0 22.5	15.3
		50	NP	30.0	30.0	22.5 28.1	19.1
D ₀		10	NP	2.8	2.8	1.8 2.3	1.6
		20	NP	5.5	5.5	3.6 4.5	3.1
		30	NP	8.3	8.3	5.4 6.8	4.6
		40	NP	11.0	11.0	7.2 9.0	6.1
		50	NP	13.8	13.8	9.0 11.3	7.7
		10	NP	5.3	5.3	3.8 4.8	3.2
		20	NP	10.5	10.5	7.5 9.4	6.4
		30	NP	15.8	15.8	11.3 14.1	9.6
		40	NP	21.0	21.0	15.0 18.8	12.8
		50	NP	26.3	26.3	18.8	16.0

<ul style="list-style-type: none"> • SOIL CLASS D^b • WALL HEIGHT = 10 FEET • 10 PSF FLOOR DEAD LOAD • 15 PSF ROOF/CEILING DEAD LOAD • BRACED WALL LINE SPACING ≤ 25 FEET 			MINIMUM TOTAL LENGTH (FEET) OF BRACED WALL PANELS REQUIRED ALONG EACH BRACED WALL LINE ^a				
		10	NP	7.3	7.3	23.5 5.3 6.6	4.5
		20	NP	14.5	14.5	40.5 13.1	9.0
		30	NP	21.8	21.8	45.8 19.8	13.4
		40	NP	29.0	29.0	21.0 26.3	17.9
		50	NP	36.3	36.3	26.3 32.9	22.3
D ₁		10	NP	3.0	3.0	2.0 2.5	1.7
		20	NP	6.0	6.0	4.0 5.0	3.4
		30	NP	9.0	9.0	6.0 7.5	5.1
		40	NP	12.0	12.0	8.0 10	6.8
		50	NP	15.0	15.0	10.0 12.5	8.5
		10	NP	6.0	6.0	4.5 5.6	3.8
		20	NP	12.0	12.0	9.0 11.3	7.7
		30	NP	18.0	18.0	13.5 16.9	11.5
		40	NP	24.0	24.0	18.0 22.5	15.3
		50	NP	30.0	30.0	22.5 28.1	19.1
		10	NP	8.5	8.5	6.0 7.5	5.1
		20	NP	17.0	17.0	12.0 15.0	10.2
		30	NP	25.5	25.5	18.0 22.5	15.3
		40	NP	34.0	34.0	24.0 30.0	20.4
		50	NP	42.5	42.5	30.0 37.5	25.5
D ₂		10	NP	4.0	4.0	2.5 3.1	2.1
		20	NP	8.0	8.0	5.0 6.3	4.3
		30	NP	12.0	12.0	7.5 9.4	6.4
		40	NP	16.0	16.0	10.0 12.5	8.5
		50	NP	20.0	20.0	12.5 15.6	10.6
		10	NP	7.5	7.5	5.5 6.9	4.7
		20	NP	15.0	15.0	11.0 13.8	9.4
		30	NP	22.5	22.5	16.5 20.6	14.0
		40	NP	30.0	30.0	22.0 27.5	18.7
		50	NP	37.5	37.5	27.5 34.4	23.4
		10	NP	NP	NP	NP	NP
		20	NP	NP	NP	NP	NP
		30	NP	NP	NP	NP	NP
		40	NP	NP	NP	NP	NP
		50	NP	NP	NP	NP	NP
	Cripple wall below one- or two- story building	10	NP	NP	NP	7.5 9.4	6.4
		20	NP	NP	NP	15.0 18.8	12.8
		30	NP	NP	NP	22.5 28.1	19.1
		40	NP	NP	NP	30.0 37.5	25.5

<ul style="list-style-type: none"> • SOIL CLASS D^b • WALL HEIGHT = 10 FEET • 10 PSF FLOOR DEAD LOAD • 15 PSF ROOF/CEILING DEAD LOAD • BRACED WALL LINE SPACING ≤ 25 FEET 			MINIMUM TOTAL LENGTH (FEET) OF BRACED WALL PANELS REQUIRED ALONG EACH BRACED WALL LINE ^a				
		50	NP	NP	NP	37.5 46.9	31.9

Reason: The purpose of this proposal is to adjust the current required minimum wall bracing for WSP method for seismic design using nominal strength and factors of safety consistent with IBC.

IRC wall bracing capacity is based on tests that utilized partial restraint in the form of return walls at each end of the wall and gypsum board panels [1]. Tests have shown that shear wall strength value is a function of the overturning restraint provided. The IBC allowable seismic shear strength relies on restraint from dead load or overturning restraint devices and does not consider additional contribution of gypsum board for capacity unless using a reduced seismic response modification coefficient, R.

The allowable unit shear capacity of 315 plf for seismic bracing was used in determining bracing length for IRC and is based on a factor of safety of 2.0. The IRC capacity includes the contribution of ½" gypsum board attached to the opposite side of the wood structural sheathing.

For the same nailing schedule (7/16" OSB, 8d common, 6/12), IBC allowable unit shear is 255 plf and based on a factor of safety of 2.8. The proposed adjustment for Table R602.10.3(3) is intended to bring the capacities into alignment by increasing the required wall bracing in the IRC by a factor of 315plf /255 plf ≈ 1.25. While there are additional considerations including seismic response for the wall bracing system and assumed percentage of partial restraint, the intent for this proposal is to align capacity and safety factors for both IBC and IRC for seismic design.

References

Sequential Phased Displacement Tests of Wood-frame Shear Walls with Corners, Report No. TE-1997-003, by J.D. Dolan and C.P. Heine, Brooks Forest Products Research Center, VPI&SU, Blacksburg, VA. September 14, 1997.

Cost Impact: The code change proposal will increase the cost of construction. It will be a minor increase.

RB298-13

Public Hearing: Committee: AS AM D
 Assembly: ASF AMF DF

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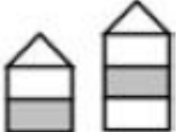


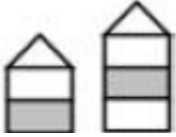

Table R602.10.3(3)

Proponent: Kevin S. Moore, S.E., Chair of Seismic Subcommittee to Code Advisory Committee, representing National Council of Structural Engineers Associations (ksmoore@sgh.com); Matt Mlakar, Chair of General Engineering Committee, Structural Engineers Association of California

Revise as follows:

Table R602.10.3(3)

BRACING REQUIREMENTS BASED ON SEISMIC DESIGN CATEGORY

<ul style="list-style-type: none"> • SOIL CLASS D^b • WALL HEIGHT = 10 FEET • 10 PSF FLOOR DEAD LOAD • 15 PSF ROOF/CEILING DEAD LOAD • BRACED WALL LINE SPACING ≤ 25 FEET 			MINIMUM TOTAL LENGTH (FEET) OF BRACED WALL PANELS REQUIRED ALONG EACH BRACED WALL LINE ^a				
Seismic Design Category	Story Location	Braced Wall Line Length (feet)	Method LIB ^c	Method GB	Methods DWB, SFB, PBS, PCP, HPS, CS-SFB ^d	Method WSP	Methods CS-WSP, CS-G
C (townhouses only)		10	2.5	2.5	2.5	1.6	1.4 <u>1.8</u>
		20	5.0	5.0	5.0	3.2	2.7 <u>3.5</u>
		30	7.5	7.5	7.5	4.8	4.1 <u>5.3</u>
		40	10.0	10.0	10.0	6.4	5.4 <u>7.0</u>
		50	12.5	12.5	12.5	8.0	6.8 <u>8.8</u>
		10	NP	4.5	4.5	3.0	2.6 <u>3.4</u>
		20	NP	9.0	9.0	6.0	5.1 <u>6.6</u>
		30	NP	13.5	13.5	9.0	7.7 <u>10.0</u>
		40	NP	18.0	18.0	12.0	10.2 <u>13.3</u>
		50	NP	22.5	22.5	15.0	12.8 <u>16.6</u>
		10	NP	6.0	6.0	4.5	3.8 <u>5.0</u>
		20	NP	12.0	12.0	9.0	7.7 <u>10.0</u>
		30	NP	18.0	18.0	13.5	11.5 <u>15.0</u>
		40	NP	24.0	24.0	18.0	15.3 <u>20.0</u>
		50	NP	30.0	30.0	22.5	19.1 <u>24.8</u>
D ₀		10	NP	2.8	2.8	1.8	1.6 <u>2.1</u>
		20	NP	5.5	5.5	3.6	3.1 <u>4.0</u>
		30	NP	8.3	8.3	5.4	4.6 <u>6.0</u>
		40	NP	11.0	11.0	7.2	6.1 <u>8.0</u>
		50	NP	13.8	13.8	9.0	7.7 <u>10</u>
		10	NP	5.3	5.3	3.8	3.2 <u>4.2</u>
		20	NP	10.5	10.5	7.5	6.4 <u>8.3</u>
		30	NP	15.8	15.8	11.3	9.6 <u>12.5</u>
		40	NP	21.0	21.0	15.0	12.8 <u>16.6</u>
		50	NP	26.3	26.3	18.8	16.0 <u>20.8</u>
		10	NP	7.3	7.3	5.3	4.5 <u>5.9</u>
		20	NP	14.5	14.5	10.5	9.0 <u>11.7</u>
		30	NP	21.8	21.8	15.8	13.4 <u>17.4</u>
		40	NP	29.0	29.0	21.0	17.9 <u>23.3</u>
		50	NP	36.3	36.3	26.3	22.3 <u>29.0</u>

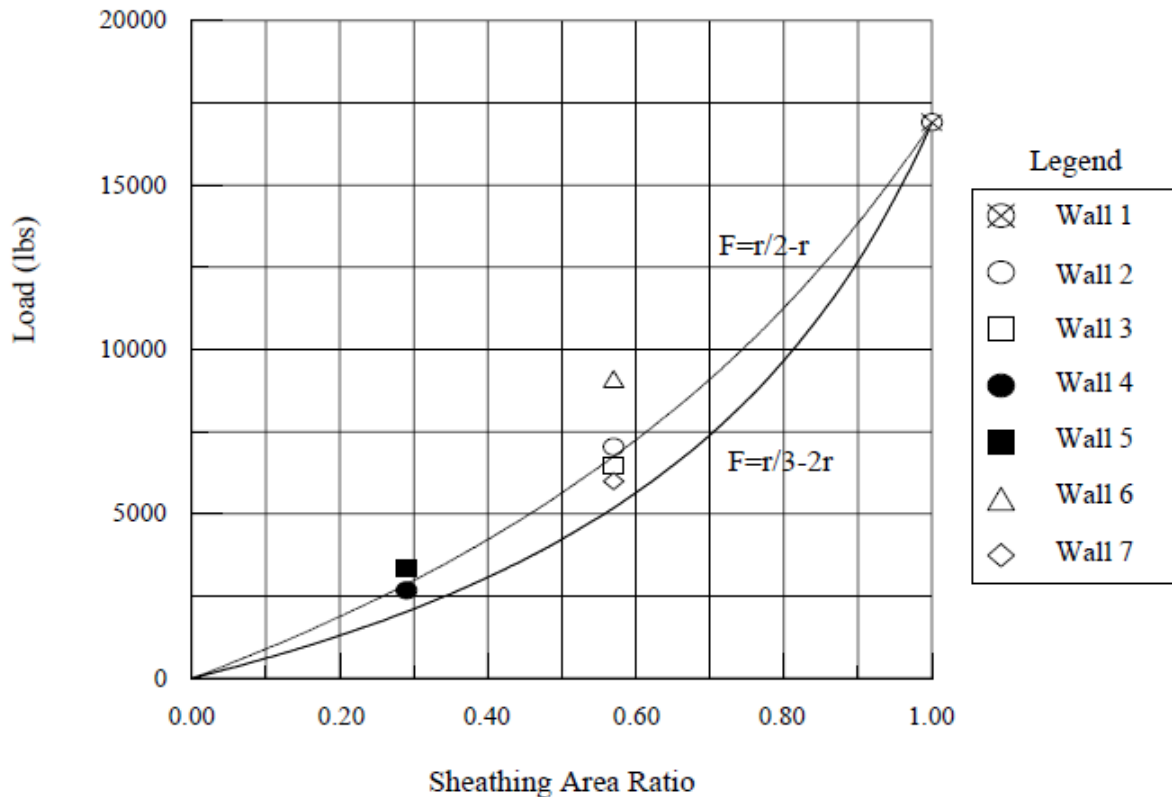
<ul style="list-style-type: none"> SOIL CLASS D^b WALL HEIGHT = 10 FEET 10 PSF FLOOR DEAD LOAD 15 PSF ROOF/CEILING DEAD LOAD BRACED WALL LINE SPACING ≤ 25 FEET 			MINIMUM TOTAL LENGTH (FEET) OF BRACED WALL PANELS REQUIRED ALONG EACH BRACED WALL LINE ^a				
D ₁		10	NP	3.0	3.0	2.0	4.7 <u>2.2</u>
		20	NP	6.0	6.0	4.0	3.4 <u>4.4</u>
		30	NP	9.0	9.0	6.0	5.1 <u>6.6</u>
		40	NP	12.0	12.0	8.0	6.8 <u>8.8</u>
		50	NP	15.0	15.0	10	8.5 <u>11.0</u>
		10	NP	6.0	6.0	4.5	3.8 <u>5.0</u>
		20	NP	12.0	12.0	9.0	7.7 <u>10.0</u>
		30	NP	18.0	18.0	13.5	11.5 <u>15.0</u>
		40	NP	24.0	24.0	18.0	15.3 <u>19.9</u>
		50	NP	30.0	30.0	22.5	19.1 <u>24.8</u>
		10	NP	8.5	8.5	6.0	5.1 <u>6.6</u>
		20	NP	17.0	17.0	12.0	10.2 <u>13.3</u>
		30	NP	25.5	25.5	18.0	15.3 <u>19.9</u>
		40	NP	34.0	34.0	24.0	20.4 <u>26.5</u>
		50	NP	42.5	42.5	30.0	25.5 <u>33.2</u>
D ₂		10	NP	4.0	4.0	2.5	2.1 <u>2.7</u>
		20	NP	8.0	8.0	5.0	4.3 <u>5.6</u>
		30	NP	12.0	12.0	7.5	6.4 <u>8.3</u>
		40	NP	16.0	16.0	10.0	8.5 <u>11.0</u>
		50	NP	20.0	20.0	12.5	10.6 <u>13.8</u>
		10	NP	7.5	7.5	5.5	4.7 <u>6.1</u>
		20	NP	15.0	15.0	11.0	9.4 <u>12.2</u>
		30	NP	22.5	22.5	16.5	14.0 <u>18.2</u>
		40	NP	30.0	30.0	22.0	18.7 <u>24.3</u>
		50	NP	37.5	37.5	27.5	23.4 <u>30.4</u>
		10	NP	NP	NP	NP	NP
		20	NP	NP	NP	NP	NP
		30	NP	NP	NP	NP	NP
		40	NP	NP	NP	NP	NP
		50	NP	NP	NP	NP	NP
	Cripple wall below one- or two- story building	10	NP	NP	NP	7.5	6.4 <u>8.3</u>
		20	NP	NP	NP	15.0	12.8 <u>16.6</u>
		30	NP	NP	NP	22.5	19.1 <u>24.8</u>
		40	NP	NP	NP	30.0	25.5 <u>33.2</u>
		50	NP	NP	NP	37.5	31.9 <u>41.5</u>

Reason: The purpose of this proposed code change is to adjust the current required minimum wall bracing for CS-WSP, CS-G methods for seismic designs using nominal strength and factor of safety consistent with IBC. It entails the following adjustments:

- 1) Use $F=r/(3-2r)$ for perforated shear walls (PSW) to determine strength for Continuous Sheathed Wood Structural Panel (CS-WSP) and Continuously Sheathed Wood Structural Panel Adjacent to Garage Openings (CS-G) bracing methods.
- 2) Use unit shear capacity consistent with IBC for (7/16" OSB, 8d common, 6/12) to determine wall bracing strength for CS-WSP and CS-G.
- 3) Revise minimum braced wall panels for CS-WSP and CS-G bracing method in Table R602.10.3(3) based on items 1 and 2 above.

The IBC solution for design of perforated shear wall is based on AWC SDPWS which uses $F=r/(3-2r)$ for modeling PSW that envelopes strength measured by tests. IRC uses $F=r/(2-r)$ which better represents the average of tests available.

Comparison of tests using the IRC model show some walls may be under designed as shown in the following graph. The two models shown represent the design capacity of the PSW used by IBC and IRC. The proposed values shown in Table R602.10.3(3) represent an increase of required wall length by a factor of 1.3. This ratio is the approximation for the largest difference between the two models shown below. This represents a conservative approach to establish consistency in factors of safety with IBC. A more refined adjustment is required to evaluate the bracing length requirements if the unit shear strength is adjusted as proposed in number 2 of this proposal. The data points represent measured capacity of the various wall openings.



References

- 1) J.D. Dolan and C.P., 1997 "Heine Sequential Phased Displacement Tests of Wood-frame Shear Walls with Corners," Report No. TE-1997-003, Brooks Forest Products Research Center, VPI&SU, Blacksburg, VA. September 14, 1997.
- 2) NAHB Research Center, Inc., 1998 "The Performance of Perforated Shear Walls with Narrow Wall Segments, Reduced Base Restraint, and Alternative Framing Methods," National Association of Home Builders and the U.S. Department of Housing and Urban Development, Washington, DC. May 1998.

Cost Impact: This code change proposal will not increase construction cost.

RB299-13

Public Hearing: Committee: AS AM D
 Assembly: ASF AMF DF

R602.10.3(3)T #2-RB-MLAKAR-MOORE.doc






RB300 – 13


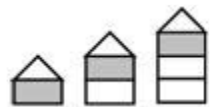




Table R602.10.3(3)


Proponent: Louis Wagner, Executive Director, North American Fiberboard Association
(lwagner@fiberboard.org)

Revise as follows:

TABLE R602.10.3(3)
BRACING REQUIREMENTS BASED ON SEISMIC DESIGN CATEGORY

<ul style="list-style-type: none"> • SOIL CLASS D^b • WALL HEIGHT = 10 FEET • 10 PSF FLOOR DEAD LOAD • 15 PSF ROOF/CEILING DEAD LOAD • BRACED WALL LINE SPACING ≤ 25 FEET 			MINIMUM TOTAL LENGTH (FEET) OF BRACED WALL PANELS REQUIRED ALONG EACH BRACED WALL LINE ^a				
Seismic Design Category	Story Location	Braced Wall Line Length (feet)	Method LIB ^c	Method GB	Methods DWB, SFB, PBS, PCP, HPS, CS-SFB ^d	Method WSP	Methods CS-WSP, CS-G
C (townhouses only)		10	2.5	2.5	2.5	1.6	1.4
		20	5.0	5.0	5.0	3.2	2.7
		30	7.5	7.5	7.5	4.8	4.1
		40	10.0	10.0	10.0	6.4	5.4
		50	12.5	12.5	12.5	8.0	6.8
		10	NP	4.5	4.5	3.0	2.6
		20	NP	9.0	9.0	6.0	5.1
		30	NP	13.5	13.5	9.0	7.7
		40	NP	18.0	18.0	12.0	10.2
		50	NP	22.5	22.5	15.0	12.8
		10	NP	6.0	6.0	4.5	3.8
		20	NP	12.0	12.0	9.0	7.7
		30	NP	18.0	18.0	13.5	11.5
		40	NP	24.0	24.0	18.0	15.3
		50	NP	30.0	30.0	22.5	19.1
D ₀		10	NP	2.8	2.8	1.8	1.6
		20	NP	5.5	5.5	3.6	3.1
		30	NP	8.3	8.3	5.4	4.6
		40	NP	11.0	11.0	7.2	6.1
		50	NP	13.8	13.8	9.0	7.7
		10	NP	5.3	5.3	3.8	3.2

<ul style="list-style-type: none"> SOIL CLASS D^b WALL HEIGHT = 10 FEET 10 PSF FLOOR DEAD LOAD 15 PSF ROOF/CEILING DEAD LOAD BRACED WALL LINE SPACING ≤ 25 FEET 			MINIMUM TOTAL LENGTH (FEET) OF BRACED WALL PANELS REQUIRED ALONG EACH BRACED WALL LINE ^a				
		20	NP	10.5	10.5	7.5	6.4
		30	NP	15.8	15.8	11.3	9.6
		40	NP	21.0	21.0	15.0	12.8
		50	NP	26.3	26.3	18.8	16.0
		10	NP	7.3	7.3	5.3	4.5
		20	NP	14.5	14.5	10.5	9.0
		30	NP	21.8	21.8	15.8	13.4
		40	NP	29.0	29.0	21.0	17.9
		50	NP	36.3	36.3	26.3	22.3
D ₁		10	NP	3.0	3.0	2.0	1.7
		20	NP	6.0	6.0	4.0	3.4
		30	NP	9.0	9.0	6.0	5.1
		40	NP	12.0	12.0	8.0	6.8
		50	NP	15.0	15.0	10.0	8.5
		10	NP	6.0	6.0	4.5	3.8
		20	NP	12.0	12.0	9.0	7.7
		30	NP	18.0	18.0	13.5	11.5
		40	NP	24.0	24.0	18.0	15.3
		50	NP	30.0	30.0	22.5	19.1
		10	NP	8.5	8.5	6.0	5.1
		20	NP	17.0	17.0	12.0	10.2
		30	NP	25.5	25.5	18.0	15.3
		40	NP	34.0	34.0	24.0	20.4
		50	NP	42.5	42.5	30.0	25.5
D ₂		10	NP	4.0	4.0	2.5	2.1
		20	NP	8.0	8.0	5.0	4.3
		30	NP	12.0	12.0	7.5	6.4
		40	NP	16.0	16.0	10.0	8.5
		50	NP	20.0	20.0	12.5	10.6
		10	NP	7.5	7.5	5.5	4.7

<ul style="list-style-type: none"> SOIL CLASS D^b WALL HEIGHT = 10 FEET 10 PSF FLOOR DEAD LOAD 15 PSF ROOF/CEILING DEAD LOAD BRACED WALL LINE SPACING ≤ 25 FEET 			MINIMUM TOTAL LENGTH (FEET) OF BRACED WALL PANELS REQUIRED ALONG EACH BRACED WALL LINE ^a				
		20	NP	15.0	15.0	11.0	9.4
		30	NP	22.5	22.5	16.5	14.0
		40	NP	30.0	30.0	22.0	18.7
		50	NP	37.5	37.5	27.5	23.4
		10	NP	NP	NP	NP	NP
		20	NP	NP	NP	NP	NP
		30	NP	NP	NP	NP	NP
		40	NP	NP	NP	NP	NP
		50	NP	NP	NP	NP	NP
	Cripple wall below one- or two-story dwelling	10	NP	NP	NP	7.5	6.4
		20	NP	NP	NP	15.0	12.8
		30	NP	NP	NP	22.5	19.1
		40	NP	NP	NP	30.0	25.5
		50	NP	NP	NP	37.5	31.9

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 pound per square foot = 0.0479 kPa.

a. Linear interpolation shall be permitted.

b. Wall bracing lengths are based on a soil site class "D." Interpolation of bracing length between the S_{ds} values associated with the Seismic Design Categories shall be permitted when a site-specific S_{ds} value is determined in accordance with Section 1613.3 of the *International Building Code*.

c. Method LIB shall have gypsum board fastened to at least one side with nails or screws per Table R602.3(1) for exterior sheathing or Table R702.3.5 for interior gypsum board. Spacing of fasteners at panel edges shall not exceed 8 inches.

d. Method CS-SFB applies in SDC G-only D_0 , D_1 and D_2 as allowed in Section R602.10.22.1.

Reason: Section R602.10.22.1 allows CS-SFB to be used in zones D_0 , D_1 and D_2 with the added requirement of a minimum panel width of 32" instead of the 24" minimum required for other continuous sheathings. This was part of an agreement reached during meetings of the Ad Hoc Committee on wall Bracing.

Related code changes have been submitted for TABLE R602.10.3(1) Footnote c, TABLE R602.10.3(3) Footnote d and Table R602.10.4 Footnote d. All three should be heard together.

Cost Impact: The code change proposal will not increase the cost of construction.

RB300-13

Public Hearing: Committee:
Assembly:

AS
ASF

AM
AMF

D
DF

R602.10.3(3)T #1-RB-WAGNER.doc

RB301 – 13

Table R602.10.3(4)

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

TABLE R602.10.3(4)
SEISMIC ADJUSTMENT FACTORS TO THE REQUIRED LENGTH OF WALL BRACING

ADJUSTMENT BASED ON:	STORY/SUPPORTING	CONDITION	ADJUSTMENT FACTOR ^{a,b} (Multiply length from Table R602.10.3(3) by this factor.)	APPLICABLE METHODS
Roof/ceiling dead load for wall supporting	1, 2 or 3 story building Roof only or roof plus one or two stories	≤ 15 psf	1.0	All methods
	Roof plus one or two stories 2 or 3 story building	>15 psf and ≤ 25 psf	1.1	
	Roof only 1 story building	>15 psf and ≤ 25 psf	1.2	

(Portions of Table not shown remain unchanged)

Reason: The purpose of this code change is to make this provision of the code clear and unambiguous. The current language is subject to interpretation. The term “roof” reference in the “**STORY/SUPPORTING**” column represents a roof and its supporting walls, i.e., single story. Thus, “roof only” is the roof + walls of a single story, “roof plus one or two stories” is a 2 or 3 story building, and “Roof only plus one or two stories” is a 1, 2 or 3 story building.

Without knowledge of the intent and just reading the entries in the “**STORY/SUPPORTING**” column it would be easy to misinterpret the intent of the code. For example “roof plus one or two stories” *sounds* like a 1 or 2 story building. But the intent of the code is “roof *and supporting walls* plus one or two *additional* stories”, or a 2 or 3 story building.

At 15 psf or less 1, 2 or 3 story buildings require no adjustment to the amount of bracing required. Between 15 and a maximum of 25 psf, the adjustment factor depends on the number of stories involved. This portion was not impacted by the proposed change.

We are asking the committee to please support the clarifying language, to better represent the intent of the IRC.

Cost Impact: The code change proposal will not increase the cost of construction.

RB301-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R602.10.3(4)T #1-RB-KEITH.doc

RB302 – 13

Table R602.10.3(4)

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

TABLE R602.10.3(4)
SEISMIC ADJUSTMENT FACTORS TO THE REQUIRED LENGTH OF WALL BRACING

ADJUSTMENT BASED ON:	STORY/SUPPORTING	CONDITION	ADJUSTMENT FACTOR ^{a,b} [Multiply length from Table R602.10.3(3) by this factor]	APPLICABLE METHODS
Walls with stone or masonry veneer, town-houses in SDC-C ^{d,e,f}	(Figure)		1.0	All intermittent and continuous methods
	(Figure)		1.5	
	(Figure)		1.5	

For SI: 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

- Linear interpolation shall be permitted.
- The total length of bracing required for a given wall line is the product of all applicable adjustment factors.
- The length-to-width ratio for the floor/roof *diaphragm* shall not exceed 3:1. The top plate lap splice nailing shall be a minimum of 12-16d nails on each side of the splice.
- Applies to stone or masonry veneer exceeding the first story height. See Section R602.10.6.5 for requirements when stone or masonry veneer does not exceed the first story height.
- The adjustment factor for stone or masonry veneer shall be applied to all exterior *braced wall lines* and all *braced wall lines* on the interior of the building, backing or perpendicular to and laterally supported veneered walls.
- Applies to stone and masonry veneer exceeding the first story height and not extending up into the gable end.

(Portions of Table not shown remain unchanged)

Reason: The purpose of these proposals is to clarify the IRC.

- The reference to Section R602.10.6.5 in the second portion of Footnote d is clearly applicable to SDCs D₀, D₁ and D₂ only. The above portion of the table is applicable to townhouses in SDC C. It is confusing referencing a footnote, part of which is clearly not relevant. It calls into question the relevant portions of the footnote. As the first portion of footnote d is applicable to townhouses in SDC C, to avoid confusion we propose the relevant information be duplicated in its own Footnote f.
- The second portion of the proposed footnote adds the gable end to the not-to-extend criteria. The IRC is clear that the line of demarcation between using the standard bracing provisions and the Method BV-WSP is when the brick or masonry veneer extends up past the first story height. It is not clear what to do when the veneer extends up the gable-end wall. The definition of story in Chapter 2 provided below could lead one to believe that the gable-end wall was part of the story below:

STORY. *That portion of a building included between the upper surface of a floor and the upper surface of the floor or roof next above.*

From a structural perspective, however the mass in a gable end-wall can equal or exceed the mass of a veneered second story. For example, a 40-foot wide building with a 12:12 pitch can have gable-end wall that is a maximum of 20 feet tall above the top of the wall below. As the area is triangular the average height of this gable-end wall is 10 feet tall. This is the same mass as a veneered 10 foot second story wall.

It is clearly NOT the intent of the IRC to permit the standard bracing provisions for only a single story UNLESS the same or larger mass is part of a gable-end wall. The above proposal clarifies the intent of this section with respect to veneered gable-end walls.

This portion of the proposed change is duplicated in another code change proposal.

Cost Impact: The code change proposal will not increase the cost of construction.

RB302-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R602.10.3(4)T #2-RB-KEITH.doc




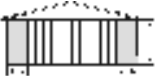



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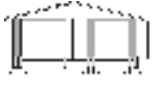
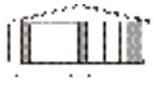




Table R602.10.4

Proponent: Louis Wagner, Executive Director, North American Fiberboard Association
(lwagner@fiberboard.org)

Revise as follows:

**TABLE R602.10.4
BRACING METHODS**

METHODS, MATERIAL		MINIMUM THICKNESS	FIGURE	CONNECTION CRITERIA ^a	
				Fasteners	Spacing
Intermittent Bracing Method	LIB Let-in-bracing	1 × 4 wood or approved metal straps at 45° to 60° angles for maximum 16" stud spacing		Wood: 2-8d common nails or 3-8d (2½" long x 0.113" dia.) nails	Wood: per stud and top and bottom plates
				Metal strap: per manufacturer	Metal: per manufacturer
	DWB Diagonal wood boards	¾"(1" nominal) for maximum 24" stud spacing		2-8d (2½" long × 0.113" dia.) nails or 2 - 1¾" long staples	Per stud
	WSP Wood structural panel (See Section R604)	¾"		Exterior sheathing per Table R602.3(3)	6" edges 12" field
				Interior sheathing per Table R602.3(1) or R602.3(2)	Varies by fastener
	BV-WSP^c Wood Structural Panels with Stone or Masonry Veneer (See Section R602.10.6.5)	7/16"	See Figure R602.10.6.5	8d common (2½" × 0.131) nails	4" at panel edges 12" at intermediate supports 4" at braced wall panel end posts
	SFB Structural fiberboard sheathing	½" or 25/32" for maximum 16" stud spacing		1½" long × 0.12" dia. (for ½" thick sheathing) 1¾" long × 0.12" dia. (for 25/32" thick sheathing) galvanized roofing nails or 8d common (2½" long × 0.131" dia.) nails	3" edges 6" field
	GB Gypsum board	½"		Nails or screws per Table R602.3(1) for exterior locations	For all braced wall panel locations: 7" edges (including top and bottom plates) 7" field
				Nails or screws per Table R702.3.5 for interior locations	
	PBS Particleboard sheathing (See Section R605)	3/8" or ½" for maximum 16" stud spacing		For 3/8", 6d common (2" long × 0.113" dia.) nails For ½", 8d common (2½" long × 0.131" dia.) nails	3" edges 6" field
	PCP Portland cement plaster	See Section R703.6 for maximum 16" stud spacing		1½" long, 11 gage, 7/16" dia. head nails or 7/8" long, 16 gage staples	6" o.c. on all framing members

METHODS, MATERIAL		MINIMUM THICKNESS	FIGURE	CONNECTION CRITERIA ^a	
				Fasteners	Spacing
Intermittent Bracing Methods	HPS Hardboard panel siding	7/16" for maximum 16" stud spacing		0.092" dia., 0.225" dia. head nails with length to accommodate 1 1/2" penetration into studs	4" edges 8" field
	ABW Alternate braced wall	3/8"		See Section R602.10.6.1	See Section R602.10.6.1
	PFH Portal frame with hold-downs	3/8"		See Section R602.10.6.2	See Section R602.10.6.2
	PFG Portal frame at garage	7/16"		See Section R602.10.6.3	See Section R602.10.6.3
	CS-WSP Continuously sheathed wood structural panel	3/8"		Exterior sheathing per Table R602.3(3) Interior sheathing per Table R602.3(1) or R602.3(2)	6" edges 12" field Varies by fastener
Continuous Sheathing Methods	CS-G^{b, c} Continuously sheathed wood structural panel adjacent to garage openings	3/8"		See Method CS-WSP	See Method CS-WSP
	CS-PF Continuously sheathed portal frame	7/16"		See Section R602.10.6.4	See Section R602.10.6.4
	CS-SFB^d Continuously sheathed structural fiberboard	1/2" or 25/32" for maximum 16" stud spacing		1 1/2" long x 0.12" dia. (for 1/2" thick sheathing) 1 3/4" long x 0.12" dia. (for 25/32" thick sheathing) galvanized roofing nails or 8d common (2 1/2" long x 0.131" dia.) nails	3" edges 6" field

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 degree = 0.0175 rad, 1 pound per square foot = 47.8 N/m², 1 mile per hour = 0.447 m/s.

- Adhesive attachment of wall sheathing, including Method GB, shall not be permitted in Seismic Design Categories C, D₀, D₁ and D₂.
- Applies to panels next to garage door opening when supporting gable end wall or roof load only. May only be used on one wall of the garage. In Seismic Design Categories D₀, D₁ and D₂, roof covering dead load may not exceed 3 psf.
- Garage openings adjacent to a Method CS-G panel shall be provided with a header in accordance with Table R502.5(1). A full height clear opening shall not be permitted adjacent to a Method CS-G panel.
- Method CS-SFB does not apply in Seismic Design Categories D₀, D₁ and D₂ ~~and in areas where the wind speed exceeds 100 mph, except as allowed in Section R602.10.22.1.~~
- Method applies to detached one- and two-family dwellings in Seismic Design Categories D₀ through D₂ only.

Reason: Section R602.10.22.1 allows CS-SFB to be used in zones D₀, D₁ and D₂ with the added requirement of a minimum panel width of 32" instead of the 24" minimum required for other continuous sheathings. This was part of an agreement reached during meetings of the Ad Hoc Committee on wall Bracing.

There is a logical inconsistency in prohibiting CS-SFB when SFB which uses less bracing material is permitted. CS-SFB has already been penalized by ranking it lower than other continuous sheathings.

Related code changes have been submitted for Table R602.10.3(1) Footnote c, Table R602.10.3(3) Footnote d and Table R602.10.4 Footnote d. All three should be heard together.

Cost Impact: The code change proposal will not increase the cost of construction.

RB303-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.10.4T-RB-WAGNER.doc


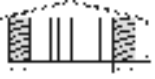



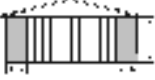

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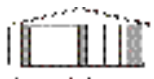




Table R602.10.4

Proponent: Kevin S. Moore, S.E., Chair of Seismic Subcommittee to Code Advisory Committee, representing National Council of Structural Engineers Associations (ksmoore@sgh.com); Matt Mlakar, Chair of General Engineering Committee, Structural Engineers Association of California

Revise as follows:

**TABLE R602.10.4
BRACING METHODS**

METHODS, MATERIAL		MINIMUM THICKNESS	FIGURE	CONNECTION CRITERIA ^a	
				Fasteners	Spacing
Intermittent Bracing Method	LIB Let-in-bracing	1 × 4 wood or approved metal straps at 45° to 60° angles for maximum 16" stud spacing		Wood: 2-8d common nails or 3-8d (2½" long x 0.113" dia.) nails	Wood: per stud and top and bottom plates
				Metal strap: per manufacturer	Metal: per manufacturer
	DWB Diagonal wood boards	¾"(1" nominal) for maximum 24" stud spacing		2-8d (2½" long × 0.113" dia.) nails or 2 - 1¾" long staples	Per stud
	WSP Wood structural panel (See Section R604)	$\frac{3}{8}"$ <u>7/16"</u>		Exterior sheathing per Table R602.3(3)	6" edges 12" field
				Interior sheathing per Table R602.3(1) or R602.3(2)	Varies by fastener
	BV-WSP^e Wood Structural Panels with Stone or Masonry Veneer (See Section R602.10.6.5)	7/16"	See Figure R602.10.6.5	8d common (2½" × 0.131) nails	4" at panel edges 12" at intermediate supports 4" at braced wall panel end posts
	SFB Structural fiberboard sheathing	½" or 25/32" for maximum 16" stud spacing		1½" long × 0.12" dia. (for ½" thick sheathing) 1¾" long × 0.12" dia. (for 25/32" thick sheathing) galvanized roofing nails or 8d common (2½" long × 0.131" dia.) nails	3" edges 6" field
	GB Gypsum board	½"		Nails or screws per Table R602.3(1) for exterior locations Nails or screws per Table R702.3.5 for interior locations	For all braced wall panel locations: 7" edges (including top and bottom plates) 7" field
	PBS Particleboard sheathing (See Section R605)	3/8" or ½" for maximum 16" stud spacing		For 3/8", 6d common (2" long × 0.113" dia.) nails For ½", 8d common (2½" long × 0.131" dia.) nails	3" edges 6" field
	PCP Portland cement plaster	See Section R703.6 for maximum 16" stud spacing		1½" long, 11 gage, 7/16" dia. head nails or 7/8" long, 16 gage staples	6" o.c. on all framing members

METHODS, MATERIAL	MINIMUM THICKNESS	FIGURE	CONNECTION CRITERIA ^a		
			Fasteners	Spacing	
HPS Hardboard panel siding	$\frac{7}{16}$ " for maximum 16" stud spacing		0.092" dia., 0.225" dia. head nails with length to accommodate 1½" penetration into studs	4" edges 8" field	
ABW Alternate braced wall	$\frac{3}{8}$ " <u>$\frac{7}{16}$"</u>		See Section R602.10.6.1	See Section R602.10.6.1	
Intermittent Bracing Methods	PFH Portal frame with hold-downs	$\frac{3}{8}$ " <u>$\frac{7}{16}$"</u>		See Section R602.10.6.2	See Section R602.10.6.2
	PFG Portal frame at garage	$\frac{7}{16}$ "		See Section R602.10.6.3	See Section R602.10.6.3
Continuous Sheathing Methods	CS-WSP Continuously sheathed wood structural panel	$\frac{3}{8}$ " <u>$\frac{7}{16}$"</u>		Exterior sheathing per Table R602.3(3)	6" edges 12" field
				Interior sheathing per Table R602.3(1) or R602.3(2)	Varies by fastener
	CS-G^{b,c} Continuously sheathed wood structural panel adjacent to garage openings	$\frac{3}{8}$ " <u>$\frac{7}{16}$"</u>		See Method CS-WSP	See Method CS-WSP
	CS-PF Continuously sheathed portal frame	$\frac{7}{16}$ "		See Section R602.10.6.4	See Section R602.10.6.4
	CS-SFB^d Continuously sheathed structural fiberboard	$\frac{1}{2}$ " or $\frac{25}{32}$ " for maximum 16" stud spacing		$1\frac{1}{2}$ " long \times 0.12" dia. (for $\frac{1}{2}$ " thick sheathing) $1\frac{3}{4}$ " long \times 0.12" dia. (for $\frac{25}{32}$ " thick sheathing) galvanized roofing nails or 8d common ($2\frac{1}{2}$ " long \times 0.131" dia.) nails	3" edges 6" field

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 degree = 0.0175 rad, 1 pound per square foot = 47.8 N/m², 1 mile per hour = 0.447 m/s.

- Adhesive attachment of wall sheathing, including Method GB, shall not be permitted in Seismic Design Categories C, D₀, D₁ and D₂.
- Applies to panels next to garage door opening when supporting gable end wall or roof load only. May only be used on one wall of the garage. In Seismic Design Categories D₀, D₁ and D₂, roof covering dead load may not exceed 3 psf.
- Garage openings adjacent to a Method CS-G panel shall be provided with a header in accordance with Table R502.5(1). A full height clear opening shall not be permitted adjacent to a Method CS-G panel.
- Method CS-SFB does not apply in Seismic Design Categories D₀, D₁ and D₂ and in areas where the wind speed exceeds 100 mph.
- Method applies to detached one- and two-family dwellings in Seismic Design Categories D₀ through D₂ only.

Reason: The IRC wall bracing capacity for WSP, CS-WSP and CS-G in Table R602.10.4 are currently based on research from Virginia Tech as reported in TE-1997-003. The wood structural panel sheathing used in the test specimen was 7/16" OSB with 1/2" gypsum board sheathing on the opposite side of 2x framing. The 2012 IRC Table R602.10.3(3) bracing requirements are based on a nominal strength of 634 plf with safety factor of 2 used as

design value for application of perforated shear wall to determine WSP, CS-WSP and CS-G minimum braced wall lengths. In addition the joint task force of the City of Los Angeles Department of Building and Safety and the Structural Engineers Association of Southern California (SEAOSC) reported observed failures from the 1994 Northridge earthquake that occurred at the inner ply joint line of 3/8" three-ply plywood. The task force attributed the failure to a greater detrimental effect of overdriven fasteners with 3/8" three-ply plywood as compared to thicker plywood sheathing.

References

- 1) J.D. Dolan and C.P. Heine, 1997, "Sequential Phased Displacement Tests of Wood-frame Shear Walls with Corners," Report No. TE-1997-003, Brooks Forest Products Research Center, VPI&SU, Blacksburg, VA. September 14, 1997.
- 2) B. Schmidt, R. Harder, circa 1994, "Report on Plywood Shear Wall Performance," City of Los Angeles Department of Building and Safety and Structural Engineers Associations of Southern California Joint Task Force Plywood Shear Wall Committee,

Cost Impact: This code change proposal may increase construction cost.

RB304-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.10.4T-RB-MLAKAR-MOORE.doc

RB305 – 13

R602.10.4.1

Proponent: Edward L. Keith, APA – The Engineered Wood Association(ed.keith@apawood.org)

Revise as follows:

R602.10.4.1 Mixing methods. Mixing of bracing methods shall be permitted as follows:

1. Mixing intermittent bracing and continuous sheathing methods from story to story shall be permitted.
2. Mixing intermittent bracing methods from *braced wall line* to *braced wall line* within a story shall be permitted. Within Seismic Design Categories A, B and C or and in regions where the basic wind speed is less than or equal to 100 mph (45 m/s), mixing of intermittent bracing and continuous sheathing methods from *braced wall line* to *braced wall line* within a story shall be permitted.
3. Mixing intermittent bracing methods along a *braced wall line* shall be permitted in Seismic Design Categories A and B, and detached dwellings in Seismic Design Category C provided the length of required bracing in accordance with Table R602.10.3(1) or R602.10.3(3) is the highest value of all intermittent bracing methods used.
4. Mixing of continuous sheathing methods CS-WSP, CS-G and CS-PF along a *braced wall line* shall be permitted.
5. In Seismic Design Categories A and B, and for detached one- and two-family dwellings in Seismic Design Category C, mixing of intermittent bracing methods along the interior portion of a *braced wall line* with continuous sheathing methods CS-WSP, CS-G and CS-PF along the exterior portion of the same *braced wall line* shall be permitted. The length of required bracing shall be the highest value of all intermittent bracing methods used in accordance with Table R602.10.3(1) or R602.10.3(3) as adjusted by Tables R602.10.3(2) and R602.10.3(4), respectively. The requirements of Section R602.10.7 shall apply to each end of the continuously sheathed portion of the *braced wall line*.

Reason: The intent of the code provision as written is that mixing bracing types from one braced wall line to another braced wall line within a story is to be permitted in areas of relatively low hazard. Thus BOTH criteria must be met - Seismic Design Categories A, B and C and where the basic wind speed is less than or equal to 100 mph (45 m/s). It was not the intent of the proposal to permit mixing when only one of the criteria was met, e.g., OK in SDC D₂ at 90 mph, or OK in <110 mph if SDC C. Both relatively low hazard criteria must be met.

Cost Impact: The code change proposal will not increase the cost of construction.

RB305-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.10.4.1 #1-RB-KEITH.doc

RB306 – 13

R602.10.4.1

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

R602.10.4.1 Mixing methods. Mixing of bracing methods shall be permitted as follows:

1. Mixing intermittent bracing and continuous sheathing methods from story to story shall be permitted.
2. Mixing intermittent bracing methods from *braced wall line* to *braced wall line* within a story shall be permitted. Within Seismic Design Categories A, B and C or in regions where the basic wind speed is less than or equal to 100 mph (45 m/s), mixing of intermittent bracing and continuous sheathing methods from *braced wall line* to *braced wall line* within a story shall be permitted.
3. Mixing intermittent bracing methods along a *braced wall line* shall be permitted in Seismic Design Categories A and B, and detached dwellings in Seismic Design Category C provided the length of required bracing in accordance with Table R602.10.3(1) or R602.10.3(3) is the highest value of all intermittent bracing methods used.
4. Mixing of continuous sheathing methods CS-WSP, CS-G and CS-PF along a *braced wall line* shall be permitted. Intermittent methods ABW, PFH, and PFG shall also be permitted to be used along a braced wall line with continuous sheathed methods.
5. In Seismic Design Categories A and B, and for detached one- and two-family dwellings in Seismic Design Category C, mixing of intermittent bracing methods along the interior portion of a *braced wall line* with continuous sheathing methods CS-WSP, CS-G and CS-PF along the exterior portion of the same *braced wall line* shall be permitted. The length of required bracing shall be the highest value of all intermittent bracing methods used in accordance with Table R602.10.3(1) or R602.10.3(3) as adjusted by Tables R602.10.3(2) and R602.10.3(4), respectively. The requirements of Section R602.10.7 shall apply to each end of the continuously sheathed portion of the *braced wall line*.

Reason: It was never the intent of the Ad Hoc Bracing Committee to restrict the shear wall and portal frame methods (Methods ABW, PFH, and PFG) only for use with the intermittent bracing methods. These three methods have their basis in the alternate bracing methods of the 2006 IRC and were developed principally for use at garage door locations and other locations where full length bracing panels are not practical. Such situations are common to most structures whether intermittent or continuous methods are used. There is no rational reason to restrict their use to intermittent bracing only.

Note that the anchorage requirements of the Methods PFH and ABW meets or exceeds the normally-required anchorage requirements of the continuously sheathed return corner, 800 lbf or 1,800 lbf alternative. If used, the Method PFG portal would have to comply with the corner requirements of Sections R602.10.2.2.1 and/or R602.10.7, as applicable.

Cost Impact: The code change proposal will not increase the cost of construction.

RB306-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.10.4.1 #2-RB-KEITH.doc

RB307 – 13

R602.10.4.1

Proponent: Randall Shackelford, P.E., Simpson Strong-Tie Company, Inc.,
(rshackelford@strongtie.com)

Revise as follows:

R602.10.4.1 Mixing methods. Mixing of bracing methods shall be permitted as follows:

1. Mixing intermittent bracing and continuous sheathing methods from story to story shall be permitted.
2. Mixing intermittent bracing methods from *braced wall line* to *braced wall line* within a story shall be permitted. In regions within Seismic Design Categories A, B and C ~~or in regions~~ where the basic wind speed is less than or equal to 100 mph (45 m/s), mixing of intermittent bracing and continuous sheathing methods from *braced wall line* to *braced wall line* within a story shall be permitted.
3. Mixing intermittent bracing methods along a *braced wall line* shall be permitted in Seismic Design Categories A and B, and detached dwellings in Seismic Design Category C provided the length of required bracing in accordance with Table R602.10.3(1) or R602.10.3(3) is the highest value of all intermittent bracing methods used.
4. Mixing of continuous sheathing methods CS-WSP, CS-G and CS-PF along a *braced wall line* shall be permitted.
5. In Seismic Design Categories A and B, and for detached one- and two-family dwellings in Seismic Design Category C, mixing of intermittent bracing methods along the interior portion of a *braced wall line* with continuous sheathing methods CS-WSP, CS-G and CS-PF along the exterior portion of the same *braced wall line* shall be permitted. The length of required bracing shall be the highest value of all intermittent bracing methods used in accordance with Table R602.10.3(1) or R602.10.3(3) as adjusted by Tables R602.10.3(2) and R602.10.3(4), respectively. The requirements of Section R602.10.7 shall apply to each end of the continuously sheathed portion of the *braced wall line*.

Reason: The reason for this proposal is to clarify when intermittent and continuous bracing methods can be mixed within a story. I believe the "or" needs to be deleted because the language is too permissive and the sentence needs to be re-written so that the location has to be in SDC A, B, or C and have a basic windspeed ≤ 100 mph.

As currently written, because of the use of the term "or", a structure could be located within Seismic Design Category D₂, but as long as the basic wind speed is less than or equal to 100 mph, it would be permitted to have braced wall lines on the same story with different bracing methods.

That is not the intention of these provisions as they were originally written. The original intent was to limit mixing of intermittent and continuous methods to lower wind and lower seismic areas. In higher hazard areas, it is not advisable to mix braced wall lines of intermittent and continuous bracing methods in the same story because there can be a stiffness difference between the various methods.

The revised wording restores the original intent of this section.

Cost Impact: The main impact of this will be in higher seismic areas where constructing braced wall lines on the same story of intermittent and continuous bracing methods will be clearly prohibited (as it should have been all along). There conceivably could be a slight cost increase if a builder were using intermittent bracing methods with inexpensive sheathing between braces on some walls, and continuous sheathing on other walls on the same story, and had to change all walls to continuous sheathing so a continuous portal frame could be used.

RB307-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.10.4.1-RB-SHACKELFORD.doc

RB308 – 13

R602.10.4.4 (NEW), Table R602.10.4.4 (NEW)

Proponent: Kirk Grundahl, Qualtim, representing the Structural Building Components Association (SBCA) (kgrundahl@qualtim.com)

Add new text as follows:

R602.10.4.4 Design Values. For the purpose of braced wall design, the capacity of wood structural panels to resist lateral loads, as found in Table R 602.10.3(1) are found in Table R602.10.4.4.

**TABLE R602.10.4.4
SIMPLIFIED SHEAR VALUES FOR BRACED WALL LINES**

<u>Sheathing Material</u>	<u>Bottom plate connection to foundation</u>	<u>Fastener</u>	<u>Fastener Spacing</u>	<u>Any Species Stud Framing</u>		
				<u>Tested capacity</u>	<u>System Effects Factor</u>	<u>IRC Lateral Design Capacity</u>
<u>3/8", 7/16" or 15/32" WSP @16" and 24" o.c framing -- Wind.</u>	<u>Anchor bolts in accordance with code requirements</u>	<u>6d (2" x 0.113" nails) or 8d (2 1/2 x 0.131"</u>	<u>6:12</u>	<u>335</u>	<u>1.80</u>	<u>600</u>
<u>3/8", 7/16" or 15/32" WSP @16" and 24" o.c framing (with 1/2" gypsum on interior face of wall. -- Wind</u>	<u>Anchor bolts in accordance with code requirements</u>	<u>6d (2" x 0.113") or 8d (2 1/2 x 0.131" nails and Types S or W drywall screws.</u>	<u>6:12 WSP & 16:16 for GWB</u>	<u>465</u>	<u>1.80</u>	<u>840</u>

a. The lateral design capacity of braced wall panels is based on full scale wall assembly tests using the minimum restraint provisions of the IRC, further adjusted by the partial restraint/systems effect factor.

Reason: Over the past several years, SBCRI has conducted a great deal of research into the requirements of the IRC, section R602.10 and the design capacity of wall assemblies built to those provisions. Table R602.10.3(1), Bracing Requirements Based on Wind Speed, was developed by the Ad-Hoc Wall Bracing Committee. The Lateral Design Capacity shown in the table above is the capacity determined by the committee to be used as the nominal strength of braced wall panels built to the minimum requirements of the IRC and using Method WSP. The braced wall panel lengths shown in Table R602.10.3(1) were calculated using these values. The system effect factor shown simply shows the factor required to be multiplied by the actual performance wood structural panels in buildings constructed to the minimum requirements of the IRC in order to achieve the stated lateral design capacity. This factor accounts for the increase in capacities due to additional framing, interior partitions, floor and ceiling framing, corner framing, etc. The tested capacities shown are the approximate capacities of wood structural panels used in buildings built to the minimum requirements of the IRC. Table R602.10.1 simply adds design value transparency to this section to show what the assumed system effect is once all of the building's construction detailing has been completed (i.e. additional strength from the addition of interior partitions, windows and doors, corner framing, interior gypsum, etc.). This approach is intended to be an aid to all registered design professionals as they make decisions about how best to resist applied loads and the safety considerations thereof. Full details of this research can be found at <http://sbcri.info/bwpex.php> and additional background on current design values is found here <http://sbcri.info/bcters.php>. In addition, the Background on how the IRC wall bracing provisions were derived can be found in an article by Crandell-Martin in the spring 2009 edition of Wood Design Focus, "The Story Behind the 2009 IRC Wall Bracing Provisions (Part 2: New Wind Bracing Requirements)"

Cost Impact: This code change proposal will not increase the cost of construction.

RB308-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R602.10.4.4 (NEW)-RB-GRUNDAHL.doc

RB309 – 13

R602.10.4.4 (NEW), Table R602.10.4.4 (NEW)

Proponent: Larry Wainright. Qualtim, representing the Structural Building Components Association (SBCA) (lwainright@qualtim.com)

Add new text as follows:

R602.10.4.4 Braced Wall Panel Design. Subject to the limitations of Section R602.10, the design of braced wall panels using the bracing methods defined in section R602.10.4 shall be in accordance with Table R602.10.4.4.

TABLE R602.10.4.4
BRACED WALL PANEL DESIGN CAPACITIES

<u>Bracing Method</u>	<u>Baseline capacity (PLF)</u>	<u>Partial Restraint/System Effects Factor</u>	<u>IRC Lateral Design Capacity (PLF)^a</u>
<u>LIB, GWB</u>	<u>400</u>	<u>1.2</u>	<u>480</u>
<u>DWB, WSP, SFB, PBS, PCP, HPS, CS-SFB</u>	<u>700</u>	<u>1.2</u>	<u>840</u>
<u>CS-WSP, CS-G, CS-PF</u>	<u>820</u>	<u>1.2</u>	<u>985</u>

a. The lateral design capacity of braced wall panels is based on fully restrained wall assembly tests (with holddowns) further adjusted by the partial restraint/systems effect factor.

Reason: Over the past several years, SBCRI has conducted a great deal of research into the requirements of the IRC, section R602.10 and the design capacity of wall assemblies built to those provisions. Table R602.10.3(1), Bracing Requirements Based on Wind Speed, was developed by the Ad-Hoc Wall Bracing Committee. The Lateral Design Capacity shown in the table above is the capacity determined by the committee to be used as the nominal strength of braced wall panels built to the minimum requirements of the IRC. The committee used as the basis for these design values, wall assembly test data from testing in accordance with ASTM E72, E564 or E2126. The braced wall panel lengths shown in Table R602.10.3(1) were calculated using these capacities. Table R602.10.4.4 simply adds design value transparency to this section by showing clearly what the assumed design capacity of braced wall panels is. This approach is intended to be an aid to all registered design professionals as they make decisions about how best to resist applied loads and the safety considerations thereof. The technical background on how the IRC wall bracing provisions were derived can be found in an article by Crandell-Martin in the spring 2009 edition of Wood Design Focus, "The Story Behind the 2009 IRC Wall Bracing Provisions (Part 2: New Wind Bracing Requirements)" Further research in this area by SBCRI can be found at <http://sbcri.info/bwpex.php> and additional background on current design values is found here <http://sbcri.info/bcters.php>

Cost Impact: This proposal will not increase the cost of construction.

RB309-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.10.4.4 (NEW)-RB-WAINRIGHT.doc

RB310 – 13

Table R602.10.5

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

TABLE R602.10.5
MINIMUM LENGTH OF BRACED WALL PANELS

METHOD (See Table R602.10.4)		MINIMUM LENGTH ^a (in.)					CONTRIBUTING LENGTH (in.)
		WALL HEIGHT					
		8 ft	9 ft	10 ft	11 ft	12 ft	
CS-PF	<u>SDC A, B and C</u>	<u>16</u>	<u>18</u>	<u>20</u>	<u>22^e</u>	<u>24^e</u>	<u>1.5 x Actual^b</u>
	<u>SDC D₀, D₁ and D₂</u>	16	18	20	22 ^e	24 ^e	Actual ^b

(Portions of Table not shown remain unchanged)

Reason: Currently Method PFG (Portal Frame at Garage) is permitted in the 2012 IRC Table R602.10.5 with a 1.5 multiplier to convert the leg length to a length contributing to bracing. The multiplier was permitted because Method PFG was restricted for use in areas of low seismicity (SDCs A, B and C).

Cyclic testing conducted at APA in 2006 of the CS-PF (Continuous Sheathed – Portal Frame) showed that the CS-PF has a design strength at least as high as the PFG tested in a similar manner. Based on the results of this testing it is reasonable to permit the same multiplier to be applied to the Method CS-PF when similarly restricted to areas of low seismicity as is Method PFG.

Please note that the CS-PF portal frame can have a leg length as small as 16 inches, where the PFG has a minimum leg length of 24 inches. What makes the CS-PF perform as well or better than the PFG, even with a shorter leg length, is the fact that the CS-PF has nearly twice as many fasteners as the PFG. It is the fastener interaction between the framing and sheathing that determine the ultimate capacity of this wood-structural-panel/framing bracing system.

Note that the IRC bracing provisions are difficult to meet in many cases as a result of narrow building lots and the aesthetic requirements of modern homes. Areas around garages and picture windows are especially difficult to accommodate and still meet the minimum bracing requirements of the code. Permitting the equal-to-stronger minimum 16-inch CS-PF the same multiplier as the 24-inch PFG is both rational and extremely helpful in making the 2012 IRC bracing provisions viable.

We ask the committee to extend the same multiplier to the 16-inch CS-PF that is applied to the 24-inch PFG when the same use restrictions are applied. This is based on full-scale cyclic load tests described in APA Test Report T2006-29 and NAHB-Research Center Test Report EG5522_08216.

Cost Impact: The code change proposal will not increase the cost of construction.

RB310-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R602.10.5T-RB-KEITH.doc

RB311 – 13

Figure R602.10.6.2

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

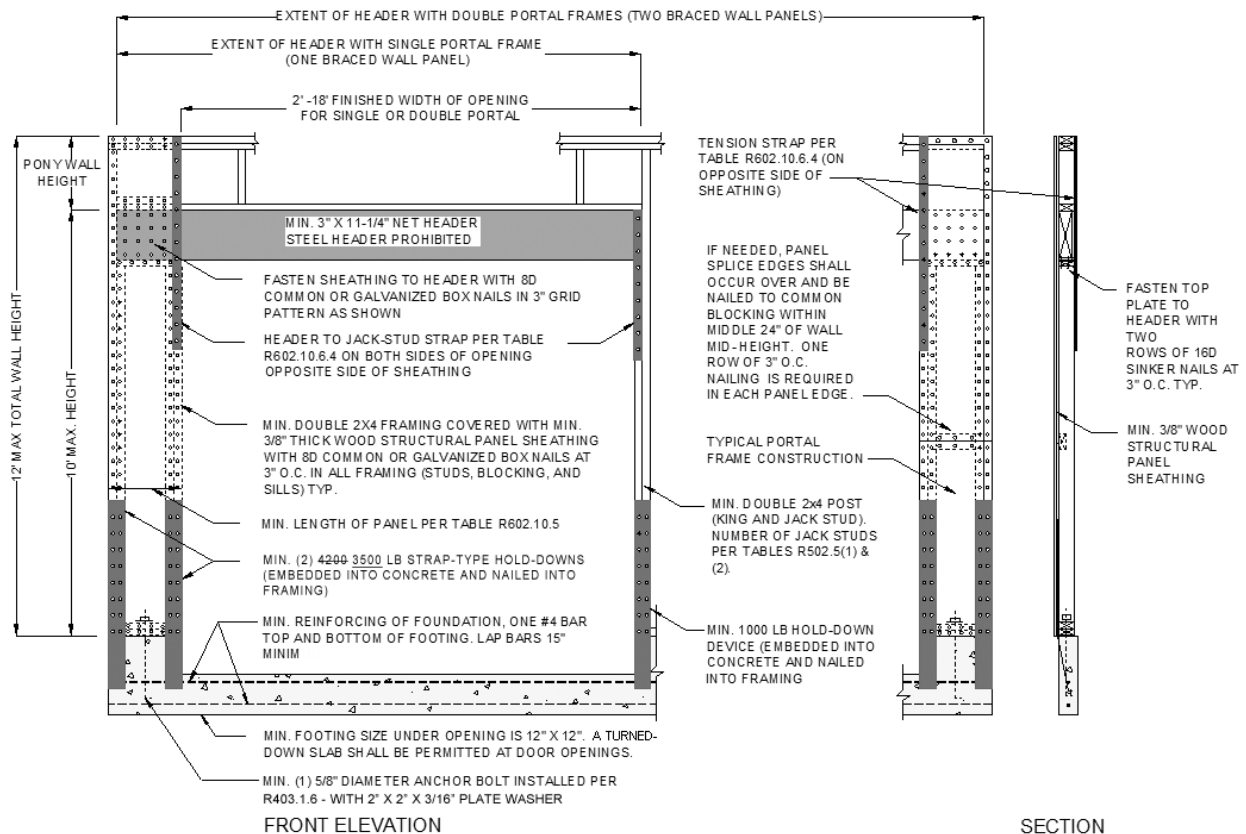


FIGURE R602.10.6.2
METHOD PFH-PORTAL FRAME WITH HOLD-DOWNS

Reason: This is a companion item to S291-12/13 adopted in Portland in the October Final Action Hearing.

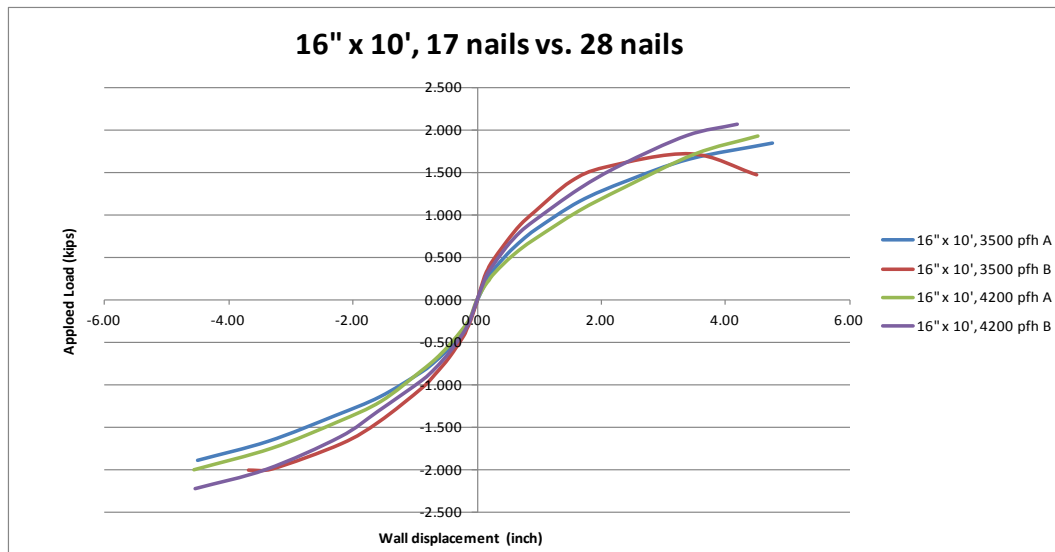
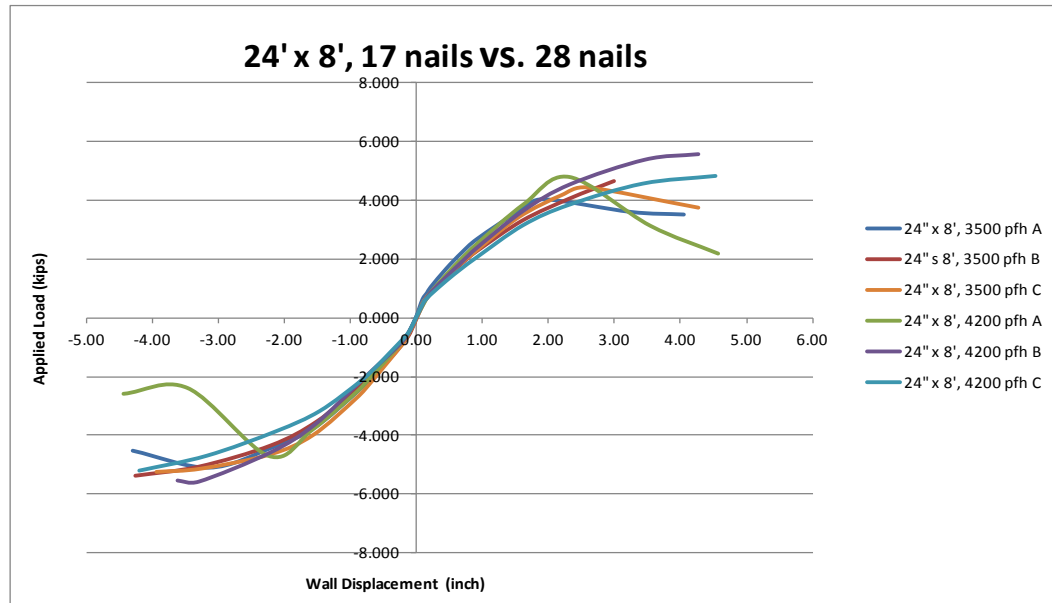
1) There are a couple of types of changes to Figure 2308.9.3.2 proposed. There are both technical changes and editorial changes.

Technical changes: The two technical changes made to the figure are the reduction of the capacity of the portal frame leg tie-down devices from 4200 lbf to 3500 lbf and the removal of the third bottom plate at the portal frame leg. (Note that the third bottom plate we propose to delete is NOT shown in the figure above. The normal strikethrough and underline procedures are difficult to apply to figure changes.)

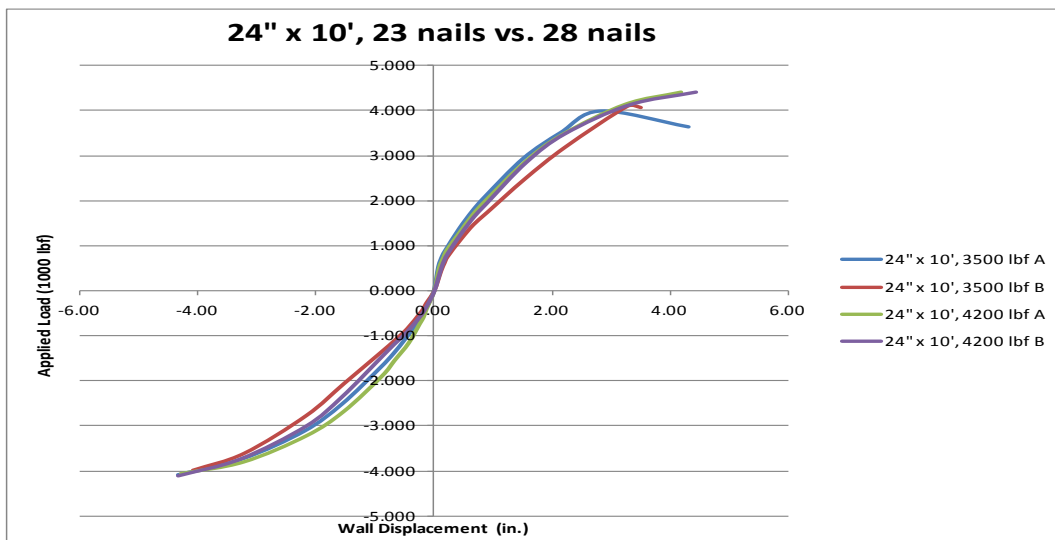
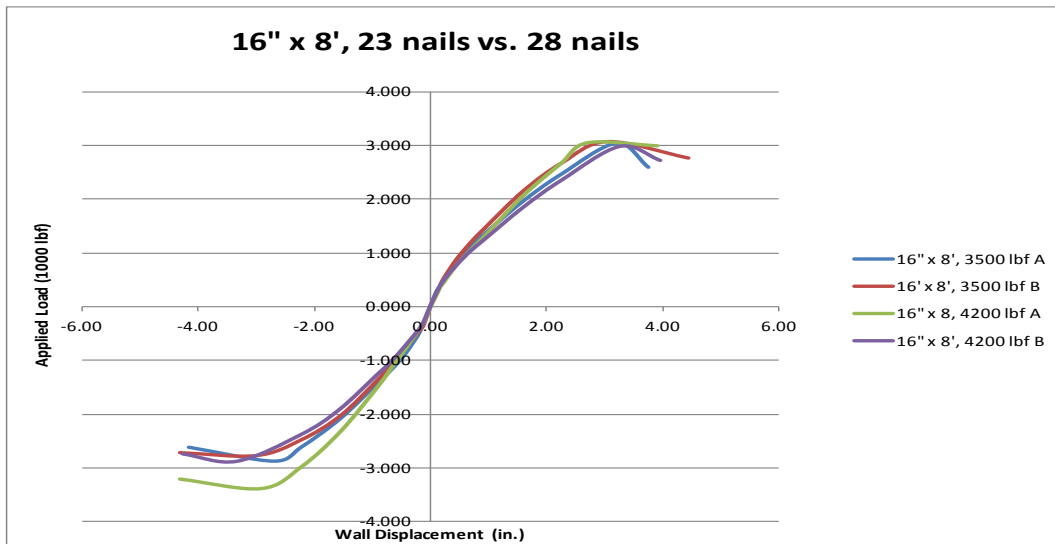
- A. The first technical change is the reduction of the tie-down from 4200 lbf to 3500 lbf. The initial testing was conducted on the portal frames utilizing the 4200 lbf hold down because that was what was readily available and in common use by the construction industry. At the time of initial testing, no attempt was made to determine the sensitivity of the system to such a reduction in tie-down capacity. As the initial prescriptive parameters of the portal frame were based on testing, there was no latitude for determining the impact of the industry wide reduction to such tie-downs in response to the cracked-concrete provisions of ACI 318. As such, retesting of the portal frames with both 4200 lbf and 3500 lbf tie-downs was necessary to determine the impact on the performance of the system, if any. Portals with 24-inch wide legs x 8 foot height as well as 16-inch wide x 10 feet high were tested by APA. Pairs of each size were tested with 4200 lbf tie-downs and then retested with 3500 lbf tie-downs. Upon consultation with Simpson Strong-Tie technical personnel it was determined that the 3500 lbf capacity would be simulated by using 17 nails in the 4,200 lb strap. The 4,200 lb capacity of the strap was achieved by filling all 28 holes in the strap even though 21 nails would yield the 4,200 lbf capacities. This was done

to simulate actual field installed conditions. The results of these tests as seen below illustrate that the whole portal frame system was relatively insensitive to the reduction in tie-down capacity within the over-nailed 4200 lbf to 3500 lbf range. No attempt was made to determine how low the tie-down capacity could be reduced before an impact on the performance of the portal frames could be seen.

These tests were conducted using the CUREe method, as described in ASTM E2126, with a frequency of 0.5 Hz. The following charts show the backbone curves for the Method PFH portal frames tested with 3500 lbf and 4200 lbf tie-downs at both the 24-inch wide leg portals 8-feet high as well as the 16-inch wide portals 10-feet high. These are the extremes of the possible portal frame geometries from the most rigid (24-inch wide leg portals 8-feet high) to the least rigid (16-inch wide portals 10-feet high).



The results of the above tests agree favorably with previous testing conducted with varying numbers of fasteners as seen below:



- B. The second technical change is the removal of the third bottom plate. The attached figure shows the third bottom plate removed from the figure. As mentioned above the original testing was conducted with the third plate in place. The third plate causes numerous difficulties in the field, not the least of which is that the normal length threaded anchors are too short to accommodate the third plate and provide the required depth of penetration into the foundation. This results in inadequate anchor depth-of-embedment or the use of threaded sleeves and all-thread to extend the bolt length to accommodate the third plate. When investigating the change to the 3500 lbf hold down, we utilized this opportunity to run the tests with only double bottom plates. All subsequent testing was done without the third bottom plate. The results of this testing indicated that the third bottom plate has negligible impact on the performance of the portal frames.

It is clear from the backbone curves shown above that the reduction in the capacity of the hold-down strap from 4,200 to 3,500 lbf has no significant impact on the performance of the portal frame. As such, we request that by this public comment, the reference to the hold-down capacity be changed from 4,200 to 3,500 lbf in both the figure and corresponding text.

APA Report T2012L-24 – *Bracing Method Alternative Attachment (IBC), Portal Frame with Hold Downs (Bracing Method PFH) (IRC) – Hold-Down Strap Capacity Variations* is available for free download at apawood.org.

Cost Impact: The code change proposal will not increase the cost of construction.

RB311-13

Public Hearing: Committee: AS AM D
 Assembly: ASF AMF DF

R602.10.6.2F #1-RB-KEITH.doc

RB312 – 13

Figure R602.10.6.2, Figure R602.10.6.3, Figure R602.10.6.4

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

In all three of the figures revise the following annotation directed to the mid-height splice of the portal frame legs.

IF NEEDED, PANEL SPLICE EDGES SHALL OCCUR OVER AND BE NAILED TO COMMON BLOCKING WITHIN THE MIDDLE 24" OF THE ~~WALL MID-PORTAL-LEG~~ HEIGHT. ONE ROW OF 3" O.C. NAILING IS REQUIRED IN EACH PANEL EDGE.

Reason: The original intent of the annotation was to place the permissible splice location within a band 24-inches wide located at the center of the portal-frame leg. Due to an unfortunate choice of language in the original development of these two drawings, the stipulation for "within 24" of the wall mid-height" describes a band that is 48-inches wide (24 inches from above to mid-height and 24 inches from below to mid-height. Such an interpretation is far outside of the original intent.

This proposal also changes "wall mid-height" to "portal-leg height". In the original development of this method the portal-leg height was only different from the wall height by the width of the header so while the original language was not correct (it is the portal-leg height that is important when making the panel splice), a miss-interpretation was not significant. Recent changes to the IRC, however, permit the possibility of placing pony walls over the portals, and/or placing the portals on masonry stem-walls. As the difference between the portal-leg height and the wall height can now be up to 48 inches it is very important properly state the appropriate location for the sheathing splice plate. The center 24 inches of the *portal leg* is the appropriate place for the splice. Request the committee's approval to clarify the true intent of these provisions.

Note that with approval of this proposal the same annotation will be used in all three of the portal frame figures in the IRC, minimizing confusion and reducing the possibility of misapplication.

Cost Impact: The code change proposal will not increase the cost of construction.

RB312-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.10.6.2F #2-RB-KEITH.doc

RB313 – 13

Figure R602.10.6.2, Figure R602.10.6.3, Figure R602.10.6.4

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

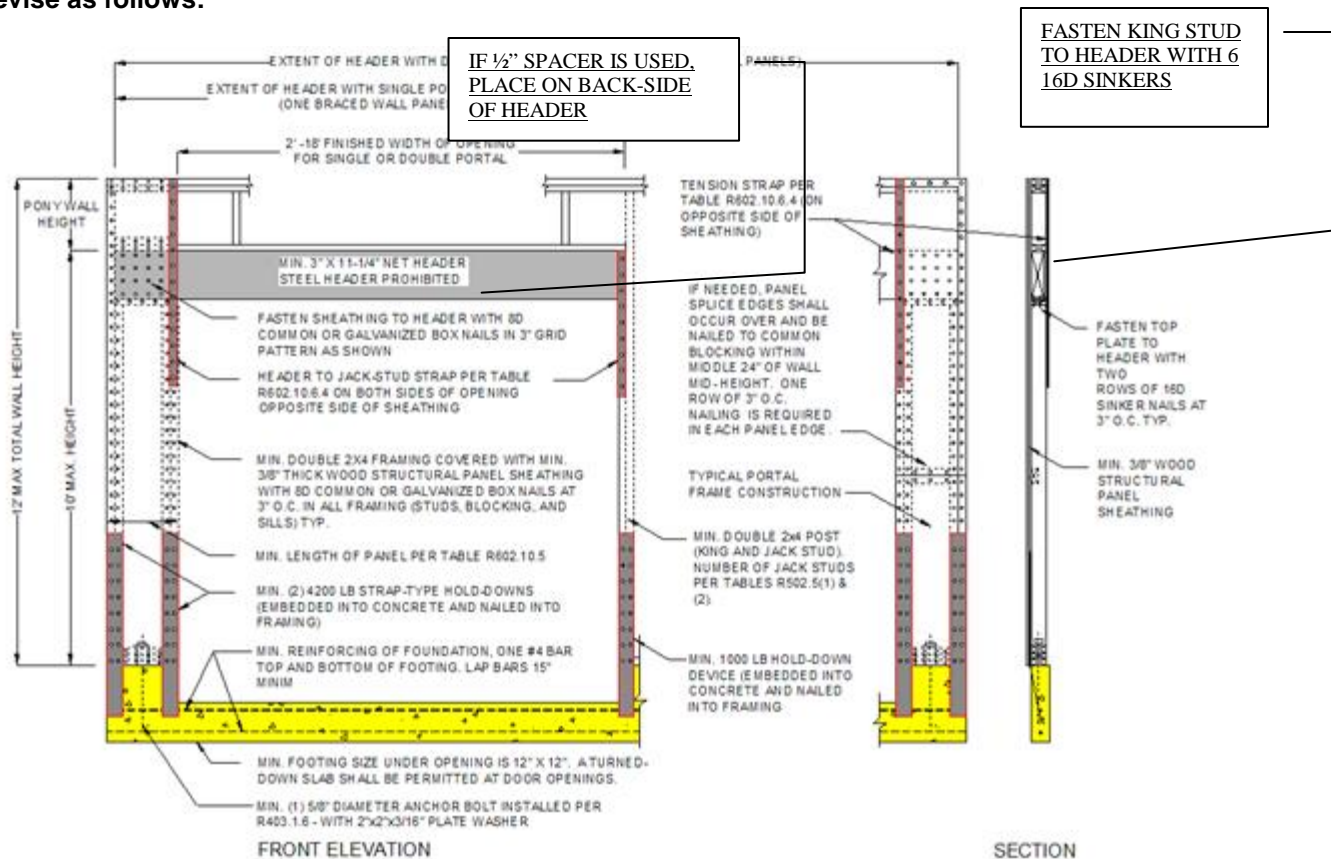


FIGURE R602.10.2
METHOD PFH: PORTAL FRAME WITH HOLD-DOWNS

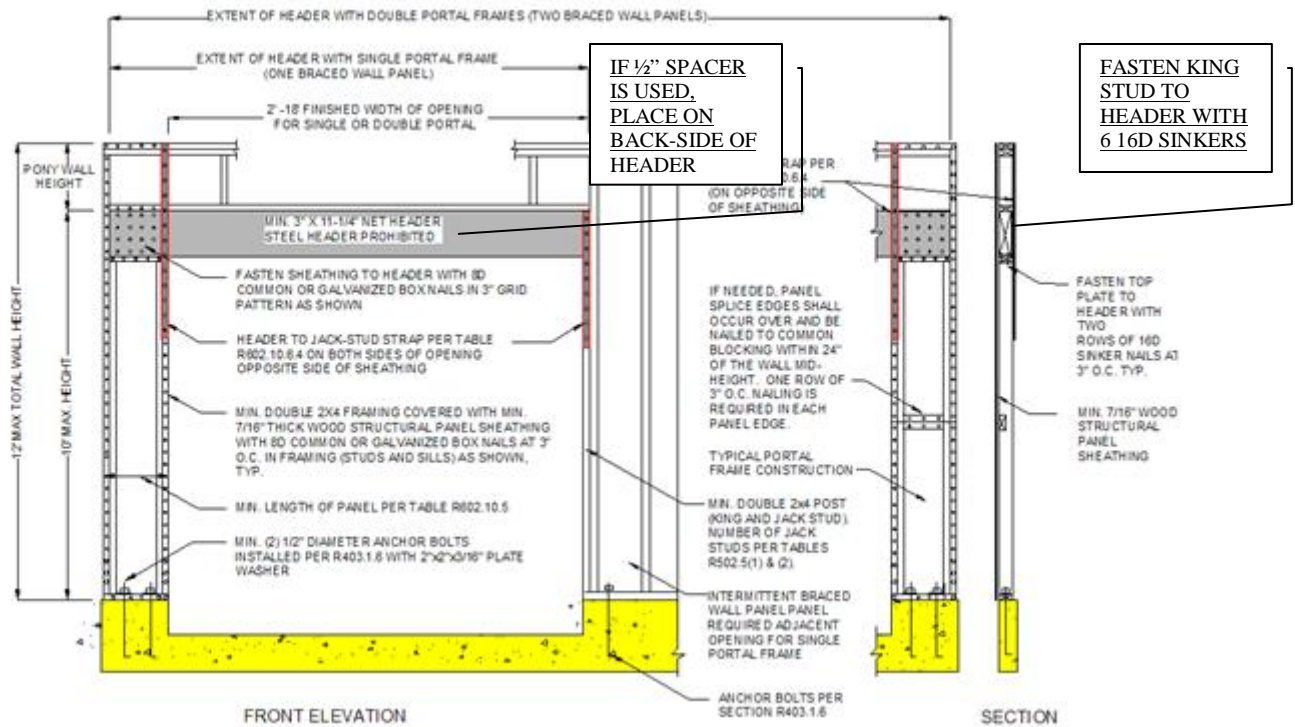


FIGURE R602.10.6.3
METHOD PFG: PORTAL FRAME AT GARAGE DOOR OPENINGS IN SEISMIC DESIGN CATEGORIES A, B, AND C

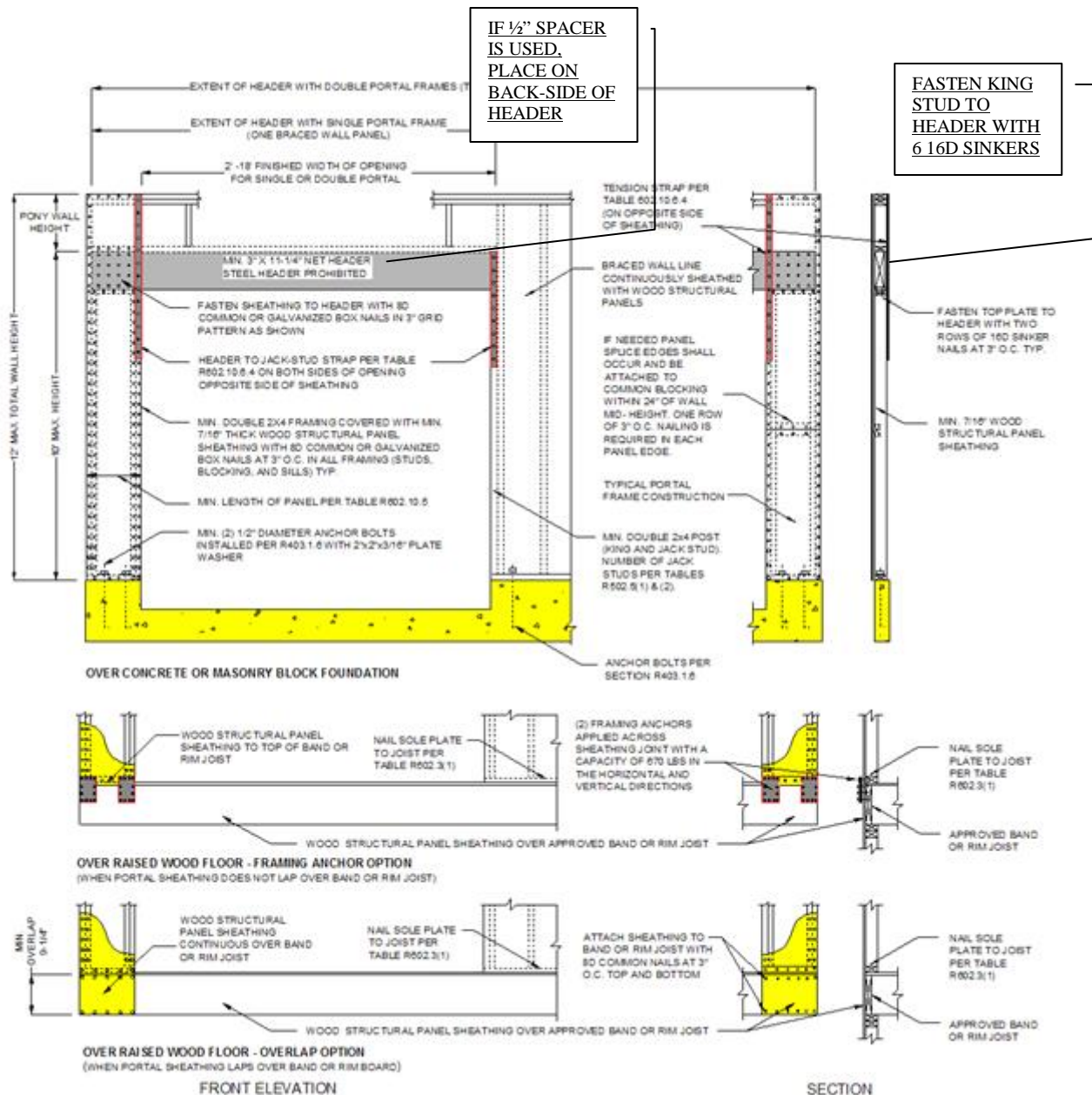


FIGURE R602.10.6.4
METHOD CS-PH; CONTINUOUSLY SHEATHED PORTAL FRAME PANEL CONSTRUCTION

Reason: When the three portal frame figures were homogenized and redrawn by a single source for the 2009 IRC a couple of annotations were inadvertently eliminated from the drawings. The attached proposal replaces these annotations.

The first annotation in all 3 figures states that is a 1/2-inch spacer is used to develop a built-up header, that the spacer be put on the back-side of the header. This placement insures that the 8d nails used in the grid pattern at the top of the portal leg adequately penetrate the back header to insure proper load distribution. As the spacer offers no structural advantage to the header, its placement behind the built-up header is of no structural consequence.

The second annotation calls out 6 16d sinker nails to attach the king stud to the header at the top of the portal-frame leg. These assemblies were developed and tested with these nails present and this should be reflected in the drawings.

We encourage the committee to vote in favor of this proposal to clarify the intent of these 3 portal-frame figures.

Cost Impact: The code change proposal will not increase the cost of construction.

RB313-13

Public Hearing: Committee:
Assembly:

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ASF

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R602.10.6.2F #3-RB-KEITH.doc

RB314 – 13

Table R602.10.3(4), R602.10.6.5

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

TABLE R602.10.3(4) SEISMIC ADJUSTMENT FACTORS TO THE REQUIRED LENGTH OF WALL BRACING

- d. Applies to stone or masonry veneer exceeding the first story height or extending up into the gable end. See Section R602.10.5 for requirements when stone or masonry veneer does not exceed the first story height and does not extend up into the gable end.

(Portions of Table not shown remain unchanged)

R602.10.6.5 Wall bracing for dwellings with stone and masonry veneer in Seismic Design Categories D₀, D₁ and D₂. Where stone and masonry veneer are installed in accordance with Section R703.7, wall bracing on exterior *braced wall lines* and *braced wall lines* on the interior of the building, backing or perpendicular to and laterally supporting veneered walls shall comply with this section.

Where dwellings in Seismic Design Categories D₀, D₁ and D₂ have stone or masonry veneer installed in accordance with Section R703.7, and the veneer does not exceed the first-story height and does not extend up into the gable end, wall bracing shall be in accordance with Section R602.10.3.

Where detached one- or two-family dwellings in Seismic Design Categories D₀, D₁ and D₂ have stone or masonry veneer installed in accordance with Section R703.7, and the veneer exceeds the first-story height or extends up into the gable end, wall bracing at exterior *braced wall lines* and *braced wall lines* on the interior of the building shall be constructed using Method BV-WSP in accordance with this section and Figure R602.10.6.5. Cripple walls shall not be permitted, and required interior *braced wall lines* shall be supported on continuous foundations.

Townhouses in Seismic Design Categories D₀, D₁ and D₂ with stone or masonry veneer exceeding the first-story height or extending up into the gable end shall be designed in accordance with accepted engineering practice.

Reason: The IRC is clear that the line of demarcation between using the standard bracing provisions and the Method BV-WSP is when the brick or masonry veneer extends up past the first story height. It is not clear what to do when the veneer extends up the gable-end wall. The definition of story in Chapter 2 provided below could lead one to believe that the gable-end wall was part of the story below:

STORY. *That portion of a building included between the upper surface of a floor and the upper surface of the floor or roof next above.*

From a structural perspective, however the mass in a gable end wall can equal or exceed the mass of a veneered second story. For example a 40-foot wide building with a 12:12 pitch can have gable-end wall that is a maximum of 20 feet tall above the top of the wall below. As the area is triangular the average height of this gable-end wall is 10 feet tall. This is the same mass as a veneered 10 foot second story wall.

It is clearly NOT the intent of the IRC to permit the standard bracing provisions for only a single story UNLESS the same or larger mass is part of a gable-end wall. The above proposal clarifies the intent of this section with respect to veneered gable-end walls.

Cost Impact: The code change proposal will not increase the cost of construction.

RB314-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.10.6.5-RB-KEITH.doc

RB315 – 13

R602.10.6.5.1

Proponent: Randall Shackelford, P.E., Simpson Strong-Tie Co., Inc. (rshackelford@strongtie.com)

Revise as follows:

R602.10.6.5.1 Length of bracing. The length of bracing along each *braced wall line* shall be the greater of that required by the design wind speed and *braced wall line* spacing in accordance with Table R602.10.3(1) as adjusted by the factors in the Table R602.10.3(2) or the Seismic Design Category and *braced wall line* length in accordance with Table R602.10.6.5. Angled walls shall be permitted to be counted in accordance with Section R602.10.1.4, and *braced wall panel* location shall be in accordance with Section R602.10.2.2. Spacing between *braced wall lines* shall be in accordance with Table R602.10.1.3. The seismic adjustment factors in Table R602.10.3(4) shall not be applied to the length of bracing determined using Table R602.10.6.5, except that the bracing amount increase for *braced wall line* spacing greater than 25 feet in accordance with Table R602.10.1.3 shall be required. In no case shall the minimum total length of bracing in a *braced wall line*, after all adjustments have been taken, be less than 48 inches (1219 mm) total.

Reason: The purpose of this code change is to clarify the required maximum spacing of braced wall lines supporting brick veneer in Seismic Design Categories D₀, D₁, and D₂, and when the spacing is permitted to be increased, and that the bracing amounts are to be increased when the braced wall spacing is increased above the typical maximum of 25 feet. The current section is basically silent on what the braced wall line spacing should be. Further, it states that the typical seismic increases in Table R602.10.3.4 are not to be used. This could lead the user to believe that all braced wall lines must be spaced a maximum of 25 feet apart. By specifying that the braced wall line spacing is to be in accordance with Table R602.10.1.3, this clarifies that the spacing is permitted to be increased to 35 feet in certain cases.

But when braced wall line spacing is increased, the shear load on the braced wall lines is increased, so more bracing is required. This change will allow for flexibility in residences that are covered by this section by clarifying that the braced wall lines are permitted to be spaced up to 35 feet apart, as long as the amount of bracing is appropriately increased.

Cost Impact: Depending on how this section is currently being interpreted, this could lower costs by allowing braced wall lines to be spaced farther apart, or it could increase costs if braced wall lines are currently being permitted to be spaced further apart than allowed by Table R602.10.1.3.

RB315-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.10.6.5.1-RB-SHACKELFORD.doc

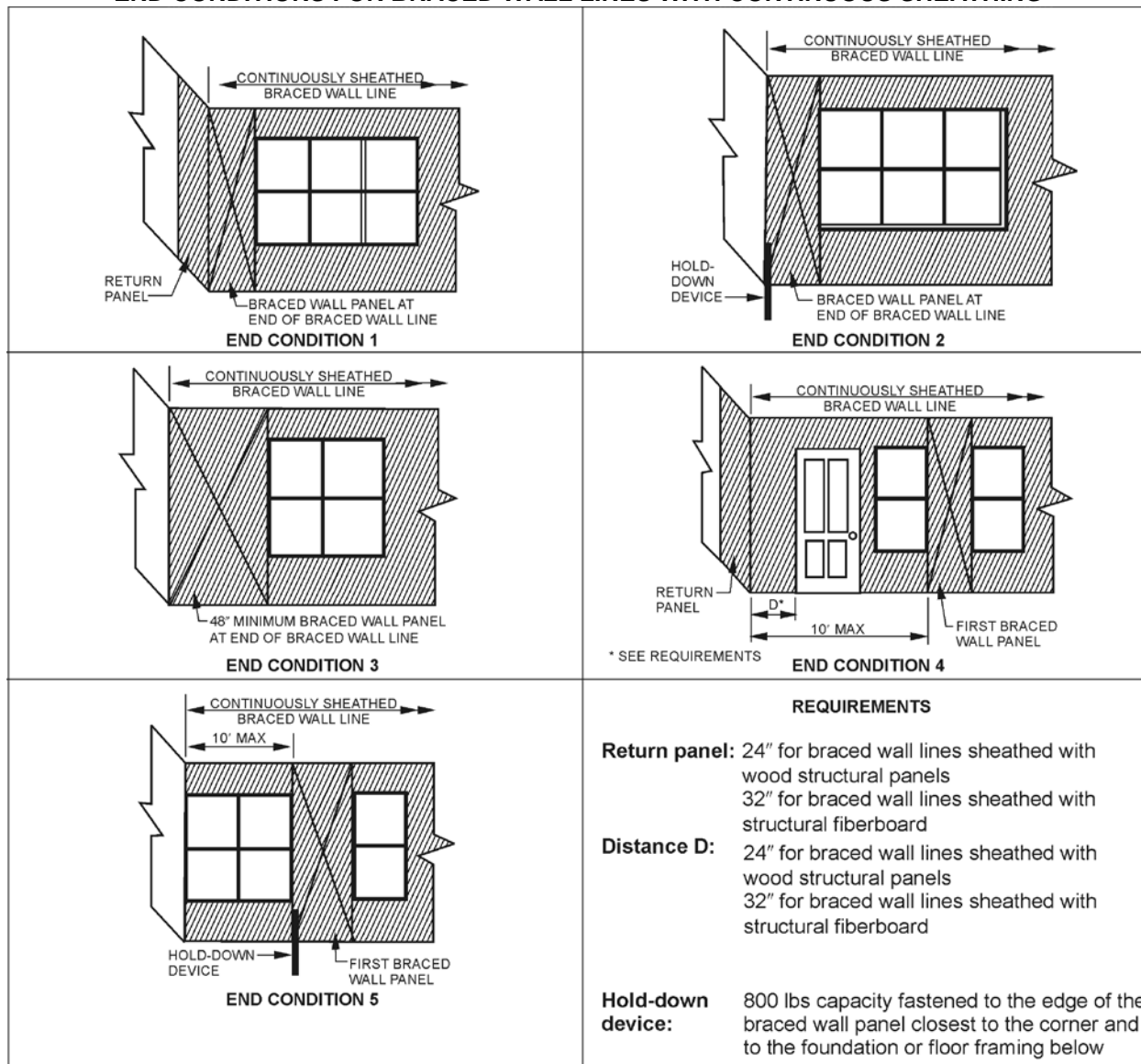
RB316 – 13

Figure R602.10.7

Proponent: Kevin S. Moore, S.E., Chair of Seismic Subcommittee to Code Advisory Committee, representing, National Council of Structural Engineers Associations (ksmoore@sgh.com); Matt Mlakar, Chair of General Engineering Committee, Structural Engineers Association of California

Revise as follows:

FIGURE R602.10.7
END CONDITIONS FOR BRACED WALL LINES WITH CONTINUOUS SHEATHING



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound = 4.45 N.

Reason: Figure R602.10.7 shows when an end restraint is required for the methods covered in R602.10.7 and not just for the Continuously Sheathed Method.

Cost Impact: This code change proposal will not increase construction cost.

RB316-13

Public Hearing: Committee:
Assembly:

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AMF

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DF

R602.10.7F #1-RB-MLAKAR-MOORE.doc

RB317 – 13

Figure R602.10.7

Proponent: Kevin S. Moore, S.E., Chair of Seismic Subcommittee to Code Advisory Committee, representing National Council of Structural Engineers Associations (ksmoore@sgh.com); Matt Mlakar, Chair of General Engineering Committee, Structural Engineers Association of California

Revise as follows:

REQUIREMENTS	
Return panel:	24" for braced wall lines sheathed with wood structural panels 32" for braced wall lines sheathed with structural fiberboard
Distance D:	24" for braced wall lines sheathed with wood structural panels 32" for braced wall lines sheathed with structural fiberboard
<u>Return panel anchorage:</u>	<u>Provide 5/8" anchor with 3"x3" bearing washer</u> <u>12" maximum from corner of return wall</u>
Hold-down device:	800 lbs. capacity fastened to the edge of the braced wall panel closest to the corner and to the foundation or floor framing below

FIGURE R602.10.7

END CONDITIONS FOR BRACED WALL LINES WITH CONTINUOUS SHEATHING

(Portions of Figure not shown remain unchanged)

Reason: Current return panel requirement does not require anchorage for the return panel that reflects the tested condition. This proposal adds limitation and anchorage requirement to return panel.

Reference

- 1) J.D. Dolan and C.P. Heine, 1997 "Sequential Phased Displacement Tests of Wood-frame Shear Walls with Corners," Report No. TE-1997-003, Brooks Forest Products Research Center, VPI&SU, Blacksburg, VA. September 14, 1997.

Cost Impact: This code change proposal will not increase construction cost.

RB317-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.10.7F #2-RB-MLAKAR-MOORE.doc

RB318 – 13

Figure R602.10.7

Proponent: Kevin S. Moore, S.E., Chair of Seismic Subcommittee to Code Advisory Committee, representing National Council of Structural Engineers Associations (ksmoore@sgh.com); Matt Mlakar, Chair of General Engineering Committee, Structural Engineers Association of California

Revise as follows:

REQUIREMENTS	
Return panel:	24" for braced wall lines sheathed with wood structural panels 32" for braced wall lines sheathed with structural fiberboard
Distance D:	24" for braced wall lines sheathed with wood structural panels 32" for braced wall lines sheathed with structural fiberboard
Hold-down device:	800 lbs. capacity fastened to the edge of the braced wall panel closest to the corner and to the foundation or floor framing below
<u>Return panel anchorage:</u>	<u>Return panel not permitted for second floor unless designed in accordance with accepted engineering practice</u>

FIGURE R602.10.7

END CONDITIONS FOR BRACED WALL LINES WITH CONTINUOUS SHEATHING

(Portions of Figure not shown remain unchanged)

Reason: This proposal adds a limitation and anchorage requirement to the return panel provision. Supporting experimental research utilized anchorage to a rigid base for return panel. The anchorage required at the second floor must be designed using accepted engineering practice. A substantiated load path detail from the second floor return panel to story below could be developed and provided in future editions of the IRC.

Reference

- 1) J.D. Dolan and C.P. Heine, 1997 "Sequential Phased Displacement Tests of Wood-frame Shear Walls with Corners," Report No. TE-1997-003, Brooks Forest Products Research Center, VPI&SU, Blacksburg, VA. September 14, 1997.

Cost Impact: This code change proposal will not increase construction cost.

RB318-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.10.7F #3-RB-MLAKAR-MOORE.doc

RB319 – 13

R602.10.8.2

Proponent: Gary J. Ehrlich, P.E., National Association of Home Builders (NAHB) (gehrlich@nahb.org)

Revise as follows:

R602.10.8.2 Connections to roof framing. Top plates of exterior braced wall panels shall be attached to rafters or roof trusses above in accordance with Table R602.3(1) and this section. Where required by this section, blocking between rafters or roof trusses shall be attached to top plates of braced wall panels and to rafters and roof trusses in accordance with Table R602.3(1). A continuous band, rim, or header joist or roof truss parallel to the braced wall panels shall be permitted to replace the blocking required by this section. Blocking shall not be required over openings in continuously-sheathed braced wall lines. In addition to the requirements of this section, lateral support shall be provided for rafters and ceiling joists in accordance with Section R802.8 and for trusses in accordance with Section R802.10.3. Roof ventilation shall be provided in accordance with Section R806.1.

1. For Seismic Design Categories A, B and C ~~and wind speeds less than 100 mph (45 m/s)~~ where the distance from the top of the braced wall panel to the top of the rafters or roof trusses above is 9 1/4 inches (235 mm) or less, blocking between rafters or roof trusses shall not be required. Where the distance from the top of the braced wall panel to the top of the rafters or roof trusses above is between 9 1/4 inches (235 mm) and 15 1/4 inches (387 mm), blocking between rafters or roof trusses shall be provided above the braced wall panel in accordance with Figure R602.10.8.2(1).

Exception: Where the outside edge of truss vertical web members aligns with the outside face of the wall studs below, the wall sheathing extending above the top plate as shown in Figure R602.10.8.2(3) shall be permitted to be fastened to each truss webs with 3-8d nails (2.5" x 0.131") and blocking between the trusses shall not be required.

2. For Seismic Design Categories D0, D1 and D2 ~~or wind speeds of 100 mph (45 m/s) or greater,~~ where the distance from the top of the braced wall panel to the top of the rafters or roof trusses is 15 1/4 inches (387 mm) or less, blocking between rafters or roof trusses shall be provided above the braced wall panel in accordance with Figure R602.10.8.2(1).
3. Where the distance from the top of the braced wall panel to the top of rafters or roof trusses exceeds 15 1/4 inches (387 mm), the top plates of the braced wall panel shall be connected to perpendicular rafters or roof trusses above in accordance with one or more of the following methods:
 - 3.1. Soffit blocking panels constructed in accordance with Figure R602.10.8.2(2);
 - 3.2. Vertical blocking panels constructed in accordance with Figure R602.10.8.2(3);
 - 3.3. Blocking panels provided by the roof truss manufacturer and designed in accordance with Section R802.10 ~~Full-height engineered blocking panels designed in accordance with the AF&PA WFCM;~~ or
 - 3.4. Blocking, blocking panels, or other methods of lateral load transfer designed in accordance with the AWC WFCM or accepted engineering practice.

Reason: In 2010, the NAHB Research Center with the support of NAHB and the Forest Products Laboratory conducted testing of roof assemblies with 10" and 16" deep truss heels. The research indicates that the IRC blocking provisions are overly conservative for truss heels up to 16" in areas within the wind design limits of the IRC. The results can be summarized and compared with required lateral capacities per Table 3.4 of the 2012 *Wood Frame Construction Manual*.

700-year Basic Wind Speed (mph)	Wind Exposure	Heel Height (inches)	Required Lateral Capacity (lbs)	Peak Lateral Capacity (lbs)	Factor of Safety	Deflection (inches)
140mph	B	10	134	514	3.84	0.40
140mph	B	10	134	332	2.62	0.60
140mph	C	16	186	514	2.76	0.55
140mph	C	16	186	332	1.89	0.80

The NAHBRC also tested several 16" heel configurations with a strip of OSB face-nailed to the ends of the trusses instead of blocking between the trusses. The peak capacities exceeded those for the unblocked 16" heel and were slightly lower than those for the 10" heel. The stiffnesses are greater than those for both the unblocked 10" and the 16" heel, thus the deflections at the required lateral capacity will be less.

Two additional changes are proposed. The current options 3.3 and 3.4 for designing a blocking panel using the WFCM or designing blocking, blocking panels or other methods of lateral load transfer are effectively one and the same. The WFCM provides an engineered design, whether the Chapter 2 engineering tables or Chapter 3 prescriptive tables are used. It is therefore proposed to combine the option to use the WFCM into the general design option. A pointer to the wood truss section is added for when the truss manufacturer designs and supplies truss blocking panels as part of the truss package. By adding this pointer, the truss manufacturer is still required to design the truss block in accordance with accepted engineering practice, but the design need not be signed and sealed by a registered design professional unless the jurisdiction where the project is located requires the entire truss design package be signed and sealed.

Cost Impact: The code change proposal will not increase the cost of construction.

RB319-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R602.10.8.2-RB-EHRLICH.doc

RB320 – 13

R602.10.8.2(3)

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

Add detail as shown below to Figure R602.10.8.2(3): (Remainder unchanged)

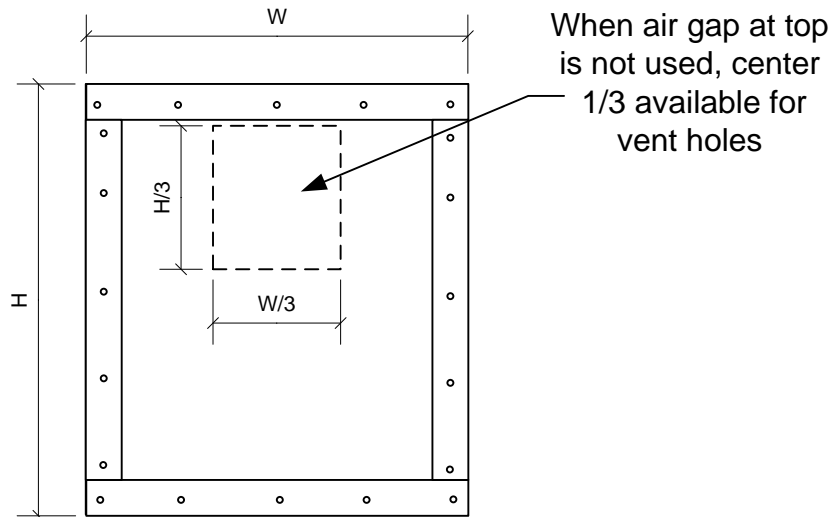


FIGURE R602.10.8.2(3)
BRACED WALL PANEL CONNECTION OPTION TO PERPENDICULAR RAFTERS OR ROOF TRUSSES

Reason: When the air gap is not desired, as in the case of an engineered roof system, the ventilation requirements can be met by placing an opening in the fabricated blocking panels. An opening sized as shown above will not compromise the ability of the fabricated blocking panel to resist overturning or transfer shear from the roof diaphragm to the wall below.

Cost Impact: The code change proposal will not increase the cost of construction.

RB320-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.10.8.2(3)F-RB-KEITH.doc

RB321 – 13

R602.10.11

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

R602.10.11 Cripple wall bracing. Cripple walls shall be constructed in accordance with Section R602.9 and braced in accordance with this section. Cripple walls shall be braced with the length and method of bracing used for the wall above in accordance with Tables R602.10.3(1) and R602.10.3(3), and the applicable adjustment factors in Tables R602.10.3(2) and R602.10.3(4), respectively, except the length of the cripple wall bracing shall be multiplied by a factor of 1.15. The maximum distance between adjacent edges of braced wall panels shall be reduced from 20 feet (6069 mm) to 14 feet (4267 mm). When gypsum wall board is not used on the inside of the cripple wall bracing, the length adjustments for the elimination of the gypsum wallboard, or equivalent, shall be applied as directed in Tables R602.10.3(2) and R602.10.3(4) to the length of cripple wall bracing required. This adjustment shall be taken in addition to the 1.15 increase described above.

Reason: The original provision requires the cripple wall length of bracing to be based on the length of bracing used in the wall above the cripple wall, increased by a factor of 1.15. Note however, the walls above are normally habitable spaces and as such the lengths of bracing used in these spaces are usually based on using gypsum board on the inside of the walls. Cripple walls however are not normally fabricated with a gypsum wall board finish on the inside. As such, just to make the resistance to wind or seismic forces equal between the walls above and the cripple walls below, the required bracing lengths in the cripple walls below would have to be increased by the adjustment factors (1.4 for wind and 1.5 for seismic) applicable when gypsum board is not present on the inside. See Tables R602.10.3(2) and (4). Of course, the alternative would be to sheath the inside of the cripple wall framing with gypsum wall board or an equivalent finish. On top of this increase in bracing of the cripple walls by either applying the adjustment factors or through the application of gypsum wallboard to the inside of the cripple wall framing, the 1.15 is still applicable.

Note that the 1.15 increase for cripple walls was a part of the code before the wall bracing lengths were based on gypsum board, or an equivalent, being required on the inside of the braced wall panels. As such it is clearly the intent of the code that the cripple walls have 15 percent more resistance to wind and seismic forces (a greater length of bracing) than the walls it supports. To accomplish this, cripple wall bracing length must be increased if gypsum wall board is not installed on the inside in addition to the 1.15 factor.

Cost Impact: The code change proposal will not increase the cost of construction.

RB321-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.10.11-RB-KEITH.doc

RB322 – 13

R602.10.11

Proponent: Gary J. Ehrlich, P.E., National Association of Home Builders (NAHB) (gehrlich@nahb.org)

Revise as follows:

R602.10.11 Cripple wall bracing. Cripple walls shall be constructed in accordance with Section R602.9 and braced in accordance with this section. Cripple walls shall be braced with the length and method of bracing used for the wall above in accordance with Tables R602.10.3(1) and R602.10.3(3), and the applicable adjustment factors in Table R602.10.3(2) or R602.10.3(4), respectively, except that the length of cripple wall bracing shall be multiplied by a factor of 1.15. ~~The distance between adjacent edges of braced wall panels shall be reduced from 20 feet (6096 mm) to 14 feet (4267 mm).~~

Reason: The purpose of this code change proposal is to correct an error made in correlating the 2012 braced wall provisions. The reduction in spacing between braced wall panels in a cripple wall originated from cripple wall failures observed in seismic events such as the 1994 Northridge Earthquake. Working through the ICC Ad-Hoc Committee on Wall Bracing, NAHB developed a proposal for the 2009/2010 Code Development Cycle that reorganized the cripple wall bracing provisions and removed the spacing reduction for low-seismic areas. The proposal was approved at the Public Hearings and ratified by the consent agenda vote at the Final Action Hearings. A separate effort by the Ad-Hoc Committee to correlate their comprehensive reorganization of the wall bracing section with a modification made by the IRC-Building/Energy Committee inadvertently resulted in the spacing reduction being reinstated for low-seismic areas. This amendment corrects that oversight and restores the original intent of the Ad-Hoc Wall Bracing Committee's cripple wall proposal.

Cost Impact: The code change proposal will not increase the cost of construction.

RB322-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.10.11-RB-EHRLICH.doc

RB323 – 13

R602.12, Table R602.12.4



Proponent: Brian Foley, P.E., Fairfax County, VA representing Virginia Building and Code Officials Association (brian.foley@fairfaxcounty.gov)

Revise as follows:

R602.12 Simplified wall bracing. Buildings meeting all of the conditions listed below shall be permitted to be braced in accordance with this section as an alternate to the requirements of Section R602.10. The entire building shall be braced in accordance with this section; the use of other bracing provisions of R602.10, except as specified herein, shall not be permitted.

1. There shall be no more than ~~two~~three stories above the top of a concrete or masonry foundation or basement wall. Permanent wood foundations shall not be permitted.
2. Floors shall not cantilever more than 24 inches (607 mm) beyond the foundation or bearing wall below.
3. Wall height shall not be greater than 10 feet (2743 mm).
4. The building shall have a roof eave-to-ridge height of 15 feet (4572 mm) or less.
5. All exterior walls shall have gypsum board with a minimum thickness of $\frac{1}{2}$ inches (12.7 mm) installed on the interior side fastened in accordance with Table R702.3.5.
6. The structure shall be located where the basic wind speed is less than or equal to 90 mph (40 m/s), and the Exposure Category is A or B..
7. The structure shall be located in Seismic Design Category of A, B or C for detached one- and two-family dwellings or Seismic Design Category A or B for townhouses.
8. Cripple walls shall not be permitted in ~~two~~three-story buildings.

TABLE R602.12.4
MINIMUM NUMBER OF BRACING UNITS ON EACH SIDE OF THE CIRCUMSCRIBED RECTANGLE

STORY LEVEL	EAVE-TO RIDGE HEIGHT (FEET)	MINIMUM NUMBER OF BRACING UNITS ON EACH LONG SIDE ^{a,b}						MINIMUM NUMBER OF BRACING UNITS ON EACH SHORT SIDE ^{a,b}					
		Length of short side (ft) ^c						Length of long side (ft) ^c					
		10	20	30	40	50	60	10	20	30	40	50	60
	10	1	2	2	2	3	3	1	2	2	2	3	3
		2	3	3	4	5	6	2	3	3	4	5	6
		<u>2</u>	<u>3</u>	<u>4</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>6</u>	<u>7</u>	<u>8</u>
	15	1	2	3	3	4	4	1	2	3	3	4	4
		2	3	4	5	6	7	2	3	4	5	6	7
		<u>2</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>9</u>	<u>2</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>9</u>

For SI: 1 ft = 304.8 mm

a. Interpolation shall not be permitted.

- b. Cripple walls or wood-framed basement walls in a walk-out condition of a one-story structure shall be designed as the first floor of a two-story house.
- c. Actual lengths of the sides of the circumscribed rectangle shall be rounded to the next highest unit of 10 when using this table.

Reason: Using the existing adjustments for a three story building from Section R602.10, the use of Simplified Wall Bracing can be expanded to a wide range of buildings without impacting safety. Since the values in Table R602.12.4 were calculated from R602.10, then the adjustment factors will create an accurate bracing amount for a three-story building just as it would if calculated from the wind tables of R602.10.

Cost Impact: The code change proposal will not increase the cost of construction.

RB323-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.12 #2-RB-FOLEY.doc

RB324 – 13

R602.12, Table R602.12.4




Proponent: Brian Foley, P.E., Fairfax County, VA, representing Virginia Building and Code Officials Association (brian.foley@fairfaxcounty.gov)







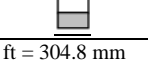
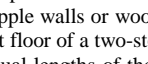
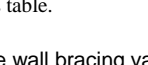
Revise as follows:

R602.12 Simplified wall bracing. Buildings meeting all of the conditions listed below shall be permitted to be braced in accordance with this section as an alternate to the requirements of Section R602.10. The entire building shall be braced in accordance with this section; the use of other bracing provisions of R602.10, except as specified herein, shall not be permitted.

1. There shall be no more than ~~two~~three stories above the top of a concrete or masonry foundation or basement wall. Permanent wood foundations shall not be permitted.
2. Floors shall not cantilever more than 24 inches (607 mm) beyond the foundation or bearing wall below.
3. Wall height shall not be greater than 10 feet (2743 mm).
4. The building shall have a roof eave-to-ridge height of 15 feet (4572 mm) or less.
5. All exterior walls shall have gypsum board with a minimum thickness of $\frac{1}{2}$ inches (12.7 mm) installed on the interior side fastened in accordance with Table R702.3.5.
6. The structure shall be located where the basic wind speed is less than or equal to ~~90~~100 mph (40 ~~44~~ m/s), and the Exposure Category is A or B.
7. The structure shall be located in Seismic Design Category of A, B or C for detached one- and two-family dwellings or Seismic Design Category A or B for townhouses.
8. Cripple walls shall not be permitted in ~~two~~three-story buildings.

TABLE R602.12.4
MINIMUM NUMBER OF BRACING UNITS ON EACH SIDE OF THE CIRCUMSCRIBED RECTANGLE

WIND SPEED	STORY LEVEL	EAVE-TO RIDGE HEIGHT (FEET)	MINIMUM NUMBER OF BRACING UNITS ON EACH LONG SIDE ^{a,b}						MINIMUM NUMBER OF BRACING UNITS ON EACH SHORT SIDE ^{a,b}					
			Length of short side (ft) ^c						Length of long side (ft) ^c					
			10	20	30	40	50	60	10	20	30	40	50	60
90		10	1	2	2	2	3	3	1	2	2	2	3	3
			2	3	3	4	5	6	2	3	3	4	5	6
			<u>2</u>	<u>3</u>	<u>4</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>6</u>	<u>7</u>	<u>8</u>
		15	1	2	3	3	4	4	1	2	3	3	4	4
			2	3	4	5	6	7	2	3	4	5	6	7
			<u>2</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>9</u>	<u>2</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>9</u>
100		<u>10</u>	<u>1</u>	<u>2</u>	<u>2</u>	<u>3</u>	<u>3</u>	<u>4</u>	<u>1</u>	<u>2</u>	<u>2</u>	<u>3</u>	<u>3</u>	<u>4</u>

WIND SPEED	STORY LEVEL	EAVE-TO RIDGE HEIGHT (FEET)	MINIMUM NUMBER OF BRACING UNITS ON EACH LONG SIDE ^{a,b}						MINIMUM NUMBER OF BRACING UNITS ON EACH SHORT SIDE ^{a,b}					
			Length of short side (ft) ^c						Length of long side (ft) ^c					
			10	20	30	40	50	60	10	20	30	40	50	60
														
			<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
			<u>2</u>	<u>4</u>	<u>5</u>	<u>7</u>	<u>8</u>	<u>10</u>	<u>2</u>	<u>4</u>	<u>5</u>	<u>7</u>	<u>8</u>	<u>10</u>
		<u>15</u>	<u>2</u>	<u>3</u>	<u>3</u>	<u>4</u>	<u>4</u>	<u>6</u>	<u>2</u>	<u>3</u>	<u>3</u>	<u>4</u>	<u>4</u>	<u>6</u>
			<u>3</u>	<u>4</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>10</u>	<u>3</u>	<u>4</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>10</u>
			<u>3</u>	<u>6</u>	<u>7</u>	<u>10</u>	<u>11</u>	<u>13</u>	<u>3</u>	<u>6</u>	<u>7</u>	<u>10</u>	<u>11</u>	<u>13</u>
														
														
														

For SI: 1 ft = 304.8 mm

- Interpolation shall not be permitted.
- Cripple walls or wood-framed basement walls in a walk-out condition of a one-story structure shall be designed as the first floor of a two-story house.
- Actual lengths of the sides of the circumscribed rectangle shall be rounded to the next highest unit of 10 when using this table.

Reason: Using the wall bracing values for wind speed of 100 mph and three stories from Section R602.10, the use of Simplified Wall Bracing can be expanded to a wide range of areas and building types without impacting safety. Since the 90 mph values in Table R602.12.4 were calculated from R602.10, then the 100 mph will create an accurate bracing amounts as it would if calculated from the wind tables of R602.10.

Cost Impact: The code change proposal will not increase the cost of construction.

RB324-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R602.12 #3-RB-FOLEY.doc

RB325 – 13

R602.12, Table R602.12.4

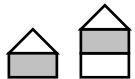
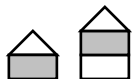
Proponent: Brian Foley, P.E., Fairfax County, VA, representing Virginia Building and Code Officials Association (brian.foley@fairfaxcounty.gov)

Revise as follows:

R602.12 Simplified wall bracing. Buildings meeting all of the conditions listed below shall be permitted to be braced in accordance with this section as an alternate to the requirements of Section R602.10. The entire building shall be braced in accordance with this section; the use of other bracing provisions of R602.10, except as specified herein, shall not be permitted.

1. There shall be no more than two stories above the top of a concrete or masonry foundation or basement wall. Permanent wood foundations shall not be permitted.
2. Floors shall not cantilever more than 24 inches (607 mm) beyond the foundation or bearing wall below.
3. Wall height shall not be greater than 10 feet (2743 mm).
4. The building shall have a roof eave-to-ridge height of 15 feet (4572 mm) or less.
5. All exterior walls shall have gypsum board with a minimum thickness of $\frac{1}{2}$ inches (12.7 mm) installed on the interior side fastened in accordance with Table R702.3.5.
6. The structure shall be located where the basic wind speed is less than or equal to 90 mph (40 m/s), and the Exposure Category is A, ~~B or C~~.
7. The structure shall be located in Seismic Design Category of A, B or C for detached one- and two-family dwellings or Seismic Design Category A or B for townhouses.
8. Cripple walls shall not be permitted in two-story buildings.

TABLE R602.12.4
MINIMUM NUMBER OF BRACING UNITS ON EACH SIDE OF THE CIRCUMSCRIBED RECTANGLE

STORY LEVEL	EAVE-TO RIDGE HEIGHT (FEET)	MINIMUM NUMBER OF BRACING UNITS ON EACH LONG SIDE ^{a,b,d}						MINIMUM NUMBER OF BRACING UNITS ON EACH SHORT SIDE ^{a,b,d}					
		Length of short side (ft) ^c						Length of long side (ft) ^c					
		10	20	30	40	50	60	10	20	30	40	50	60
	10	1	2	2	2	3	3	1	2	2	2	3	3
		2	3	3	4	5	6	2	3	3	4	5	6
	15	1	2	3	3	4	4	1	2	3	3	4	4
		2	3	4	5	6	7	2	3	4	5	6	7

For SI: 1 ft = 304.8 mm

- a. Interpolation shall not be permitted.
- b. Cripple walls or wood-framed basement walls in a walk-out condition of a one-story structure shall be designed as the first floor of a two-story house.
- c. Actual lengths of the sides of the circumscribed rectangle shall be rounded to the next highest unit of 10 when using this table.
- d. For exposure category C, multiply bracing units by a factor of 1.20 for a one-story building and 1.30 for a two-story building.

Reason: Using the existing adjustments for exposure category C from Section R602.10, the use of Simplified Wall Bracing can be expanded to a wide range of areas of the country without impacting safety. Since the values in Table R602.12.4 were calculated

from R602.10, then the adjustment factors will create an accurate bracing amount for exposure category C just as it would if calculated from the wind tables of R602.10.

Cost Impact: The code change proposal will not increase the cost of construction.

RB325-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.12 #1-RB-FOLEY.doc

RB326 – 13

R602.12, Table R602.12.4

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

R602.12 Simplified wall bracing. Buildings meeting all of the conditions listed in items 1-8 shall be permitted to be braced in accordance with this section as an alternative to the requirements of Section R602.10. The entire building shall be braced in accordance with this section; the use of other bracing provisions of R602.10, except as specified herein, shall not be permitted.

1. There shall be no more than two stories above the top of a concrete or masonry foundation or basement wall. Permanent wood foundations shall not be permitted.
2. Floors shall not cantilever more than 24 inches (607 mm) beyond the foundation or bearing wall below.
3. Wall height shall not be greater than 10 feet (2743 mm).
4. The building shall have a roof eave-to-ridge height of 15 feet (4572 mm) or less.
5. All exterior walls shall have gypsum board with a minimum thickness of $\frac{1}{2}$ inch (12.7 mm) installed on the interior side fastened in accordance with Table R702.3.5.
6. The structure shall be located where the basic wind speed is less than or equal to 90 mph (40 m/s), and the Exposure Category is A or B except as provided for in Table R602.12.4, footnote d.
7. The structure shall be located in Seismic Design Category A, B or C for detached one- and two-family dwellings or Seismic Design Category A or B for townhouses.
8. Cripple walls shall not be permitted in two-story buildings.

TABLE R602.12.4
MINIMUM NUMBER OF BRACING UNITS ON EACH SIDE OF THE CIRCUMSCRIBED RECTANGLE

STORY LEVEL	EAVE-TO-RIDGE HEIGHT (feet)	MINIMUM NUMBER OF BRACING UNITS ON EACH LONG SIDE ^{a,b,d}						MINIMUM NUMBER OF BRACING UNITS ON EACH SHORT SIDE ^{a,b,d}					
		Length of short side (feet) ^c						Length of long side (feet) ^c					
		10	20	30	40	50	60	10	20	30	40	50	60

d. The simplified wall bracing method (Section R602.12) shall be permitted to be used in wind Exposure Category C providing the minimum number of bracing units shown in Table R602.10.4 above is multiplied by a factor of 1.2 for a single-story building and by a factor of 1.3 for a two-story building, and the result shall be rounded to the next higher unit.

(Portions of Table not shown remain unchanged)

Reason: A great part of the Midwest meets the wind-speed requirements of the simplified method but because the Great Plains is designated Exposure C. For the purposes of the Simplified Bracing Method, the primary difference between the bracing required in Exposure B and C is that Exposure C requires additional bracing. A review of the permitted narrow wall bracing methods shows that all are appropriate for Exposure Categories A-C. The required 3/8 inch WSP is appropriate for 90 miles per hour Exposure C as well (Table R602.3(3)). And, in accordance with Footnote d of Table R602.10.4, structural fiberboard sheathing thickness may also be used in any exposure up to 100 mph.

As nothing else in the Simplified Bracing Method limits it to Exposure B except the amount of bracing required, the wind exposure adjustment factors in Table R602.10.3(2) are appropriate for increasing the amount of bracing needed to expand the use of the method to Exposure C. Note that these adjustment factors have been a part of the code for over 6 years.

Cost Impact: The code change proposal will not increase the cost of construction.

RB326-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R602.12-RB-KEITH.doc

RB327 – 13

R602.12.6.2

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

R602.12.6.2 Method CS-PF *Braced wall panels* constructed as Method CS-PF in accordance with Section R602.10.6.4 shall be permitted when all framed portions of all exterior walls are sheathed with wood structural panels. Each CS-PF panel shall equal ~~0.5~~ **0.75** bracing units. A maximum of four CS-PF panels shall be permitted on all segments of walls parallel to each side of the circumscribed rectangle. Segments of walls which include a Method CS-PF panel shall meet the requirements of Section R602.10.4.2.

Reason: Currently each Method PFG (Portal Frame at Garage) is permitted in the 2012 IRC Section R602.12.6.3 to contributing 0.75 bracing units to the required amount of bracing. The contribution amount is based on the 1.5 multiplier to the length of the vertical leg of the portal frame permitted in Table R602.10.5. This multiplier was added in the “legacy” IRC provisions because Method PFG was restricted for use in areas of low seismicity (SDCs A, B and C).

Cyclic testing conducted at APA in 2006 of the CS-PF (Continuous Sheathed – Portal Frame) showed that the CS-PF has a design strength at least as high as the PFG tested in a similar manner. Based on the results of this testing it is reasonable to permit the same contributing amount of bracing units for the Method CS-PF when similarly restricted to areas of low seismicity as is the Simplified Method.

Please note that the CS-PF portal frame can have a leg length as small as 16 inches, where the PFG has a minimum leg length of 24 inches. What makes the CS-PF perform as well or better than the PFG, even with a shorter leg length, is the fact that the CS-PF has nearly twice as many fasteners as the PFG. It is the fastener interaction between the framing and sheathing that determine the ultimate capacity of this wood-structural-panel/framing bracing system.

Note that the IRC bracing provisions are difficult to meet in many cases as a result of narrow lot widths and the aesthetic requirements of modern homes. Areas around garages and picture windows are especially difficult to accommodate and still meet the minimum bracing requirements of the code. Permitting the equal-to-stronger minimum 16-inch CS-PF to have the same adjustment factor as the 24-inch PFG is both rational and extremely helpful in broadening the scope of the 2012 IRC Simplified Bracing provisions.

We ask the committee to permit the 16-inch CS-PF the same 0.75 bracing unit contribution as is applied to the 24-inch PFG when used in the Simplified Bracing Method. This is based on full-scale cyclic load tests described in APA Test Report T2006-29 and NAHB-Research Center Test Report EG5522_08216.

Cost Impact: The code change proposal will not increase the cost of construction.

RB327-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.12.6.2-RB-KEITH.doc

RB328 – 13

R602.12.6.3

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

R602.12.6.3 Methods ABW, PFH and PFG. *Braced wall panels* constructed as Methods ABW, PFH and PFG shall be permitted when bracing units are constructed using wood structural panels applied either continuously or intermittently. Each ABW and PFH panel shall equal one bracing unit, and each PFG panel shall be equal to 0.75 bracing units.

Reason: This proposal adds the traditional bracing method with hold downs (Method ABW) to the list of permitted bracing methods that may be used with the Simplified Bracing Provisions. Method ABW provides a narrow wall bracing option to the Simplified Method that may assist designers and builders in meeting the hard-to-meet bracing requirements of the first story of a two story structure on a narrow width lot. This method would provide one unit of bracing (36 inches to 48 inches for continuous and intermittent, respectively) for a bracing element as narrow as 28 inches.

With the increases in bracing requirements of the 2009 IRC it is important that designers and builders have the requisite tools to meet these more challenging requirements. Site-built shear walls (ABW), portal frames (PFH and PFG) are essential tools equally beneficial for both intermittent and continuously sheathed walls alike.

Cost Impact: The code change proposal will not increase the cost of construction

RB328-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.12.6.3-RB-KEITH.doc

RB329 – 13

R602.10 (NEW), R602.11, R602.12, Appendix R (NEW)

Proponent: Jay Crandell, P.E., ARES Consulting, representing Foam Sheathing Committee/American Chemistry Council (jcrandell@aresconsulting.biz); Larry Wainright, Structural Building Components Association; Paul Lautrup, OX Engineered Products

Revise as follows:

APPENDIX R **WALL BRACING SUPPLEMENTAL PROVISIONS**

~~R602.10~~ AR602.10 Wall bracing.

~~R602.10.1~~ AR602.10.1 Braced wall lines.

~~R602.10.1.1~~ AR602.10.1.1 Length of a braced wall line.

FIGURE ~~R602.10.1.1~~ AR602.10.1.1 BRACED WALL LINES

~~R602.10.1.2~~ AR602.10.1.2 Offsets along a braced wall line.

~~R602.10.1.3~~ AR602.10.1.3 Spacing of braced wall lines.

TABLE ~~R602.10.1.3~~ AR602.10.1.3 BRACED WALL LINE SPACING

~~R602.10.1.4~~ AR602.10.1.4 Angled walls.

FIGURE ~~R602.10.1.4~~ AR602.10.1.4 ANGLED WALLS

~~R602.10.2~~ AR602.10.2 Braced wall panels.

~~R602.10.2.1~~ AR602.10.2.1 Braced wall panel uplift load path.

~~R602.10.2.2~~ AR602.10.2.2 Locations of braced wall panels.

FIGURE ~~R602.10.2.2~~ AR602.10.2.2 LOCATION OF BRACED WALL PANELS

~~R602.10.2.2.1~~ AR602.10.2.2.1 Location of braced wall panels in Seismic Design Categories D₀, D₁ and D₂.

~~R602.10.2.3~~ AR602.10.2.3 Minimum number of braced wall panels.

~~R602.10.3~~ AR602.10.3 Required length of bracing.

TABLE ~~R602.10.3(1)~~ AR602.10.3(1) BRACING REQUIREMENTS BASED ON WIND SPEED

TABLE ~~R602.10.3(2)~~ AR602.10.3(2) WIND ADJUSTMENT FACTORS TO THE REQUIRED LENGTH OF WALL BRACING

TABLE ~~R602.10.3(3)~~ AR602.10.3(3) BRACOMG REQUIREMENTS BASED ON SEISMIC DESIGN CATEGORY

TABLE ~~R602.10.3(4)~~ AR602.10.3(4) SEISMIC ADJUSTMENT FACTORS TO THE REQUIRED LENGTH OF WALL BRACING

~~R602.10.4~~ AR602.10.4 Construction methods for braced wall panels.

TABLE ~~R602.10.4~~ AR602.10.4 BRACING METHODS

~~R602.10.4.1~~ AR602.10.4.1 Mixing methods.

~~R602.10.4.2~~ AR602.10.4.2 Continuous sheathing methods.

~~R602.10.4.3~~ AR602.10.4.3 Braced wall panel interior finish material.

~~R602.10.5~~ AR602.10.5 Minimum length of a braced wall panel.

TABLE ~~R602.10.5~~ AR602.10.5 MINIMUM LENGTH OF BRACED WALL PANELS

FIGURE ~~R602.10.5~~ AR602.10.5 BRACED WALL PANELS WITH CONTINUOUS SHEATHING

~~R602.10.5.1~~ AR602.10.5.1 Contributing length.

~~R602.10.5.2~~ AR602.10.5.2 Partial credit.

TABLE ~~R602.10.5.2~~ AR602.10.5.2 PARTIAL CREDIT FOR BRACED WALL PANELS LESS THAN 48 INCHES IN ACTUAL LENGTH

~~R602.10.6~~ AR602.10.6 Construction of Methods ABW, PFH, PFG, CS-PF and BV-WSP.

~~R602.10.6.1~~ AR602.10.6.1 Method ABW: Alternate braced wall panels.

TABLE ~~R602.10.6.1~~ AR602.10.6.1 MINIMUM HOLD-DOWN FORCES FOR METHOD ABW BRACED WALL PANELS

FIGURE ~~R602.10.6.1~~ AR602.10.6.1 METHOD ABW-ALTERNATE BRACED WALL PANEL

~~R602.10.6.2~~ AR602.10.6.2 Method PFH: Portal frame with hold-downs.

FIGURE ~~R602.10.6.2~~ AR602.10.6.2 METHOD PFH-PORTAL FRAME WITH HOLD-DOWNS

~~R602.10.6.3~~ AR602.10.6.3 Method PFG: Portal frame at garage door openings in Seismic Design Categories A, B and C.

FIGURE ~~R602.10.6.3~~ AR602.10.6.3 METHOD PFG-PORTAL FRAME AT GARAGE DOOR OPENINGS IN SEISMIC DESIGN CATEGORIES A, B AND C

~~R602.10.6.4~~ AR602.10.6.4 Method CS-PF: Continuously sheathed portal frame.

FIGURE ~~R602.10.6.4~~ AR602.10.6.4 METHOD CS-PF-CONTINUOUSLY SHEATHED PORTAL FRAME PANEL CONSTRUCTION

TABLE ~~R602.10.6.4~~ AR602.10.6.4 TENSION STRAP CAPACITY REQUIRED FOR RESISTING WIND PRESURES PERPENDICULAR TO METHOD PFH, PFG AND CS-PF BRACED WALL PANELS

~~R602.10.6.5~~ AR602.10.6.5 Wall bracing for dwellings with stone and masonry veneer in Seismic Design Categories D₀, D₁ and D₂.

TABLE ~~R602.10.6.5~~ AR602.10.6.5 METHOD BV-WSP WALL BRACING REQUIREMENTS

FIGURE ~~R602.10.6.5~~ AR602.10.6.5 METHOD BV-WSP-WALL BRACING FOR DWELLINGS WITH STONE AND MASONRY VENEER IN SEISMIC DESIGN CATEGORIES D₀, D₁, AND D₂

~~R602.10.6.5.1~~ AR602.10.6.5.1 Length of bracing.

~~R602.10.7~~ AR602.10.7 Ends of braced wall lines with continuous sheathing.

FIGURE ~~R602.10.7~~ AR602.10.7 END CONDITIONS FOR BRACED WALL LINES WITH CONTINUOUS SHEATHING

~~R602.10.8~~ AR602.10.8 Braced wall panel connections.

FIGURE ~~R602.10.8(1)~~ AR602.10.8(1) BRACED WALL PANEL CONNECTION WHEN PERPENDICULAR TO FLOOR/CEILING FRAMING

FIGURE ~~R602.10.8(2)~~ AR602.10.8(2) BRACED WALL PANEL CONNECTION WHEN PARALLEL TO FLOOR/CEILING FRAMING

~~R602.10.8.1~~ AR602.10.8.1 Braced wall panel connections for Seismic Design Categories D₀, D₁ and D₂.

~~R602.10.8.2~~ AR602.10.8.2 Connections to roof framing.

FIGURE ~~R602.10.8.2(1)~~ AR602.10.8.2(1) BRACED WALL PANEL CONNECTION TO PERPENDICULAR RAFTERS

FIGURE ~~R602.10.8.2(2)~~ AR602.10.8.2(2) BRACED WALL PANEL CONNECTION OPTION TO PERPENDICULAR RAFTERS OR ROOF TRUSSES

FIGURE ~~R602.10.8.2(3)~~ AR602.10.8.2(3) BRACED WALL PANEL CONNECTION OPTION TO PERPENDICULAR RAFTERS OR ROOF TRUSSES

~~R602.10.9~~ AR602.10.9 Braced wall panel support.

FIGURE ~~R602.10.9~~ AR602.10.9 MASONRY STEM WALLS SUPPORTING BRACED WALL PANELS

~~R602.10.9.1~~ AR602.10.9.1 Braced wall panel support for Seismic Design Category D₂.

~~R602.10.10~~ AR602.10.10 Panel joints.

~~R602.10.11~~ AR602.10.11 Cripple wall bracing.

~~R602.10.11.1~~ AR602.10.11.1 Cripple wall bracing for Seismic Design Categories D₀ and D₁ and townhouses in Seismic Design Category C.

~~R602.10.11.2~~ AR602.10.11.2 Cripple wall bracing for Seismic Design Category D₂.

~~R602.10.11.3~~ AR602.10.11.3 Redesignation of cripple walls.

~~R602.11~~ AR602.11 Wall anchorage.

~~R602.11.1~~ AR602.11.1 Wall anchorage for all buildings in Seismic Design Categories D₀, D₁ and D₂ and townhouses in Seismic Design Category C.

~~R602.11.2~~ AR602.11.2 Stepped foundations in Seismic Design Categories D₀, D₁ and D₂.

R602.10 Wall bracing. Buildings, and portions thereof, shall be braced in accordance with one or more of the following sections using bracing materials and methods complying with Section R602.10.1 and load path detailing in accordance with Section R602.10.5:

1. Intermittent bracing per Section R602.10.2,
2. Continuous sheathing per Section R602.10.3,
3. Engineered design per Section R602.10.4, or
4. Appendix R – Wall Bracing Supplemental Provisions

Where a building, or portion thereof, does not comply with Section R602.10.2, Section R602.10.3, or Section R602.10.5, those portions shall be designed and constructed in accordance with Section R602.10.4. Townhouses in Seismic Design Category C and all buildings in Seismic Design Categories D₀, D₁, and D₂ shall comply with the bracing requirements in Appendix R or be designed in accordance with Section R602.10.4.

R602.10.1 Bracing materials and methods. Wall bracing materials and methods shall comply with Table R602.10.1.

TABLE R602.10.1
BRACING METHODS^{a,b}

<u>Method</u>	<u>Minimum Brace Material Thickness or Size</u>	<u>Minimum Braced Wall Panel Width or Brace Angle</u>	<u>Connection Criteria</u>	
			<u>Minimum Fasteners</u>	<u>Maximum Spacing</u>
<u>LIB</u> <u>Let-in Bracing</u>	<u>1x4 wood brace</u> <u>(or approved</u> <u>metal brace</u> <u>installed per</u> <u>manufacturer</u> <u>instructions)</u>	<u>45° angle and</u> <u>maximum 16"oc</u> <u>stud spacing^c</u>	<u>2-8d common</u> <u>nails or 3-8d box</u> <u>nails (2-1/2" long</u> <u>x 0.113" dia.)</u>	<u>Per stud and</u> <u>top and</u> <u>bottom plates</u>
<u>DWB</u> <u>Diagonal wood</u> <u>boards</u>	<u>3/4" (1" nominal)</u>	<u>48"</u>	<u>2-8d box nails</u> <u>(2-1/2" long x</u> <u>0.113" diameter)</u> <u>or 2 – 1-3/4"</u> <u>long 16ga.</u> <u>staples</u>	<u>Per stud and</u> <u>top and</u> <u>bottom plates</u>
<u>WSP</u> <u>Wood structural</u> <u>panel</u>	<u>3/8"</u>	<u>48"^d</u>	<u>6d common nail</u> <u>or 8d box nail (2-</u> <u>1/2" long x</u> <u>0.113" diameter)</u>	<u>6" edges, 12"</u> <u>field</u>
<u>SFB</u> <u>Structural</u> <u>Fiberboard</u> <u>Sheathing</u>	<u>1/2"</u>	<u>48"^d</u>	<u>1-1/2" long x</u> <u>0.120" dia.</u> <u>galvanized</u> <u>roofing nails</u>	<u>3" edges, 6"</u> <u>field</u>
<u>GB</u> <u>Gypsum Board</u> <u>(installed on both</u> <u>sides of wall)</u>	<u>1/2"</u>	<u>96"</u> <u>(48" for use with</u> <u>Section</u> <u>R602.10.3)</u>	<u>5d cooler nails</u> <u>or #6 screws</u>	<u>7" edges, 7"</u> <u>field</u> <u>(including top</u> <u>and bottom</u> <u>plates)</u>
<u>PCP</u> <u>Portland cement</u> <u>plaster</u>	<u>3/4"</u> <u>(maximum</u> <u>16"oc stud</u> <u>spacing)</u>	<u>48"</u>	<u>1-1/2" long, 11</u> <u>gage, 7/16"</u> <u>diameter head</u> <u>nails or 7/8"</u>	<u>6" o.c. on all</u> <u>framing</u> <u>members</u>

			<u>long, 16 gage staples</u>	
<u>CS-WSP^e</u> <u>Continuously sheathed WSP</u>	<u>3/8"</u>	<u>Refer to Table R602.10.1.1</u>	<u>Same as WSP</u>	<u>Same as WSP</u>
<u>CS-SFB^e</u> <u>Continuously sheathed SFB</u>	<u>1/2"</u>		<u>Same as SFB</u>	<u>Same as SFB</u>
<u>PF</u> <u>Portal Frame^f</u>	<u>7/16"</u>	<u>See Figure R602.10.1</u>	<u>See Figure R602.10.1</u>	<u>See Figure R602.10.1</u>

For SI: 1 inch = 25.4 mm

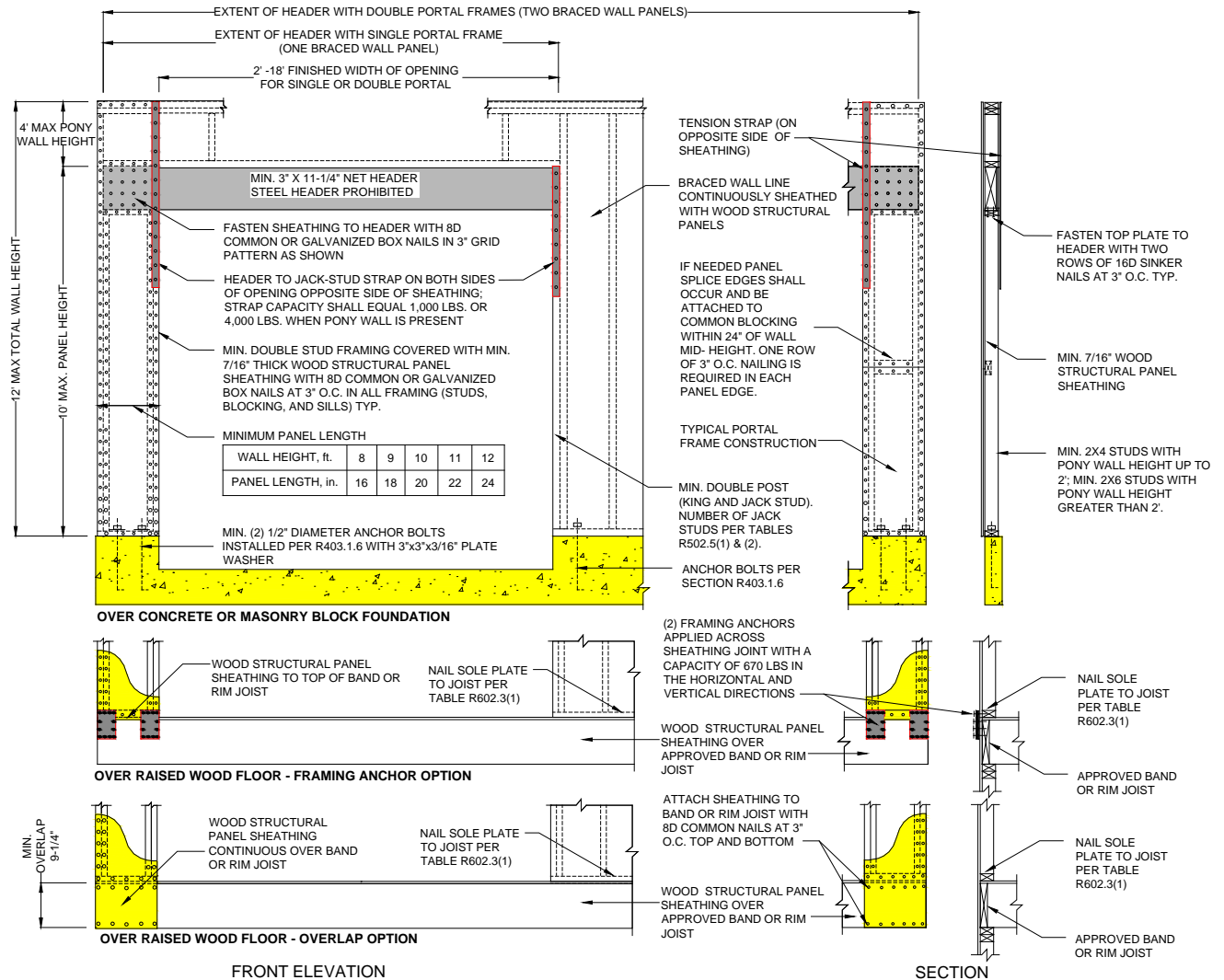
- a. Alternative bracing materials and methods, when approved in accordance with Section R104.11, shall be permitted to be used as a substitute for any of the bracing materials listed in Table R602.10.1 provided at least equivalent performance is demonstrated. Where the tested bracing strength or stiffness differs from tabulated materials, the bracing amount required for the alternative material shall be permitted to be factored to achieve equivalence.
- b. All edges of panel-type wall bracing shall be attached to framing or blocking, except GB bracing horizontal joints shall not be required to be blocked where joints are finished.
- c. Method LIB shall not be permitted for walls supporting a roof and two stories. Two LIB braces installed at a 60° angle shall be permitted to be substituted for each 45° angle LIB brace.
- d. A braced wall panel shall be permitted to be reduced to a 32-inch length when studs at each end of the braced wall panel are anchored to foundation or framing below using hold-down device with minimum 2,800 lbs design tension capacity. For detached single story garages and attached garages supporting roof only, a minimum 24-inch brace panel length shall be permitted on one wall containing one or more garage door openings.
- e. Bracing methods CS-WSP and CS-SFB shall have sheathing installed on all sheathable surfaces above, below, and between wall openings.
- f. For purposes of bracing in accordance with Section R602.10.2, two Method PF brace panels having a minimum width of 24-inches each shall be considered equivalent to one braced wall panel.

TABLE R602.10.1.1

MINIMUM WIDTHS OF METHOD CS-WSP AND CS-SFB BRACED WALL PANELS

<u>Maximum Opening Height Adjacent to Braced Wall Panel</u>	<u>Minimum Length of Braced Wall Panel (inches)</u>			
	<u>8' tall wall</u>	<u>9' tall wall</u>	<u>10' tall wall</u>	<u>12' tall wall</u>
<u>Up to 5' – 4"</u>	<u>24</u>	<u>27</u>	<u>30</u>	<u>36</u>
<u>Up to 6' – 8"</u>	<u>32</u>	<u>30</u>	<u>30</u>	<u>36</u>
<u>Up to 8'</u>	<u>48</u>	<u>41</u>	<u>38</u>	<u>36</u>
<u>Up to 9'</u>	<u>-</u>	<u>54</u>	<u>46</u>	<u>41</u>
<u>Up to 10'</u>	<u>-</u>	<u>-</u>	<u>60</u>	<u>48</u>
<u>Up to 12'</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>72</u>

For SI: 1 foot = 305 mm, 1 inch = 25.4 mm



For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 lb = 4.45 N

NOTE: Minimum PF panel length shall be 24 inches (610 mm) for use with Section R602.10.2.

FIGURE R602.10.1
METHOD PF – PORTAL FRAME CONSTRUCTION

602.10.2. Intermittent Bracing. Intermittent bracing shall comply with Sections R602.10.2.1 and R602.10.2.2.

R602.10.2.1 Limitations. The intermittent bracing requirements of Section R602.10.2.2 shall be limited to the following conditions of use:

1. Basic design wind speed shall not exceed 100 mph (161 km/h).
2. Bracing methods shall be LIB, DWB, WSP, SFB, GB, PCP, and PF in accordance with Table R602.10.1.
3. Overall plan length of the house is limited to 75 feet (22.9 m) and the overall plan width shall be no less than one-third the overall plan length.
4. Wall height at each story level shall not exceed 10 feet (3.05 m).
5. Roof eave-to-ridge height shall not exceed 10 feet (3.05 m) unless the roof is considered as an additional story for the purpose of determining bracing amounts required.
6. Except where used as bracing method GB, minimum ½-inch-thick gypsum wall board interior finish, or approved interior finish of equivalent or greater shear resistance, shall be installed on the interior side of exterior walls and both sides of interior walls and fastened in accordance with Table R702.3.5.
7. Floors supporting brace panels shall not cantilever more than 24 inches (607 mm) beyond the foundation or bearing wall below.
8. Townhouses shall be stabilized independently of adjacent units unless a design is provided to permit lateral load transfer between adjacent units.

R602.10.2.2 Requirements. Braced wall panels shall be constructed of bracing methods, materials, and minimum braced panel lengths complying with Table R602.10.1. The number of braced wall panels required for each side of a building (elevation view) at each story level of the building shall comply with Table R602.10.2 and shall be oriented parallel to the building side. The following additional requirements shall apply:

1. In no case shall the amount of bracing be less than two braced wall panels on exterior walls comprising each side of a building (elevation view) for each story level of the building.
2. Braced wall panel shall be located on each building side at each story level in accordance with Figure R602.10.2.2.
3. No more than one-half the number of braced wall panels required on a building side shall be permitted to be relocated from exterior walls to interior walls oriented in the same plan direction and within one-half the floor plan dimension perpendicular to the exterior wall.
4. Use of multiple bracing methods and materials complying with Table R602.10.1 shall be permitted.
5. Houses with skewed wings shall be constructed in accordance with either Section R602.10.3 or designed in accordance with Section R602.10.4.
6. Garage door openings supporting a floor load above shall be braced using Method PF unless the building plan level containing the garage opening wall complies with all the bracing requirements of this section.
7. The bracing amount provided on an upper story building side shall be "deemed-to-comply" where it equals or exceeds the amount of bracing required for the story immediately below.

TABLE R602.10.2
NUMBER OF BRACED WALL PANELS REQUIRED
FOR EACH HOUSE ELEVATION (BUILDING SIDE) AT EACH STORY LEVEL¹

Wind Velocity	Story Level Supporting:	Longest Overall Dimension of Floor Plan for a Given Story Level		
		25'	50'	75'
90 mph	Roof Only	1	2	3
	Roof + 1 Story	2	4	6
	Roof + 2 Stories	3	6	9
100 mph	Roof Only	2	3	4
	Roof + 1 Story	3	5	8
	Roof + 2 Stories	4	8	11

For SI: 1 foot = 305 mm

- Interpolation between dimensions shall be permitted. Extrapolation is prohibited.
- Table applies to wind exposure B. For wind exposure C or D, multiply number of braced wall panels required by 1.3 or 1.6, respectively.
- Fractions of panels shall be rounded to the nearest one-half braced wall panel. The following braced wall panel conditions shall be permitted to be counted as one-half a braced wall panel: (1) one 60 degree LIB, (2) one 48" GB or one 96" GB with gypsum wall board on one side, or (3) one 36" WSP, SFB, or PCP braced wall panel for wall heights not more than 9 feet (2.75 m).

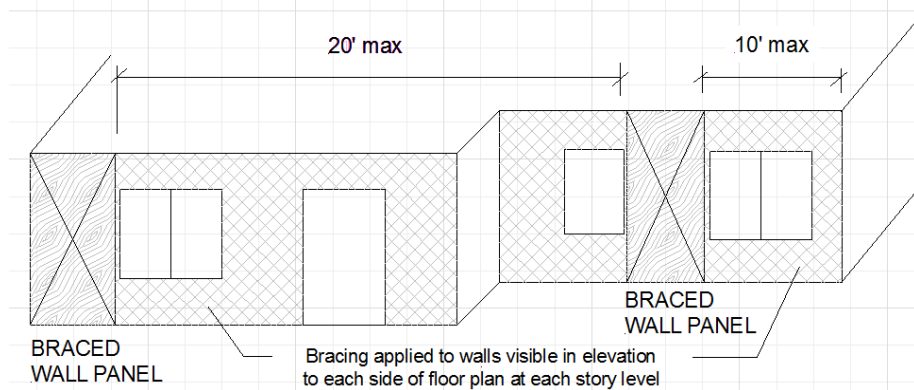


FIGURE R602.10.2.2
LOCATION OF BRACED WALL PANELS

R602.10.3 Continuous Sheathing.

R602.10.3.1 Limitations. The continuous sheathing requirements of Section R602.10.3 shall be limited to bracing methods CS-WSP and CS-SFB in accordance with Table R602.10.1 with the following conditions of use:

- Basic design wind speed shall not exceed 110 mph (177 km/h).
- Wall height at each story level shall not exceed 12 feet (3.66 m).
- Eave to ridge height shall not exceed 20 feet (6.10 m).
- Exterior walls shall be sheathed on all sheathable surfaces including infill areas between braced wall panels, above and below wall openings and on gable end walls.
- Except where used as bracing method GB, minimum ½-inch-thick gypsum wall board interior finish, or approved interior finish of equivalent or greater shear resistance, shall be installed on the interior side of exterior walls and both sides of interior walls and fastened in accordance with Table R702.3.5.
- Floors supporting braced wall panels shall not cantilever more than 24 inches (607 mm) beyond the foundation or bearing wall below.
- Townhouses shall be stabilized independently of adjacent units, unless a design is provided to permit lateral load transfer between adjacent units.

R602.10.3.2 Requirements. The required length of bracing for each side of a building (plan elevation) at each story level shall be determined using Table R602.10.3 and Figure R602.10.3(1). The cumulative contributing length of braced wall panels assigned to a rectangle side and each complying with Table R602.10.1.1 shall be greater than or equal to the required length of bracing. The following additional requirements shall apply:

1. Braced wall panels on exterior or interior walls shall be assigned to the nearest rectangle side as shown in Figure R602.10.3(2) for each story level floor plan.
2. Braced wall panels shall be distributed and installed in accordance with Figure R602.10.3(3).
3. A minimum of one-half the required bracing amount for each rectangle side should be located on exterior walls within 8 feet of the location of the rectangle side.
4. Interior braced wall panels using Method GB shall be assigned to the closest parallel rectangle side and shall contribute 0.5 times their actual length.
5. The bracing amount provided on an upper story building side shall be “deemed-to-comply” where it equals or exceeds the amount of bracing required for the story immediately below.

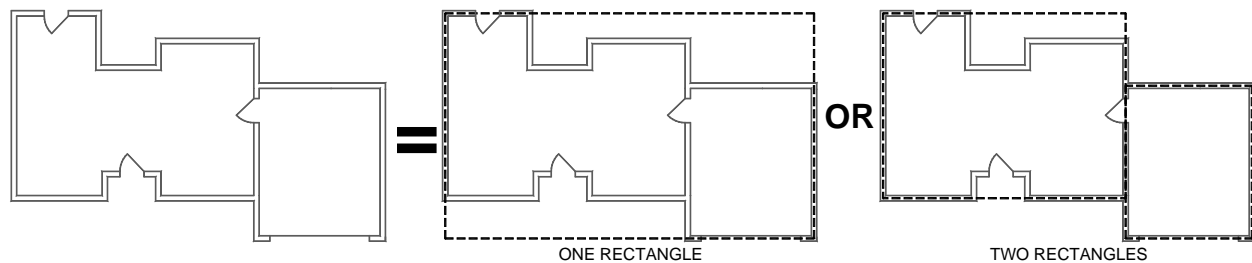


FIGURE R602.10.3(1)
CIRCUMSCRIBED RECTANGLES^{a,b,c}

- a. Each floor plan level shall be circumscribed with one or more rectangles around the entire floor plan at the floor level under consideration as shown in Figure R602.10.3.
- b. Rectangles shall surround all enclosed offsets and projections such as sunrooms and attached garages for a given story level floor plan. Chimneys, partial height projections, and open structures, such as carports and decks, shall be excluded from the rectangle.
- c. Each rectangle shall have no side greater than 80 feet (24.4 m) with a maximum rectangle length-to-width ratio of 3:1. Rectangles shall be permitted to be skewed to accommodate diagonal walls.

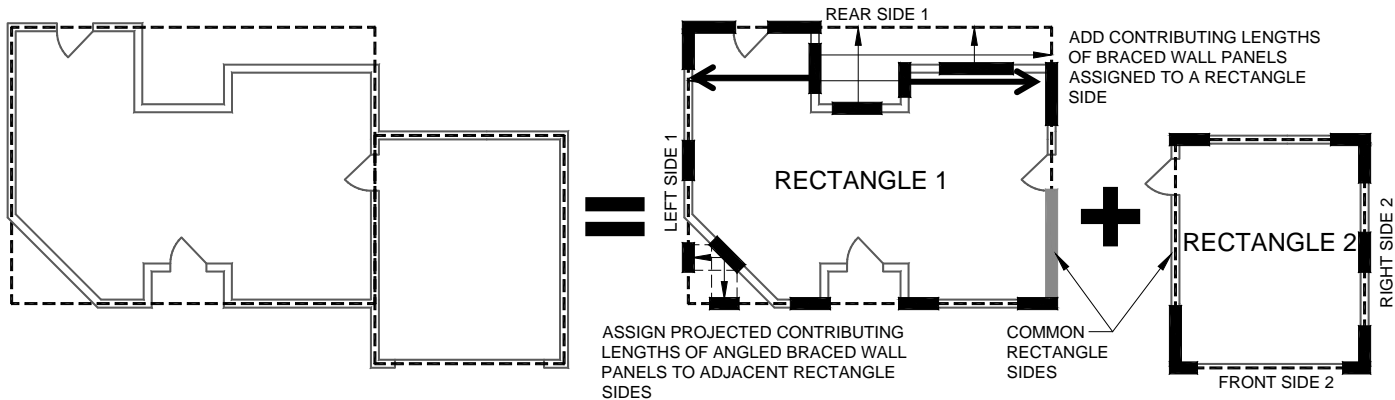
TABLE R602.10.3
REQUIRED LENGTH OF BRACING ALONG EACH SIDE
OF A CIRCUMSCRIBED RECTANGLE ^{a,b,c,d}

WIND SPEED	EAVE-TO RIDGE HEIGHT (FEET)	NUMBER OF LEVELS ABOVE ^e	REQUIRED LENGTH (FEET) OF BRACING ON ANYSIDE OF RECTANGLE							
			Length of perpendicular side (ft) ^f							
			10	20	30	40	50	60	70	80
90	10	None	2.0	3.5	5.0	6.0	7.5	9.0	10.5	12.0
		One story	3.5	6.5	9.0	12.0	14.5	17.0	19.8	22.6
		Two stories	5.0	9.5	13.5	17.5	21.5	25.5	29.2	33.4
	15	None	2.6	4.6	6.5	7.8	9.8	11.7	13.7	15.7
		One story	4.0	7.5	10.4	13.8	16.7	19.6	22.9	26.2
		Two stories	5.5	10.5	14.9	19.3	23.7	27.5	32.1	36.7
	20	None	2.9	5.2	7.3	8.8	11.1	13.2	15.4	17.6
		One story	4.5	8.5	11.8	15.6	18.9	22.1	25.8	29.5
		Two stories	6.2	11.9	16.8	21.8	27.3	31.1	36.3	41.5
100	10	None	2.5	4.0	6.0	7.5	9.5	11.0	12.8	14.6
		One story	4.5	8.0	11.0	14.5	18.0	21.0	24.5	28.0
		Two stories	6.0	11.5	16.5	21.5	26.5	31.0	36.2	41.4
	15	None	3.4	5.2	7.8	9.8	12.4	14.3	16.7	19.1
		One story	5.2	9.2	12.7	16.7	20.7	24.2	28.2	32.2
		Two stories	6.6	12.7	18.2	23.7	29.2	34.1	39.8	45.5
	20	None	3.8	5.9	8.8	11.1	14.0	16.2	18.9	21.6
		One story	5.9	10.4	14.4	18.9	23.4	27.3	31.8	36.3
		Two stories	7.5	14.4	20.6	26.8	33.0	38.5	44.9	51.3
110	10	None	3.0	5.0	7.0	9.0	11.5	13.3	15.5	17.5
		One story	5.0	9.5	13.5	17.5	21.5	25.5	29.5	34.0
		Two stories	7.5	14.0	20.0	26.0	32.0	37.5	44.0	50.0
	15	None	4.2	6.3	9.5	11.9	15.0	17.3	20.2	23.1
		One story	6.3	11.2	15.4	20.2	25.0	29.3	34.2	39.1
		Two stories	8.0	15.4	22.0	28.7	35.3	41.3	48.2	55.1
	20	None	4.6	7.2	10.6	13.4	16.9	19.6	22.9	26.2
		One story	7.2	12.6	17.4	22.9	28.3	33.0	38.5	44.0
		Two stories	9.1	17.4	24.9	32.4	39.9	46.6	54.4	62.2

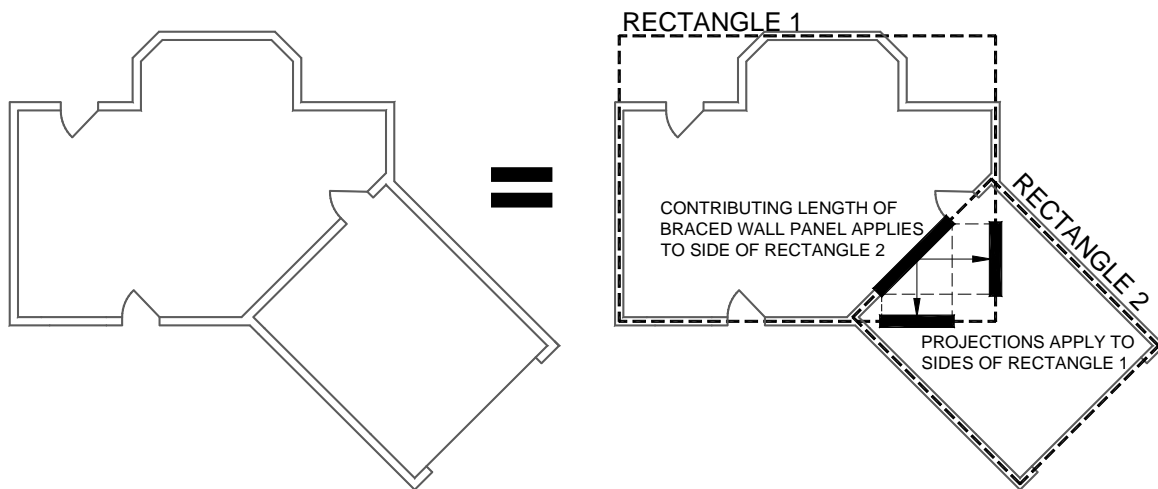
For SI: 1 ft = 304.8 mm

- Interpolation shall be permitted; extrapolation shall be prohibited.
- For Exposure Category C or D, multiply the required length of bracing by a factor of 1.3 or 1.6, respectively.
- For wall heights other than 10 ft (3.05 m), multiply the required length of bracing by the following factors: 0.90 for 8 feet (2.44 m), 0.95 for 9 feet (2.74 m), 1.05 for 11 feet (3.35 m) and 1.10 for 12 feet (3.66 m).
- Where minimum ½" gypsum wall board interior finish is not provided, the required bracing amount for the affected rectangle side shall be multiplied by 1.40.

- e. A floor, habitable or otherwise, contained wholly within the roof rafters or roof trusses need not be considered a story for purposes of determining wall bracing provided the eave to ridge height does not exceed 20 feet (6.10 m).
- f. Perpendicular sides to the front and rear sides are the left and right sides. Perpendicular sides to the left and right sides are the front and rear sides.



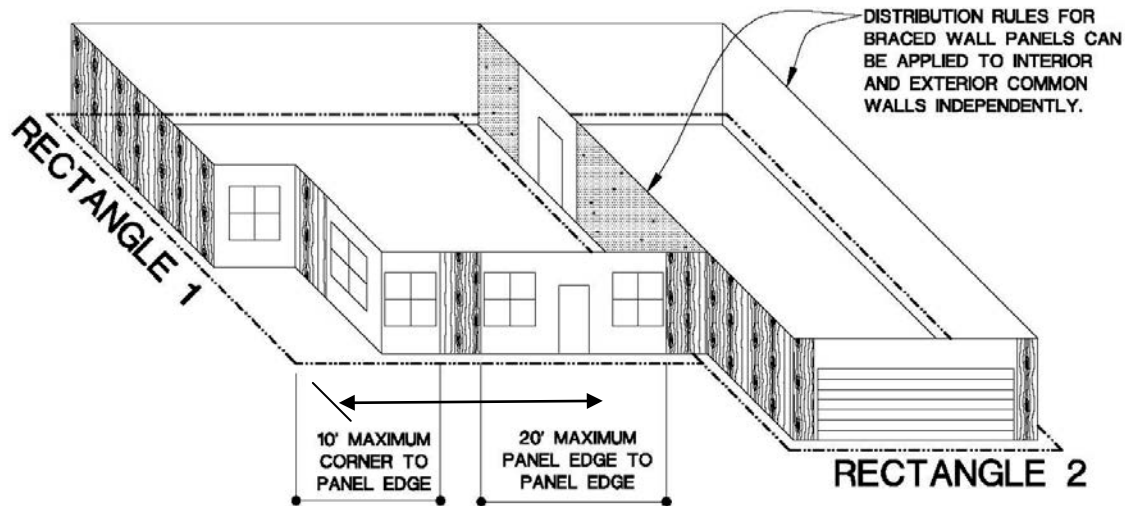
(a) Regular Floor Plan



(b) Skewed Floor Plan

FIGURE R602.10.3(2)
ASSIGNMENT OF BRACED WALL PANELS
CIRCUMSCRIBED RECTANGLE SIDES^{a,b,c}

- a. Projected contributing lengths of angled braced wall panels shall be assigned to the closest rectangle sides.
- b. Where multiple rectangles share a common side or sides, as shown in Figure R602.10.3(2)(a), the total required length of bracing on the common side shall equal the sum of the required lengths from each of the shared rectangle sides.
- c. Braced wall panels located on a common wall where skewed rectangles intersect, as shown in Figure R602.10.3(2)(b), shall have their contributing length applied towards the required length of bracing for the parallel rectangle side and its projected contributing lengths towards the adjacent skewed rectangle sides. Where the common side of rectangle 2 as shown in Figure R602.10.3(2)(b) has no physical wall, the portion shall be designed in accordance with Section R602.10.4.



For SI: 1 ft = 304.8 mm

FIGURE R602.10.3(3)
DISTRIBUTION OF BRACED WALL PANELS^{a,b,c,d}

- A braced wall panel complying with Table R602.10.1.1 shall be located on each elevation view within 10 feet (3.05 m) of the corners of circumscribed rectangles.
- The distance between adjacent edges of braced wall panels shall be no more than 20 feet (6.10 m) as measured along the rectangle side.
- A minimum 24-inch-wide CS-WSP or 32-inch-wide CS-SFB panel shall be located on each side of inside and outside corners or an 800 lb rated tie-down shall be fastened to the edge of the braced wall panel closest to each corner.
- Interior and exterior wall segments which contribute to the common sides of multiple rectangles shall be permitted to apply the distribution requirements given above to each wall segment independently.

R602.10.4 Wall bracing by engineered design. Designs using bracing materials and methods listed in Table R602.10.1 or approved alternative materials and methods shall be permitted and shall comply with accepted engineering practice. Accepted engineering practice shall include the following:

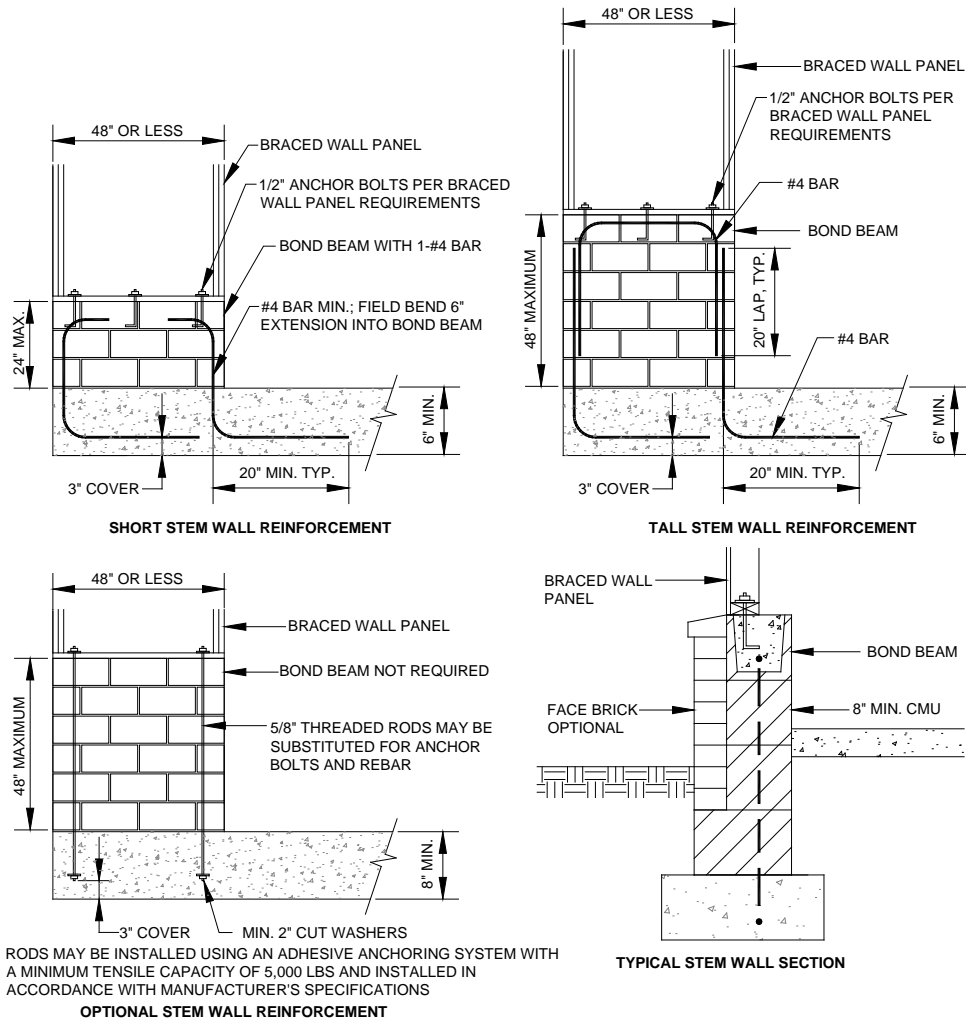
- Design in accordance with Section R301, or
- Design equivalent to the analysis basis and scope of the prescriptive provisions of R602.10, including determination of design loads, design unit shear values, and bracing amounts.

R602.10.5 Load path details. Construction shall comply with applicable detailing requirements of this section to ensure an adequate continuous load path for transfer of bracing loads and uplift loads from the roof to the foundation.

R602.10.5.1 Wind uplift load path. Framing connections to transfer roof uplift forces shall comply with Section R602.3.5 and Section R802.11.

R602.10.5.2 Foundation anchorage. Braced wall panels shall be connected to the foundation per Section R403.1.6 and as required in Figure R602.10.1 for portal frames (Method PF).

R602.10.5.3 Masonry or concrete pedestals. Masonry or concrete stem walls with a length of 48 inches (1220 mm) or less supporting braced wall panels shall be reinforced in accordance with Figure R602.10.4.3. Concrete stem walls shall be 6" nominal minimum thickness.



NOTE: GROUT BOND BEAMS AND ALL CELLS WHICH CONTAIN REBAR, THREADED RODS AND ANCHOR BOLTS.

For SI: 1 in=25.4 mm

FIGURE R602.10.5.3
MASONRY STEM WALLS SUPPORTING BRACED WALL PANELS

R602.10.5.4 Blocking of floor framing. When parallel to floor framing, braced wall panels shall be connected to a band, rim or header joist, floor framing or perpendicular full-height solid blocking between floor framing at 16 inches (406 mm) on center. When perpendicular to floor framing, braced wall panels shall be connected to full-height solid blocking between floor framing. Attachments shall be in accordance with Table R602.3(1). Manufactured lumber or truss blocking panels shall be permitted to substitute for full-height solid blocking.

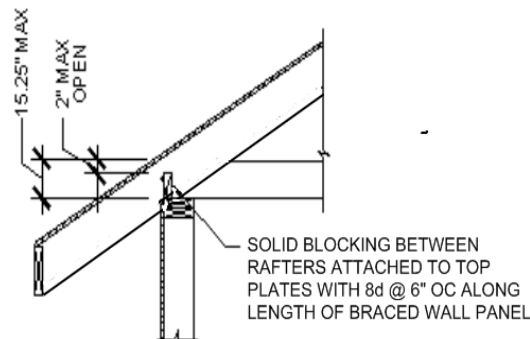
R602.10.5.5 Blocking of roof framing. When parallel to roof framing, braced wall panels shall be connected to a band, rim or header joist, or roof truss. When perpendicular to roof framing, the top plates of exterior braced wall panels shall be connected to the rafters or roof trusses above in accordance with Table R602.10.5.5 and fastened in accordance with Table R602.3(1).

TABLE R602.10.5.5
BRACED WALL PANEL CONNECTIONS TO PERPENDICULAR ROOF FRAMING

<u>DISTANCE FROM TOP OF BRACED WALL PANEL TO TOP OF RAFTER OR ROOF</u>	<u>REQUIREMENT</u>	<u>REFERENCED FIGURE</u>
--	--------------------	--------------------------

<u>TRUSS, (in)</u>		
≤ 9.25	No blocking required	NA
$9.25 - 15.25$	Solid 2x blocking between rafters or trusses	R602.10.5.5(1)
$15.25 - 48$	Vertical blocking panels	R602.10.5.5(2)
> 48	Designed in accordance with accepted engineering practice	NA

For SI: 1 inch = 25.4 mm



For SI: 1 inch = 25.4 mm

FIGURE R602.10.5.5(1)
BRACED WALL PANEL CONNECTION TO PERPENDICULAR RAFTERS OR TRUSSES

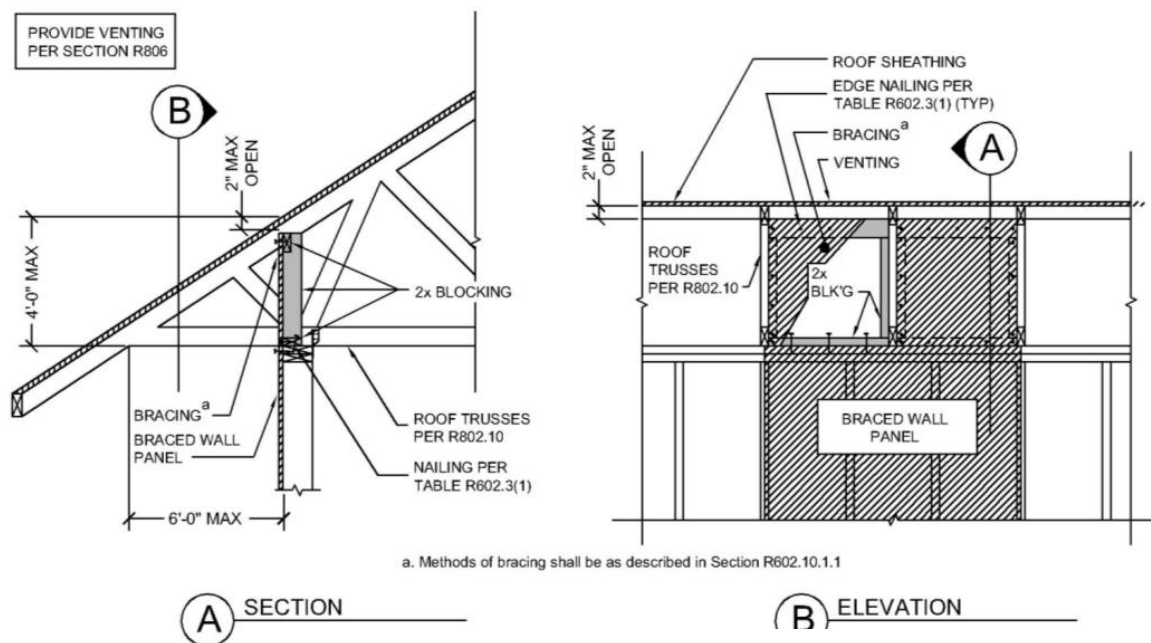


FIGURE R602.10.5.5(2)
BRACED WALL PANEL CONNECTION TO PERPENDICULAR RAFTERS OR ROOF TRUSSES

R602.10.5.6 Cripple walls and framed walls of walk-out basements. The required length of bracing for cripple walls with a maximum height of 48 inches (1220 mm) or less along its entire length shall be equal to the wall above. The required length of bracing for cripple walls with a height greater than 48 inches (1220 mm) at any location along its length and for framed walls of a walk-out basement shall be determined in accordance with Section R602.10.2 or R602.10.3, considering the cripple wall or walk-out

basement as an additional story. As an alternative, the required length of bracing shall be permitted to equal to the wall above multiplied by a factor of 1.15.

R602.10.5.7 Open Elevated Foundations. Open elevated foundations, such as pile foundations shall be constructed to transfer all lateral loads from the wall bracing system to the piles or elevated piers, including shears, overturning, and uplift loads. Piles or elevated piers along with their foundations shall be sized and/or embedded to transfer all lateral loads imposed by the wall bracing system to the ground.

R602.10.5.8 Balloon frame wall bracing. Balloon frame walls shall have a maximum height of two stories unless constructed in accordance with an approved design. Wall framing shall be continuous from lowest floor to the wall top plate at the roof. Braced wall panels shall extend to the full-height of the balloon frame wall. All edges of sheathing shall be supported on and fastened to blocking or framing. The required brace wall panel length assigned to the balloon frame wall shall be based on the bracing required for the lowest floor level supporting the balloon frame wall as determined in accordance with Section R602.10.2 or R602.10.3. For balloon framed walls having a maximum height of two stories and a maximum length of 12 feet (3.66 m), braced wall panels shall be permitted to be placed parallel to the balloon framed wall on each side and at each story adjacent to the balloon framed wall, and no bracing shall be required for the balloon frame wall portion. Two story interior open ceiling areas shall not extend into the building from the balloon frame wall more than one-half the distance to the opposite building side unless bracing around the opening in the floor diaphragm is designed in accordance with Section R602.10.4.

~~**R602.12 Simplified wall bracing.** Buildings meeting all of the conditions listed in items 1-8 shall be permitted to be braced in accordance with this section as an alternative to the requirements of Section R602.10. The entire building shall be braced in accordance with this section; the use of other bracing provisions of R602.10, except as specified herein, shall not be permitted.~~

- ~~1. There shall be no more than two stories above the top of a concrete or masonry foundation or basement wall. Permanent wood foundations shall not be permitted.~~
- ~~2. Floors shall not cantilever more than 24 inches (607 mm) beyond the foundation or bearing wall below.~~
- ~~3. Wall height shall not be greater than 10 feet (2743 mm).~~
- ~~4. The building shall have a roof eave-to-ridge height of 15 feet (4572 mm) or less.~~
- ~~5. All exterior walls shall have gypsum board with a minimum thickness of $\frac{1}{2}$ inch (12.7 mm) installed on the interior side fastened in accordance with Table R702.3.5.~~
- ~~6. The structure shall be located where the basic wind speed is less than or equal to 90 mph (40 m/s), and the Exposure Category is A or B.~~
- ~~7. The structure shall be located in Seismic Design Category A, B or C for detached one- and two-family dwellings or Seismic Design Category A or B for townhouses.~~
- ~~8. Cripple walls shall not be permitted in two-story buildings.~~

~~**R602.12.1 Circumscribed rectangle.** The bracing required for each building shall be determined by circumscribing a rectangle around the entire building on each floor as shown in Figure R602.12.1. The rectangle shall surround all enclosed offsets and projections such as sunrooms and attached garages. Open structures, such as carports and decks, shall be permitted to be excluded. The rectangle shall have no side greater than 60 feet (18 288 mm), and the ratio between the long side and short side shall be a maximum of 3:1.~~

~~**R602.12.2 Sheathing materials.** The following sheathing materials installed on the exterior side of exterior walls shall be used to construct a bracing unit as defined in Section R602.12.3. Mixing materials is prohibited.~~

- ~~1. Wood structural panels with a minimum thickness of $\frac{3}{8}$ inch (9.5 mm) fastened in accordance with Table R602.3(3).~~

- ~~2. Structural fiberboard sheathing with a minimum thickness of $\frac{1}{2}$ inch (12.7 mm) fastened in accordance with Table R602.3(1).~~

R602.12.3 Bracing unit. A bracing unit shall be a full-height sheathed segment of the exterior wall with no openings or vertical or horizontal offsets and a minimum length as specified herein. Interior walls shall not contribute toward the amount of required bracing. Mixing of Items 1 and 2 is prohibited on the same story.

- ~~1. Where all framed portions of all exterior walls are sheathed in accordance with Section R602.12.2, including wall areas between bracing units, above and below openings and on gable end walls, the minimum length of a bracing unit shall be 3 feet (914 mm).~~
- ~~2. Where the exterior walls are braced with sheathing panels in accordance with Section R602.12.2 and areas between bracing units are covered with other materials, the minimum length of a bracing unit shall be 4 feet (1219 mm).~~

R602.12.3.1 Multiple bracing units. Segments of wall compliant with Section R602.12.3 and longer than the minimum bracing unit length shall be considered as multiple bracing units. The number of bracing units shall be determined by dividing the wall segment length by the minimum bracing unit length. Full-height sheathed segments of wall narrower than the minimum bracing unit length shall not contribute toward a bracing unit except as specified in Section R602.12.6.

R602.12.4 Number of bracing units. Each side of the circumscribed rectangle, as shown in Figure R602.12.1, shall have, at a minimum, the number of bracing units in accordance with Table R602.12.4 placed on the parallel exterior walls facing the side of the rectangle. Bracing units shall then be placed using the distribution requirements specified in Section R602.12.5.

R602.12.5 Distribution of bracing units. The placement of bracing units on exterior walls shall meet all of the following requirements as shown in Figure R602.12.5.

- ~~1. A bracing unit shall begin no more than 12 feet (3658 mm) from any wall corner.~~
- ~~2. The distance between adjacent edges of bracing units shall be no greater than 20 feet (6096 mm).~~
- ~~3. Segments of wall greater than 8 feet (2438 mm) in length shall have a minimum of one bracing unit.~~

R602.12.6 Narrow panels. The bracing methods referenced in Section R602.10 and specified in Sections R602.12.6.1 through R602.12.6.3 shall be permitted when using simplified wall bracing.

R602.12.6.1 Method CS-G. *Braced wall panels* constructed as Method CS-G in accordance with Tables R602.10.4 and R602.10.5 shall be permitted for one-story garages when all framed portions of all exterior walls are sheathed with wood structural panels. Each CS-G panel shall be equivalent to 0.5 of a bracing unit. Segments of wall which include a Method CS-G panel shall meet the requirements of Section R602.10.4.2.

R602.12.6.2 Method CS-PF. *Braced wall panels* constructed as Method CS-PF in accordance with Section R602.10.6.4 shall be permitted when all framed portions of all exterior walls are sheathed with wood structural panels. Each CS-PF panel shall equal 0.5 bracing units. A maximum of four CS-PF panels shall be permitted on all segments of walls parallel to each side of the circumscribed rectangle. Segments of wall which include a Method CS-PF panel shall meet the requirements of Section R602.10.4.2.

R602.12.6.3 Methods PFH and PFG. *Braced wall panels* constructed as Method PFH and PFG shall be permitted when bracing units are constructed using wood structural panels. Each PFH panel shall equal one bracing unit and each PFG panel shall be equal to 0.75 bracing units.

R602.12.7 Lateral support. ~~For bracing units located along the eaves, the vertical distance from the outside edge of the top wall plate to the roof sheathing above shall not exceed 9.25 inches (235 mm) at the location of a bracing unit unless lateral support is provided in accordance with Section R602.10.8.2.~~

R602.12.8 Stem walls. ~~Masonry stem walls with a height and length of 48 inches (1219 mm) or less supporting a bracing unit or a Method CS-G, CS-PF or PFG braced wall panel shall be constructed in accordance with Figure R602.10.9. Concrete stem walls with a length of 48 inches (1219 mm) or less, greater than 12 inches (305 mm) tall and less than 6 inches (152 mm) thick shall be reinforced sized and located in accordance with Figure R602.10.9.~~

Reason: In recent years, great concern has arisen regarding the complexity of the IRC wall bracing provisions. Much good work was done by the ICC Ad Hoc Wall Bracing Committee to resolve significant technical issues and deficiencies in the IRC bracing provisions, including conventional bracing provisions which had not kept up with changes in housing over the years, resulting in concerns with structural safety and performance. Unfortunately, the technical solutions required added complexity to resolve. Now, in an understandable reaction to this added complexity, many attempts are being made to simplify the wall bracing provisions. However, some of these attempts at simplicity are doing so by essentially picking "winners and losers" (e.g., removing certain bracing methods and materials from consideration in a favored simplified approach). The approach of this proposal is to be inclusive and simple while adhering to the technical advancements achieved by the ICC Ad Hoc Wall Bracing Committee.

The proposal is formatted as follows for ease of use:

1. Section R602.10 -- provides charging language for two simplified bracing approaches (intermittent and continuous), an engineered approach, and the existing IRC 2012 provisions (Appendix R).
2. Section R602.10.1 -- provides bracing methods and materials common to both simplified methods and is non-exclusive. [1 sentence, 2 Tables, and 1 Figure]
3. Section R602.10.2 -- simplified intermittent bracing (for low wind only, 90 and 100 mph) [1 page of text, 1 Table, 1 Figure]
4. Section R602.10.3 -- simplified continuous bracing (for up to 110 mph, wind); [1 page of text, 1 Table and 3 Figures]
5. Section R602.10.4 -- provides two engineering approaches, one of which is consistent with IRC bracing provisions to permit engineered solutions analyzed in a manner equivalent to the IRC; [1 paragraph of text]
6. Section R602.10.5 -- provides various load path details important to overall building performance and connectivity for any bracing method. [2-1/2 pages including text, figures, and table]

To achieve the goal of this proposal, several factors have been considered as described next.

First, Canada recently updated its residential wall bracing provisions considering the same issues and data that the ICC Ad Hoc Committee considered. However, they ended up with a different solution worthy of consideration and, thus, influenced the approach taken in this proposal. Their approach essentially continued traditional (conventional) bracing practices in the lowest hazard regions of the country in recognition that bracing problems were rare (even in newer homes) in this condition. Thus, for much of the country the simple "status quo" was considered adequate absent any strong evidence to the contrary. This same approach is relevant to the US. In moderate hazard regions of the country, an approach similar to that developed by the IRC Ad Hoc Wall Bracing Committee was implemented in Canada. Finally, in the most extreme high hazard regions of Canada engineered design was implemented (which is already the case for many of the high hazard areas in the US).

Second, a simple and limited scope conventional bracing practice is still effective in the IBC, Section 2308. If these provisions are still considered adequate for commercial building applications, then are they not also suitable for housing? The continuing existence and use of the IBC 2308 conventional wall bracing provisions, as well as past experience, suggest strongly that the answer is YES. The IBC 2308 conventional bracing provisions are inclusive and simple to use. Further, they have been recently reformatted for clarity in IBC 2015 proposal S273-11/12 which was approved at the Group A FAH last fall. Therefore, this proposal makes use of this concept, upgrades the approach to improve bracing performance for wind, and applies it in a limited set of conditions for housing in the IRC applicable only to the lowest hazard regions where past experience has been successful. Again, this action also is consistent with the approach taken in Canada after deliberations of a special task group.

Third, for a broader range of hazard conditions covered by the IRC, a simplified approach based primarily on continuous sheathing methods is adopted. This approach is similar to that being considered in various states (including VA from which this approach was derived). As hazards become greater and bracing loads on homes increase, continuous sheathed bracing becomes a more viable and practical bracing method for homes. This is driven by practicality and performance, not simply as a matter of picking "winners and losers" in the interest of simplifying the code by reducing bracing options and restricting market competition without clear cause in even the lowest hazard regions.

Fourth, in areas where hazards and bracing loads are extreme, engineered solutions provide a better means of maintaining simplicity, affordability or efficiency, and performance. An engineered design has a greater ability and flexibility in addressing load path details which are difficult and complex to adequately address in a prescriptive building code (without making the code more complex than many users are willing to tolerate). In this case, engineering provides a value-added solution. However, to fully realize the value potential of engineering, engineers must be equipped with the same efficient design methodology used by the IRC Ad Hoc Wall Bracing Committee to upgrade the IRC wall bracing provisions. Otherwise, engineering will be non-competitive and resisted by the housing market for no other reason than not having access to the design methods as used to develop the IRC wall bracing provisions. Therefore, this proposal recognizes conventional engineering practices (e.g., IBC and IRC Section 301) and also includes the option to use design consistent with the IRC for buildings within the scope of the IRC. The IRC commentary should be coordinated with the proposal by referencing the following peer-reviewed journal paper explaining the engineering basis of the IRC bracing provisions:

Crandell, J. and Martin, Z., "The Story Behind the 2009 IRC Wall Bracing Provisions (Part 2: New Wind Bracing Requirements)", *Wood Design Focus*, Forest Products Society, Madison, WI, Spring 2009.

Fifth, for special conditions not addressed in the proposed simplified conventional bracing and continuous sheathing methods addressed in this proposal, the existing IRC provisions are listed as one of the accepted means of a bracing design and are placed in Appendix R. The more complex provisions of the IRC should only be required in special cases, realizing that these provisions add significant complexity not necessary for most homes in most states and regions of the US.

Finally, bracing materials and methods in the IRC were evaluated using very specific performance criteria that are not currently made explicit such that innovation is encouraged and competition between incumbent materials and new materials is conducted on a fair and level playing field. Therefore, this proposal includes language to allow equivalency on the basis of equivalent bracing performance, not just a narrow equivalency concept based only on equivalency of materials (e.g., a weaker bracing material should be considered as equivalent when a greater amount is required to provide equivalent bracing performance of a building in end use). While this seems like common sense, it has been a major barrier to innovation, evaluation, acceptance, and fair market competition of alternative means and methods of bracing. This also affects the ability to provide competitive and consistent engineered solutions.

Based on the above points and a clear need to take the IRC wall bracing provisions to the next step to better promote simplicity, affordability, performance, and innovation, your support for approval of this proposal is requested.

Cost Impact: The code change proposal will not increase the cost of construction.

RB329-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R602.10 (NEW)-RB-CRANDELL-LAUTRUP-WAINRIGHT.doc

RB330 – 13

R603, M1308.1, M2101.6, P2603.2

Proponent: Bonnie Manley, P.E., American Iron and Steel Institute (bmanley@steel.org)

Revise as follows:

SECTION R603 COLD-FORMED STEEL WALL FRAMING

R603.1 General. Elements shall be straight and free of any defects that would significantly affect structural performance. Cold-formed steel wall framing members shall be in accordance with the requirements of this section.

R603.1.1 Applicability limits. The provisions of this section shall control the construction of exterior cold-formed steel wall framing and interior load-bearing cold-formed steel wall framing for buildings not more than 60 feet (18 288 mm) long perpendicular to the joist or truss span, not more than 40 feet (12 192 mm) wide parallel to the joist or truss span, and less than or equal to three stories above *grade plane*. All exterior walls installed in accordance with the provisions of this section shall be considered as load-bearing walls. Cold-formed steel walls constructed in accordance with the provisions of this section shall be limited to sites ~~subjected to a maximum~~ where the ultimate design wind speed ~~of 140~~ is less than 139 miles per hour (6249 m/s), Exposure Category B or C₁ and ~~a maximum~~ the ground snow load is less than or equal to ~~of~~ 70 pounds per square foot (3.35 kPa).

R603.1.2 In-line framing. Load-bearing cold-formed steel studs constructed in accordance with Section R603 shall be located in-line with joists, trusses and rafters in accordance with Figure R603.1.2 and the tolerances specified as follows:

1. The maximum tolerance shall be $\frac{3}{4}$ inch (19 mm) between the centerline of the horizontal framing member and the centerline of the vertical framing member.
2. Where the centerline of the horizontal framing member and bearing stiffener are located to one side of the centerline of the vertical framing member, the maximum tolerance shall be $\frac{1}{8}$ inch (3 mm) between the web of the horizontal framing member and the edge of the vertical framing member.

R603.2 Structural framing. Load-bearing cold-formed steel wall framing members shall be in accordance with this section. ~~Figure R603.2(1) and with the dimensional and minimum thickness requirements specified in Tables R603.2(1) and R603.2(2). Tracks shall comply with Figure R603.2(2) and shall have a minimum flange width of $1\frac{1}{4}$ inches (32 mm).~~

R603.2.1 Material. Load-bearing cold-formed steel framing members shall be cold-formed to shape from structural quality sheet steel complying with the requirements of ~~one of the following:~~

- ~~1. ASTM A 653: Grades 33 and 50 (Class 1 and 3).~~
- ~~2. ASTM A 792: Grades 33 and 50A.~~
- ~~3. ASTM A 1003: Structural Grades 33 Type H and 50 Type H.~~

R603.2.2 Corrosion protection. Load-bearing cold-formed steel framing shall have a metallic coating complying with ASTM A 1003 and one of the following:

1. A minimum of G 60 in accordance with ASTM A 653.
2. A minimum of AZ 50 in accordance with ASTM A 792.

R603.2.3 Dimension, thickness and material grade. Load-bearing cold-formed steel wall framing members shall comply with Figure R603.2.3(1) and with the dimensional and thickness requirements specified in Table R603.2.3. Additionally, all c-shaped sections shall have a minimum flange width of 1.625 inches (41 mm) and a maximum flange width of 2 inches (51 mm). The minimum lip size for c-

shaped sections shall be 0.5 inches (13 mm). Track sections shall comply with Figure R603.2.3(2) and shall have a minimum flange width of $1\frac{1}{4}$ inches (32 mm). Minimum Grade 33 ksi steel shall be used wherever 33 mil and 43 mil thicknesses are specified. Minimum Grade 50 ksi steel shall be used wherever 54 and 68 mil thicknesses are specified.

R603.2.4 Identification. Load-bearing cold-formed steel framing members shall have a legible *label*, stencil, stamp or embossment with the following information as a minimum:

1. Manufacturer's identification.
2. Minimum base steel thickness in inches (mm).
3. Minimum coating designation.
4. Minimum yield strength, in kips per square inch (ksi) (MPa).

~~R603.2.3 Corrosion protection.~~ Load-bearing cold-formed steel framing shall have a metallic coating complying with ASTM A 1003 and one of the following:

- ~~1. A minimum of G 60 in accordance with ASTM A 653.~~
- ~~2. A minimum of AZ 50 in accordance with ASTM A 792.~~

FIGURE R603.2.3(1) C-SHAPED SECTION

(Figure remains unchanged)

FIGURE R603.2.3(2) TRACK SECTION

(Figure remains unchanged)

TABLE R603.2(1)
LOAD-BEARING COLD-FORMED STEEL STUD SIZES

MEMBER DESIGNATION ^a	WEB DEPTH (inches)	MINIMUM FLANGE WIDTH (inches)	MAXIMUM FLANGE WIDTH (inches)	MINIMUM LIP SIZE (inches)
350S162-t	3.5	1.625	2	0.5
550S162-t	5.5	1.625	2	0.5

For SI: 1 inch = 25.4 mm; 1 mil = 0.0254 mm.

a. The member designation is defined by the first number representing the member depth in hundredths of an inch "S" representing a stud or joist member, the second number representing the flange width in hundredths of an inch, and the letter "t" shall be a number representing the minimum base metal thickness in mils [See Table R603.2(2)].

TABLE R603.2.3
LOAD-BEARING COLD-FORMED STEEL STUD SIZES AND THICKNESSES

MEMBER DESIGNATION ^a	WEB DEPTH (inches)	MINIMUM BASE STEEL THICKNESS mil (inches)
350S162-t	3.5	33 (0.0329), 43 (0.0428), 54 (0.0538)
550S162-t	5.5	33 (0.0329), 43 (0.0428), 54 (0.0538), 68 (0.0677)

For SI: 1 inch = 25.4 mm; 1 mil = 0.0254 mm.

a. The member designation is defined by the first number representing the member depth in hundredths of an inch "S" representing a stud or joist member, the second number representing the flange width in hundredths of an inch, and the letter "t" shall be a number representing the minimum base metal thickness in mils.

TABLE R603.2(2)
MINIMUM THICKNESS OF COLD-FORMED STEEL MEMBERS

DESIGNATION THICKNESS (mils)	MINIMUM BASE STEEL THICKNESS (inches)
33	0.0329

43	0.0428
54	0.0538
68	0.0677
97	0.0966

For SI: 1 mil = 0.0254 mm, 1 inch = 25.4 mm.

R603.2.5.4 Fastening requirements. Screws for steel-to-steel connections shall be installed with a minimum edge distance and center-to-center spacing of $\frac{1}{2}$ inch (12.7 mm), shall be self-drilling tapping and shall conform to ASTM C 1513. Structural sheathing shall be attached to cold-formed steel studs with minimum No. 8 self-drilling tapping screws that conform to ASTM C 1513. Screws for attaching structural sheathing to cold-formed steel wall framing shall have a minimum head diameter of 0.292 inch (7.4 mm) with countersunk heads and shall be installed with a minimum edge distance of $\frac{3}{8}$ inch (9.5 mm). Gypsum board shall be attached to cold-formed steel wall framing with minimum No. 6 screws conforming to ASTM C 954 or ASTM C 1513 with a bugle head style and shall be installed in accordance with Section R702. For all connections, screws shall extend through the steel a minimum of three exposed threads. All fasteners shall have rust inhibitive coating suitable for the installation in which they are being used, or be manufactured from material not susceptible to corrosion.

~~Where No. 8 screws are specified in a steel-to-steel connection, the required number of screws in the connection is permitted to be reduced in accordance with the reduction factors in Table R603.2.4, when larger screws are used or when one of the sheets of steel being connected is thicker than 33 mils (0.84 mm). When applying the reduction factor, the resulting number of screws shall be rounded up.~~

**TABLE R603.2.4
SCREW SUBSTITUTION FACTOR**

SCREW SIZE	THINNEST CONNECTED STEEL SHEET (mils)	
	33	43
#8	1.0	0.67
#10	0.93	0.62
#12	0.86	0.56

For SI: 1 mil = 0.0254 mm.

~~R603.2.5~~ **R603.2.6 Web holes, web hole reinforcing and web hole patching.** Web holes, web hole reinforcing and web hole patching shall be in accordance with this section.

~~R603.2.5.1~~ **R603.2.6.1 Web holes.** Web holes in wall studs and other structural members shall comply with all of the following conditions:

1. Holes shall conform to Figure ~~R603.2.5.4~~ **R603.2.6.1**;
2. Holes shall be permitted only along the centerline of the web of the framing member;
3. Holes shall have a center-to-center spacing of not less than 24 inches (610 mm);
4. Holes shall have a web hole width not greater than 0.5 times the member depth, or $1\frac{1}{2}$ inches (38 mm);
5. Holes shall have a web hole length not exceeding $4\frac{1}{2}$ inches (114 mm); and
6. Holes shall have a minimum distance between the edge of the bearing surface and the edge of the web hole of not less than 10 inches (254 mm).

Framing members with web holes not conforming to the above requirements shall be reinforced in accordance with Section ~~R603.2.5.2~~ **R603.2.6.2**, patched in accordance with Section ~~R603.2.5.3~~ **R603.2.6.3** or designed in accordance with accepted engineering practice.

FIGURE R603.2.5.4 R603.2.6.1 WALL STUD WEB HOLES

(Figure remains unchanged)

~~R603.2.5.2~~ R603.2.6.2 Web hole reinforcing. Web holes in gable endwall studs not conforming to the requirements of Section ~~R603.2.5.4~~ R603.2.6.1 shall be permitted to be reinforced if the hole is located fully within the center 40 percent of the span and the depth and length of the hole does not exceed 65 percent of the flat width of the web. The reinforcing shall be a steel plate or C-shape section with a hole that does not exceed the web hole size limitations of Section ~~R603.2.5.4~~ R603.2.6.1 for the member being reinforced. The steel reinforcing shall be the same thickness as the receiving member and shall extend at least 1 inch (25.4 mm) beyond all edges of the hole. The steel reinforcing shall be fastened to the web of the receiving member with No.8 screws spaced no more than 1 inch (25.4 mm) center-to-center along the edges of the patch with minimum edge distance of $\frac{1}{2}$ inch (12.7 mm).

~~R603.2.5.3~~ R603.2.6.3 Hole patching. Web holes in wall studs and other structural members not conforming to the requirements in Section ~~R603.2.5.4~~ R603.2.6.1 shall be permitted to be patched in accordance with either of the following methods:

1. Framing members shall be replaced or designed in accordance with accepted engineering practice when web holes exceed the following size limits:
 - 1.1. The depth of the hole, measured across the web, exceeds 70 percent of the flat width of the web; or
 - 1.2. The length of the hole measured along the web exceeds 10 inches (254 mm) or the depth of the web, whichever is greater.
2. Web holes not exceeding the dimensional requirements in Section ~~R603.2.5.3~~ R603.2.6.3, Item 1 shall be patched with a solid steel plate, stud section or track section in accordance with Figure ~~R603.2.5.3~~ R603.2.6.3. The steel patch shall, as a minimum, be of the same thickness as the receiving member and shall extend at least 1 inch (25.4 mm) beyond all edges of the hole. The steel patch shall be fastened to the web of the receiving member with No. 8 screws spaced no more than 1 inch (25.4 mm) center-to-center along the edges of the patch with a minimum edge distance of $\frac{1}{2}$ inch (12.7 mm).

FIGURE ~~R603.2.5.3~~ R603.2.6.3 WALL STUD WEB HOLE PATCH

(Figure remains unchanged)

R603.3 Wall construction. All exterior cold-formed steel framed walls and interior load-bearing cold-formed steel framed walls shall be constructed in accordance with the provisions of this section.

R603.3.1 Wall to foundation or floor connection. Cold-formed steel framed walls shall be anchored to foundations or floors in accordance with Table R603.3.1 and Figure R603.3.1(1), R603.3.1(2), ~~or~~ R603.3.1(3) or R603.3.1(4). Anchor bolts shall be located not more than 12 inches (305 mm) from corners or the termination of bottom tracks. Anchor bolts shall extend a minimum of 15 inches (381 mm) into masonry or 7 inches (178 mm) into concrete. Foundation anchor straps shall be permitted, in lieu of anchor bolts, if spaced as required to provide equivalent anchorage to the required anchor bolts and installed in accordance with manufacturer's requirements.

R603.3.1.1 Gable endwalls. Gable endwalls with heights greater than 10 feet (3048 mm) shall be anchored to foundations or floors in accordance with Tables R603.3.1.1(1) or R603.3.1.1(2).

TABLE R603.3.1
WALL TO FOUNDATION OR FLOOR CONNECTION REQUIREMENTS^{a,b}

FRAMING CONDITION			ULTIMATE WIND SPEED (mph) AND EXPOSURE CATEGORY					
			85-B	90115 B	100126 B 85or 110 C	140< 139 B 90 or 115 C	160126 C	< 140139 C
Wall bottom track to floor per Figure R603.3.1(1)			1-No. 8 screw at 12" o.c.	1-No. 8 screw at 12" o.c.	1-No. 8 screw at 12" o.c.	1-No. 8 screw at 12" o.c.	2-No. 8 screws at 12" o.c.	2 No. 8 screws at 12" o.c.
Wall bottom track to foundation per Figure R603.3.1(2) ^d			¹ / ₂ " minimum diameter anchor bolt at 6' o.c.	¹ / ₂ " minimum diameter anchor bolt at 6' o.c.	¹ / ₂ " minimum diameter anchor bolt at 4' o.c.	¹ / ₂ " minimum diameter anchor bolt at 4' o.c.	¹ / ₂ " minimum diameter anchor bolt at 4' o.c.	¹ / ₂ " minimum diameter anchor bolt at 4' o.c.
Wall bottom track to wood sill per Figure R603.3.1(3)			Steel plate spaced at 4' o.c., with 4-No. 8 screws and 4-10d or 6-8d common nails	Steel plate spaced at 4' o.c., with 4-No. 8 screws and 4-10d or 6-8d common nails	Steel plate spaced at 3' o.c., with 4-No. 8 screws and 4-10d or 6-8d common nails	Steel plate spaced at 3' o.c., with 4-No. 8 screws and 4-10d or 6-8d common nails	Steel plate spaced at 2' o.c., with 4-No. 8 screws and 4-10d or 6-8d common nails	Steel plate spaced at 2' o.c., with 4-No. 8 screws and 4-10d or 6-8d common nails
Wind uplift connector strength to 16" stud spacing ^e			NR	NR	NR	NR	NR	65 lb per foot of wall length
Wind uplift connector strength for 24" stud spacing ^e			NR	NR	NR	NR	NR	100 lb per foot of wall length
Wind uplift connector strength (lbs) ^{c,e}	Stud Spacing (in.)	Roof Span (ft)						
	16	24		NR	NR	NR	124	209
		28		NR	NR	62	151	249
		32		NR	NR	79	179	289
		36		NR	NR	94	206	329
		40		NR	61	117	239	374
	24	24		NR	NR	69	186	314
		28		NR	NR	93	227	374
		32		NR	NR	117	268	434
		36		NR	64	141	309	494
		40		NR	92	176	359	562

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s, 1 foot = 304.8 mm, 1 lb = 4.45 N.

a. Anchor bolts are to be located not more than 12 inches from corners or the termination of bottom tracks (e.g., at door openings or corners). Bolts are to extend a minimum of 15 inches into masonry or 7 inches into concrete.

b. All screw sizes shown are minimum.

c. NR = uplift connector not required.

d. Foundation anchor straps are permitted in place of anchor bolts, if spaced as required to provide equivalent anchorage to the required anchor bolts and installed in accordance with manufacturer's requirements.

e. See Figure R603.3.1(4) for details.

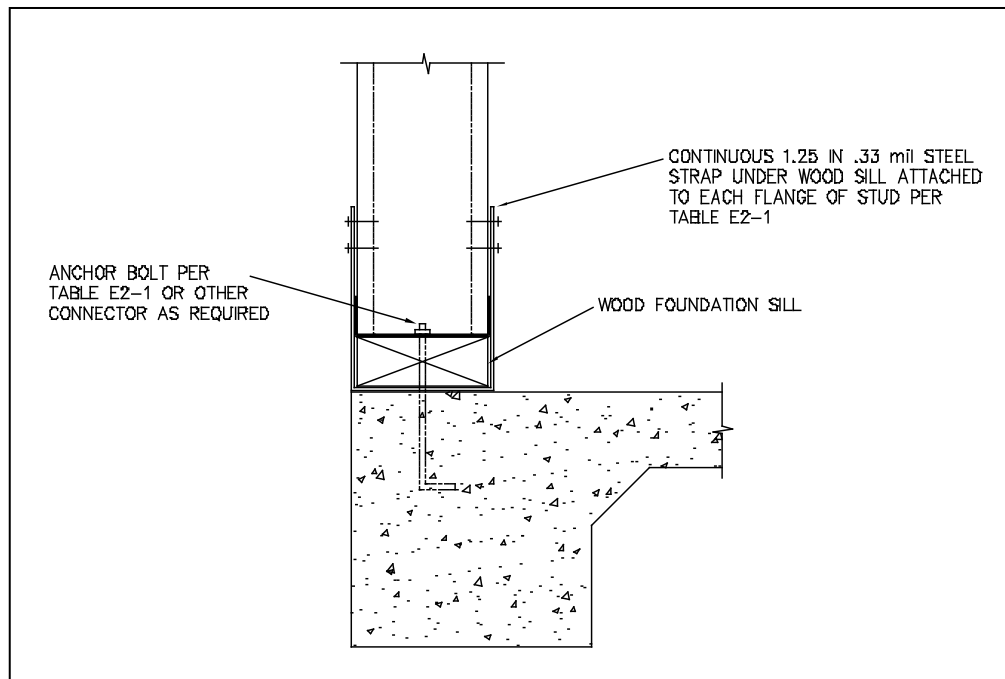


FIGURE R603.3.1(4) WIND UPLIFT CONNECTOR
(Note: New figure. Delete reference to tables.)

TABLE R603.3.1.1(1)
GABLE ENDWALL TO FLOOR CONNECTION REQUIREMENTS^{a,b,c}

BASIC ULTIMATE WIND SPEED (mph)		WALL BOTTOM TRACK TO FLOOR JOIST OR TRACK CONNECTION		
Exposure Category		Stud height, h (ft)		
B	C	10 < h ≤ 14	14 < h ≤ 18	18 < h ≤ 22
85	-	1-No. 8 screw @ 12" o.c.	1-No. 8 screw @ 12" o.c.	1-No. 8 screw @ 12" o.c.
90-115	-	1-No. 8 screw @ 12" o.c.	1-No. 8 screw @ 12" o.c.	1-No. 8 screw @ 12" o.c.
120-126	85-110	1-No. 8 screw @ 12" o.c.	1-No. 8 screw @ 12" o.c.	1-No. 8 screw @ 12" o.c.
130-139	90-115	1-No. 8 screw @ 12" o.c.	1-No. 8 screw @ 12" o.c.	2-No. 8 screws @ 12" o.c.
-	120-126	1-No. 8 screw @ 12" o.c.	2-No. 8 screws @ 12" o.c.	1-No. 8 screw @ 8" o.c.
-	130-139	2-No. 8 screws @ 12" o.c.	1-No. 8 screw @ 8" o.c.	2-No. 8 screws @ 8" o.c.

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s, 1 foot = 304.8 mm.

a. Refer to Table R603.3.1.1(2) for gable endwall bottom track to foundation connections.

b. Where attachment is not given, special design is required.

c. Stud height, *h*, is measured from wall bottom track to wall top track or brace connection height.

TABLE R603.3.1.1(2)
GABLE ENDWALL BOTTOM TRACK TO FOUNDATION CONNECTION REQUIREMENTS^{a,b,c}

BASIC ULTIMATE WIND SPEED (mph)		MINIMUM SPACING FOR 1/2 IN. DIAMETER ANCHOR BOLTS^d		
Exposure Category		Stud height, h (ft)		
B	C	10 < h ≤ 14	14 < h ≤ 18	18 < h ≤ 22

85	-	6'-0" o.c.	6'-0" o.c.	6'-0" o.c.
90115	-	6'-0" o.c.	5'-7" o.c.	6'-0" o.c.
100126	85110	5'-10" o.c.	6'-0" o.c.	6'-0" o.c.
110<139	90115	4'-10" o.c.	5'-6" o.c.	6'-0" o.c.
-	100126	4'-1" o.c.	6'-0" o.c.	6'-0" o.c.
-	110<139	5'-1" o.c.	6'-0" o.c.	5'-2" o.c.

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s, 1 foot = 304.8 mm.

a. Refer to Table R603.3.1.1(1) for gable endwall bottom track to floor joist or track connection connections.

b. Where attachment is not given, special design is required.

c. Stud height, h , is measured from wall bottom track to wall top track or brace connection height.

d. Foundation anchor straps are permitted in place of anchor bolts if spaced as required to provide equivalent anchorage to the required anchor bolts and installed in accordance with manufacturer's requirements.

R603.3.2 Minimum stud sizes. Cold-formed steel walls shall be constructed in accordance with Figure R603.3.1(1), R603.3.1(2) or R603.3.1(3), as applicable. Exterior wall stud size and thickness shall be determined in accordance with the limits set forth in Tables R603.3.2(2) through R603.3.2(34 16). Interior load-bearing wall stud size and thickness shall be determined in accordance with the limits set forth in Tables R603.3.2(2) through R603.3.2(34 16) based upon an ultimate design wind speed of 85115 miles per hour (38 51 m/s), Exposure Category A/B, wind value and the building width, stud spacing and snow load, as appropriate. Fastening requirements shall be in accordance with Section ~~R603.2.4~~ R603.2.5 and Table R603.3.2(1). Top and bottom tracks shall have the same minimum thickness as the wall studs.

Exterior wall studs shall be permitted to be reduced to the next thinner size, as shown in Tables R603.3.2(2) through R603.3.2(~~16~~34), but not less than 33 mils (0.84 mm), where both of the following conditions exist:

1. Minimum of $\frac{1}{2}$ inch (12.7 mm) gypsum board is installed and fastened in accordance with Section R702 on the interior surface.
2. Wood structural sheathing panels of minimum $\frac{7}{16}$ -inch-thick (11 mm) oriented strand board or $\frac{15}{32}$ -inch-thick (12 mm) plywood is installed and fastened in accordance with Section R603.9.4 and Table R603.3.2(1) on the outside surface.

Interior load-bearing walls shall be permitted to be reduced to the next thinner size, as shown in Tables R603.3.2(2) through R603.3.2(~~34~~ 16), but not less than 33 mils (0.84 mm), where a minimum of $\frac{1}{2}$ -inch (12.7 mm) gypsum board is installed and fastened in accordance with Section R702 on both sides of the wall. The tabulated stud thickness for load-bearing walls shall be used when the *attic* load is 10 pounds per square feet (480 Pa) or less. A limited *attic* storage load of 20 pounds per square feet (960 Pa) shall be permitted provided that the next higher snow load column is used to select the stud size from Tables R603.3.2(2) through R603.3.2(~~34~~ 16).

For two-story buildings, the tabulated stud thickness for walls supporting one floor, roof and ceiling shall be used when second floor live load is 30 pounds per square feet (1440 Pa). Second floor live loads of 40 psf (1920 pounds per square feet) shall be permitted provided that the next higher snow load column is used to select the stud size from Tables R603.3.2(2) through R603.3.2(~~24~~ 11).

For three-story buildings, the tabulated stud thickness for walls supporting one or two floors, roof and ceiling shall be used when the third floor live load is 30 pounds per square feet (1440 Pa). Third floor live loads of 40 pounds per square feet (1920 Pa) shall be permitted provided that the next higher snow load column is used to select the stud size from Tables R603.3.2(~~22~~ 12) through R603.3.2(~~34~~ 16).

R603.3.2.1 Gable endwalls. The size and thickness of gable endwall studs with heights less than or equal to 10 feet (3048 mm) shall be permitted in accordance with the limits set forth in Table R603.3.2.1(1) ~~or R603.3.2.1(2)~~. The size and thickness of gable endwall studs with heights greater than 10 feet (3048 mm) shall be determined in accordance with the limits set forth in Table R603.3.2.1(~~23~~) ~~or R603.3.2.1(4)~~.

TABLE R603.3.2(1)
WALL FASTENING SCHEDULE^a

DESCRIPTION OF BUILDING ELEMENT	NUMBER AND SIZE OF FASTENERS ^a	SPACING OF FASTENERS
Floor joist to track of load-bearing wall	2-No. 8 screws	Each joist
Wall stud to top or bottom track	2-No. 8 screws	Each end of stud, one per flange
Structural sheathing to wall studs	No. 8 screws ^b	6" o.c. on edges and 12" o.c. at intermediate supports
<u>½" Gypsum board to framing</u>	<u>No. 6 screws</u>	<u>12" o.c.</u>
Roof framing to wall	Approved design or tie down in accordance with Section R802.11.	

For SI: 1 inch = 25.4 mm.

a. All screw sizes shown are minimum.

b. Screws for attachment of structural sheathing panels are to be bugle-head, flat-head, or similar head styles with a minimum head diameter of 0.29 inch.

TABLE R603.3.2(2)
24-FOOT-WIDE BUILDING SUPPORTING ROOF AND CEILING ONLY^{a, b, c, d} 33 ksi STEEL

ULTIMATE WIND SPEED (mph) AND EXPOSURE CATEGORY		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)											
				8-Foot Studs				9-Foot Studs				10-Foot Studs			
Exp. B	Exp. C			Ground Snow Load (psf)											
		20	30	50	70	20	30	50	70	20	30	50	70		
85 mph	-	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	33	33	43	43
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33
90-115 mph	-	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	33	33	43	43
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33
100-126 mph	85-110 mph	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	43	43	43	43
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	33	33	33	33	43
110-139 mph	90-115 mph	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	43	43	43	43	43	43	43	54
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	33	43	43	43	43
-	100-126 mph	350S162	16	33	33	33	33	33	33	33	33	43	43	43	43
			24	43	43	43	43	43	43	43	43	54	54	54	54
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	43	43	43	43	43	43	43	43
-	110-139 mph	350S162	16	33	33	33	33	43	43	43	43	43	43	43	43
			24	43	43	43	43	54	54	54	54	68-54	68-54	68-54	68-54
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	43	43	43	43	43	43	43	43	43	43	43

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa, 1 ksi = 1000 psi = 6.895 MPa.

a. Deflection criterion: $L/240$.

b. Design load assumptions:

Second floor dead load is 10 psf.

Second floor live load is 30 psf.

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

TABLE R603.3.2(3)
24-FOOT-WIDE BUILDING SUPPORTING ROOF AND CEILING
ONLY^{a,b,c} 50 ksi STEEL

WIND SPEED		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)													
				8-Foot Studs				9-Foot Studs				10-Foot Studs					
Exp. B	Exp. C			Ground Snow Load (psf)													
				20	30	50	70	20	30	50	70	20	30	50	70		
85 mph	-	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33	
			24	33	33	33	43	33	33	33	33	33	33	33	33	43	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33
90 mph	-	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33	
			24	33	33	33	43	33	33	33	33	33	33	33	33	43	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33
100mph	85 mph	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33	
			24	33	33	33	43	33	33	33	33	33	33	33	33	43	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33
110mph	90 mph	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33	
			24	33	33	33	43	33	33	33	43	43	43	43	43	43	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33
-	100mph	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33	
			24	33	33	33	43	43	43	43	43	43	43	43	43	43	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33
-	110mph	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33	
			24	33	33	33	43	43	43	43	43	43	54	54	54	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33	33

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

1 Ksi = 1,000 psi = 6.895 MPa.

a. Deflection criterion: $L/240$.

b. Design load assumptions:

Second floor dead load is 10 psf.

Second floor live load is 30 psf.

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

TABLE R603.3.2(34)
28-FOOT-WIDE BUILDING SUPPORTING ROOF AND CEILING ONLY^{a, b, c, d} 33 ksi STEEL

ULTIMATE WIND SPEED (mph) AND EXPOSURE CATEGORY		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)												
				8-Foot Studs				9-Foot Studs				10-Foot Studs				
Exp. B	Exp. C			Ground Snow Load (psf)												
				20	30	50	70	20	30	50	70	20	30	50	70	
85 mph	-	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	33	33	43	43	33	33	43	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	33	33	33	43	
90-115 mph	-	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	33	33	43	43	33	33	43	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	33	33	33	43	
140-126 mph	85-110 mph	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	33	33	43	43	43	43	43	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	33	33	33	43	
110-139 mph	90-115 mph	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33	43
			24	33	33	43	43	43	43	43	43	43	43	43	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	33	33	33	43	
-	140-126 mph	350S162	16	33	33	33	33	33	33	33	33	43	43	43	43	43
			24	43	43	43	54	43	43	43	54	54	54	54	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	33	33	33	43	
-	110-139 mph	350S162	16	33	33	33	33	43	43	43	43	43	43	43	43	43
			24	43	43	43	54	54	54	54	54	68	54	68	54	68
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	33	33	33	43	

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

1 Ksi = 1,000 psi = 6.895 MPa.

a. Deflection criterion: $L/240$.

b. Design load assumptions:

Second floor dead load is 10 psf.

Second floor live load is 30 psf.

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

TABLE R603.3.2(5)
28-FOOT-WIDE BUILDING SUPPORTING ROOF AND CEILING ONLY^{a,b,c} - 50 ksi STEEL

WIND SPEED		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)											
Exp. B	Exp. C			8-Foot Studs				9-Foot Studs				10-Foot Studs			
				Ground Snow Load (psf)											
				20	30	50	70	20	30	50	70	20	30	50	70
85 mph	-	350S162	46	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	33	33	33	43
		550S162	46	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33
90 mph	-	350S162	46	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	33	33	33	43
		550S162	46	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33
100mph	85 mph	350S162	46	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	33	33	43	43
		550S162	46	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33
110mph	90 mph	350S162	46	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	43	43	43	43
		550S162	46	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33
-	100mph	350S162	46	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	43	43	43	43	43	43	43	43
		550S162	46	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	33	33	33	33	33
-	110mph	350S162	46	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	43	43	43	43	54	54	54	54
		550S162	46	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	43

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

1 Ksi = 1,000 psi = 6.895 MPa.

a.—Deflection criterion: $L/240$.

b.—Design load assumptions:

Second floor dead load is 10 psf.

Second floor live load is 30 psf.

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c.—Building width is in the direction of horizontal framing members supported by the wall studs.

TABLE R603.3.2(6 4)
32-FOOT-WIDE BUILDING SUPPORTING ROOF AND CEILING ONLY^{a, b, c, d} 33-ksi STEEL

ULTIMATE WIND SPEED (mph) AND EXPOSURE CATEGORY		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)											
				8-Foot Studs				9-Foot Studs				10-Foot Studs			
Exp. B	Exp. C			Ground Snow Load (psf)											
				20	30	50	70	20	30	50	70	20	30	50	70
85 mph	-	350S162	16	33	33	33	33	33	33	33	33	33	33	33	43
			24	33	33	43	54	33	33	43	43	33	33	43	54
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	33	33	33	43
90/115 mph	-	350S162	16	33	33	33	33	33	33	33	33	33	33	33	43
			24	33	33	43	54	33	33	43	43	33	33	43	54
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	33	33	33	43
100/126 mph	85/110 mph	350S162	16	33	33	33	33	33	33	33	33	33	33	33	43
			24	33	33	43	54	33	33	43	54	43	43	43	54
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	33	33	33	43
110<139 mph	90/115 mph	350S162	16	33	33	33	43	33	33	33	33	33	33	33	43
			24	33	33	43	54	43	43	43	54	43	43	43	54
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	33/43	33/43	43	43
-	100/126 mph	350S162	16	33	33	33	43	33	33	33	43	43	43	43	43
			24	43	43	43	54	43	43	43	54	54	54	54	54
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	33/43	33/43	33/43	43	33/43	33/43	43	43
-	110<139 mph	350S162	16	33	33	33	43	43	43	43	43	43	43	43	43
			24	43	43	43	54	54	54	54	54	68/54	68/54	68/54	68/54
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33/43	33/43	43	43	33/43	33/43	43	43	43	43	43	43

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

1 Ksi = 1,000 psi = 6.895 MPa.

a. Deflection criterion: $L/240$.

b. Design load assumptions:

Second floor dead load is 10 psf.

Second floor live load is 30 psf.

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

TABLE R603.3.2(7)
32-FOOT-WIDE BUILDING SUPPORTING ROOF AND CEILING ONLY^{a,b,c} 50 ksi STEEL

WIND SPEED		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)												
Exp. B	Exp. C			8-Foot Studs				9-Foot Studs				10-Foot Studs				
				Ground Snow Load (psf)												
				20	30	50	70	20	30	50	70	20	30	50	70	
85 mph	-	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	33	33	43	43	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	33	33	33	33	33	43
90 mph	-	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	33	33	43	43	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	33	33	33	33	33	43
100mph	85 mph	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	33	33	33	43	33	33	43	43	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	33	33	33	33	33	43
110mph	90 mph	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	33	33	33	43	43	43	43	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	33	33	33	33	33	43
-	100mph	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	43	43	43	43	43	43	43	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	33	33	33	33	43
-	110mph	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33	43
			24	33	33	43	43	43	43	43	43	54	54	54	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	33	33	33	33	43

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

1 Ksi = 1,000 psi = 6.895 MPa.

a. — Deflection criterion: $L/240$.

b. — Design load assumptions:

Second floor dead load is 10 psf.

Second floor live load is 30 psf.

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c. — Building width is in the direction of horizontal framing members supported by the wall studs.

TABLE R603.3.2(8 5)
36-FOOT-WIDE BUILDING SUPPORTING ROOF AND CEILING ONLY^{a, b, c, d} 33 ksi STEEL

ULTIMATE WIND SPEED (mph) AND EXPOSURE CATEGORY		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)											
				8-Foot Studs				9-Foot Studs				10-Foot Studs			
Exp. B	Exp. C			Ground Snow Load (psf)											
				20	30	50	70	20	30	50	70	20	30	50	70
85 mph	-	350S162	16	33	33	33	43	33	33	33	43	33	33	33	43
			24	33	33	43	54	33	33	43	54	33	43	43	54
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	33	33	43	43	33	33	43	43
90115 mph	-	350S162	16	33	33	33	43	33	33	33	43	33	33	33	43
			24	33	33	43	54	33	33	43	54	33	43	43	54
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	33	33	43	43	33	33	43	43
100126mph	85110 mph	350S162	16	33	33	33	43	33	33	33	43	33	33	33	43
			24	33	33	43	54	33	33	43	54	43	43	54	54
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	33	33	43	43	33	33	43	43
110<139mph	90115 mph	350S162	16	33	33	33	43	33	33	33	33	33	33	33	43
			24	33	33	43	54	43	43	43	43	43	43	54	6854
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	33	33	43	43	33	33	43	43
-	100126mph	350S162	16	33	33	33	43	33	33	33	43	43	43	43	43
			24	43	43	43	54	43	43	43	54	54	54	54	6854
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	33	33	43	43	33	33	43	43
-	110<139mph	350S162	16	33	33	33	43	43	43	43	43	43	43	43	43
			24	43	43	54	54	54	54	54	54	6854	6854	6854	6854
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	54	33	33	43	43	43	43	43	54

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

1 Ksi = 1,000 psi = 6.895 MPa.

a. Deflection criterion: $L/240$.

b. Design load assumptions:
 Second floor dead load is 10 psf.
 Second floor live load is 30 psf.
 Roof/ceiling dead load is 12 psf.
 Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

TABLE R603.3.2(9)
36-FOOT-WIDE BUILDING SUPPORTING ROOF AND CEILING ONLY^{a,b,c} 50 ksi STEEL

WIND SPEED		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)											
				8-Foot Studs				9-Foot Studs				10-Foot Studs			
Exp. B	Exp. C			Ground Snow Load (psf)											
		20	30	50	70	20	30	50	70	20	30	50	70		
85 mph	-	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	33	33	43	43	33	33	43	54
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	33	33	33	43
90 mph	-	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	33	33	43	43	33	33	43	54
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	33	33	33	43
100mph	85 mph	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	33	33	43	43	33	33	43	54
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	33	33	33	43
110mph	90 mph	350S162	16	33	33	33	33	33	33	33	33	33	33	33	43
			24	33	33	43	54	33	33	33	43	43	43	43	54
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	33	33	33	43
-	100mph	350S162	16	33	33	33	33	33	33	33	33	33	33	33	43
			24	33	33	33	54	43	43	43	43	43	43	43	54
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	33	33	33	43
-	110mph	350S162	16	33	33	33	43	33	33	33	33	33	33	33	43
			24	33	33	43	54	43	43	43	54	54	54	54	54
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	33	33	33	43

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

1 Ksi = 1,000 psi = 6.895 MPa.

a. Deflection criterion: $L/240$.

b. Design load assumptions:

Second floor dead load is 10 psf.

Second floor live load is 30 psf.

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

TABLE R603.3.2(40 6)
40-FOOT-WIDE BUILDING SUPPORTING ROOF AND CEILING ONLY^{a, b, c, d} 33-ksi STEEL

ULTIMATE WIND SPEED (mph) AND EXPOSURE CATEGORY		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)												
				8-Foot Studs				9-Foot Studs				10-Foot Studs				
Exp. B	Exp. C			Ground Snow Load (psf)												
				20	30	50	70	20	30	50	70	20	30	50	70	
85 mph	-	350S162	16	33	33	33	43	33	33	33	43	33	33	33	43	
			24	33	33	43	54	33	33	43	54	43	43	54	68	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	54	33	33	43	43	33	33	43	54	
90-115 mph	-	350S162	16	33	33	33	43	33	33	33	43	33	33	33	43	
			24	33	33	43	54	33	33	43	54	43	43	54	68-54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	
			24	33	33	43	54	33	33	43	43	33	33	43	54	
100-126 mph	85-110 mph	350S162	16	33	33	33	43	33	33	33	43	33	33	33-43	43	
			24	33	43	43	54	33	43	43	54	43	43	54	68-54	
		550S162	16	33	33	33	43	33	33	33	33	33	33	33	33	
			24	33	33	43	54	33	33	43	43	33	33	43	54	
110-139 mph	90-115 mph	350S162	16	33	33	33	43	33	33	33	43	33	33	43	43	
			24	33	43	43	54	43	43	43	54	43	43	54	68-54	
		550S162	16	33	33	33	43	33	33	33	33	33	33	33	43	
			24	33	33	43	54	33	33	43	43	33-43	33-43	43	54	
-	100-126 mph	350S162	16	33	33	33	43	33	33	33	43	43	43	43	43	
			24	43	43	54	68-54	43	43	54	54	54	54	54	68-54	
		550S162	16	33	33	33	43	33	33	33	33	33	33	33	43	
			24	33	33	43	54	33-43	33-43	43	54	33-43	33-43	43	54	
-	110-139 mph	350S162	16	33	33	43	43	43	43	43	43	43	43	43	54	
			24	43	43	54	68-54	54	54	54	68-54	68-54	68-54	68-54	68	
		550S162	16	33	33	33	43	33	33	33	43	33	33	33	43	
			24	33-43	33-43	43	54	33-43	33-43	43	54	43	43	43	54	

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

1 Ksi = 1,000 psi = 6.895 MPa.

a. Deflection criterion: $L/240$.

b. Design load assumptions:

Second floor dead load is 10 psf.

Second floor live load is 30 psf.

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

TABLE R603.3.2(11)
40-FOOT-WIDE BUILDING SUPPORTING ROOF AND CEILING ONLY^{a,b,c} 50 ksi STEEL

WIND SPEED		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)												
				8-Foot Studs				9-Foot Studs				10-Foot Studs				
Exp. B	Exp. C			Ground Snow Load (psf)												
				20	30	50	70	20	30	50	70	20	30	50	70	
85 mph	-	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33	43
			24	33	33	43	54	33	33	43	43	33	33	43	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	33	33	33	33	43
90 mph	-	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33	43
			24	33	33	43	54	33	33	43	43	33	33	43	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	33	33	33	33	43
100mph	85 mph	350S162	16	33	33	33	43	33	33	33	33	33	33	33	33	43
			24	33	33	43	54	33	33	43	54	33	33	43	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	33	33	33	33	43
110mph	90 mph	350S162	16	33	33	33	43	33	33	33	33	33	33	33	33	43
			24	33	33	43	54	33	33	43	54	43	43	43	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	33	33	33	33	43
-	100mph	350S162	16	33	33	33	43	33	33	33	43	33	33	33	43	
			24	33	33	43	54	43	43	43	54	43	43	54	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	33	33	33	43	33	33	43	43	43
-	110mph	350S162	16	33	33	33	43	33	33	33	43	33	33	33	43	
			24	33	33	43	54	43	43	43	54	54	54	54	68	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	33	33	33	43	33	33	43	43	43

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

1 Ksi = 1,000 psi = 6.895 MPa.

a. — Deflection criterion: $L/240$.

b. — Design load assumptions:

Second floor dead load is 10 psf.

Second floor live load is 30 psf.

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c. — Building width is in the direction of horizontal framing members supported by the wall studs.

TABLE R603.3.2(42 7)
24-FOOT-WIDE BUILDING SUPPORTING ONE FLOOR, ROOF AND CEILING^{a,b,c,d} 33-ksi STEEL

ULTIMATE WIND SPEED (mph) AND EXPOSURE CATEGORY		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)													
				8-Foot Studs				9-Foot Studs				10-Foot Studs					
Ground Snow Load (psf)																	
Exp. B	Exp. C			20	30	50	70	20	30	50	70	20	30	50	70		
85 mph	-	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33	43	
			24	33	33	43	43	33	43	43	43	43	43	43	43	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	33	33	33	33	43	
90115 mph	-	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33	43	
			24	33	33	43	43	33	43	43	43	43	43	43	54		
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33	
			24	33	33	33	43	33	33	33	43	33	33	33	33	43	
100126mph	85110 mph	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33	43	
			24	33	43	43	43	43	43	43	43	43	43	43	54		
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33	
			24	33	33	33	43	33	33	33	43	33	33	33	33	43	
110<139mph	90115 mph	350S162	16	33	33	33	43	33	33	33	33	33	33	33	43	43	
			24	43	43	43	43	43	43	43	43	54	54	54	54		
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33	
			24	33	33	33	43	33	33	33	43	43	43	43	43	43	
-	100126mph	350S162	16	33	33	33	43	33	33	33	43	43	43	43	43	43	
			24	43	43	43	54	43	43	54	54	54	54	54	54		
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33	
			24	33	33	33	43	43	43	43	43	43	43	43	43	43	
-	110<139mph	350S162	16	33	33	33	43	43	43	43	43	43	43	43	43	43	
			24	43	43	43	54	54	54	54	54	6854	6854	6854	6854		
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33	
			24	43	43	43	43	43	43	43	43	43	43	43	43	43	

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

1 Ksi = 1,000 psi = 6.895 MPa.

a. Deflection criterion: $L/240$.

b. Design load assumptions:

Second floor dead load is 10 psf.

Second floor live load is 30 psf.

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

TABLE R603.3.2(13)
24-FOOT-WIDE BUILDING SUPPORTING ONE FLOOR, ROOF AND CEILING^{a,b,c} 50 ksi STEEL

WIND SPEED		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)												
				8-Foot Studs				9-Foot Studs				10-Foot Studs				
Exp. B	Exp. C			Ground Snow Load (psf)												
				20	30	50	70	20	30	50	70	20	30	50	70	
85 mph	-	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	33	33	43	43	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33
90 mph	-	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	33	33	43	43	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33
100mph	85 mph	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	43	43	43	43	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33
110mph	90 mph	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	33	33	43	43	43	43	43	43	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33	33
-	100mph	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	43	43	43	43	43	43	43	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	33	33	33	33	33	43
-	110mph	350S162	16	33	33	33	33	33	33	33	33	33	33	43	43	
			24	43	43	43	43	43	43	43	43	54	54	54	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	33	33	33	33	33	43

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

1 Ksi = 1,000 psi = 6.895 MPa.

a. Deflection criterion: $L/240$.

b. Design load assumptions:
 Second floor dead load is 10 psf.
 Second floor live load is 30 psf.
 Roof/ceiling dead load is 12 psf.
 Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

TABLE R603.3.2(14 8)
28-FOOT-WIDE BUILDING SUPPORTING ONE FLOOR, ROOF AND CEILING^{a,b,c,d} 33-ksi
STEEL

ULTIMATE WIND SPEED (mph) AND EXPOSURE CATEGORY		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)												
				8-Foot Studs				9-Foot Studs				10-Foot Studs				
Exp. B	Exp. C			Ground Snow Load (psf)												
				20	30	50	70	20	30	50	70	20	30	50	70	
85 mph	-	350S162	16	33	33	33	43	33	33	33	43	33	33	33	43	
			24	43	43	43	54	43	43	43	54	43	43	43	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	33	33	43	43	33	33	43	43	
90115 mph	-	350S162	16	33	33	33	43	33	33	33	43	33	33	33	43	
			24	43	43	43	54	43	43	43	54	43	43	43	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	
			24	33	33	43	43	33	33	43	43	33	33	43	43	
400126mph	85110 mph	350S162	16	33	33	33	43	33	33	33	43	33	33	43	43	
			24	43	43	43	54	43	43	43	54	43	43	54	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	
			24	33	33	43	43	33	33	43	43	33	33	43	43	
110<139mph	90115 mph	350S162	16	33	33	33	43	33	33	33	43	43	43	43	43	
			24	43	43	43	54	43	43	43	54	54	54	54	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	
			24	33	33	43	43	33	33	43	43	43	43	43	43	
-	400126mph	350S162	16	33	33	33	43	33	33	43	43	43	43	43	43	
			24	43	43	43	54	54	54	54	54	54	54	54	6854	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	
			24	33	33	43	43	43	43	43	43	43	43	43	43	
-	110<139mph	350S162	16	33	33	43	43	43	43	43	43	43	43	43	54	
			24	43	43	54	54	54	54	54	54	6854	6854	6854	6854	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	
			24	43	43	43	43	43	43	43	43	43	43	43	43	

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

1 Ksi = 1,000 psi = 6.895 MPa.

a. Deflection criterion: $L/240$.

b. Design load assumptions:

Second floor dead load is 10 psf.

Second floor live load is 30 psf.

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

TABLE R603.3.2(15)
28-FOOT-WIDE BUILDING SUPPORTING ONE FLOOR, ROOF AND CEILING^{a,b,c} 50 ksi STEEL

WIND SPEED		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)												
				8-Foot Studs				9-Foot Studs				10-Foot Studs				
				Ground Snow Load (psf)												
Exp. B	Exp. C			20	30	50	70	20	30	50	70	20	30	50	70	
85 mph	-	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	33	33	43	43	43	43	43	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	43	33	33	33	43	33	33	33	43	
90 mph	-	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	33	33	43	43	43	43	43	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	
			24	33	33	33	43	33	33	33	43	33	33	33	43	
100mph	85 mph	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33	43
			24	33	33	43	43	33	33	43	43	43	43	43	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	
			24	33	33	33	43	33	33	33	43	33	33	33	43	
110mph	90 mph	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33	43
			24	33	33	43	43	43	43	43	43	43	43	43	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	
			24	33	33	33	43	33	33	33	43	33	33	33	43	
-	100mph	350S162	16	33	33	33	33	33	33	33	33	33	33	33	33	43
			24	43	43	43	54	43	43	43	43	43	43	54	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	
			24	33	33	33	43	33	33	33	43	33	33	33	43	
-	110mph	350S162	16	33	33	33	43	33	33	33	33	43	43	43	43	
			24	43	43	43	54	43	43	43	43	54	54	54	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	
			24	33	33	33	43	33	33	33	43	33	33	33	43	

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

1 Ksi = 1,000 psi = 6.895 MPa.

a. Deflection criterion: $L/240$.

b. Design load assumptions:

Second floor dead load is 10 psf.

Second floor live load is 30 psf.

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

TABLE R603.3.2(46 9)
32-FOOT-WIDE BUILDING SUPPORTING ONE FLOOR, ROOF AND CEILING^{a,b,c,d} 33-ksi
STEEL

ULTIMATE WIND SPEED (mph) AND EXPOSURE CATEGORY		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)											
				8-Foot Studs				9-Foot Studs				10-Foot Studs			
Exp. B	Exp. C			Ground Snow Load (psf)											
				20	30	50	70	20	30	50	70	20	30	50	70
85 mph	-	350S162	16	33	33	33	43	33	33	33	43	33	33	43	43
			24	43	43	43	54	43	43	43	54	43	43	54	54
		550S162	16	33	33	33	43	33	33	33	33	33	33	33	43
			24	33	43	43	54	33	33	43	43	33	33	43	43
90115 mph	-	350S162	16	33	33	33	43	33	33	33	43	33	33	43	43
			24	43	43	43	54	43	43	43	54	43	43	54	54
		550S162	16	33	33	33	43	33	33	33	33	33	33	33	43
			24	33	43	43	54	33	33	43	43	33	33	43	43
400126mph	85110 mph	350S162	16	33	33	33	43	33	33	33	43	33	43	43	43
			24	43	43	43	54	43	43	43	54	54	54	54	6854
		550S162	16	33	33	33	43	33	33	33	33	33	33	33	43
			24	33	43	43	54	33	33	43	43	33	33	43	43
110<139mph	90115 mph	350S162	16	33	33	43	43	33	33	33	43	43	43	43	43
			24	43	43	54	54	43	43	54	54	54	54	54	6854
		550S162	16	33	33	33	43	33	33	33	33	33	33	33	43
			24	33	43	43	54	33	33	43	43	43	43	43	54
-	400126mph	350S162	16	33	33	43	43	43	43	43	43	43	43	43	43
			24	43	43	54	54	54	54	54	54	54	54	54	54
		550S162	16	33	33	33	43	33	33	33	33	33	33	33	43
			24	33	43	43	54	43	43	43	43	43	43	43	54
-	110<139mph	350S162	16	43	43	43	43	43	43	43	43	43	43	54	54
			24	54	54	54	6854	54	54	54	6854	6854	6854	6854	6854
		550S162	16	33	33	33	43	33	33	33	43	33	33	33	43
			24	43	43	43	54	43	43	43	43	43	43	43	54

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

1 Ksi = 1,000 psi = 6.895 MPa.

a. Deflection criterion: $L/240$.

b. Design load assumptions:

Second floor dead load is 10 psf.

Second floor live load is 30 psf.

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

TABLE R603.3.2(17)
32-FOOT-WIDE BUILDING SUPPORTING ONE FLOOR, ROOF AND CEILING^{a,b,c} 50 ksi STEEL

WIND SPEED		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)												
				8-Foot Studs				9-Foot Studs				10-Foot Studs				
Exp. B	Exp. C			Ground Snow Load (psf)												
				20	30	50	70	20	30	50	70	20	30	50	70	
85 mph	-	350S162	16	33	33	33	43	33	33	33	33	33	33	33	33	43
			24	33	33	43	54	33	33	43	43	43	43	43	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	33	33	33	43	33	33	33	33	43
90 mph	-	350S162	16	33	33	33	43	33	33	33	33	33	33	33	33	43
			24	33	33	43	54	33	33	43	43	43	43	43	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	33	33	33	43	33	33	33	33	43
100mph	85 mph	350S162	16	33	33	33	43	33	33	33	33	33	33	33	33	43
			24	33	33	43	54	33	33	43	43	43	43	43	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	33	33	33	43	33	33	33	33	43
110mph	90 mph	350S162	16	33	33	33	43	33	33	33	33	33	33	33	33	43
			24	43	43	43	54	43	43	43	54	43	43	54	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	33	33	33	43	33	33	33	33	43
-	100mph	350S162	16	33	33	33	43	33	33	33	43	33	33	43	43	
			24	43	43	43	54	43	43	43	54	54	54	54	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	33	33	33	43	33	33	43	43	
-	110mph	350S162	16	33	33	33	43	33	33	33	43	43	43	43	43	
			24	43	43	43	54	43	43	43	54	54	54	54	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	33	33	33	43	33	33	43	43	

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

1 Ksi = 1,000 psi = 6.895 MPa.

a. Deflection criterion: $L/240$.

b. Design load assumptions:

Second floor dead load is 10 psf.

Second floor live load is 30 psf.

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

TABLE R603.3.2(48 10)
36-FOOT-WIDE BUILDING SUPPORTING ONE FLOOR, ROOF AND CEILING^{a,b,c,d} 33 ksi STEEL

ULTIMATE WIND SPEED (mph) AND EXPOSURE CATEGORY		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)											
				8-Foot Studs				9-Foot Studs				10-Foot Studs			
Exp. B	Exp. C			Ground Snow Load (psf)											
				20	30	50	70	20	30	50	70	20	30	50	70
85 mph	-	350S162	16	33	33	43	43	33	33	43	43	33	33	43	43
			24	43	43	54	54	43	43	54	54	54	54	54	68
		550S162	16	33	33	33	43	33	33	33	43	33	33	33	43
			24	43	43	43	54	43	43	43	54	43	43	43	54
90115 mph	-	350S162	16	33	33	43	43	33	33	43	43	33	33	43	43
			24	43	43	54	54	43	43	54	54	54	54	6854	
		550S162	16	33	33	33	43	33	33	33	43	33	33	33	43
			24	43	43	43	54	43	43	43	54	43	43	43	54
400126mph	85110 mph	350S162	16	33	33	43	43	33	33	43	43	43	43	43	43
			24	43	43	54	6854	43	43	54	54	54	54	6854	
		550S162	16	33	33	33	43	33	33	33	43	33	33	33	43
			24	43	43	43	54	43	43	43	54	43	43	43	54
440<139mph	90115 mph	350S162	16	33	33	43	43	33	33	43	43	43	43	43	54
			24	43	43	54	6854	54	54	54	54	54	54	6854	
		550S162	16	33	33	33	43	33	33	33	43	33	33	33	43
			24	43	43	43	54	43	43	43	54	43	43	43	54
-	400126mph	350S162	16	33	33	43	43	43	43	43	43	43	43	43	54
			24	54	54	54	6854	54	54	54	6854	54	6854	6854	68
		550S162	16	33	33	33	43	33	33	33	43	33	33	33	43
			24	43	43	43	54	43	43	43	54	43	43	43	54
-	440<139mph	350S162	16	43	43	43	43	43	43	43	43	43	54	54	54
			24	54	54	54	6854	54	54	54	6854	6854	6854	6854	68
		550S162	16	33	33	33	43	33	33	33	43	33	33	33	43
			24	43	43	43	54	43	43	43	54	43	43	43	54

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

1 Ksi = 1,000 psi = 6.895 MPa.

a. Deflection criterion: $L/240$.

b. Design load assumptions:

Second floor dead load is 10 psf.

Second floor live load is 30 psf.

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

TABLE R603.3.2(19)
36-FOOT-WIDE BUILDING SUPPORTING ONE FLOOR, ROOF AND CEILING^{a,b,c} -50 ksi STEEL

WIND SPEED		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)												
				8-Foot Studs				9-Foot Studs				10-Foot Studs				
Exp. B	Exp. C			Ground Snow Load (psf)												
				20	30	50	70	20	30	50	70	20	30	50	70	
85 mph	-	350S162	16	33	33	33	43	33	33	33	43	33	33	33	43	
			24	43	43	43	54	33	33	43	54	43	43	43	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	33	33	43	43	33	33	43	43	
90 mph	-	350S162	16	33	33	33	43	33	33	33	43	33	33	33	43	
			24	43	43	43	54	33	33	43	54	43	43	43	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	
			24	33	33	43	43	33	33	43	43	33	33	43	43	
100mph	85 mph	350S162	16	33	33	33	43	33	33	33	43	33	33	33	43	
			24	43	43	43	54	43	43	43	54	43	43	54	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	
			24	33	33	43	43	33	33	43	43	33	33	43	43	
110mph	90 mph	350S162	16	33	33	33	43	33	33	33	43	33	33	43	43	
			24	43	43	43	54	43	43	43	54	43	43	54	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	
			24	33	33	43	43	33	33	43	43	33	33	43	43	
-	100mph	350S162	16	33	33	33	43	33	33	33	43	43	43	43	43	
			24	43	43	43	54	43	43	43	54	54	54	54	68	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	
			24	33	33	43	43	33	33	43	43	33	33	43	43	
-	110mph	350S162	16	33	33	43	43	33	33	33	43	43	43	43	43	
			24	43	43	54	54	43	43	54	54	54	54	54	68	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	
			24	33	33	43	43	33	33	43	43	43	43	43	43	

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

1 Ksi = 1,000 psi = 6.895 MPa.

a. Deflection criterion: $L/240$.

b. Design load assumptions:
 Second floor dead load is 10 psf.
 Second floor live load is 30 psf.
 Roof/ceiling dead load is 12 psf.
 Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

TABLE R603.3.2(20 11)
40-FOOT-WIDE BUILDING SUPPORTING ONE FLOOR, ROOF AND CEILING^{a,b,c,d} 33 ksi STEEL

ULTIMATE WIND SPEED (mph) AND EXPOSURE CATEGORY		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)												
				8-Foot Studs				9-Foot Studs				10-Foot Studs				
Exp. B	Exp. C			Ground Snow Load (psf)												
				20	30	50	70	20	30	50	70	20	30	50	70	
85 mph	-	350S162	16	33	33	43	43	33	33	43	43	43	43	43	43	54
			24	43	43	54	68	43	43	54	68	54	54	54	68	
		550S162	16	33	33	33	43	33	33	33	43	33	33	33	33	43
			24	43	43	54	54	43	43	43	54	43	43	43	43	54
90115 mph	-	350S162	16	33	33	43	43	33	33	43	43	43	43	43	43	54
			24	43	43	54	6854	43	43	54	6854	54	54	54	6854	
		550S162	16	33	33	33	43	33	33	33	43	33	33	33	33	43
			24	43	43	54	54	43	43	43	54	43	43	43	43	54
400126mph	85110 mph	350S162	16	33	33	43	43	33	33	43	43	43	43	43	43	54
			24	43	43	54	6854	43	43	54	6854	54	54	54	6854	
		550S162	16	33	33	33	43	33	33	33	43	33	33	33	33	43
			24	43	43	54	54	43	43	43	54	43	43	43	43	54
110<139mph	90115 mph	350S162	16	33	33	43	43	43	43	43	43	43	43	43	43	54
			24	43	43	54	6854	54	54	54	6854	54	54	6854	68	
		550S162	16	33	33	43	43	33	33	33	43	33	33	33	33	43
			24	43	43	54	54	43	43	43	54	43	43	43	43	54
-	400126mph	350S162	16	43	43	43	54	43	43	43	54	43	43	54	54	
			24	54	54	54	6854	54	54	54	6854	6854	6854	6854	9768	
		550S162	16	33	33	43	43	33	33	33	43	33	33	43	43	
			24	43	43	54	54	43	43	43	54	43	43	54	54	
-	110<139mph	350S162	16	43	43	43	54	43	43	43	54	54	54	54	54	
			24	54	54	54	68	54	54	6854	6854	6854	6854	6854	9768	
		550S162	16	33	33	43	43	33	33	33	43	33	33	43	43	
			24	43	43	54	54	43	43	43	54	43	43	54	54	

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

1 Ksi = 1,000 psi = 6.895 MPa.

a. Deflection criterion: $L/240$.

b. Design load assumptions:

Second floor dead load is 10 psf.

Second floor live load is 30 psf.

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

TABLE R603.3.2(21)
40-FOOT-WIDE BUILDING SUPPORTING ONE FLOOR, ROOF AND CEILING^{a,b,c} 50 ksi STEEL

WIND SPEED		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)											
				8-Foot Studs				9-Foot Studs				10-Foot Studs			
Exp.-B	Exp.-C			Ground Snow Load (psf)											
				20	30	50	70	20	30	50	70	20	30	50	70
85-mph	-	350S162	16	33	33	33	43	33	33	33	43	33	33	43	43
			24	43	43	43	54	43	43	43	54	43	43	54	54
		550S162	16	33	33	33	43	33	33	33	33	33	33	33	33
			24	33	43	43	54	33	33	43	43	33	33	43	43
90 mph	-	350S162	16	33	33	33	43	33	33	33	43	33	33	43	43
			24	43	43	43	54	43	43	43	54	43	43	54	54
		550S162	16	33	33	33	43	33	33	33	33	33	33	33	33
			24	33	43	43	54	33	33	43	43	33	33	43	43
100mph	85 mph	350S162	16	33	33	33	43	33	33	33	43	33	33	43	43
			24	43	43	54	54	43	43	43	54	43	43	54	68
		550S162	16	33	33	33	43	33	33	33	33	33	33	33	33
			24	33	43	43	54	33	33	43	43	33	33	43	43
110mph	90 mph	350S162	16	33	33	43	43	33	33	33	43	33	33	43	43
			24	43	43	54	54	43	43	43	54	54	54	54	68
		550S162	16	33	33	33	43	33	33	33	33	33	33	33	43
			24	33	43	43	54	33	33	43	43	33	33	43	43
-	100mph	350S162	16	33	33	43	43	33	33	33	43	43	43	43	43
			24	43	43	54	54	43	43	54	54	54	54	54	68
		550S162	16	33	33	33	43	33	33	33	33	33	33	33	43
			24	33	43	43	54	33	33	43	43	33	43	43	43
-	110mph	350S162	16	33	33	43	43	33	33	43	43	43	43	43	54
			24	43	43	54	68	54	54	54	54	54	54	54	68
		550S162	16	33	33	33	43	33	33	33	33	33	33	33	43
			24	33	43	43	54	33	33	43	43	43	43	43	54

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

1 Ksi = 1,000 psi = 6.895 MPa.

a. Deflection criterion: $L/240$.

b. Design load assumptions:

Second floor dead load is 10 psf.

Second floor live load is 30 psf.

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

TABLE R603.3.2(1222)
24-FOOT-WIDE BUILDING SUPPORTING TWO FLOORS, ROOF AND CEILING^{a,b,c,d} 33 ksi STEEL

ULTIMATE WIND SPEED (mph) AND EXPOSURE CATEGORY		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)											
				8-Foot Studs				9-Foot Studs				10-Foot Studs			
Exp. B	Exp. C			Ground Snow Load (psf)											
				20	30	50	70	20	30	50	70	20	30	50	70
85 mph	-	350S162	16	43	43	43	43	33	33	33	43	43	43	43	43
			24	54	54	54	54	43	43	54	54	54	54	54	54
		550S162	16	33	33	43	43	33	33	33	33	33	33	33	43
			24	43	43	54	54	43	43	43	43	43	43	43	54
90115 mph	-	350S162	16	43	43	43	43	33	33	33	43	43	43	43	43
			24	54	54	54	54	43	43	54	54	54	54	54	
		550S162	16	33	33	43	43	33	33	33	33	33	33	33	43
			24	43	43	54	54	43	43	43	43	43	43	43	54
400126mph	85110 mph	350S162	16	43	43	43	43	33	33	33	43	43	43	43	43
			24	54	54	54	54	54	54	54	54	54	54	6854	
		550S162	16	33	33	43	43	33	33	33	33	33	33	33	43
			24	43	43	54	54	43	43	43	43	43	43	43	54
110<139mph	90115 mph	350S162	16	43	43	43	43	43	43	43	43	43	43	43	43
			24	54	54	54	54	54	54	54	54	54	6854	6854	
		550S162	16	33	33	43	43	33	33	33	33	33	33	33	43
			24	43	43	54	54	43	43	43	43	43	43	43	54
-	400126mph	350S162	16	43	43	43	43	43	43	43	43	43	43	43	54
			24	54	54	54	54	54	54	54	54	6854	6854	6854	6854
		550S162	16	33	33	43	43	33	33	33	33	33	33	33	43
			24	43	43	54	54	43	43	43	43	43	43	43	54
-	110<139mph	350S162	16	43	43	43	43	43	43	43	43	54	54	54	54
			24	54	54	54	6854	54	54	6854	6854	6854	6854	9768	
		550S162	16	33	33	43	43	33	33	33	33	33	33	33	43
			24	43	43	54	54	43	43	43	43	43	43	43	54

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

1 Ksi = 1,000 psi = 6.895 MPa.

a. Deflection criterion: $L/240$.

b. Design load assumptions:

Top and middle floor dead load is 10 psf

Top floor live load is 30 psf.

Middle floor live load is 40 psf.

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

TABLE R603.3.2(23)
24-FOOT-WIDE BUILDING SUPPORTING TWO FLOORS, ROOF AND CEILING^{a,b,c} 50 ksi STEEL

WIND SPEED		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)												
				8-Foot Studs				9-Foot Studs				10-Foot Studs				
Exp. B	Exp. C			Ground Snow Load (psf)												
				20	30	50	70	20	30	50	70	20	30	50	70	
85 mph	-	350S162	16	33	33	33	43	33	33	33	33	33	33	33	33	
			24	43	43	54	54	43	43	43	43	43	43	43	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	33
			24	43	43	43	43	43	43	43	43	43	43	43	43	43
90 mph	-	350S162	16	33	33	33	43	33	33	33	33	33	33	33	33	
			24	43	43	54	54	43	43	43	43	43	43	43	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	
			24	43	43	43	43	43	43	43	43	43	43	43	43	
100mph	85 mph	350S162	16	33	33	33	43	33	33	33	33	33	33	33	33	
			24	43	43	54	54	43	43	43	43	43	43	54	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	
			24	43	43	43	43	43	43	43	43	43	43	43	43	
110mph	90 mph	350S162	16	33	33	33	43	33	33	33	33	33	33	43	43	
			24	43	43	54	54	43	43	43	43	54	54	54	54	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	
			24	43	43	43	43	43	43	43	43	43	43	43	43	
-	100mph	350S162	16	33	33	33	43	33	33	33	33	43	43	43	43	
			24	43	43	54	54	43	43	54	54	54	54	54		
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	
			24	43	43	43	43	43	43	43	43	43	43	43	43	
-	110mph	350S162	16	33	33	33	43	33	33	33	43	43	43	43	43	
			24	54	54	54	54	54	54	54	54	54	54	54	68	
		550S162	16	33	33	33	33	33	33	33	33	33	33	33	33	
			24	43	43	43	43	43	43	43	43	43	43	43	43	

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

1 Ksi = 1,000 psi = 6.895 MPa.

a. Deflection criterion: $L/240$.

b. Design load assumptions:

Top and middle floor dead load is 10 psf.

Top floor live load is 30 psf.

Middle floor live load is 40 psf.

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

TABLE R603.3.2(24 13)
28-FOOT-WIDE BUILDING SUPPORTING TWO FLOORS, ROOF AND CEILING^{a,b,c,d} 33 ksi STEEL

ULTIMATE WIND SPEED (mph) AND EXPOSURE CATEGORY		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)												
				8-Foot Studs				9-Foot Studs				10-Foot Studs				
Exp. B	Exp. C			Ground Snow Load (psf)												
				20	30	50	70	20	30	50	70	20	30	50	70	
85 mph	-	350S162	16	43	43	43	43	43	43	43	43	43	43	43	43	43
			24	54	54	54	68	54	54	54	54	54	54	54	68	
		550S162	16	43	43	43	43	43	43	43	43	43	43	43	43	43
			24	54	54	54	54	54	54	54	54	54	54	54	54	54
90115 mph	-	350S162	16	43	43	43	43	43	43	43	43	43	43	43	43	43
			24	54	54	54	68 54	54	54	54	54	54	54	54	68 54	
		550S162	16	43	43	43	43	43	43	43	43	43	43	43	43	43
			24	54	54	54	54	54	54	54	54	54	54	54	54	54
100126mph	85110 mph	350S162	16	43	43	43	43	43	43	43	43	43	43	43	43	43
			24	54	54	54	68 54	54	54	54	54	54	54	68 54	68 54	
		550S162	16	43	43	43	43	43	43	43	43	43	43	43	43	43
			24	54	54	54	54	54	54	54	54	54	54	54	54	54
110<139mph	90115 mph	350S162	16	43	43	43	43	43	43	43	43	43	43	43	43	43
			24	54	54	54	68 54	54	54	54	54	68 54	68 54	68 54	68 54	
		550S162	16	43	43	43	43	43	43	43	43	43	43	43	43	43
			24	54	54	54	54	54	54	54	54	54	54	54	54	54
-	100126mph	350S162	16	43	43	43	43	43	43	43	43	43	43	43	54	54
			24	54	54	54	68 54	54	54	68 54	68 54	68 54	68 54	68 54	97 68	
		550S162	16	43	43	43	43	43	43	43	43	43	43	43	43	43
			24	54	54	54	54	54	54	54	54	54	54	54	54	54
-	110<139mph	350S162	16	43	43	43	43	43	43	43	43	54	54	54	54	
			24	54	68 54	68 54	68 54	68 54	68 54	68 54	68	68	97 68	97 68		
		550S162	16	43	43	43	43	43	43	43	43	43	43	43	43	
			24	54	54	54	54	54	54	54	54	54	54	54	54	

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

1 Ksi = 1,000 psi = 6.895 MPa.

a. Deflection criterion: $L/240$.

b. Design load assumptions:

Top and middle floor dead load is 10 psf

Top floor live load is 30 psf.

Middle floor live load is 40 psf.

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

TABLE R603.3.2(25)
28-FOOT-WIDE BUILDING SUPPORTING TWO FLOORS, ROOF AND CEILING^{a,b,c} 50 ksi STEEL

WIND SPEED		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)											
				8-Foot Studs				9-Foot Studs				10-Foot Studs			
Exp. B	Exp. C			Ground Snow Load (psf)											
				20	30	50	70	20	30	50	70	20	30	50	70
85-mph	-	350S162	16	43	43	43	43	33	33	33	43	43	43	43	43
			24	54	54	54	54	43	43	54	54	54	54	54	
		550S162	16	33	33	33	43	33	33	33	33	33	33	33	33
			24	43	43	43	54	43	43	43	43	43	43	43	43
90 mph	-	350S162	16	43	43	43	43	33	33	33	43	43	43	43	43
			24	54	54	54	54	43	43	54	54	54	54	54	
		550S162	16	33	33	33	43	33	33	33	33	33	33	33	33
			24	43	43	43	54	43	43	43	43	43	43	43	43
100mph	85 mph	350S162	16	43	43	43	43	33	33	33	43	43	43	43	43
			24	54	54	54	54	43	43	54	54	54	54	54	
		550S162	16	33	33	33	43	33	33	33	33	33	33	33	33
			24	43	43	43	54	43	43	43	43	43	43	43	43
110mph	90 mph	350S162	16	43	43	43	43	33	33	33	43	43	43	43	43
			24	54	54	54	54	43	43	54	54	54	54	54	
		550S162	16	33	33	33	43	33	33	33	33	33	33	33	33
			24	43	43	43	54	43	43	43	43	43	43	43	43
-	100mph	350S162	16	43	43	43	43	33	33	33	43	43	43	43	43
			24	54	54	54	54	54	54	54	54	54	54	68	
		550S162	16	33	33	33	43	33	33	33	33	33	33	33	33
			24	43	43	43	54	43	43	43	43	43	43	43	43
-	110mph	350S162	16	43	43	43	43	43	43	43	43	43	43	43	43
			24	54	54	54	54	54	54	54	54	68	68	68	68
		550S162	16	33	33	33	43	33	33	33	33	33	33	33	33
			24	43	43	43	54	43	43	43	43	43	43	43	43

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

1 Ksi = 1,000 psi = 6.895 MPa.

a. Deflection criterion: $L/240$.

b. Design load assumptions:

Top and middle floor dead load is 10 psf

Top floor live load is 30 psf.

Middle floor live load is 40 psf.

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

TABLE R603.3.2(26 14)
32-FOOT-WIDE BUILDING SUPPORTING TWO FLOORS, ROOF AND CEILING^{a,b,c,d} 33 ksi STEEL

ULTIMATE WIND SPEED (mph) AND EXPOSURE CATEGORY		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)												
				8-Foot Studs				9-Foot Studs				10-Foot Studs				
Exp. B	Exp. C			Ground Snow Load (psf)												
				20	30	50	70	20	30	50	70	20	30	50	70	
85 mph	-	350S162	16	43	43	43	54	43	43	43	43	43	43	43	43	54
			24	68	68	68	68	54	54	68	68	68	68	68	68	
		550S162	16	43	43	43	43	43	43	43	43	43	43	43	43	
			24	54	54	54	68	54	54	54	54	54	54	54	54	
90-115 mph	-	350S162	16	43	43	43	54	43	43	43	43	43	43	43	54	
			24	68	68	68	68	54	54	68	68	68	68	68		
		550S162	16	43	43	43	43	43	43	43	43	43	43	43	43	
			24	54	54	54	68	54	54	54	54	54	54	54	54	
100-126 mph	85-110 mph	350S162	16	43	43	43	54	43	43	43	43	43	43	43	54	
			24	68	68	68	68	54	54	68	68	68	68	68		
		550S162	16	43	43	43	43	43	43	43	43	43	43	43	43	
			24	54	54	54	68	54	54	54	54	54	54	54	54	
110-139 mph	90-115 mph	350S162	16	43	43	43	54	43	43	43	43	43	43	54	54	
			24	68	68	68	68	54	54	68	68	68	68	68		
		550S162	16	43	43	43	43	43	43	43	43	43	43	43	43	
			24	54	54	54	68	54	54	54	54	54	54	54	54	
-	100-126 mph	350S162	16	43	43	43	54	43	43	43	43	54	54	54	54	
			24	68	68	68	68	68	68	68	68	68	9768	9768		
		550S162	16	43	43	43	43	43	43	43	43	43	43	43	43	
			24	54	54	54	68	54	54	54	54	54	54	54	54	
-	110-139 mph	350S162	16	43	43	43	54	43	43	54	54	54	54	54	54	
			24	68	68	68	68	68	68	68	68	9768	9768	9768		
		550S162	16	43	43	43	43	43	43	43	43	43	43	43	43	
			24	54	54	54	68	54	54	54	54	54	54	54	54	

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

1 Ksi = 1,000 psi = 6.895 MPa.

a. Deflection criterion: $L/240$.

b. Design load assumptions:

Top and middle floor dead load is 10 psf

Top floor live load is 30 psf.

Middle floor live load is 40 psf.

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

TABLE R603.3.2(27)
32-FOOT-WIDE BUILDING SUPPORTING TWO FLOORS, ROOF AND CEILING^{a,b,c} 50 ksi STEEL

WIND SPEED		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)											
				8-Foot Studs				9-Foot Studs				10-Foot Studs			
Exp.-B	Exp.-C			Ground Snow Load (psf)											
				20	30	50	70	20	30	50	70	20	30	50	70
85 mph	-	350S162	16	43	43	43	43	43	43	43	43	43	43	43	43
			24	54	54	54	68	54	54	54	54	54	54	54	68
		550S162	16	43	43	43	43	33	33	33	43	33	33	43	43
			24	54	54	54	54	43	43	43	54	43	43	54	54
90 mph	-	350S162	16	43	43	43	43	43	43	43	43	43	43	43	43
			24	54	54	54	68	54	54	54	54	54	54	54	68
		550S162	16	43	43	43	43	33	33	33	43	33	33	43	43
			24	54	54	54	54	43	43	43	54	43	43	54	54
100mph	85 mph	350S162	16	43	43	43	43	43	43	43	43	43	43	43	43
			24	54	54	54	68	54	54	54	54	54	54	54	68
		550S162	16	43	43	43	43	33	33	33	43	33	33	43	43
			24	54	54	54	54	43	43	43	54	43	43	54	54
110mph	90 mph	350S162	16	43	43	43	43	43	43	43	43	43	43	43	43
			24	54	54	54	68	54	54	54	54	54	54	54	68
		550S162	16	43	43	43	43	33	33	33	43	33	33	43	43
			24	54	54	54	54	43	43	43	54	43	43	54	54
-	100mph	350S162	16	43	43	43	43	43	43	43	43	43	43	43	43
			24	54	54	54	68	54	54	54	54	68	68	68	68
		550S162	16	43	43	43	43	33	33	33	43	33	33	43	43
			24	54	54	54	54	43	43	43	54	43	43	54	54
-	110mph	350S162	16	43	43	43	43	43	43	43	43	43	43	43	54
			24	54	54	54	68	54	54	54	54	68	68	68	68
		550S162	16	43	43	43	43	33	33	33	43	33	33	43	43
			24	54	54	54	54	43	43	43	54	43	43	54	54

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

1 Ksi = 1,000 psi = 6.895 MPa.

a. Deflection criterion: $L/240$.

b. Design load assumptions:

Top and middle floor dead load is 10 psf

Top floor live load is 30 psf.

Middle floor live load is 40 psf.

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

TABLE R603.3.2(28 15)
36-FOOT-WIDE BUILDING SUPPORTING TWO FLOORS, ROOF AND CEILING^{a,b,c,d} 33 ksi STEEL

ULTIMATE WIND SPEED (mph) AND EXPOSURE CATEGORY		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)												
				8-Foot Studs				9-Foot Studs				10-Foot Studs				
Exp. B	Exp. C			Ground Snow Load (psf)												
				20	30	50	70	20	30	50	70	20	30	50	70	
85 mph	-	350S162	16	54	54	54	54	43	43	43	54	54	54	54	54	
			24	68	68	68	97	68	68	68	68	68	68	68	97	
		550S162	16	43	43	43	54	43	43	43	43	43	43	43	43	43
			24	68	68	68	68	54	54	54	68	54	54	68	68	
90115 mph	-	350S162	16	54	54	54	54	43	43	43	54	54	54	54	54	
			24	68	68	68	9768	6854	6854	6854	68	68	68	68	9768	
		550S162	16	43	43	43	54	43	43	43	43	43	43	43	43	
			24	6854	6854	6854	6854	54	54	54	6854	54	54	6854	6854	
400126mph	85110 mph	350S162	16	54	54	54	54	43	43	43	54	54	54	54	54	
			24	68	68	68	9768	6854	6854	6854	68	68	68	68	9768	
		550S162	16	43	43	43	54	43	43	43	43	43	43	43	43	
			24	6854	6854	6854	6854	54	54	54	6854	54	54	6854	6854	
110<139mph	90115 mph	350S162	16	54	54	54	54	43	43	43	54	54	54	54	54	
			24	68	68	68	9768	6854	6854	6854	68	68	68	9768	9768	
		550S162	16	43	43	43	54	43	43	43	43	43	43	43	43	
			24	6854	6854	6854	6854	54	54	54	6854	54	54	6854	6854	
-	400126mph	350S162	16	54	54	54	54	43	43	54	54	54	54	54	54	
			24	68	68	68	9768	6854	6854	6854	68	9768	9768	9768	9768	
		550S162	16	43	43	43	54	43	43	43	43	43	43	43	43	
			24	6854	6854	6854	6854	54	54	54	6854	54	54	6854	6854	
-	110<139mph	350S162	16	54	54	54	54	54	54	54	54	54	54	54	68	
			24	68	68	68	9768	6854	6854	68	9768	9768	9768	9768	9768	
		550S162	16	43	43	43	54	43	43	43	43	43	43	43	43	
			24	6854	6854	6854	6854	54	54	54	6854	54	54	6854	6854	

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

1 Ksi = 1,000 psi = 6.895 MPa.

a. Deflection criterion: $L/240$.

b. Design load assumptions:

Top and middle floor dead load is 10 psf

Top floor live load is 30 psf.

Middle floor live load is 40 psf.

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

TABLE R603.3.2(29)
36-FOOT-WIDE BUILDING SUPPORTING TWO FLOORS, ROOF AND CEILING^{a,b,c} 50 ksi STEEL

WIND SPEED		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)												
				8-Foot Studs				9-Foot Studs				10-Foot Studs				
Exp. B	Exp. C			Ground Snow Load (psf)												
				20	30	50	70	20	30	50	70	20	30	50	70	
85 mph	-	350S162	16	43	43	43	54	43	43	43	43	43	43	43	43	
			24	68	68	68	68	54	54	54	68	68	68	68	68	
		550S162	16	43	43	43	43	43	43	43	43	43	43	43	43	43
			24	54	54	54	54	54	54	54	54	54	54	54	54	54
90 mph	-	350S162	16	43	43	43	54	43	43	43	43	43	43	43	43	
			24	68	68	68	68	54	54	54	68	68	68	68	68	
		550S162	16	43	43	43	43	43	43	43	43	43	43	43	43	
			24	54	54	54	54	54	54	54	54	54	54	54	54	
100mph	85 mph	350S162	16	43	43	43	54	43	43	43	43	43	43	43	43	
			24	68	68	68	68	54	54	54	68	68	68	68	68	
		550S162	16	43	43	43	43	43	43	43	43	43	43	43	43	
			24	54	54	54	54	54	54	54	54	54	54	54	54	
110mph	90 mph	350S162	16	43	43	43	54	43	43	43	43	43	43	43	43	
			24	68	68	68	68	54	54	54	68	68	68	68	68	
		550S162	16	43	43	43	43	43	43	43	43	43	43	43	43	
			24	54	54	54	54	54	54	54	54	54	54	54	54	
-	100mph	350S162	16	43	43	43	54	43	43	43	43	43	43	43	54	
			24	68	68	68	68	54	54	54	68	68	68	68	68	
		550S162	16	43	43	43	43	43	43	43	43	43	43	43	43	
			24	54	54	54	54	54	54	54	54	54	54	54	54	
-	110mph	350S162	16	43	43	43	54	43	43	43	43	43	54	54	54	
			24	68	68	68	68	54	54	68	68	68	68	68	68	
		550S162	16	43	43	43	43	43	43	43	43	43	43	43	43	
			24	54	54	54	54	54	54	54	54	54	54	54	54	

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

1 Ksi = 1,000 psi = 6.895 MPa.

a. Deflection criterion: $L/240$.

b. Design load assumptions:

Top and middle floor dead load is 10 psf

Top floor live load is 30 psf.

Middle floor live load is 40 psf.

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

TABLE R603.3.2(30 16)
40-FOOT-WIDE BUILDING SUPPORTING TWO FLOORS, ROOF AND CEILING^{a,b,c,d} 33 ksi STEEL

ULTIMATE WIND SPEED (mph) AND EXPOSURE CATEGORY		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)											
				8-Foot Studs				9-Foot Studs				10-Foot Studs			
Exp. B	Exp. C			Ground Snow Load (psf)											
				20	30	50	70	20	30	50	70	20	30	50	70
85 mph	-	350S162	16	54	54	54	54	54	54	54	54	54	54	54	54
			24	97	97	97	97	68	68	68	97	97	97	97	97
		550S162	16	54	54	54	54	43	43	54	54	43	43	54	54
			24	68	68	68	68	68	68	68	68	68	68	68	68
90-115 mph	-	350S162	16	54	54	54	54	54	54	54	54	54	54	54	54
			24	9768	9768	9768	9768	68	68	68	9768	9768	9768	9768	9768
		550S162	16	54	54	54	54	43	43	54	54	43	43	54	54
			24	6854	6854	6854	68	6854	6854	6854	6854	6854	6854	6854	6854
100-126 mph	85-110 mph	350S162	16	54	54	54	54	54	54	54	54	54	54	54	54
			24	9768	9768	9768	9768	68	68	68	9768	9768	9768	9768	9768
		550S162	16	54	54	54	54	43	43	54	54	43	43	54	54
			24	6854	6854	6854	68	6854	6854	6854	6854	6854	6854	6854	6854
110-139 mph	90-115 mph	350S162	16	54	54	54	54	54	54	54	54	54	54	54	54
			24	9768	9768	9768	9768	68	68	68	9768	9768	9768	9768	9768
		550S162	16	54	54	54	54	43	43	54	54	43	43	54	54
			24	6854	6854	6854	68	6854	6854	6854	6854	6854	6854	6854	6854
-	100-126 mph	350S162	16	54	54	54	54	54	54	54	54	54	54	54	54
			24	9768	9768	9768	9768	68	68	68	9768	9768	9768	9768	9768
		550S162	16	54	54	54	54	43	43	54	54	43	43	54	54
			24	6854	6854	6854	68	6854	6854	6854	6854	6854	6854	6854	6854
-	110-139 mph	350S162	16	54	54	54	54	54	54	54	54	54	54	6854	6854
			24	9768	9768	9768	9768	68	68	9768	9768	9768	9768	9768	---97
		550S162	16	54	54	54	54	43	43	54	54	43	43	54	54
			24	6854	6854	6854	68	6854	6854	6854	6854	6854	6854	6854	6854

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

1 Ksi = 1,000 psi = 6.895 MPa.

a. Deflection criterion: $L/240$.

b. Design load assumptions:

Top and middle floor dead load is 10 psf

Top floor live load is 30 psf.

Middle floor live load is 40 psf.

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

TABLE R603.3.2(31)
40-FOOT-WIDE BUILDING SUPPORTING TWO FLOORS, ROOF AND CEILING^{a,b,c} 50 ksi
STEEL

WIND SPEED		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (mils)											
Exp. B	Exp. C			8-Foot Studs				9-Foot Studs				10-Foot Studs			
				Ground Snow Load (psf)											
				20	30	50	70	20	30	50	70	20	30	50	70
85-mph	-	350S162	16	54	54	54	54	43	43	43	43	43	54	54	54
			24	68	68	68	68	68	68	68	68	68	68	68	
		550S162	16	43	43	43	43	43	43	43	43	43	43	43	43
			24	54	54	54	68	54	54	54	54	54	54	54	54
90 mph	-	350S162	16	54	54	54	54	43	43	43	43	43	54	54	54
			24	68	68	68	68	68	68	68	68	68	68	68	
		550S162	16	43	43	43	43	43	43	43	43	43	43	43	43
			24	54	54	54	68	54	54	54	54	54	54	54	54
100mph	85 mph	350S162	16	54	54	54	54	43	43	43	43	43	54	54	54
			24	68	68	68	68	68	68	68	68	68	68	68	
		550S162	16	43	43	43	43	43	43	43	43	43	43	43	43
			24	54	54	54	68	54	54	54	54	54	54	54	54
110mph	90 mph	350S162	16	54	54	54	54	43	43	43	43	43	54	54	54
			24	68	68	68	68	68	68	68	68	68	68	68	
		550S162	16	43	43	43	43	43	43	43	43	43	43	43	43
			24	54	54	54	68	54	54	54	54	54	54	54	54
-	100mph	350S162	16	54	54	54	54	43	43	43	43	43	54	54	54
			24	68	68	68	68	68	68	68	68	68	68	68	
		550S162	16	43	43	43	43	43	43	43	43	43	43	43	43
			24	54	54	54	68	54	54	54	54	54	54	54	54
-	110mph	350S162	16	54	54	54	54	43	43	43	43	54	54	54	54
			24	68	68	68	68	68	68	68	68	68	68	97	
		550S162	16	43	43	43	43	43	43	43	43	43	43	43	43
			24	54	54	54	68	54	54	54	54	54	54	54	54

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

1 Ksi = 1,000 psi = 6.895 MPa.

a.—Deflection criterion: $L/240$.

b.—Design load assumptions:

Top and middle floor dead load is 10 psf

Top floor live load is 30 psf.

Middle floor live load is 40 psf.

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c.—Building width is in the direction of horizontal framing members supported by the wall studs.

TABLE R603.3.2.1(1)
ALL BUILDING WIDTHS GABLE ENDWALLS 8, 9 OR 10 FEET IN HEIGHT^{a,b,c,d} 33 ksi STEEL

ULTIMATE WIND SPEED (mph) AND EXPOSURE CATEGORY		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (Mils)		
Exp. B	Exp. C			8-foot studs	9-foot studs	10-foot studs
85 mph	-	350S162	46	33	33	33
			24	33	33	33
		550S162	46	33	33	33
			24	33	33	33
90115 mph	-	350S162	16	33	33	33
			24	33	33	33
		550S162	16	33	33	33
			24	33	33	33
400126 mph	85110 mph	350S162	16	33	33	33
			24	33	33	43
		550S162	16	33	33	33
			24	33	33	33
440<139 mph	90115 mph	350S162	16	33	33	33
			24	33	33	43
		550S162	16	33	33	33
			24	33	33	33
-	400126 mph	350S162	16	33	33	43
			24	43	43	54
		550S162	16	33	33	33
			24	33	33	33
-	440<139 mph	350S162	16	33	43	43
			24	43	54	54
		550S162	16	33	33	33
			24	33	33	43

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479

kPa, 1 Ksi = 1,000 psi = 6.895 MPa.

a. Deflection criterion $L/240$.

b. Design load assumptions:

Ground snow load is 70 psf.

Roof/ceiling dead load is 12 psf.

Floor dead load is 10 psf.

Floor live load is 40 psf.

Attic dead load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

TABLE R603.3.2.1(2)
ALL BUILDING WIDTHS GABLE ENDWALLS 8, 9 OR 10 FEET IN HEIGHT^{a,b,c} 50 ksi STEEL

WIND SPEED		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (Mils)		
Exp. B	Exp. C			8-foot studs	9-foot studs	10-foot studs
85 mph	-	350S162	16	33	33	33
			24	33	33	33
		550S162	16	33	33	33
			24	33	33	33
90 mph	-	350S162	16	33	33	33
			24	33	33	33
		550S162	16	33	33	33
			24	33	33	33
100mph	85 mph	350S162	16	33	33	33
			24	33	33	33
		550S162	16	33	33	33
			24	33	33	33
110mph	90 mph	350S162	16	33	33	33
			24	33	33	43
		550S162	16	33	33	33
			24	33	33	33
-	100mph	350S162	16	33	33	33
			24	33	33	43
		550S162	16	33	33	33
			24	33	33	33
-	110mph	350S162	16	33	33	33
			24	33	43	54
		550S162	16	33	33	33
			24	33	33	33

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa, 1 Ksi = 1,000 psi = 6.895 MPa.

a. — Deflection criterion $L/240$.

b. — Design load assumptions:

Ground snow load is 70 psf.

Roof/ceiling dead load is 12 psf.

Floor dead load is 10 psf.

Floor live load is 40 psf.

Attic dead load is 10 psf.

c. — Building width is in the direction of horizontal framing members supported by the wall studs

TABLE R603.3.2.1(23)

ALL BUILDING WIDTHS GABLE ENDWALLS OVER 10 FEET IN HEIGHT^{a,b,c,d} **33 ksi STEEL**

ULTIMATE WIND SPEED (mph) AND EXPOSURE CATEGORY		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (Mils)					
Exp.-B	Exp.-C			Stud Height, h (feet)					
				10 < h ≤ 12	12 < h ≤ 14	14 < h ≤ 16	16 < h ≤ 18	18 < h ≤ 20	20 < h ≤ 22
85 mph	-	350S162	46	33	43	54	97	-	-
			24	43	54	97	-	-	-
		550S162	46	33	33	33	43	43	54
			24	33	33	43	54	68	97
90-115 mph	-	350S162	16	33	43	68	---97	-	-
			24	43	68	---97	-	-	-
		550S162	16	33	33	33	43	54	54
			24	33	33	43	54	68	---97
140-126 mph	85-110 mph	350S162	16	43	54	---97	-	-	-
			24	54	---97	-	-	-	-
		550S162	16	33	33	43	54	54	68
			24	33	43	54	68-54	---97	---97
140<139 mph	90-115 mph	350S162	16	43	68	-	-	-	-
			24	68	-	-	-	-	-
		550S162	16	33	43	43	54	68	---97
			24	43	54	68-54	97-68	---97	-
-	140-126 mph	350S162	16	54	---97	-	-	-	-
			24	---97	-	-	-	-	-
		550S162	16	33	43	54	68-54	---97	-
			24	43	68-54	54-97	---97	-	-
-	140<139 mph	350S162	16	68-54	---97	-	-	-	-
			24	---97	-	-	-	-	-
		550S162	16	43	54	68-54	97-68	---97	-
			24	54	68-54	97-68	-	-	-

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa, 1 Ksi = 1,000 psi = 6.895 MPa.

a. Deflection criterion $L/240$.

b. Design load assumptions:

Ground snow load is 70 psf.

Roof/ceiling dead load is 12 psf.

Floor dead load is 10 psf.

Floor live load is 40 psf.

Attic dead load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the wall studs.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

TABLE R603.3.2.1(4)
ALL BUILDING WIDTHS GABLE ENDWALLS OVER 10 FEET IN HEIGHT^{a,b,c} -50 ksi STEEL

WIND SPEED		MEMBER SIZE	STUD SPACING (inches)	MINIMUM STUD THICKNESS (Mils)					
Exp. B	Exp. C			Stud Height, h (feet)					
				10 < h ≤ 12	12 < h ≤ 14	14 < h ≤ 16	16 < h ≤ 18	18 < h	20 < h ≤ 22
85 mph	-	350S162	16	33	43	54	97	-	-
			24	33	54	97	-	-	-
		550S162	16	33	33	33	33	43	54
			24	33	33	33	43	54	97
90 mph	-	350S162	16	33	43	68	97	-	-
			24	43	68	97	-	-	-
		550S162	16	33	33	33	33	43	54
			24	33	33	43	43	68	97
100mph	85 mph	350S162	16	33	54	97	-	-	-
			24	54	97	-	-	-	-
		550S162	16	33	33	33	43	54	68
			24	33	33	43	54	97	97
110mph	90 mph	350S162	16	43	68	-	-	-	-
			24	68	-	-	-	-	-
		550S162	16	33	33	43	43	68	97
			24	33	43	54	68	97	-
-	100mph	350S162	16	54	97	-	-	-	-
			24	97	-	-	-	-	-
		550S162	16	33	33	43	54	97	-
			24	43	54	54	97	-	-
-	110mph	350S162	16	54	97	-	-	-	-
			24	97	-	-	-	-	-
		550S162	16	33	43	54	68	97	-
			24	43	54	68	97	-	-

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479

kPa, 1 Ksi = 1,000 psi = 6.895 MPa.

a. — Deflection criterion $L/240$.

b. — Design load assumptions:

Ground snow load is 70 psf.

Roof/ceiling dead load is 12 psf.

Floor dead load is 10 psf.

Floor live load is 40 psf.

Attic dead load is 10 psf.

c. — Building width is in the direction of horizontal framing members supported by the wall studs

R603.3.3 Stud bracing. The flanges of cold-formed steel studs shall be laterally braced in accordance with one of the following:

1. Gypsum board on both sides, structural sheathing on both sides, or gypsum board on one side and structural sheathing on the other side of load-bearing walls with gypsum board installed with minimum No. 6 screws in accordance with Section R702 and structural sheathing installed in accordance with Section R603.9.4 and Table R603.3.2(1).
2. Horizontal steel straps fastened in accordance with Figure R603.3.3(1) on both sides at mid-height for 8-foot (2438 mm) walls, and at one-third points for 9-foot and 10-foot (2743 mm and 3048 mm) walls. Horizontal steel straps shall be at least 1.5 inches in width and 33 mils in thickness (38 mm by 0.84 mm). Straps shall be attached to the flanges of studs with one No. 8 screw. In-line blocking shall be installed between studs at the termination of all straps and at 12 foot (3658 mm) intervals along the strap. Straps shall be fastened to the blocking with two No. 8 screws.
3. Sheathing on one side and strapping on the other side fastened in accordance with Figure R603.3.3(2). Sheathing shall be installed in accordance with Item 1. Steel straps shall be installed in accordance with Item 2.

R603.3.4 Cutting and notching. Flanges and lips of cold-formed steel studs and headers shall not be cut or notched.

R603.3.5 Splicing. Steel studs and other structural members shall not be spliced. Tracks shall be spliced in accordance with Figure R603.3.5.

R603.4 Corner framing. In exterior walls, corner studs and the top tracks shall be installed in accordance with Figure R603.4.

R603.5 Exterior wall covering. The method of attachment of exterior wall covering materials to cold-formed steel stud wall framing shall conform to the manufacturer's installation instructions.

R603.6 Headers. Headers shall be installed above all wall openings in exterior walls and interior load-bearing walls. Box beam headers and back-to-back headers each shall be formed from two equal sized C-shaped members in accordance with Figures R603.6(1) and R603.6(2), respectively, and Tables R603.6(1) through R603.6(246). L-shaped headers shall be permitted to be constructed in accordance with AISI S230. Alternately, headers shall be permitted to be designed and constructed in accordance with AISI S100, Section D4.

R603.6.1 Headers in gable endwalls. Box beam and back-to-back headers in gable endwalls shall be permitted to be constructed in accordance with Section R603.6 or with the header directly above the opening in accordance with Figures R603.6.1(1) and R603.6.1(2) and the following provisions:

1. Two 362S162-33 for openings less than or equal to 4 feet (1219 mm).
2. Two 600S162-43 for openings greater than 4 feet (1219 mm) but less than or equal to 6 feet (1830 mm).
3. Two 800S162-54 for openings greater than 6 feet (1829 mm) but less than or equal to 9 feet (2743 mm).

TABLE R603.6(1)
BOX-BEAM HEADER SPANS
Headers Supporting Roof and Ceiling Only 33 ksi steel^{a, b}

MEMBER DESIGNATION	GROUND SNOW LOAD (20 psf)					GROUND SNOW LOAD (30 psf)				
	Building width ^c (feet)					Building width ^c (feet)				
	24	28	32	36	40	24	28	32	36	40

2-350S162-33	3'-3"	2'-8"	2'-2"	-	-	2'-8"	2'-2"	-	-	-
2-350S162-43	4'-2"	3'-9"	3'-4"	2'-11"	2'-7"	3'-9"	3'-4"	2'-11"	2'-7"	2'-2"
2-350S162-54	5'-0"	4'-6"	4'-1"	3'-8"	3'-4"	4'-6"	4'-1"	3'-8"	3'-3"	3'-0"
2-350S162-68	5'-7"	5'-1"	4'-7"	4'-3"	3'-10"	5'-1"	4'-7"	4'-2"	3'-10"	3'-5"
2-350S162-97	7'-1"	6'-6"	6'-1"	5'-8"	5'-3"	6'-7"	6'-1"	5'-7"	5'-3"	4'-11"
2-550S162-33	4'-8"	4'-0"	3'-6"	3'-0"	2'-6"	4'-1"	3'-6"	3'-0"	2'-6"	-
2-550S162-43	6'-0"	5'-4"	4'-10"	4'-4"	3'-11"	5'-5"	4'-10"	4'-4"	3'-10"	3'-5"
2-550S162-54	7'-0"	6'-4"	5'-9"	5'-4"	4'-10"	6'-5"	5'-9"	5'-3"	4'-10"	4'-5"
2-550S162-68	8'-0"	7'-4"	6'-9"	6'-3"	5'-10"	7'-5"	6'-9"	6'-3"	5'-9"	5'-4"
2-550S162-97	9'-11"	9'-2"	8'-6"	8'-0"	7'-6"	9'-3"	8'-6"	8'-0"	7'-5"	7'-0"
2-800S162-33	4'-5"	3'-11"	3'-5"	3'-1"	2'-10"	3'-11"	3'-6"	3'-1"	2'-9"	2'-3"
2-800S162-43	7'-3"	6'-7"	5'-11"	5'-4"	4'-10"	6'-7"	5'-11"	5'-4"	4'-9"	4'-3"
2-800S162-54	8'-10"	8'-0"	7'-4"	6'-9"	6'-2"	8'-1"	7'-4"	6'-8"	6'-1"	5'-7"
2-800S162-68	10'-5"	9'-7"	8'-10"	8'-2"	7'-7"	9'-8"	8'-10"	8'-1"	7'-6"	7'-0"
2-800S162-97	13'-1"	12'-1"	11'-3"	10'-7"	10'-0"	12'-2"	11'-4"	10'-6"	10'-0"	9'-4"
2-1000S162-43	7'-10"	6'-10"	6'-1"	5'-6"	5'-0"	6'-11"	6'-1"	5'-5"	4'-11"	4'-6"
2-1000S162-54	10'-0"	9'-1"	8'-3"	7'-7"	7'-0"	9'-2"	8'-4"	7'-7"	6'-11"	6'-4"
2-1000S162-68	11'-11"	10'-11"	10'-1"	9'-4"	8'-8"	11'-0"	10'-1"	9'-3"	8'-7"	8'-0"
2-1000S162-97	15'-3"	14'-3"	13'-5"	12'-6"	11'-10"	14'-4"	13'-5"	12'-6"	11'-9"	11'-0"
2-1200S162-54	11'-1"	10'-0"	9'-2"	8'-5"	7'-9"	10'-1"	9'-2"	8'-4"	7'-7"	7'-0"
2-1200S162-68	13'-3"	12'-1"	11'-2"	10'-4"	9'-7"	12'-3"	11'-2"	10'-3"	9'-6"	8'-10"
2-1200S162-97	16'-8"	15'-7"	14'-8"	13'-11"	13'-3"	15'-8"	14'-8"	13'-11"	13'-2"	12'-6"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

a. Deflection criterion: L/360 for live loads, L/240 for total loads.

b. Design load assumptions:

Roof/Ceiling dead load is 12 psf.

Attic dead load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the header.

TABLE R603.6(1)
BOX-BEAM AND BACK-TO-BACK HEADER SPANS
Headers Supporting Roof and Ceiling Only^{a,b,d}

MEMBER DESIGNATION	GROUND SNOW LOAD (20 psf)					GROUND SNOW LOAD (30 psf)				
	Building width ^c (feet)					Building width ^c (feet)				
	24	28	32	36	40	24	28	32	36	40
2-350S162-33	3'-3"	2'-8"	2'-2"	-	-	2'-8"	2'-2"	-	-	-
2-350S162-43	4'-2"	3'-9"	3'-4"	2'-11"	2'-7"	3'-9"	3'-4"	2'-11"	2'-7"	2'-2"
2-350S162-54	6'-2"	5'-10"	5'-8"	5'-3"	4'-10"	5'-11"	5'-8"	5'-2"	4'-10"	4'-6"
2-350S162-68	6'-7"	6'-3"	6'-0"	5'-10"	5'-8"	6'-4"	6'-1"	5'-10"	5'-8"	5'-6"
2-550S162-33	4'-8"	4'-0"	3'-6"	3'-0"	2'-6"	4'-1"	3'-6"	3'-0"	2'-6"	-
2-550S162-43	6'-0"	5'-4"	4'-10"	4'-4"	3'-11"	5'-5"	4'-10"	4'-4"	3'-10"	3'-5"
2-550S162-54	8'-9"	8'-5"	8'-1"	7'-9"	7'-3"	8'-6"	8'-1"	7'-8"	7'-2"	6'-8"
2-550S162-68	9'-5"	9'-0"	8'-8"	8'-4"	8'-1"	9'-1"	8'-8"	8'-4"	8'-1"	7'-10"
2-800S162-33	4'-5"	3'-11"	3'-5"	3'-1"	2'-10"	3'-11"	3'-6"	3'-1"	2'-9"	2'-3"
2-800S162-43	7'-3"	6'-7"	5'-11"	5'-4"	4'-10"	6'-7"	5'-11"	5'-4"	4'-9"	4'-3"
2-800S162-54	10'-10"	10'-2"	9'-7"	9'-0"	8'-5"	10'-2"	9'-7"	8'-11"	8'-4"	7'-9"
2-800S162-68	12'-8"	11'-10"	11'-2"	10'-7"	10'-1"	11'-11"	11'-2"	10'-7"	10'-0"	9'-6"
2-1000S162-43	7'-10"	6'-10"	6'-1"	5'-6"	5'-0"	6'-11"	6'-1"	5'-5"	4'-11"	4'-6"
2-1000S162-54	12'-3"	11'-5"	10'-9"	10'-2"	9'-6"	11'-6"	10'-9"	10'-1"	9'-5"	8'-9"
2-1000S162-68	14'-5"	13'-5"	12'-8"	12'-0"	11'-6"	13'-6"	12'-8"	12'-0"	11'-5"	10'-10"

2-1200S162-54	12'-11"	11'-3"	10'-0"	9'-0"	8'-2"	11'-5"	10'-0"	9'-0"	8'-1"	7'-4"
2-1200S162-68	15'-11"	14'-10"	14'-0"	13'-4"	12'-8"	15'-0"	14'-0"	13'-3"	12'-7"	11'-11"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

a. Deflection criterion: L/360 for live loads, L/240 for total loads.

b. Design load assumptions:

Roof/Ceiling dead load is 12 psf.

Attic dead load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the header.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

TABLE R603.6(2)
BOX-BEAM HEADER SPANS Headers Supporting Roof and Ceiling Only (50 ksi steel)^{a, b}

MEMBER DESIGNATION	GROUND SNOW LOAD (20 psf)					GROUND SNOW LOAD (30 psf)				
	Building width ^c (feet)					Building width ^c (feet)				
	24	28	32	36	40	24	28	32	36	40
2-350S162-33	4'-4"	3'-11"	3'-6"	3'-2"	2'-10"	3'-11"	3'-6"	3'-1"	2'-9"	2'-5"
2-350S162-43	5'-6"	5'-0"	4'-7"	4'-2"	3'-10"	5'-0"	4'-7"	4'-2"	3'-10"	3'-6"
2-350S162-54	6'-2"	5'-10"	5'-8"	5'-3"	4'-10"	5'-11"	5'-8"	5'-2"	4'-10"	4'-6"
2-350S162-68	6'-7"	6'-3"	6'-0"	5'-10"	5'-8"	6'-4"	6'-1"	5'-10"	5'-8"	5'-6"
2-350S162-97	7'-3"	6'-11"	6'-8"	6'-5"	6'-3"	7'-0"	6'-8"	6'-5"	6'-3"	6'-0"
2-550S162-33	6'-2"	5'-6"	5'-0"	4'-7"	4'-2"	5'-7"	5'-0"	4'-6"	4'-1"	3'-8"
2-550S162-43	7'-9"	7'-2"	6'-7"	6'-1"	5'-8"	7'-3"	6'-7"	6'-1"	5'-7"	5'-2"
2-550S162-54	8'-9"	8'-5"	8'-1"	7'-9"	7'-3"	8'-6"	8'-1"	7'-8"	7'-2"	6'-8"
2-550S162-68	9'-5"	9'-0"	8'-8"	8'-4"	8'-1"	9'-1"	8'-8"	8'-4"	8'-1"	7'-10"
2-550S162-97	10'-5"	10'-0"	9'-7"	9'-3"	9'-0"	10'-0"	9'-7"	9'-3"	8'-11"	8'-8"
2-800S162-33	4'-5"	3'-11"	3'-5"	3'-1"	2'-10"	3'-11"	3'-6"	3'-1"	2'-9"	2'-6"
2-800S162-43	9'-1"	8'-5"	7'-8"	6'-11"	6'-3"	8'-6"	7'-8"	6'-10"	6'-2"	5'-8"
2-800S162-54	10'-10"	10'-2"	9'-7"	9'-0"	8'-5"	10'-2"	9'-7"	8'-11"	8'-4"	7'-9"
2-800S162-68	12'-8"	11'-10"	11'-2"	10'-7"	10'-1"	11'-11"	11'-2"	10'-7"	10'-0"	9'-6"
2-800S162-97	14'-2"	13'-6"	13'-0"	12'-7"	12'-2"	13'-8"	13'-1"	12'-7"	12'-2"	11'-9"
2-1000S162-43	7'-10"	6'-10"	6'-1"	5'-6"	5'-0"	6'-11"	6'-1"	5'-5"	4'-11"	4'-6"
2-1000S162-54	12'-3"	11'-5"	10'-9"	10'-2"	9'-6"	11'-6"	10'-9"	10'-1"	9'-5"	8'-9"
2-1000S162-68	14'-5"	13'-5"	12'-8"	12'-0"	11'-6"	13'-6"	12'-8"	12'-0"	11'-5"	10'-10"
2-1000S162-97	17'-1"	16'-4"	15'-8"	14'-11"	14'-3"	16'-5"	15'-9"	14'-10"	14'-1"	13'-6"
2-1200S162-54	12'-11"	11'-3"	10'-0"	9'-0"	8'-2"	11'-5"	10'-0"	9'-0"	8'-1"	7'-4"
2-1200S162-68	15'-11"	14'-10"	14'-0"	13'-4"	12'-8"	15'-0"	14'-0"	13'-3"	12'-7"	11'-11"
2-1200S162-97	19'-11"	18'-7"	17'-6"	16'-8"	15'-10"	18'-9"	17'-7"	16'-7"	15'-9"	15'-0"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

a. Deflection criterion: L/360 for live loads, L/240 for total loads.

b. Design load assumptions:

Roof/Ceiling dead load is 12 psf.

Attic dead load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the header.

TABLE R603.6(3)
BOX-BEAM SPANS
Headers Supporting Roof and Ceiling Only 33 ksi steel^{a, b}

MEMBER DESIGNATION	GROUND SNOW LOAD (50 psf)					GROUND SNOW LOAD (70 psf)				
	Building width ^c (feet)					Building width ^c (feet)				
	24	28	32	36	40	24	28	32	36	40
2-350S162-33	-	-	-	-	-	-	-	-	-	-
2-350S162-43	2'-4"	-	-	-	-	-	-	-	-	-
2-350S162-54	3'-1"	2'-8"	2'-3"	-	-	2'-1"	-	-	-	-
2-350S162-68	3'-7"	3'-2"	2'-8"	2'-3"	-	2'-6"	-	-	-	-
2-350S162-97	5'-1"	4'-7"	4'-3"	3'-11"	3'-7"	4'-1"	3'-8"	3'-4"	3'-0"	2'-8"
2-550S162-33	2'-2"	-	-	-	-	-	-	-	-	-
2-550S162-43	3'-8"	3'-1"	2'-6"	-	-	2'-3"	-	-	-	-
2-550S162-54	4'-7"	4'-0"	3'-6"	3'-0"	2'-6"	3'-3"	2'-8"	2'-1"	-	-
2-550S162-68	5'-6"	4'-11"	4'-5"	3'-11"	3'-6"	4'-3"	3'-8"	3'-1"	2'-7"	2'-1"
2-550S162-97	7'-3"	6'-7"	6'-1"	5'-8"	5'-3"	5'-11"	5'-4"	4'-11"	4'-6"	4'-1"
2-800S162-33	2'-7"	-	-	-	-	-	-	-	-	-
2-800S162-43	4'-6"	3'-9"	3'-1"	2'-5"	-	2'-10"	-	-	-	-
2-800S162-54	5'-10"	5'-1"	4'-6"	3'-11"	3'-4"	4'-3"	3'-6"	2'-9"	-	-
2-800S162-68	7'-2"	6'-6"	5'-10"	5'-3"	4'-8"	5'-7"	4'-10"	4'-2"	3'-7"	2'-11"
2-800S162-97	9'-7"	8'-9"	8'-2"	7'-7"	7'-0"	7'-11"	7'-2"	6'-7"	6'-0"	5'-7"
2-1000S162-43	4'-8"	4'-1"	3'-6"	2'-9"	-	3'-3"	2'-2"	-	-	-
2-1000S162-54	6'-7"	5'-10"	5'-1"	4'-5"	3'-9"	4'-10"	4'-0"	3'-2"	2'-3"	-
2-1000S162-68	8'-3"	7'-5"	6'-8"	6'-0"	5'-5"	6'-5"	5'-7"	4'-9"	4'-1"	3'-5"
2-1000S162-97	11'-4"	10'-5"	9'-8"	9'-0"	8'-5"	9'-5"	8'-6"	7'-10"	7'-2"	6'-7"
2-1200S162-54	7'-3"	6'-5"	5'-7"	4'-10"	4'-2"	5'-4"	4'-4"	3'-5"	2'-5"	-
2-1200S162-68	9'-2"	8'-2"	7'-5"	6'-8"	6'-0"	7'-1"	6'-2"	5'-4"	4'-6"	3'-9"
2-1200S162-97	12'-10"	11'-9"	10'-11"	10'-2"	9'-6"	10'-7"	9'-8"	8'-10"	8'-2"	7'-6"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

a. — Deflection criterion: L/360 for live loads, L/240 for total loads.

b. — Design load assumptions:

Roof/Ceiling dead load is 12 psf.

Attic dead load is 10 psf.

c. — Building width is in the direction of horizontal framing members supported by the header.

TABLE R603.6(2)
BOX-BEAM AND BACK-TO-BACK HEADER SPANS
Headers Supporting Roof and Ceiling Only^{a, b, d}

MEMBER DESIGNATION	GROUND SNOW LOAD (50 psf)					GROUND SNOW LOAD (70 psf)				
	Building width ^c (feet)					Building width ^c (feet)				
	24	28	32	36	40	24	28	32	36	40
2-350S162-33	-	-	-	-	-	-	-	-	-	-
2-350S162-43	2'-4"	-	-	-	-	-	-	-	-	-
2-350S162-54	4'-8"	4'-2"	3'-9"	3'-5"	3'-1"	3'-7"	3'-2"	2'-9"	2'-5"	2'-0"
2-350S162-68	5'-7"	5'-2"	4'-9"	4'-4"	3'-11"	4'-7"	4'-1"	3'-7"	3'-2"	2'-10"
2-550S162-33	2'-2"	-	-	-	-	-	-	-	-	-

2-550S162-43	3'-8"	3'-1"	2'-6"	-	-	2'-3"	-	-	-	-
2-550S162-54	6'-11"	6'-3"	5'-9"	5'-3"	4'-9"	5'-6"	4'-11"	4'-5"	3'-11"	3'-5"
2-550S162-68	8'-0"	7'-6"	6'-11"	6'-5"	5'-11"	6'-9"	6'-1"	5'-6"	5'-0"	4'-7"
2-800S162-33	2'-7"	-	-	-	-	-	-	-	-	-
2-800S162-43	4'-6"	3'-9"	3'-1"	2'-5"	-	2'-10"	-	-	-	-
2-800S162-54	8'-0"	7'-3"	6'-8"	6'-1"	5'-7"	6'-5"	5'-9"	5'-1"	4'-7"	4'-0"
2-800S162-68	9'-9"	9'-0"	8'-3"	7'-8"	7'-1"	8'-0"	7'-3"	6'-7"	6'-0"	5'-6"
2-1000S162-43	4'-8"	4'-1"	3'-6"	2'-9"	-	3'-3"	2'-2"	-	-	-
2-1000S162-54	9'-1"	8'-2"	7'-3"	6'-7"	6'-0"	7'-0"	6'-2"	5'-6"	5'-0"	4'-6"
2-1000S162-68	11'-1"	10'-2"	9'-5"	8'-8"	8'-1"	9'-1"	8'-3"	7'-6"	6'-10"	6'-3"
2-1200S162-54	7'-8"	6'-9"	6'-1"	5'-6"	5'-0"	5'-10"	5'-1"	4'-7"	4'-1"	3'-9"
2-1200S162-68	12'-3"	11'-3"	10'-4"	9'-7"	8'-11"	10'-1"	9'-1"	8'-3"	7'-6"	6'-10"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

a. Deflection criterion: L/360 for live loads, L/240 for total loads.

b. Design load assumptions:

Roof/Ceiling dead load is 12 psf.

Attic dead load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the header.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

TABLE R603.6(4)
BOX-BEAM HEADER SPANS Headers Supporting Roof and Ceiling Only
(50 ksi steel)^{a, b}

MEMBER DESIGNATION	GROUND SNOW LOAD (50 psf)					GROUND SNOW LOAD (70 psf)				
	Building width ^c (feet)					Building width ^c (feet)				
	24	28	32	36	40	24	28	32	36	40
2-350S162-33	2'-7"	2'-2"	-	-	-	-	-	-	-	-
2-350S162-43	3'-8"	3'-3"	2'-10"	2'-6"	2'-1"	2'-8"	2'-3"	-	-	-
2-350S162-54	4'-8"	4'-2"	3'-9"	3'-5"	3'-1"	3'-7"	3'-2"	2'-9"	2'-5"	2'-0"
2-350S162-68	5'-7"	5'-2"	4'-9"	4'-4"	3'-11"	4'-7"	4'-1"	3'-7"	3'-2"	2'-10"
2-350S162-97	6'-2"	5'-11"	5'-8"	5'-6"	5'-4"	5'-8"	5'-5"	5'-3"	4'-11"	4'-7"
2-550S162-33	3'-11"	3'-4"	2'-10"	2'-4"	-	2'-7"	-	-	-	-
2-550S162-43	5'-4"	4'-10"	4'-4"	3'-10"	3'-5"	4'-2"	3'-7"	3'-1"	2'-7"	2'-1"
2-550S162-54	6'-11"	6'-3"	5'-9"	5'-3"	4'-9"	5'-6"	4'-11"	4'-5"	3'-11"	3'-5"
2-550S162-68	8'-0"	7'-6"	6'-11"	6'-5"	5'-11"	6'-9"	6'-1"	5'-6"	5'-0"	4'-7"
2-550S162-97	8'-11"	8'-6"	8'-2"	7'-11"	7'-8"	8'-1"	7'-9"	7'-6"	7'-1"	6'-7"
2-800S162-33	2'-8"	2'-4"	2'-1"	1'-11"	1'-9"	2'-0"	1'-9"	-	-	-
2-800S162-43	5'-10"	5'-2"	4'-7"	4'-2"	3'-10"	4'-5"	3'-11"	3'-6"	3'-0"	2'-6"
2-800S162-54	8'-0"	7'-3"	6'-8"	6'-1"	5'-7"	6'-5"	5'-9"	5'-1"	4'-7"	4'-0"
2-800S162-68	9'-9"	9'-0"	8'-3"	7'-8"	7'-1"	8'-0"	7'-3"	6'-7"	6'-0"	5'-6"
2-800S162-97	12'-1"	11'-7"	11'-2"	10'-8"	10'-2"	11'-0"	10'-4"	9'-9"	9'-2"	8'-7"
2-1000S162-43	4'-8"	4'-1"	3'-8"	3'-4"	3'-0"	3'-6"	3'-1"	2'-9"	2'-6"	2'-3"
2-1000S162-54	9'-1"	8'-2"	7'-3"	6'-7"	6'-0"	7'-0"	6'-2"	5'-6"	5'-0"	4'-6"
2-1000S162-68	11'-1"	10'-2"	9'-5"	8'-8"	8'-1"	9'-1"	8'-3"	7'-6"	6'-10"	6'-3"
2-1000S162-97	13'-9"	12'-11"	12'-2"	11'-7"	11'-1"	11'-11"	11'-3"	10'-7"	9'-11"	9'-4"
2-1200S162-54	7'-8"	6'-9"	6'-1"	5'-6"	5'-0"	5'-10"	5'-1"	4'-7"	4'-1"	3'-9"
2-1200S162-68	12'-3"	11'-3"	10'-4"	9'-7"	8'-11"	10'-1"	9'-1"	8'-3"	7'-6"	6'-10"
2-1200S162-97	15'-4"	14'-5"	13'-7"	12'-11"	12'-4"	13'-4"	12'-6"	11'-10"	11'-1"	10'-5"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

- a. Deflection criterion: L/360 for live loads, L/240 for total loads.
b. Design load assumptions:
— Roof/Ceiling dead load is 12 psf.
— Attic dead load is 10 psf.
c. Building width is in the direction of horizontal framing members supported by the header.

TABLE R603.6(5)
BOX-BEAM HEADER SPANS
Headers Supporting One Floor, Roof and Ceiling 33 ksi steel^{a, b}

MEMBER DESIGNATION	GROUND SNOW LOAD (20 psf)					GROUND SNOW LOAD (30 psf)				
	Building width ^c (feet)					Building width ^c (feet)				
	24	28	32	36	40	24	28	32	36	40
2-350S162-33	-	-	-	-	-	-	-	-	-	-
2-350S162-43	2'-2"	-	-	-	-	2'-1"	-	-	-	-
2-350S162-54	2'-11"	2'-5"	-	-	-	2'-10"	2'-4"	-	-	-
2-350S162-68	3'-8"	3'-2"	2'-9"	2'-4"	-	3'-7"	3'-1"	2'-8"	2'-3"	-
2-350S162-97	4'-11"	4'-5"	4'-2"	3'-8"	3'-5"	4'-10"	4'-5"	4'-0"	3'-8"	3'-4"
2-550S162-33	-	-	-	-	-	-	-	-	-	-
2-550S162-43	3'-5"	2'-9"	2'-1"	-	-	3'-3"	2'-7"	-	-	-
2-550S162-54	4'-4"	3'-9"	3'-2"	2'-7"	2'-1"	4'-3"	3'-7"	3'-1"	2'-6"	-
2-550S162-68	5'-3"	4'-8"	4'-1"	3'-7"	3'-2"	5'-2"	4'-7"	4'-0"	3'-6"	3'-1"
2-550S162-97	7'-0"	6'-5"	5'-10"	5'-5"	5'-0"	6'-11"	6'-4"	5'-9"	5'-4"	4'-11"
2-800S162-33	2'-1"	-	-	-	-	-	-	-	-	-
2-800S162-43	4'-2"	3'-4"	2'-7"	-	-	4'-0"	3'-3"	2'-5"	-	-
2-800S162-54	5'-6"	4'-9"	4'-1"	3'-5"	2'-9"	5'-5"	4'-8"	3'-11"	3'-3"	2'-8"
2-800S162-68	6'-11"	6'-2"	5'-5"	4'-10"	4'-3"	6'-9"	6'-0"	5'-4"	4'-8"	4'-1"
2-800S162-97	9'-4"	8'-6"	7'-10"	7'-3"	6'-8"	9'-2"	8'-4"	7'-8"	7'-1"	6'-7"
2-1000S162-43	4'-4"	3'-9"	2'-11"	-	-	4'-3"	3'-8"	2'-9"	-	-
2-1000S162-54	6'-3"	5'-5"	4'-7"	3'-11"	3'-2"	6'-1"	5'-3"	4'-6"	3'-9"	3'-0"
2-1000S162-68	7'-11"	7'-0"	6'-3"	5'-6"	4'-10"	7'-9"	6'-10"	6'-1"	5'-4"	4'-9"
2-1000S162-97	11'-0"	10'-1"	9'-3"	8'-7"	8'-0"	10'-11"	9'-11"	9'-2"	8'-5"	7'-10"
2-1200S162-54	6'-11"	5'-11"	5'-1"	4'-3"	3'-5"	6'-9"	5'-9"	4'-11"	4'-1"	3'-3"
2-1200S162-68	8'-9"	7'-9"	6'-11"	6'-1"	5'-4"	8'-7"	7'-7"	6'-9"	5'-11"	5'-3"
2-1200S162-97	12'-4"	11'-5"	10'-6"	9'-8"	9'-0"	12'-3"	11'-3"	10'-4"	9'-6"	8'-10"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

- a. Deflection criterion: L/360 for live loads, L/240 for total loads.
b. Design load assumptions:
Second floor dead load is 10 psf.
Roof/Ceiling dead load is 12 psf.
Second floor live load is 30 psf.
Attic dead load is 10 psf.
c. Building width is in the direction of horizontal framing members supported by the header.

TABLE R603.6(3)
BOX-BEAM AND BACK-TO-BACK HEADER SPANS
Headers Supporting One Floor, Roof and Ceiling^{a, b, d}

MEMBER DESIGNATION	GROUND SNOW LOAD (20 psf)					GROUND SNOW LOAD (30 psf)				
	Building width ^c (feet)					Building width ^c (feet)				
	24	28	32	36	40	24	28	32	36	40
2-350S162-33	-	-	-	-	-	-	-	-	-	-

2-350S162-43	2'-2"	-	-	-	-	2'-1"	-	-	-	-
2-350S162-54	4'-4"	3'-10"	3'-5"	3'-1"	2'-9"	4'-3"	2'-9"	3'-4"	3'-0"	2'-8"
2-350S162-68	5'-0"	4'-9"	4'-7"	4'-2"	3'-9"	4'-11"	4'-8"	4'-6"	4'-1"	3'-9"
2-550S162-33	-	-	-	-	-	-	-	-	-	-
2-550S162-43	3'-5"	2'-9"	2'-1"	-	-	3'-3"	2'-7"	-	-	-
2-550S162-54	6'-6"	5'-10"	5'-3"	4'-9"	4'-4"	6'-4"	5'-9"	5'-2"	4'-8"	4'-3"
2-550S162-68	7'-2"	6'-10"	6'-5"	5'-11"	5'-6"	7'-0"	6'-9"	6'-4"	5'-10"	5'-4"
2-800S162-33	2'-1"	-	-	-	-	-	-	-	-	-
2-800S162-43	4'-2"	3'-4"	2'-7"	-	-	4'-0"	3'-3"	2'-5"	-	-
2-800S162-54	7'-6"	6'-9"	6'-2"	5'-7"	5'-0"	7'-5"	6'-8"	6'-0"	5'-5"	4'-11"
2-800S162-68	9'-3"	8'-5"	7'-8"	7'-1"	6'-6"	9'-1"	8'-3"	7'-7"	7'-0"	6'-5"
2-1000S162-43	4'-4"	3'-9"	2'-11"	-	-	4'-3"	3'-8"	2'-9"	-	-
2-1000S162-54	8'-6"	7'-6"	6'-8"	6'-0"	5'-5"	8'-4"	7'-4"	6'-6"	5'-10"	5'-4"
2-1000S162-68	10'-6"	9'-7"	8'-9"	8'-0"	7'-5"	10'-4"	9'-5"	8'-7"	7'-11"	7'-3"
2-1200S162-54	7'-1"	6'-2"	5'-6"	5'-0"	4'-6"	6'-11"	6'-1"	5'-5"	4'-10"	4'-5"
2-1200S162-68	11'-7"	10'-7"	9'-8"	8'-11"	8'-2"	11'-5"	10'-5"	9'-6"	8'-9"	8'-0"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

a. Deflection criterion: L/360 for live loads, L/240 for total loads.

b. Design load assumptions:

Second floor dead load is 10 psf.

Roof/Ceiling dead load is 12 psf.

Second floor live load is 30 psf.

Attic dead load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the header.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

TABLE R603.6(6)

BOX-BEAM HEADER SPANS Headers Supporting One Floor, Roof and Ceiling (50 ksi steel)^{a, b}

MEMBER DESIGNATION	GROUND SNOW LOAD (20 psf)					GROUND SNOW LOAD (30 psf)				
	Building width ^c (feet)					Building width ^c (feet)				
	24	28	32	36	40	24	28	32	36	40
2-350S162-33	2'-4"	-	-	-	-	2'-3"	-	-	-	-
2-350S162-43	3'-4"	2'-11"	2'-6"	2'-1"	-	3'-3"	2'-10"	2'-5"	2'-0"	-
2-350S162-54	4'-4"	3'-10"	3'-5"	3'-1"	2'-9"	4'-3"	2'-9"	3'-4"	3'-0"	2'-8"
2-350S162-68	5'-0"	4'-9"	4'-7"	4'-2"	3'-9"	4'-11"	4'-8"	4'-6"	4'-1"	3'-9"
2-350S162-97	5'-6"	5'-3"	5'-1"	4'-11"	2'-9"	5'-5"	5'-2"	5'-0"	4'-10"	4'-8"
2-550S162-33	3'-6"	2'-11"	2'-4"	-	-	3'-5"	2'-10"	2'-3"	-	-
2-550S162-43	5'-0"	4'-5"	3'-11"	3'-5"	3'-0"	4'-11"	4'-4"	3'-10"	3'-4"	2'-11"
2-550S162-54	6'-6"	5'-10"	5'-3"	4'-9"	4'-4"	6'-4"	5'-9"	5'-2"	4'-8"	4'-3"
2-550S162-68	7'-2"	6'-10"	6'-5"	5'-11"	5'-6"	7'-0"	6'-9"	6'-4"	5'-10"	5'-4"
2-550S162-97	7'-11"	7'-7"	7'-3"	7'-0"	6'-10"	7'-9"	7'-5"	7'-2"	6'-11"	6'-9"
2-800S162-33	2'-5"	2'-2"	1'-11"	1'-9"	-	2'-5"	2'-1"	1'-10"	1'-8"	-
2-800S162-43	5'-5"	4'-9"	4'-3"	3'-9"	3'-5"	5'-3"	4'-8"	4'-1"	3'-9"	3'-5"
2-800S162-54	7'-6"	6'-9"	6'-2"	5'-7"	5'-0"	7'-5"	6'-8"	6'-0"	5'-5"	4'-11"
2-800S162-68	9'-3"	8'-5"	7'-8"	7'-1"	6'-6"	9'-1"	8'-3"	7'-7"	7'-0"	6'-5"
2-800S162-97	10'-9"	10'-3"	9'-11"	9'-7"	9'-3"	10'-7"	10'-1"	9'-9"	9'-5"	9'-1"
2-1000S162-43	4'-4"	3'-9"	3'-4"	3'-0"	2'-9"	4'-3"	3'-8"	3'-3"	2'-11"	2'-8"
2-1000S162-54	8'-6"	7'-6"	6'-8"	6'-0"	5'-5"	8'-4"	7'-4"	6'-6"	5'-10"	5'-4"
2-1000S162-68	10'-6"	9'-7"	8'-9"	8'-0"	7'-5"	10'-4"	9'-5"	8'-7"	7'-11"	7'-3"

2-1000S162-97	12'-11"	12'-4"	11'-8"	11'-1"	10'-6"	12'-9"	12'-2"	11'-6"	10'-11"	10'-5"
2-1200S162-54	7'-1"	6'-2"	5'-6"	5'-0"	4'-6"	6'-11"	6'-1"	5'-5"	4'-10"	4'-5"
2-1200S162-68	11'-7"	10'-7"	9'-8"	8'-11"	8'-2"	11'-5"	10'-5"	9'-6"	8'-9"	8'-0"
2-1200S162-97	14'-9"	13'-9"	13'-0"	12'-4"	11'-9"	14'-7"	13'-8"	12'-10"	12'-3"	11'-8"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

- a. Deflection criterion: L/360 for live loads, L/240 for total loads.
- b. Design load assumptions:
- Second floor dead load is 10 psf.
 - Roof/Ceiling dead load is 12 psf.
 - Second Floor live loads 30 psf.
 - Attic live load is 10 psf.
- c. Building width is in the direction of horizontal framing members supported by the header.

TABLE R603.6(7)
BOX-BEAM HEADER SPANS
Headers Supporting One Floor, Roof and Ceiling^{a, b}

MEMBER DESIGNATION	GROUND SNOW LOAD (50 psf)					GROUND SNOW LOAD (70 psf)				
	Building width ^c (feet)					Building width ^c (feet)				
	24	28	32	36	40	24	28	32	36	40
2-350S162-33	-	-	-	-	-	-	-	-	-	-
2-350S162-43	-	-	-	-	-	-	-	-	-	-
2-350S162-54	-	-	-	-	-	-	-	-	-	-
2-350S162-68	2'-8"	2'-3"	-	-	-	-	-	-	-	-
2-350S162-97	4'-0"	3'-7"	3'-3"	2'-11"	2'-7"	3'-4"	2'-11"	2'-6"	2'-2"	-
2-550S162-33	-	-	-	-	-	-	-	-	-	-
2-550S162-43	2'-0"	-	-	-	-	-	-	-	-	-
2-550S162-54	3'-1"	2'-6"	-	-	-	-	-	-	-	-
2-550S162-68	4'-1"	3'-6"	2'-11"	2'-5"	-	3'-1"	2'-5"	-	-	-
2-550S162-97	5'-10"	5'-3"	4'-10"	4'-5"	4'-0"	4'-11"	4'-5"	3'-11"	3'-6"	3'-2"
2-800S162-33	-	-	-	-	-	-	-	-	-	-
2-800S162-43	2'-6"	-	-	-	-	-	-	-	-	-
2-800S162-54	4'-0"	3'-3"	2'-6"	-	-	2'-8"	-	-	-	-
2-800S162-68	5'-5"	4'-8"	4'-0"	3'-4"	2'-8"	4'-2"	3'-4"	2'-6"	-	-
2-800S162-97	7'-9"	7'-1"	6'-6"	5'-11"	5'-5"	6'-7"	5'-11"	5'-4"	4'-10"	4'-4"
2-1000S162-43	2'-10"	-	-	-	-	-	-	-	-	-
2-1000S162-54	4'-7"	3'-8"	2'-9"	-	-	3'-0"	-	-	-	-
2-1000S162-68	6'-2"	5'-4"	4'-7"	3'-10"	3'-1"	4'-9"	3'-10"	2'-11"	-	-
2-1000S162-97	9'-3"	8'-5"	7'-8"	7'-1"	6'-6"	7'-10"	7'-1"	6'-5"	5'-9"	5'-2"
2-1200S162-54	5'-0"	4'-0"	3'-1"	-	-	3'-4"	-	-	-	-
2-1200S162-68	6'-10"	5'-11"	5'-0"	4'-3"	3'-5"	5'-3"	4'-3"	3'-2"	-	-
2-1200S162-97	10'-5"	9'-6"	8'-8"	8'-0"	7'-4"	8'-10"	8'-0"	7'-3"	6'-6"	5'-10"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

- a. Deflection criterion: L/360 for live loads, L/240 for total loads.
- b. Design load assumptions:
- Second floor dead load is 10 psf.
 - Roof/Ceiling dead load is 12 psf.
 - Second floor live load is 30 psf.
 - Attic dead load is 10 psf.
- c. Building width is in the direction of horizontal framing members supported by the header.

TABLE R603.6(4)
BOX-BEAM AND BACK-TO-BACK HEADER SPANS
Headers Supporting One Floor, Roof and Ceiling^{a, b, d}

MEMBER DESIGNATION	GROUND SNOW LOAD (50 psf)					GROUND SNOW LOAD (70 psf)				
	Building width^c (feet)					Building width^c (feet)				
	24	28	32	36	40	24	28	32	36	40
2-350S162-33	-	-	-	-	-	-	-	-	-	-
2-350S162-43	-	-	-	-	-	-	-	-	-	-
2-350S162-54	3'-5"	3'-0"	2'-7"	2'-2"	-	2'-8"	2'-2"	-	-	-
2-350S162-68	4'-6"	4'-1"	3'-8"	3'-3"	2'-11"	3'-9"	3'-3"	2'-10"	2'-5"	2'-1"
2-550S162-33	-	-	-	-	-	-	-	-	-	-
2-550S162-43	2'-0"	-	-	-	-	-	-	-	-	-
2-550S162-54	5'-3"	3'-8"	4'-1"	3'-8"	3'-2"	4'-3"	3'-8"	3'-1"	2'-7"	2'-0"
2-550S162-68	6'-5"	5'-10"	5'-3"	4'-9"	4'-4"	5'-5"	4'-9"	4'-3"	3'-9"	3'-4"
2-800S162-33	-	-	-	-	-	-	-	-	-	-
2-800S162-43	2'-6"	-	-	-	-	-	-	-	-	-
2-800S162-54	6'-1"	5'-5"	4'-10"	4'-3"	3'-9"	4'-11"	4'-3"	3'-8"	3'-0"	2'-5"
2-800S162-68	7'-8"	6'-11"	6'-3"	5'-9"	5'-2"	6'-5"	5'-9"	5'-1"	4'-6"	4'-0"
2-1000S162-43	2'-10"	-	-	-	-	-	-	-	-	-
2-1000S162-54	6'-7"	5'-10"	5'-3"	4'-9"	4'-3"	5'-4"	4'-9"	4'-1"	3'-5"	2'-9"
2-1000S162-68	8'-8"	7'-10"	7'-2"	6'-6"	5'-11"	7'-4"	6'-6"	5'-9"	5'-1"	4'-6"
2-1200S162-54	5'-6"	4'-10"	4'-4"	3'-11"	3'-7"	4'-5"	3'-11"	3'-6"	3'-2"	2'-11"
2-1200S162-68	9'-7"	8'-8"	7'-11"	7'-2"	6'-6"	8'-1"	7'-2"	6'-4"	5'-8"	5'-0"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

a. Deflection criterion: L/360 for live loads, L/240 for total loads.

b. Design load assumptions:

Second floor dead load is 10 psf.

Roof/Ceiling dead load is 12 psf.

Second floor live load is 30 psf.

Attic dead load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the header.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

TABLE R603.6(8)
BOX-BEAM HEADER SPANS Headers Supporting One Floor, Roof and Ceiling (50 ksi steel)^{a, b}

MEMBER DESIGNATION	GROUND SNOW LOAD (50 psf)					GROUND SNOW LOAD (70 psf)				
	Building width^c (feet)					Building width^c (feet)				
	24	28	32	36	40	24	28	32	36	40
2-350S162-33	-	-	-	-	-	-	-	-	-	-
2-350S162-43	2'-8"	-	-	-	-	-	-	-	-	-
2-350S162-54	3'-5"	3'-0"	2'-7"	2'-2"	-	2'-8"	2'-2"	-	-	-
2-350S162-68	4'-6"	4'-1"	3'-8"	3'-3"	2'-11"	3'-9"	3'-3"	2'-10"	2'-5"	2'-1"
2-350S162-97	5'-1"	4'-10"	4'-8"	4'-6"	4'-5"	4'-10"	4'-7"	4'-4"	4'-0"	3'-8"
2-550S162-33	2'-4"	-	-	-	-	-	-	-	-	-
2-550S162-43	3'-10"	3'-4"	2'-9"	2'-3"	-	2'-11"	2'-3"	-	-	-
2-550S162-54	5'-3"	3'-8"	4'-1"	3'-8"	3'-2"	4'-3"	3'-8"	3'-1"	2'-7"	2'-0"
2-550S162-68	6'-5"	5'-10"	5'-3"	4'-9"	4'-4"	5'-5"	4'-9"	4'-3"	3'-9"	3'-4"

2-550S162-97	7'-4"	7'-0"	6'-9"	6'-6"	6'-4"	6'-11"	6'-8"	6'-3"	5'-10"	5'-5"
2-800S162-33	4'-11"	4'-8"	-	-	-	-	-	-	-	-
2-800S162-43	4'-2"	3'-8"	3'-4"	2'-9"	2'-2"	3'-5"	2'-9"	-	-	-
2-800S162-54	6'-1"	5'-5"	4'-10"	4'-3"	3'-9"	4'-11"	4'-3"	3'-8"	3'-0"	2'-5"
2-800S162-68	7'-8"	6'-11"	6'-3"	5'-9"	5'-2"	6'-5"	5'-9"	5'-1"	4'-6"	4'-0"
2-800S162-97	9'-11"	9'-6"	9'-2"	8'-10"	8'-3"	9'-5"	8'-10"	8'-2"	7'-7"	7'-0"
2-1000S162-43	3'-4"	2'-11"	2'-7"	2'-5"	2'-2"	2'-8"	2'-5"	2'-2"	-	-
2-1000S162-54	6'-7"	5'-10"	5'-3"	4'-9"	4'-3"	5'-4"	4'-9"	4'-1"	3'-5"	2'-9"
2-1000S162-68	8'-8"	7'-10"	7'-2"	6'-6"	5'-11"	7'-4"	6'-6"	5'-9"	5'-1"	4'-6"
2-1000S162-97	11'-7"	10'-11"	10'-3"	9'-7"	9'-0"	10'-5"	9'-7"	8'-10"	8'-2"	7'-8"
2-1200S162-54	5'-6"	4'-10"	4'-4"	3'-11"	3'-7"	4'-5"	3'-11"	3'-6"	3'-2"	2'-11"
2-1200S162-68	9'-7"	8'-8"	7'-11"	7'-2"	6'-6"	8'-1"	7'-2"	6'-4"	5'-8"	5'-0"
2-1200S162-97	12'-11"	12'-2"	11'-6"	10'-8"	10'-0"	11'-8"	10'-9"	9'-11"	9'-2"	8'-6"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

- a. Deflection criterion: L/360 for live loads, L/240 for total loads.
b. Design load assumptions:
— Second floor dead load is 10 psf.
— Roof/Ceiling dead load is 12 psf.
— Second floor live load is 30 psf.
— Attic live load is 10 psf.
c. Building width is in the direction of horizontal framing members supported by the header.

TABLE R603.6(9)
BOX-BEAM HEADER SPANS
Headers Supporting Two Floors, Roof and Ceiling 33 ksi steel^{a,b}

MEMBER DESIGNATION	GROUND SNOW LOAD (20 psf)					GROUND SNOW LOAD (30 psf)				
	Building width ^c (feet)					Building width ^c (feet)				
	24	28	32	36	40	24	28	32	36	40
2-350S162-33	-	-	-	-	-	-	-	-	-	-
2-350S162-43	-	-	-	-	-	-	-	-	-	-
2-350S162-54	-	-	-	-	-	-	-	-	-	-
2-350S162-68	-	-	-	-	-	-	-	-	-	-
2-350S162-97	3'-1"	2'-8"	2'-3"	-	-	3'-1"	2'-7"	2'-2"	-	-
2-550S162-33	-	-	-	-	-	-	-	-	-	-
2-550S162-43	-	-	-	-	-	-	-	-	-	-
2-550S162-54	-	-	-	-	-	-	-	-	-	-
2-550S162-68	2'-9"	-	-	-	-	2'-8"	-	-	-	-
2-550S162-97	4'-8"	4'-1"	3'-7"	3'-2"	2'-9"	4'-7"	4'-0"	3'-6"	3'-1"	2'-8"
2-800S162-33	-	-	-	-	-	-	-	-	-	-
2-800S162-43	-	-	-	-	-	-	-	-	-	-
2-800S162-54	2'-1"	-	-	-	-	-	-	-	-	-
2-800S162-68	3'-8"	2'-9"	-	-	-	3'-7"	2'-8"	-	-	-
2-800S162-97	6'-3"	5'-6"	4'-11"	4'-4"	3'-9"	6'-2"	5'-5"	4'-10"	4'-3"	3'-9"
2-1000S162-43	-	-	-	-	-	-	-	-	-	-
2-1000S162-54	2'-5"	-	-	-	-	2'-3"	-	-	-	-
2-1000S162-68	4'-3"	3'-2"	2'-0"	-	-	4'-2"	3'-1"	-	-	-
2-1000S162-97	7'-5"	6'-7"	5'-10"	5'-2"	4'-7"	7'-4"	6'-6"	5'-9"	5'-1"	4'-6"
2-1200S162-54	2'-7"	-	-	-	-	2'-6"	-	-	-	-

2-1200S162-68	4'-8"	3'-6"	2'-2"	-	-	4'-7"	3'-5"	2'-0"	-	-
2-1200S162-97	8'-5"	7'-5"	6'-7"	5'-10"	5'-2"	8'-3"	7'-4"	6'-6"	5'-9"	5'-1"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

- Deflection criterion: L/360 for live loads, L/240 for total loads.
- Design load assumptions:
 - Second floor dead load is 10 psf.
 - Roof/Ceiling dead load is 12 psf.
 - Second floor live load is 40 psf
 - Third floor live load is 30 psf.
 - Attic live load is 10 psf.
- Building width is in the direction of horizontal framing members supported by the header.
- Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

TABLE R603.6(5)
BOX-BEAM AND BACK-TO-BACK HEADER SPANS
Headers Supporting Two Floors, Roof and Ceiling^{a, b, d}

MEMBER DESIGNATION	GROUND SNOW LOAD (20 psf)					GROUND SNOW LOAD (30 psf)				
	Building width ^c (feet)					Building width ^c (feet)				
	24	28	32	36	40	24	28	32	36	40
2-350S162-33	-	-	-	-	-	-	-	-	-	-
2-350S162-43	-	-	-	-	-	-	-	-	-	-
2-350S162-54	2'-5"	-	-	-	-	2'-4"	-	-	-	-
2-350S162-68	3'-6"	3'-0"	2'-6"	2'-1"	-	3'-5"	2'-11"	2'-6"	2'-0"	-
2-550S162-33	-	-	-	-	-	-	-	-	-	-
2-550S162-43	-	-	-	-	-	-	-	-	-	-
2-550S162-54	3'-11"	3'-3"	2'-8"	2'-0"	-	3'-10"	3'-3"	2'-7"	-	-
2-550S162-68	5'-1"	4'-5"	3'-10"	3'-3"	2'-9"	5'-0"	4'-4"	3'-9"	3'-3"	2'-9"
2-800S162-33	-	-	-	-	-	-	-	-	-	-
2-800S162-43	-	-	-	-	-	-	-	-	-	-
2-800S162-54	4'-7"	3'-10"	3'-1"	2'-5"	-	4'-6"	3'-9"	3'-0"	2'-4"	-
2-800S162-68	6'-0"	5'-3"	4'-7"	3'-11"	3'-4"	6'-0"	5'-2"	4'-6"	3'-11"	3'-3"
2-1000S162-43	-	-	-	-	-	-	-	-	-	-
2-1000S162-54	5'-0"	4'-4"	3'-6"	2'-9"	-	4'-11"	4'-3"	3'-5"	2'-7"	-
2-1000S162-68	6'-10"	6'-0"	5'-3"	4'-6"	3'-10"	6'-9"	5'-11"	5'-2"	4'-5"	3'-9"
2-1200S162-54	4'-2"	3'-7"	3'-3"	2'-11"	-	4'-1"	3'-7"	3'-2"	2'-10"	-
2-1200S162-68	7'-7"	6'-7"	5'-9"	5'-0"	4'-2"	7'-6"	6'-6"	5'-8"	4'-10"	4'-1"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

- Deflection criterion: L/360 for live loads, L/240 for total loads.
- Design load assumptions:
 - Second floor dead load is 10 psf.
 - Roof/Ceiling dead load is 12 psf.
 - Second floor live load is 40 psf
 - Third floor live load is 30 psf.
 - Attic live load is 10 psf.
- Building width is in the direction of horizontal framing members supported by the header.
- Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

TABLE R603.6(10)
BOX-BEAM HEADER SPANS Headers Supporting Two Floors, Roof and Ceiling (50 ksi steel)^{a, b}

MEMBER DESIGNATION	GROUND SNOW LOAD (20 psf)	GROUND SNOW LOAD (30 psf)
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	Building width ^c (feet)					Building width ^c (feet)				
	24	28	32	36	40	24	28	32	36	40
2-350S162-33	-	-	-	-	-	-	-	-	-	-
2-350S162-43	-	-	-	-	-	-	-	-	-	-
2-350S162-54	2'-5"	-	-	-	-	2'-4"	-	-	-	-
2-350S162-68	3'-6"	3'-0"	2'-6"	2'-1"	-	3'-5"	2'-11"	2'-6"	2'-0"	-
2-350S162-97	4'-9"	4'-6"	4'-1"	3'-8"	3'-4"	4'-8"	4'-5"	4'-0"	3'-8"	3'-4"
2-550S162-33	-	-	-	-	-	-	-	-	-	-
2-550S162-43	2'-7"	-	-	-	-	2'-6"	-	-	-	-
2-550S162-54	3'-11"	3'-3"	2'-8"	2'-0"	-	3'-10"	3'-3"	2'-7"	-	-
2-550S162-68	5'-1"	4'-5"	3'-10"	3'-3"	2'-9"	5'-0"	4'-4"	3'-9"	3'-3"	2'-9"
2-550S162-97	6'-10"	6'-5"	5'-10"	5'-5"	4'-11"	6'-9"	6'-4"	5'-10"	5'-4"	4'-11"
2-800S162-33	-	-	-	-	-	-	-	-	-	-
2-800S162-43	3'-1"	2'-3"	-	-	-	3'-0"	2'-2"	-	-	-
2-800S162-54	4'-7"	3'-10"	3'-1"	2'-5"	-	4'-6"	3'-9"	3'-0"	2'-4"	-
2-800S162-68	6'-0"	5'-3"	4'-7"	3'-11"	3'-4"	6'-0"	5'-2"	4'-6"	3'-11"	3'-3"
2-800S162-97	9'-2"	8'-4"	7'-8"	7'-0"	6'-6"	9'-1"	8'-3"	7'-7"	7'-0"	6'-5"
2-1000S162-43	2'-6"	2'-2"	-	-	-	2'-6"	2'-2"	-	-	-
2-1000S162-54	5'-0"	4'-4"	3'-6"	2'-9"	-	4'-11"	4'-3"	3'-5"	2'-7"	-
2-1000S162-68	6'-10"	6'-0"	5'-3"	4'-6"	3'-10"	6'-9"	5'-11"	5'-2"	4'-5"	3'-9"
2-1000S162-97	10'-0"	9'-1"	8'-3"	7'-8"	7'-0"	9'-10"	9'-0"	8'-3"	7'-7"	7'-0"
2-1200S162-54	4'-2"	3'-7"	3'-3"	2'-11"	-	4'-1"	3'-7"	3'-2"	2'-10"	-
2-1200S162-68	7'-7"	6'-7"	5'-9"	5'-0"	4'-2"	7'-6"	6'-6"	5'-8"	4'-10"	4'-1"
2-1200S162-97	11'-2"	10'-1"	9'-3"	8'-6"	7'-10"	11'-0"	10'-0"	9'-2"	9'-2"	7'-9"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

a. Deflection criterion: L/360 for live loads, L/240 for total loads.

b. Design load assumptions:

Second floor dead load is 10 psf.

Roof/Ceiling dead load is 12 psf.

Second floor live load is 40 psf.

Third floor live load is 30 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the header.

TABLE R603.6(11)
BOX-BEAM HEADER SPANS
Headers Supporting Two Floors, Roof and Ceiling 33 ksi steel^{a,b}

MEMBER DESIGNATION	GROUND SNOW LOAD (50 psf)					GROUND SNOW LOAD (70 psf)				
	Building width ^c (feet)					Building width ^c (feet)				
	24	28	32	36	40	24	28	32	36	40
2-350S162-33	-	-	-	-	-	-	-	-	-	-
2-350S162-43	-	-	-	-	-	-	-	-	-	-
2-350S162-54	-	-	-	-	-	-	-	-	-	-
2-350S162-68	-	-	-	-	-	-	-	-	-	-
2-350S162-97	2'-11"	2'-5"	2'-0"	-	-	2'-7"	2'-2"	-	-	-
2-550S162-33	-	-	-	-	-	-	-	-	-	-
2-550S162-43	-	-	-	-	-	-	-	-	-	-
2-550S162-54	-	-	-	-	-	-	-	-	-	-
2-550S162-68	2'-5"	-	-	-	-	-	-	-	-	-
2-550S162-97	4'-4"	3'-10"	3'-4"	2'-10"	2'-5"	4'-0"	3'-6"	3'-1"	2'-7"	2'-2"
2-800S162-33	-	-	-	-	-	-	-	-	-	-
2-800S162-43	-	-	-	-	-	-	-	-	-	-
2-800S162-54	-	-	-	-	-	-	-	-	-	-
2-800S162-68	3'-3"	2'-3"	-	-	-	2'-8"	-	-	-	-
2-800S162-97	5'-11"	5'-2"	4'-6"	4'-0"	3'-5"	5'-6"	4'-10"	4'-3"	3'-8"	3'-2"
2-1000S162-43	-	-	-	-	-	-	-	-	-	-
2-1000S162-54	-	-	-	-	-	-	-	-	-	-
2-1000S162-68	3'-9"	2'-7"	-	-	-	3'-1"	-	-	-	-
2-1000S162-97	7'-0"	6'-2"	5'-5"	4'-9"	4'-2"	6'-6"	5'-9"	5'-1"	4'-5"	3'-10"
2-1200S162-54	-	-	-	-	-	-	-	-	-	-
2-1200S162-68	4'-2"	2'-10"	-	-	-	3'-5"	2'-0"	-	-	-
2-1200S162-97	7'-11"	7'-0"	6'-2"	5'-5"	4'-8"	7'-4"	6'-6"	5'-9"	5'-0"	4'-4"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

a. Deflection criterion: L/360 for live loads, L/240 for total loads.

b. Design load assumptions:

Second floor dead load is 10 psf.

Roof/Ceiling dead load is 12 psf.

Second floor live load is 40 psf.

Third floor live load is 30 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the header.

TABLE R603.6(6)
BOX-BEAM AND BACK-TO-BACK HEADER SPANS
Headers Supporting Two Floors, Roof and Ceiling^{a,b,d}

MEMBER DESIGNATION	GROUND SNOW LOAD (50 psf)					GROUND SNOW LOAD (70 psf)				
	Building width ^c (feet)					Building width ^c (feet)				
	24	28	32	36	40	24	28	32	36	40
2-350S162-33	-	-	-	-	-	-	-	-	-	-
2-350S162-43	-	-	-	-	-	-	-	-	-	-
2-350S162-54	2'-2"	-	-	-	-	-	-	-	-	-
2-350S162-68	3'-3"	2'-9"	2'-3"	-	-	2'-11"	2'-5"	-	-	-

2-550S162-33	-	-	-	-	-	-	-	-	-	-
2-550S162-43	-	-	-	-	-	-	-	-	-	-
2-550S162-54	3'-7"	2'-11"	2'-3"	-	-	3'-3"	2'-7"	-	-	-
2-550S162-68	4'-9"	2'-1"	3'-6"	3'-0"	2'-5"	4'-4"	3'-9"	3'-2"	2'-8"	2'-1"
2-800S162-33	-	-	-	-	-	-	-	-	-	-
2-800S162-43	-	-	-	-	-	-	-	-	-	-
2-800S162-54	4'-3"	3'-5"	2'-8"	-	-	3'-9"	3'-0"	2'-3"	-	-
2-800S162-68	5'-8"	4'-11"	4'-2"	3'-7"	2'-11"	5'-3"	4'-6"	3'-10"	3'-3"	2'-7"
2-1000S162-43	-	-	-	-	-	-	-	-	-	-
2-1000S162-54	4'-8"	3'-11"	3'-1"	2'-2"	-	4'-3"	3'-5"	2'-7"	-	-
2-1000S162-68	6'-5"	5'-7"	4'-9"	4'-1"	3'-4"	5'-11"	5'-1"	4'-5"	3'-8"	2'-11"
2-1200S162-54	3'-11"	3'-5"	3'-0"	2'-4"	-	3'-7"	3'-2"	2'-10"	-	-
2-1200S162-68	7'-1"	6'-2"	5'-3"	4'-6"	3'-8"	6'-6"	5'-8"	4'-10"	4'-0"	3'-3"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

a. Deflection criterion: L/360 for live loads, L/240 for total loads.

b. Design load assumptions:

Second floor dead load is 10 psf.

Roof/Ceiling dead load is 12 psf.

Second floor live load is 40 psf

Third floor live load is 30 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the header.

d. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

TABLE R603.6(12)

BOX-BEAM HEADER SPANS^{a,b,c} - Headers Supporting Two Floors, Roof and Ceiling (50 ksi steel)^{a,b}

MEMBER DESIGNATION	GROUND SNOW LOAD (50 psf)					GROUND SNOW LOAD (70 psf)				
	Building width ^c (feet)					Building width ^c (feet)				
	24	28	32	36	40	24	28	32	36	40
2-350S162-33	-	-	-	-	-	-	-	-	-	-
2-350S162-43	-	-	-	-	-	-	-	-	-	-
2-350S162-54	2'-2"	-	-	-	-	-	-	-	-	-
2-350S162-68	3'-3"	2'-9"	2'-3"	-	-	2'-11"	2'-5"	-	-	-
2-350S162-97	4'-6"	4'-3"	3'-10"	3'-6"	3'-2"	4'-3"	4'-0"	3'-7"	3'-3"	3'-0"
2-550S162-33	-	-	-	-	-	-	-	-	-	-
2-550S162-43	2'-3"	-	-	-	-	-	-	-	-	-
2-550S162-54	3'-7"	2'-11"	2'-3"	-	-	3'-3"	2'-7"	-	-	-
2-550S162-68	4'-9"	2'-1"	3'-6"	3'-0"	2'-5"	4'-4"	3'-9"	3'-2"	2'-8"	2'-1"
2-550S162-97	6'-5"	6'-1"	5'-7"	5'-1"	4'-8"	6'-3"	5'-10"	5'-4"	4'-10"	4'-5"
2-800S162-33	-	-	-	-	-	-	-	-	-	-
2-800S162-43	2'-8"	-	-	-	-	2'-2"	-	-	-	-
2-800S162-54	4'-3"	3'-5"	2'-8"	-	-	3'-9"	3'-0"	2'-3"	-	-
2-800S162-68	5'-8"	4'-11"	4'-2"	3'-7"	2'-11"	5'-3"	4'-6"	3'-10"	3'-3"	2'-7"
2-800S162-97	8'-9"	8'-0"	7'-3"	6'-8"	6'-2"	8'-4"	7'-7"	6'-11"	6'-4"	5'-10"
2-1000S162-43	2'-4"	2'-0"	-	-	-	2'-2"	-	-	-	-
2-1000S162-54	4'-8"	3'-11"	3'-1"	2'-2"	-	4'-3"	3'-5"	2'-7"	-	-
2-1000S162-68	6'-5"	5'-7"	4'-9"	4'-1"	3'-4"	5'-11"	5'-1"	4'-5"	3'-8"	2'-11"
2-1000S162-97	9'-6"	8'-8"	7'-11"	7'-3"	6'-8"	9'-0"	8'-3"	7'-6"	6'-11"	6'-4"

2-1200S162-54	3'-11"	3'-5"	3'-0"	2'-4"	-	3'-7"	3'-2"	2'-10"	-	-
2-1200S162-68	7'-1"	6'-2"	5'-3"	4'-6"	3'-8"	6'-6"	5'-8"	4'-10"	4'-0"	3'-3"
2-1200S162-97	10'-8"	9'-8"	8'-10"	8'-1"	7'-5"	10'-1"	9'-2"	8'-5"	7'-9"	7'-1"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

a. Deflection criterion: L/360 for live loads, L/240 for total loads.

b. Design load assumptions:

Second floor dead load is 10 psf.

Roof/Ceiling dead load is 12 psf.

Second floor live load is 40 psf

Third floor live load is 30 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the header.

TABLE R603.6(13)
BACK-TO-BACK HEADER SPANS Headers Supporting Roof and Ceiling Only (33 ksi steel)^{a,b}

MEMBER DESIGNATION	GROUND SNOW LOAD (20 psf)					GROUND SNOW LOAD (30 psf)				
	Building width ^c (feet)					Building width ^c (feet)				
	24	28	32	36	40	24	28	32	36	40
2-350S162-33	2'-11"	2'-4"	-	-	-	2'-5"	-	-	-	-
2-350S162-43	4'-8"	3'-10"	3'-5"	3'-1"	2'-9"	3'-11"	3'-5"	3'-0"	2'-8"	2'-4"
2-350S162-54	5'-3"	4'-9"	4'-4"	4'-1"	3'-8"	4'-10"	4'-4"	4'-0"	3'-8"	3'-4"
2-350S162-68	6'-1"	5'-7"	5'-2"	4'-10"	4'-6"	5'-8"	5'-3"	4'-10"	4'-6"	4'-2"
2-350S162-97	7'-3"	6'-10"	6'-5"	6'-0"	5'-8"	6'-11"	6'-5"	6'-0"	5'-8"	5'-4"
2-550S162-33	4'-5"	3'-9"	3'-1"	2'-6"	-	3'-9"	3'-2"	2'-6"	-	-
2-550S162-43	6'-2"	5'-7"	5'-0"	4'-7"	4'-2"	5'-7"	5'-0"	4'-6"	4'-1"	3'-8"
2-550S162-54	7'-5"	6'-9"	6'-3"	5'-9"	5'-4"	6'-10"	6'-3"	5'-9"	5'-4"	4'-11"
2-550S162-68	6'-7"	7'-11"	7'-4"	6'-10"	6'-5"	8'-0"	7'-4"	6'-10"	6'-5"	6'-0"
2-550S162-97	10'-5"	9'-8"	9'-0"	8'-6"	8'-0"	9'-9"	9'-0"	8'-6"	8'-0"	7'-7"
2-800S162-33	4'-5"	3'-11"	3'-5"	3'-1"	2'-4"	3'-11"	3'-6"	3'-0"	2'-3"	-
2-800S162-43	7'-7"	6'-10"	6'-2"	5'-8"	5'-2"	6'-11"	6'-2"	5'-7"	5'-1"	4'-7"
2-800S162-54	9'-3"	8'-7"	7'-11"	7'-4"	6'-10"	8'-8"	7'-11"	7'-4"	6'-9"	6'-3"
2-800S162-68	10'-7"	9'-10"	9'-4"	8'-10"	8'-5"	9'-11"	9'-4"	8'-10"	8'-4"	7'-11"
2-800S162-97	13'-9"	12'-9"	12'-0"	11'-3"	10'-8"	12'-10"	12'-0"	11'-3"	10'-7"	10'-0"
2-1000S162-43	7'-10"	6'-10"	6'-1"	5'-6"	5'-0"	6'-11"	6'-1"	5'-5"	4'-11"	4'-6"
2-1000S162-54	10'-5"	9'-9"	9'-0"	8'-4"	7'-9"	9'-10"	9'-0"	8'-4"	7'-9"	7'-2"
2-1000S162-68	12'-1"	11'-3"	10'-8"	10'-1"	9'-7"	11'-4"	10'-8"	10'-1"	9'-7"	9'-1"
2-1000S162-97	15'-3"	14'-3"	13'-5"	12'-9"	12'-2"	14'-4"	13'-5"	12'-8"	12'-1"	11'-6"
2-1200S162-54	11'-6"	10'-9"	10'-0"	9'-0"	8'-2"	10'-10"	10'-0"	9'-0"	8'-1"	7'-4"
2-1200S162-68	13'-4"	12'-6"	11'-9"	11'-2"	10'-8"	12'-7"	11'-10"	11'-2"	10'-7"	10'-1"
2-1200S162-97	16'-8"	15'-7"	14'-8"	13'-11"	13'-3"	15'-8"	14'-8"	13'-11"	13'-2"	12'-7"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

a. Deflection criterion: L/360 for live loads, L/240 for total loads.

b. Design load assumptions:

Roof/ceiling dead load is 12 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the header.

TABLE R603.6(14)
BACK-TO-BACK HEADER SPANS Headers Supporting Roof and Ceiling Only (50 ksi steel)^{a,b}

MEMBER DESIGNATION	GROUND SNOW LOAD (20 psf)					GROUND SNOW LOAD (30 psf)				
	Building width ^c (feet)					Building width ^c (feet)				
	24	28	32	36	40	24	28	32	36	40
2-350S162-33	4'-2"	3'-8"	3'-3"	2'-10"	2'-6"	3'-8"	3'-3"	2'-10"	2'-5"	2'-1"
2-350S162-43	5'-5"	5'-0"	4'-6"	4'-2"	3'-10"	5'-0"	4'-7"	4'-2"	3'-10"	3'-6"
2-350S162-54	6'-2"	5'-10"	5'-8"	5'-4"	5'-0"	5'-11"	5'-8"	5'-4"	5'-0"	4'-8"
2-350S162-68	6'-7"	6'-3"	6'-0"	5'-10"	5'-8"	6'-4"	6'-1"	5'-10"	5'-8"	5'-6"
2-350S162-97	7'-3"	6'-11"	6'-8"	6'-5"	6'-3"	7'-0"	6'-8"	6'-5"	6'-3"	6'-0"
2-550S162-33	5'-10"	5'-3"	4'-8"	4'-3"	3'-9"	5'-3"	4'-9"	4'-2"	3'-9"	3'-3"
2-550S162-43	7'-9"	7'-2"	6'-7"	6'-1"	5'-8"	7'-3"	6'-7"	6'-1"	5'-8"	5'-3"
2-550S162-54	8'-9"	8'-5"	8'-1"	7'-9"	7'-5"	8'-6"	8'-1"	7'-9"	7'-5"	6'-11"
2-550S162-68	9'-5"	9'-0"	8'-8"	8'-4"	8'-1"	9'-1"	8'-8"	8'-4"	8'-1"	7'-10"
2-550S162-97	10'-5"	10'-0"	9'-7"	9'-3"	9'-0"	10'-0"	9'-7"	9'-3"	8'-11"	8'-8"
2-800S162-33	4'-5"	3'-11"	3'-5"	3'-1"	2'-10"	3'-11"	3'-6"	3'-1"	2'-9"	2'-6"
2-800S162-43	9'-1"	8'-5"	7'-8"	6'-11"	6'-3"	8'-6"	7'-8"	6'-10"	6'-2"	5'-8"
2-800S162-54	10'-10"	10'-2"	9'-7"	9'-1"	8'-8"	10'-2"	9'-7"	9'-0"	8'-7"	8'-1"
2-800S162-68	12'-8"	11'-10"	11'-2"	10'-7"	10'-1"	11'-11"	11'-2"	10'-7"	10'-0"	9'-7"
2-800S162-97	14'-2"	13'-6"	13'-0"	12'-7"	12'-2"	13'-8"	13'-1"	12'-7"	12'-2"	11'-9"
2-1000S162-43	7'-10"	6'-10"	6'-1"	5'-6"	5'-0"	6'-11"	6'-1"	5'-5"	4'-11"	4'-6"
2-1000S162-54	12'-3"	11'-5"	10'-9"	10'-3"	9'-9"	11'-6"	10'-9"	10'-2"	9'-8"	8'-11"
2-1000S162-68	14'-5"	13'-5"	12'-8"	12'-0"	11'-6"	13'-6"	12'-8"	12'-0"	11'-5"	10'-11"
2-1000S162-97	17'-1"	16'-4"	15'-8"	14'-11"	14'-3"	16'-5"	15'-9"	14'-10"	14'-1"	13'-6"
2-1200S162-54	12'-11"	11'-3"	10'-0"	9'-0"	8'-2"	11'-5"	10'-0"	9'-0"	8'-1"	7'-4"
2-1200S162-68	15'-11"	14'-10"	14'-0"	13'-4"	12'-8"	15'-0"	14'-0"	13'-3"	12'-7"	12'-0"
2-1200S162-97	19'-11"	18'-7"	17'-6"	16'-8"	15'-10"	18'-9"	17'-7"	16'-7"	15'-9"	15'-0"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

- a. Deflection criterion: L/360 for live loads, L/240 for total loads.
- b. Design load assumptions:
 - Roof/ceiling dead load is 12 psf.
 - Attic live load is 10 psf.
- c. Building width is in the direction of horizontal framing members supported by the header.

TABLE R603.6(15)
BACK-TO-BACK HEADER SPANS Headers Supporting Roof and Ceiling Only (33 ksi steel)^{a, b}

MEMBER DESIGNATION	GROUND SNOW LOAD (50 psf)					GROUND SNOW LOAD (70 psf)				
	Building width ^c (feet)					Building width ^c (feet)				
	24	28	32	36	40	24	28	32	36	40
2-350S162-33	-	-	-	-	-	-	-	-	-	-
2-350S162-43	2'-6"	-	-	-	-	-	-	-	-	-
2-350S162-54	3'-6"	3'-1"	2'-8"	2'-4"	2'-0"	2'-7"	2'-1"	-	-	-
2-350S162-68	4'-4"	3'-11"	3'-7"	3'-3"	2'-11"	3'-5"	3'-0"	2'-8"	2'-4"	2'-1"
2-350S162-97	5'-5"	5'-0"	4'-8"	4'-6"	4'-1"	4'-6"	4'-2"	3'-10"	3'-6"	3'-3"
2-550S162-33	-	-	-	-	-	-	-	-	-	-
2-550S162-43	3'-10"	3'-3"	2'-9"	2'-2"	-	2'-6"	-	-	-	-
2-550S162-54	5'-1"	4'-7"	4'-1"	3'-8"	3'-4"	3'-11"	3'-5"	2'-11"	2'-6"	2'-0"
2-550S162-68	6'-2"	5'-8"	5'-2"	4'-9"	4'-5"	5'-0"	4'-6"	4'-1"	3'-9"	3'-4"
2-550S162-97	7'-9"	7'-2"	6'-8"	6'-3"	5'-11"	6'-6"	6'-0"	5'-7"	5'-2"	4'-10"
2-800S162-33	-	-	-	-	-	-	-	-	-	-
2-800S162-43	4'-10"	4'-1"	3'-6"	2'-11"	2'-3"	3'-3"	2'-5"	-	-	-
2-800S162-54	6'-6"	5'-10"	5'-3"	4'-9"	4'-4"	5'-1"	4'-6"	3'-11"	3'-4"	2'-10"
2-800S162-68	8'-1"	7'-5"	6'-10"	6'-4"	5'-11"	6'-8"	6'-1"	5'-6"	5'-0"	4'-7"
2-800S162-97	10'-3"	9'-7"	8'-11"	8'-5"	7'-11"	8'-8"	8'-0"	7'-6"	7'-0"	6'-7"
2-1000S162-43	4'-8"	4'-1"	3'-8"	3'-4"	2'-8"	3'-6"	2'-10"	-	-	-
2-1000S162-54	7'-5"	6'-8"	6'-1"	5'-6"	5'-0"	5'-10"	5'-1"	4'-6"	3'-11"	3'-4"
2-1000S162-68	9'-4"	8'-7"	7'-11"	7'-4"	6'-10"	7'-8"	7'-0"	6'-4"	5'-10"	5'-4"
2-1000S162-97	11'-9"	11'-0"	10'-5"	9'-11"	9'-5"	10'-3"	9'-7"	8'-11"	8'-4"	7'-10"
2-1200S162-54	7'-8"	6'-9"	6'-1"	5'-6"	5'-0"	5'-10"	5'-1"	4'-7"	4'-1"	3'-9"
2-1200S162-68	10'-4"	9'-6"	8'-10"	8'-2"	7'-7"	8'-7"	7'-9"	7'-1"	6'-6"	6'-0"
2-1200S162-97	12'-10"	12'-1"	11'-5"	10'-10"	10'-4"	11'-2"	10'-6"	9'-11"	9'-5"	9'-0"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

a. — Deflection criterion: L/360 for live loads, L/240 for total loads.

b. — Design load assumptions:

— Roof/ceiling dead load is 12 psf.

— Attic live load is 10 psf.

c. — Building width is in the direction of horizontal framing members supported by the header.

TABLE R603.6(16)
BACK-TO-BACK HEADER SPANS Headers Supporting Roof and Ceiling Only (50 ksi steel)^{a, b}

MEMBER DESIGNATION	GROUND SNOW LOAD (50 psf)					GROUND SNOW LOAD (70 psf)				
	Building width ^c (feet)					Building width ^c (feet)				
	24	28	32	36	40	24	28	32	36	40
2-350S162-33	2'-3"	-	-	-	-	-	-	-	-	-
2-350S162-43	3'-8"	3'-3"	2'-10"	2'-6"	2'-2"	2'-8"	2'-3"	-	-	-
2-350S162-54	4'-9"	4'-4"	4'-0"	3'-8"	3'-8"	3'-10"	3'-5"	3'-1"	2'-9"	2'-5"
2-350S162-68	5'-7"	5'-4"	5'-2"	4'-11"	4'-7"	5'-1"	4'-8"	4'-3"	3'-11"	3'-8"
2-350S162-97	6'-2"	5'-11"	5'-8"	5'-6"	5'-4"	5'-8"	5'-5"	5'-3"	5'-0"	4'-11"
2-550S162-33	3'-6"	2'-10"	2'-3"	-	-	2'-0"	-	-	-	-
2-550S162-43	5'-5"	4'-10"	4'-4"	3'-11"	3'-6"	4'-2"	3'-8"	3'-2"	2'-8"	2'-3"
2-550S162-54	7'-2"	6'-6"	6'-0"	5'-7"	5'-2"	5'-10"	5'-3"	4'-10"	4'-5"	4'-0"
2-550S162-68	8'-0"	7'-8"	7'-3"	6'-11"	6'-6"	7'-2"	6'-7"	6'-1"	5'-8"	5'-4"
2-550S162-97	8'-11"	8'-6"	8'-2"	7'-11"	7'-8"	8'-1"	7'-9"	7'-6"	7'-2"	6'-11"
2-800S162-33	2'-8"	2'-4"	2'-1"	1'-11"	-	2'-0"	-	-	-	-
2-800S162-43	5'-10"	5'-2"	4'-7"	4'-2"	3'-10"	4'-5"	3'-11"	3'-6"	3'-2"	2'-9"
2-800S162-54	8'-4"	7'-8"	7'-1"	6'-7"	6'-1"	6'-10"	6'-3"	5'-8"	5'-2"	4'-9"
2-800S162-68	9'-9"	9'-2"	8'-8"	8'-3"	7'-10"	8'-6"	7'-11"	7'-4"	6'-10"	6'-5"
2-800S162-97	12'-1"	11'-7"	11'-2"	10'-8"	10'-2"	11'-0"	10'-4"	9'-9"	9'-3"	8'-10"
2-1000S162-43	4'-8"	4'-1"	2'-8"	3'-4"	3'-0"	3'-6"	10'-1"	2'-9"	2'-6"	2'-3"
2-1000S162-54	9'-3"	8'-2"	7'-3"	6'-7"	6'-0"	7'-0"	6'-2"	5'-6"	5'-0"	4'-6"
2-1000S162-68	11'-1"	10'-5"	9'-10"	9'-4"	8'-11"	9'-8"	9'-1"	8'-5"	7'-10"	7'-4"
2-1000S162-97	13'-9"	12'-11"	12'-2"	11'-7"	11'-1"	11'-11"	11'-3"	10'-7"	10'-1"	9'-7"
2-1200S162-54	7'-8"	6'-9"	6'-1"	5'-6"	5'-0"	5'-10"	5'-1"	4'-7"	4'-1"	3'-9"
2-1200S162-68	12'-3"	11'-6"	10'-11"	10'-4"	9'-11"	10'-8"	10'-0"	9'-2"	8'-4"	7'-7"
2-1200S162-97	15'-4"	14'-5"	13'-7"	12'-11"	12'-4"	13'-4"	12'-6"	11'-10"	11'-3"	10'-9"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

a. — Deflection criterion: L/360 for live loads, L/240 for total loads.

b. — Design load assumptions:

— Roof/ceiling dead load is 12 psf.

— Attic live load is 10 psf.

c. — Building width is in the direction of horizontal framing members supported by the header.

TABLE R603.6(17)

BACK-TO-BACK HEADER SPANS Headers Supporting One Floor, Roof and Ceiling (33 ksi steel)^{a, b}

MEMBER DESIGNATION	GROUND SNOW LOAD (20 psf)					GROUND SNOW LOAD (30 psf)				
	Building width ^c (feet)					Building width ^c (feet)				
	24	28	32	36	40	24	28	32	36	40
2-350S162-33	-	-	-	-	-	-	-	-	-	-
2-350S162-43	2'-2"	-	-	-	-	2'-1"	-	-	-	-
2-350S162-54	3'-3"	2'-9"	2'-5"	2'-0"	-	3'-2"	2'-9"	2'-4"	-	-
2-350S162-68	4'-4"	3'-8"	3'-3"	2'-11"	2'-8"	4'-0"	3'-7"	3'-2"	2'-11"	2'-7"
2-350S162-97	5'-2"	4'-9"	4'-4"	4'-1"	3'-9"	5'-1"	4'-8"	4'-4"	4'-0"	3'-9"
2-550S162-33	-	-	-	-	-	-	-	-	-	-
2-550S162-43	3'-6"	2'-10"	2'-3"	-	-	3'-5"	2'-9"	2'-2"	-	-
2-550S162-54	4'-9"	4'-2"	3'-9"	3'-3"	2'-10"	4'-8"	4'-1"	3'-8"	3'-2"	2'-9"
2-550S162-68	5'-10"	5'-3"	4'-10"	4'-5"	4'-1"	5'-9"	5'-3"	4'-9"	4'-4"	4'-0"
2-550S162-97	7'-4"	6'-9"	6'-4"	5'-11"	5'-6"	7'-3"	6'-9"	6'-3"	5'-10"	5'-5"
2-800S162-33	-	-	-	-	-	-	-	-	-	-
2-800S162-43	4'-4"	3'-8"	2'-11"	2'-3"	-	4'-3"	3'-6"	2'-10"	2'-1"	-
2-800S162-54	6'-1"	5'-5"	4'-10"	4'-4"	3'-10"	6'-0"	5'-4"	4'-9"	4'-3"	3'-9"
2-800S162-68	7'-8"	7'-0"	6'-5"	5'-11"	5'-5"	7'-7"	6'-11"	6'-4"	5'-10"	5'-4"
2-800S162-97	9'-10"	9'-1"	8'-5"	7'-11"	7'-5"	9'-8"	8'-11"	8'-4"	7'-10"	7'-4"
2-1000S162-43	4'-4"	3'-9"	3'-4"	2'-8"	-	4'-3"	3'-8"	3'-3"	2'-6"	-
2-1000S162-54	6'-11"	6'-2"	5'-6"	5'-0"	4'-5"	6'-10"	6'-1"	5'-5"	4'-10"	4'-4"
2-1000S162-68	8'-10"	8'-1"	7'-5"	6'-10"	6'-4"	8'-8"	7'-11"	7'-3"	6'-8"	6'-2"
2-1000S162-97	11'-3"	10'-7"	9'-11"	9'-5"	8'-10"	11'-2"	10'-5"	9'-10"	9'-3"	8'-9"
2-1200S162-54	7'-1"	6'-2"	5'-6"	5'-0"	4'-6"	6'-11"	6'-1"	5'-5"	4'-10"	4'-5"
2-1200S162-68	9'-10"	9'-0"	8'-3"	7'-7"	7'-0"	9'-8"	8'-10"	8'-1 ¹¹ "	7'-6"	6'-11"
2-1200S162-97	12'-4"	11'-7"	10'-11"	10'-4"	9'-10"	12'-3"	11'-5"	10'-9"	10'-3"	9'-9"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

a. — Deflection criterion: L/360 for live loads, L/240 for total loads.

b. — Design load assumptions:

— Second floor dead load is 10 psf.

— Roof/Ceiling dead load is 12 psf.

— Second floor live load is 30 psf

— Attic live load is 10 psf.

c. — Building width is in the direction of horizontal framing members supported by the header.

TABLE R603.6(18)

BACK-TO-BACK HEADER SPANS Headers Supporting One Floor, Roof and Ceiling (50 ksi steel)^{a, b}

MEMBER DESIGNATION	GROUND SNOW LOAD (20 psf)					GROUND SNOW LOAD (30 psf)				
	Building width^c (feet)					Building width^c (feet)				
	24	28	32	36	40	24	28	32	36	40
2-350S162-33	-	-	-	-	-	-	-	-	-	-
2-350S162-43	3'-4"	2'-11"	2'-6"	2'-2"	-	3'-3"	2'-10"	2'-5"	2'-1"	-
2-350S162-54	4'-6"	4'-1"	3'-8"	3'-4"	3'-0"	4'-5"	4'-0"	3'-7"	3'-3"	2'-11"
2-350S162-68	5'-0"	4'-9"	4'-7"	4'-5"	4'-3"	4'-11"	4'-8"	4'-6"	4'-4"	4'-2"
2-350S162-97	5'-6"	5'-3"	5'-1"	4'-11"	4'-9"	5'-5"	5'-2"	5'-0"	4'-10"	4'-8"
2-550S162-33	3'-1"	2'-5"	-	-	-	3'-0"	2'-3"	-	-	-
2-550S162-43	5'-1"	4'-6"	4'-0"	3'-6"	3'-1"	4'-11"	4'-5"	3'-11"	3'-5"	3'-0"
2-550S162-54	6'-8"	6'-2"	5'-7"	5'-2"	4'-9"	6'-6"	6'-0"	5'-6"	5'-1"	4'-8"
2-550S162-68	7'-2"	6'-10"	6'-7"	6'-4"	6'-1"	7'-0"	6'-9"	6'-6"	6'-3"	6'-0"
2-550S162-97	7'-11"	7'-7"	7'-3"	7'-0"	6'-10"	7'-9"	7'-5"	7'-2"	6'-11"	6'-9"
2-800S162-33	2'-5"	2'-2"	1'-11"	-	-	2'-5"	2'-1"	1'-10"	-	-
2-800S162-43	5'-5"	4'-9"	4'-3"	3'-9"	3'-5"	5'-3"	4'-8"	4'-1"	3'-9"	3'-5"
2-800S162-54	7'-11"	7'-2"	6'-7"	6'-1"	5'-7"	7'-9"	7'-1"	6'-6"	6'-0"	5'-6"
2-800S162-68	9'-5"	8'-9"	8'-3"	7'-9"	7'-4"	9'-3"	8'-8"	8'-2"	7'-8"	7'-3"
2-800S162-97	10'-9"	10'-3"	9'-11"	9'-7"	9'-3"	10'-7"	10'-1"	9'-9"	9'-5"	9'-1"
2-1000S162-43	4'-4"	3'-9"	3'-4"	3'-0"	2'-9"	4'-3"	3'-8"	3'-3"	2'-11"	2'-8"
2-1000S162-54	8'-6"	7'-5"	6'-8"	6'-0"	5'-5"	8'-4"	7'-4"	6'-6"	5'-10"	5'-4"
2-1000S162-68	10'-8"	10'-0"	9'-5"	8'-11"	8'-4"	10'-7"	9'-10"	9'-4"	8'-9"	8'-3"
2-1000S162-97	12'-11"	12'-4"	11'-8"	11'-1"	10'-6"	12'-9"	12'-2"	11'-6"	10'-11"	10'-5"
2-1200S162-54	7'-1"	6'-2"	5'-6"	5'-0"	4'-6"	6'-11"	6'-1"	5'-5"	4'-10"	4'-5"
2-1200S162-68	11'-9"	11'-0"	10'-5"	9'-10"	9'-1"	11'-8"	10'-11"	10'-3"	9'-9"	8'-11"
2-1200S162-97	14'-9"	13'-9"	13'-0"	12'-4"	11'-9"	14'-7"	13'-8"	12'-10"	12'-3"	11'-8"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

a. — Deflection criterion: L/360 for live loads, L/240 for total loads.

b. — Design load assumptions:

— Second floor dead load is 10 psf.

— Roof/Ceiling dead load is 12 psf.

— Second floor live load is 30 psf

— Attic live load is 10 psf.

c. — Building width is in the direction of horizontal framing members supported by the header.

TABLE R603.6(19)

BACK-TO-BACK HEADER SPANS Headers Supporting One Floor, Roof and Ceiling (33 ksi steel)^{a, b}

MEMBER DESIGNATION	GROUND SNOW LOAD (50 psf)					GROUND SNOW LOAD (70 psf)				
	Building width ^c (feet)					Building width ^c (feet)				
	24	28	32	36	40	24	28	32	36	40
2-350S162-33	-	-	-	-	-	-	-	-	-	-
2-350S162-43	-	-	-	-	-	-	-	-	-	-
2-350S162-54	2'-4"	-	-	-	-	-	-	-	-	-
2-350S162-68	3'-3"	2'-10"	2'-6"	2'-2"	-	2'-7"	2'-2"	-	-	-
2-350S162-97	4'-4"	4'-0"	3'-8"	3'-4"	3'-1"	3'-9"	3'-4"	3'-1"	2'-9"	2'-6"
2-550S162-33	-	-	-	-	-	-	-	-	-	-
2-550S162-43	2'-2"	-	-	-	-	-	-	-	-	-
2-550S162-54	3'-8"	3'-2"	2'-8"	2'-3"	-	2'-10"	2'-3"	-	-	-
2-550S162-68	4'-9"	4'-4"	3'-11"	3'-6"	3'-2"	4'-0"	3'-6"	3'-1"	2'-9"	2'-4"
2-550S162-97	6'-3"	5'-9"	5'-4"	5'-0"	4'-8"	5'-6"	5'-0"	4'-7"	4'-3"	3'-11"
2-800S162-33	-	-	-	-	-	-	-	-	-	-
2-800S162-43	2'-11"	2'-0"	-	-	-	-	-	-	-	-
2-800S162-54	4'-9"	4'-2"	3'-7"	3'-1"	2'-7"	3'-9"	3'-1"	2'-5"	-	-
2-800S162-68	6'-4"	5'-9"	5'-3"	4'-9"	4'-4"	5'-4"	4'-9"	4'-3"	3'-10"	3'-4"
2-800S162-97	8'-5"	7'-9"	7'-3"	6'-9"	6'-4"	7'-4"	6'-9"	6'-3"	5'-10"	5'-5"
2-1000S162-43	3'-4"	2'-5"	-	-	-	-	-	-	-	-
2-1000S162-54	5'-6"	4'-10"	4'-2"	3'-7"	3'-0"	4'-4"	3'-7"	2'-11"	2'-2"	-
2-1000S162-68	7'-4"	6'-8"	6'-1"	5'-7"	5'-1"	6'-3"	5'-7"	5'-0"	4'-5"	4'-0"
2-1000S162-97	9'-11"	8'-3"	8'-7"	8'-1"	7'-7"	8'-9"	8'-1"	7'-6"	7'-0"	6'-6"
2-1200S162-54	5'-6"	4'-10"	4'-4"	3'-11"	3'-5"	4'-5"	3'-11"	3'-3"	2'-6"	-
2-1200S162-68	8'-2"	7'-5"	6'-9"	6'-3"	5'-8"	6'-11"	6'-3"	5'-7"	5'-0"	4'-6"
2-1200S162-97	10'-10"	10'-2"	9'-8"	9'-2"	8'-7"	9'-9"	9'-2"	8'-6"	7'-11"	7'-5"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

a. — Deflection criterion: L/360 for live loads, L/240 for total loads.

b. — Design load assumptions:

— Second floor dead load is 10 psf.

— Roof/Ceiling dead load is 12 psf.

— Second floor live load is 30 psf.

— Attic live load is 10 psf.

c. — Building width is in the direction of horizontal framing members supported by the header.

TABLE R603.6(20)

BACK-TO-BACK HEADER SPANS Headers Supporting One Floor, Roof and Ceiling (50 ksi steel)^{a, b}

MEMBER DESIGNATION	GROUND SNOW LOAD (50 psf)					GROUND SNOW LOAD (70 psf)				
	Building width ^c (feet)					Building width ^c (feet)				
	24	28	32	36	40	24	28	32	36	40
2-350S162-33	-	-	-	-	-	-	-	-	-	-
2-350S162-43	2'-6"	2'-0"	-	-	-	-	-	-	-	-
2-350S162-54	3'-8"	3'-3"	2'-11"	2'-7"	2'-3"	3'-0"	2'-7"	2'-2"	-	-
2-350S162-68	4'-7"	4'-5"	4'-1"	3'-9"	3'-6"	4'-2"	3'-9"	3'-5"	3'-1"	2'-10"
2-350S162-97	5'-1"	4'-10"	4'-8"	4'-6"	4'-5"	4'-10"	4'-7"	4'-5"	4'-3"	4'-1"
2-550S162-33	-	-	-	-	-	-	-	-	-	-
2-550S162-43	3'-11"	3'-5"	2'-11"	2'-5"	-	3'-0"	2'-5"	-	-	-
2-550S162-54	5'-7"	5'-0"	4'-7"	4'-2"	3'-9"	4'-8"	4'-2"	3'-8"	3'-3"	2'-11"
2-550S162-68	6'-7"	6'-4"	5'-11"	5'-6"	5'-1"	6'-0"	5'-6"	5'-0"	4'-7"	4'-3"
2-550S162-97	7'-4"	7'-0"	6'-9"	6'-6"	6'-4"	6'-11"	6'-8"	6'-5"	6'-2"	6'-0"
2-800S162-33	4'-11"	-	-	-	-	-	-	-	-	-
2-800S162-43	4'-2"	3'-8"	3'-4"	3'-0"	2'-6"	3'-5"	3'-0"	2'-4"	-	-
2-800S162-54	6'-7"	5'-11"	5'-5"	4'-11"	4'-6"	5'-6"	4'-11"	4'-5"	3'-11"	3'-6"
2-800S162-68	8'-3"	7'-8"	7'-1"	6'-8"	6'-2"	7'-3"	6'-7"	6'-1"	5'-7"	5'-2"
2-800S162-97	9'-11"	9'-6"	9'-2"	8'-10"	8'-7"	9'-5"	9'-0"	8'-7"	8'-2"	7'-9"
2-1000S162-43	3'-4"	2'-11"	2'-7"	2'-5"	2'-2"	2'-8"	2'-5"	2'-2"	1'-11"	-
2-1000S162-54	6'-7"	5'-10"	5'-3"	4'-9"	4'-4"	5'-4"	4'-9"	4'-3"	3'-10"	3'-6"
2-1000S162-68	9'-4"	8'-9"	8'-1"	7'-7"	7'-1"	8'-3"	7'-7"	6'-11"	6'-5"	5'-11"
2-1000S162-97	11'-7"	10'-11"	10'-4"	9'-10"	9'-5"	10'-5"	9'-10"	9'-3"	8'-10"	8'-5"
2-1200S162-54	5'-6"	4'-10"	4'-4"	3'-11"	3'-7"	4'-5"	3'-11"	3'-6"	3'-2"	2'-11"
2-1200S162-68	10'-4"	9'-8"	8'-8"	7'-11"	7'-2"	8'-11"	7'-11"	7'-1"	6'-5"	5'-10"
2-1200S162-97	12'-11"	12'-2"	11'-6"	11'-0"	10'-6"	11'-8"	11'-0"	10'-5"	9'-10"	9'-5"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

a. — Deflection criterion: L/360 for live loads, L/240 for total loads.

b. — Design load assumptions:

- Second floor dead load is 10 psf.
- Roof/Ceiling dead load is 12 psf.
- Second floor live load is 30 psf
- Attic live load is 10 psf.

c. — Building width is in the direction of horizontal framing members supported by the header.

TABLE R603.6(21)
BACK-TO-BACK HEADER SPANS Headers Supporting Two Floors,
Roof and Ceiling (33 ksi steel)^{a, b}

MEMBER DESIGNATION	GROUND SNOW LOAD (20 psf)					GROUND SNOW LOAD (30 psf)				
	Building width ^c (feet)					Building width ^c (feet)				
	24	28	32	36	40	24	28	32	36	40
2-350S162-33	-	-	-	-	-	-	-	-	-	-
2-350S162-43	-	-	-	-	-	-	-	-	-	-
2-350S162-54	-	-	-	-	-	-	-	-	-	-
2-350S162-68	2'-5"	-	-	-	-	2'-4"	-	-	-	-
2-350S162-97	3'-6"	3'-2"	2'-10"	2'-6"	2'-3"	3'-6"	3'-1"	2'-9"	2'-6"	2'-3"
2-550S162-33	-	-	-	-	-	-	-	-	-	-
2-550S162-43	-	-	-	-	-	-	-	-	-	-
2-550S162-54	2'-6"	-	-	-	-	2'-5"	-	-	-	-
2-550S162-68	3'-9"	3'-3"	2'-9"	2'-4"	-	3'-8"	3'-2"	2'-9"	2'-4"	-
2-550S162-97	5'-3"	4'-9"	4'-4"	3'-11"	3'-8"	5'-2"	4'-8"	4'-3"	3'-11"	3'-7"
2-800S162-33	-	-	-	-	-	-	-	-	-	-
2-800S162-43	-	-	-	-	-	-	-	-	-	-
2-800S162-54	3'-5"	2'-8"	-	-	-	3'-4"	2'-7"	-	-	-
2-800S162-68	5'-1"	4'-5"	3'-11"	3'-4"	2'-11"	5'-0"	4'-4"	3'-10"	3'-4"	2'-10"
2-800S162-97	7'-0"	6'-5"	5'-11"	5'-5"	5'-0"	7'-0"	6'-4"	5'-10"	5'-5"	5'-0"
2-1000S162-43	-	-	-	-	-	-	-	-	-	-
2-1000S162-54	3'-11"	3'-1"	2'-3"	-	-	3'-10"	3'-0"	2'-2"	-	-
2-1000S162-68	5'-10"	5'-2"	4'-6"	4'-0"	3'-5"	5'-9"	5'-1"	4'-6"	3'-11"	3'-4"
2-1000S162-97	8'-5"	7'-8"	7'-1"	6'-6"	6'-1"	8'-4"	7'-7"	7'-0"	6'-6"	6'-0"
2-1200S162-54	4'-2"	3'-6"	2'-7"	-	-	4'-1"	3'-5"	2'-6"	-	-
2-1200S162-68	6'-6"	5'-9"	5'-1"	4'-6"	3'-11"	6'-6"	5'-8"	5'-0"	4'-5"	3'-10"
2-1200S162-97	9'-5"	8'-8"	8'-0"	7'-5"	6'-11"	9'-5"	8'-7"	7'-11"	7'-4"	6'-10"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

a. — Deflection criterion: L/360 for live loads, L/240 for total loads.

b. — Design load assumptions:

Second floor dead load is 10 psf.

Roof/Ceiling dead load is 12 psf.

Second floor live load is 40 psf

Third floor live load is 30 psf.

Attic live load is 10 psf.

c. — Building width is in the direction of horizontal framing members supported by the header

TABLE R603.6(22)
BACK-TO-BACK HEADER SPANS Headers Supporting Two Floors,
Roof and Ceiling (50 ksi steel)^{a, b}

MEMBER DESIGNATION	GROUND SNOW LOAD (20 psf)					GROUND SNOW LOAD (30 psf)				
	Building width ^c (feet)					Building width ^c (feet)				
	24	28	32	36	40	24	28	32	36	40
2-350S162-33	-	-	-	-	-	-	-	-	-	-
2-350S162-43	-	-	-	-	-	-	-	-	-	-
2-350S162-54	2'-9"	2'-3"	-	-	-	2'-8"	2'-3"	-	-	-
2-350S162-68	3'-11"	3'-6"	3'-2"	2'-10"	2'-6"	3'-11"	3'-6"	3'-1"	2'-9"	2'-6"
2-350S162-97	4'-9"	4'-6"	4'-4"	4'-1"	3'-10"	4'-8"	4'-6"	4'-4"	4'-1"	3'-9"
2-550S162-33	-	-	-	-	-	-	-	-	-	-
2-550S162-43	2'-9"	2'-0"	-	-	-	2'-8"	-	-	-	-
2-550S162-54	4'-5"	3'-10"	3'-4"	2'-11"	2'-5"	4'-4"	3'-9"	3'-3"	2'-10"	2'-5"
2-550S162-68	5'-8"	5'-2"	4'-8"	4'-3"	3'-11"	5'-8"	5'-1"	4'-8"	4'-3"	3'-10"
2-550S162-97	6'-10"	6'-6"	6'-3"	6'-0"	5'-7"	6'-9"	6'-5"	6'-3"	5'-11"	5'-6"
2-800S162-33	-	-	-	-	-	-	-	-	-	-
2-800S162-43	3'-2"	2'-7"	-	-	-	3'-1"	2'-6"	-	-	-
2-800S162-54	5'-2"	4'-7"	4'-0"	3'-6"	3'-0"	5'-2"	4'-6"	3'-11"	3'-5"	2'-11"
2-800S162-68	6'-11"	6'-3"	5'-8"	5'-2"	4'-9"	6'-10"	6'-2"	5'-7"	5'-2"	4'-8"
2-800S162-97	9'-3"	8'-8"	8'-3"	7'-9"	7'-4"	9'-2"	8'-8"	8'-2"	7'-9"	7'-4"
2-1000S162-43	2'-6"	2'-2"	2'-0"	-	-	2'-6"	2'-2"	1'-11"	-	-
2-1000S162-54	5'-0"	4'-4"	3'-11"	3'-6"	3'-2"	4'-11"	4'-4"	3'-10"	3'-6"	3'-2"
2-1000S162-68	7'-10"	7'-2"	6'-6"	5'-11"	5'-6"	7'-9"	7'-1"	6'-5"	5'-11"	5'-5"
2-1000S162-97	10'-1"	9'-5"	8'-11"	8'-6"	8'-0"	10'-0"	9'-5"	8'-10"	8'-5"	7'-11"
2-1200S162-54	-	-	-	-	-	-	-	-	-	-
2-1200S162-68	7'-4"	6'-8"	6'-1"	5'-6"	5'-1"	7'-3"	6'-7"	6'-0"	5'-6"	5'-0"
2-1200S162-97	9'-5"	8'-8"	8'-1"	7'-6"	7'-1"	9'-4"	8'-8"	8'-0"	7'-6"	7'-0"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

a. — Deflection criterion: L/360 for live loads, L/240 for total loads.

b. — Design load assumptions:

Second floor dead load is 10 psf.

Roof/Ceiling dead load is 12 psf.

Second floor live load is 40 psf

Third floor live load is 30 psf.

Attic live load is 10 psf.

c. — Building width is in the direction of horizontal framing members supported by the header

TABLE R603.6(23)
BACK-TO-BACK HEADER SPANS Headers Supporting Two Floors,
Roof and ceiling (33 ksi steel)^{a, b}

MEMBER DESIGNATION	GROUND SNOW LOAD (50 psf)					GROUND SNOW LOAD (70 psf)				
	Building width ^c (feet)					Building width ^c (feet)				
	24	28	32	36	40	24	28	32	36	40
2-350S162-33	-	-	-	-	-	-	-	-	-	-
2-350S162-43	-	-	-	-	-	-	-	-	-	-
2-350S162-54	-	-	-	-	-	-	-	-	-	-
2-350S162-68	2'-2"	-	-	-	-	-	-	-	-	-
2-350S162-97	3'-3"	3'-0"	2'-8"	2'-4"	2'-1"	3'-1"	2'-9"	2'-6"	2'-2"	-
2-550S162-33	-	-	-	-	-	-	-	-	-	-
2-550S162-43	-	-	-	-	-	-	-	-	-	-
2-550S162-54	2'-2"	-	-	-	-	-	-	-	-	-
2-550S162-68	3'-6"	3'-0"	2'-6"	2'-1"	-	3'-2"	2'-9"	2'-3"	-	-
2-550S162-97	5'-0"	4'-6"	4'-1"	3'-9"	3'-5"	4'-8"	4'-3"	3'-11"	3'-7"	3'-3"
2-800S162-33	-	-	-	-	-	-	-	-	-	-
2-800S162-43	-	-	-	-	-	-	-	-	-	-
2-800S162-54	3'-0"	2'-3"	-	-	-	2'-7"	-	-	-	-
2-800S162-68	4'-9"	4'-2"	3'-7"	3'-1"	2'-7"	4'-5"	3'-10"	3'-3"	2'-9"	2'-3"
2-800S162-97	6'-9"	6'-1"	5'-7"	5'-2"	4'-9"	6'-4"	5'-10"	5'-4"	4'-11"	4'-7"
2-1000S162-43	-	-	-	-	-	-	-	-	-	-
2-1000S162-54	3'-6"	2'-8"	-	-	-	3'-1"	2'-2"	-	-	-
2-1000S162-68	5'-6"	4'-10"	4'-2"	3'-7"	3'-1"	5'-1"	4'-6"	3'-10"	3'-4"	2'-9"
2-1000S162-97	8'-0"	7'-4"	6'-9"	6'-3"	5'-9"	7'-7"	7'-0"	6'-5"	5'-11"	5'-6"
2-1200S162-54	3'-11"	3'-0"	2'-0"	-	-	3'-5"	2'-6"	-	-	-
2-1200S162-68	6'-2"	5'-5"	4'-9"	4'-1"	3'-6"	5'-9"	5'-0"	4'-4"	3'-9"	3'-2"
2-1200S162-97	9'-1"	8'-4"	7'-8"	7'-1"	6'-7"	8'-8"	7'-11"	7'-4"	6'-9"	6'-3"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

a. — Deflection criterion: L/360 for live loads, L/240 for total loads.

b. — Design load assumptions:

Second floor dead load is 10 psf.

Roof/Ceiling dead load is 12 psf.

Second floor live load is 40 psf

Third floor live load is 30 psf.

Attic live load is 10 psf.

c. — Building width is in the direction of horizontal framing members supported by the header

TABLE R603.6(24)
BACK-TO-BACK HEADER SPANS Headers Supporting Two Floors,
Roof and Ceiling (50 ksi steel)^{a, b}

MEMBER DESIGNATION	GROUND SNOW LOAD (50 psf)					GROUND SNOW LOAD (70 psf)				
	Building width ^c (feet)					Building width ^c (feet)				
	24	28	32	36	40	24	28	32	36	40
2-350S162-33	-	-	-	-	-	-	-	-	-	-
2-350S162-43	-	-	-	-	-	-	-	-	-	-
2-350S162-54	2'-6"	2'-1"	-	-	-	2'-3"	-	-	-	-
2-350S162-68	3'-9"	3'-4"	2'-11"	2'-7"	2'-4"	3'-6"	3'-1"	2'-9"	2'-5"	2'-2"
2-350S162-97	4'-6"	4'-4"	4'-2"	3'-11"	3'-8"	4'-4"	4'-2"	4'-0"	3'-9"	3'-6"
2-550S162-33	-	-	-	-	-	-	-	-	-	-
2-550S162-43	2'-5"	-	-	-	-	-	-	-	-	-
2-550S162-54	4'-1"	3'-7"	3'-1"	2'-7"	2'-2"	3'-10"	3'-3"	2'-10"	2'-4"	-
2-550S162-68	5'-5"	4'-11"	4'-5"	4'-0"	3'-8"	5'-1"	4'-7"	4'-2"	3'-10"	3'-5"
2-550S162-97	6'-5"	6'-2"	5'-11"	5'-9"	5'-4"	6'-3"	6'-0"	5'-9"	5'-6"	5'-2"
2-800S162-33	-	-	-	-	-	-	-	-	-	-
2-800S162-43	2'-11"	2'-2"	-	-	-	2'-6"	-	-	-	-
2-800S162-54	4'-11"	4'-3"	3'-8"	3'-2"	2'-8"	4'-6"	3'-11"	3'-5"	2'-11"	2'-4"
2-800S162-68	6'-7"	5'-11"	5'-4"	4'-11"	4'-6"	6'-2"	5'-7"	5'-1"	4'-8"	4'-3"
2-800S162-97	8'-9"	8'-5"	7'-11"	7'-6"	7'-0"	8'-5"	8'-1"	7'-9"	7'-3"	6'-10"
2-1000S162-43	2'-4"	2'-1"	-	-	-	2'-2"	1'-11"	-	-	-
2-1000S162-54	4'-8"	4'-1"	3'-8"	3'-3"	3'-0"	4'-4"	3'-10"	3'-5"	3'-1"	2'-9"
2-1000S162-68	7'-6"	6'-9"	6'-2"	5'-8"	5'-2"	7'-1"	6'-5"	5'-10"	5'-4"	4'-11"
2-1000S162-97	9'-9"	9'-2"	8'-7"	8'-2"	7'-8"	9'-5"	8'-10"	8'-5"	7'-11"	7'-5"
2-1200S162-54	-	-	-	-	-	-	-	-	-	-
2-1200S162-68	7'-0"	6'-4"	5'-9"	5'-3"	4'-9"	6'-7"	6'-0"	5'-5"	5'-0"	4'-6"
2-1200S162-97	9'-1"	8'-4"	7'-9"	7'-3"	6'-9"	8'-8"	8'-0"	7'-6"	7'-0"	6'-7"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

a. Deflection criterion: L/360 for live loads, L/240 for total loads.

b. Design load assumptions:

Second floor dead load is 10 psf.

Roof/Ceiling dead load is 12 psf.

Second floor live load is 40 psf.

Third floor live load is 30 psf.

Attic live load is 10 psf.

c. Building width is in the direction of horizontal framing members supported by the header.

R603.7 Jack and king studs. The number of jack and king studs installed on each side of a header shall comply with Table R603.7(1). King, jack and cripple studs shall be of the same dimension and thickness as the adjacent wall studs. Headers shall be connected to king studs in accordance with Table R603.7(2) and the following provisions:

1. For box beam headers, one-half of the total number of required screws shall be applied to the header and one half to the king stud by use of C-shaped or track member in accordance with Figure R603.6(1). The track or C-shape sections shall extend the depth of the header minus $\frac{1}{2}$ inch (12.7 mm) and shall have a minimum thickness not less than that of the wall studs.
2. For back-to-back headers, one-half the total number of screws shall be applied to the header and one-half to the king stud by use of a minimum 2-inch by 2-inch (51 mm by 51 mm) clip angle in

accordance with Figure R603.6(2). The clip angle shall extend the depth of the header minus $\frac{1}{2}$ inch (12.7 mm) and shall have a minimum thickness not less than that of the wall studs. Jack and king studs shall be interconnected with structural sheathing in accordance with Figures R603.6(1) and R603.6(2).

TABLE R603.7(1)
TOTAL NUMBER OF JACK AND KING STUDS REQUIRED AT EACH END OF AN OPENING

SIZE OF OPENING (feet-inches)	24" O.C. STUD SPACING		16" O.C. STUD SPACING	
	No. of jack studs	No. of king studs	No. of jack studs	No. of king studs
Up to 3'-6"	1	1	1	1
> 3'-6" to 5'-0"	1	2	1	2
> 5'-0" to 5'-6"	1	2	2	2
> 5'-6" to 8'-0"	1	2	2	2
> 8'-0" to 10'-6"	2	2	2	3
> 10'-6" to 12'-0"	2	2	3	3
> 12'-0" to 13'-0"	2	3	3	3
> 13'-0" to 14'-0"	2	3	3	4
> 14'-0" to 16'-0"	2	3	3	4
> 16'-0" to 18'-0"	3	3	4	4

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

TABLE R603.7(2)
HEADER TO KING STUD CONNECTION REQUIREMENTS^{a, b, c, d}

HEADER SPAN (feet)	ULTIMATE BASIC WIND SPEED (mph), EXPOSURE CATEGORY		
	85 B or Seismic Design Categories A, B, C, D ₀ , D ₁ and D ₂	85 110, Exposure Category C or less than 110139, Exposure Category B	Less than 110 139, Exposure Category C
≤ 4'	4-No. 8 screws	4-No. 8 screws	6-No. 8 screws
> 4' to 8'	4-No. 8 screws	4-No. 8 screws	8-No. 8 screws
> 8' to 12'	4-No. 8 screws	6-No. 8 screws	10-No. 8 screws
> 12' to 16'	4-No. 8 screws	8-No. 8 screws	12-No. 8 screws

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s, 1 pound = 4.448 N.

- All screw sizes shown are minimum.
- For headers located on the first floor of a two-story building or the first or second floor of a three-story building, the total number of screws is permitted to be reduced by 2 screws, but the total number of screws shall be no less than 4.
- For roof slopes of 6:12 or greater, the required number of screws may be reduced by half, but the total number of screws shall be no less than four.
- Screws can be replaced by an uplift connector which has a capacity of the number of screws multiplied by 164 pounds (e.g., 12-No. 8 screws can be replaced by an uplift connector whose capacity exceeds 12 x 164 pounds = 1,968 pounds).

R603.8 Head and sill track. Head track spans above door and window openings and sill track spans beneath window openings shall comply with Table R603.8. For openings less than 4 feet (1219 mm) in height that have both a head track and a sill track, multiplying the spans by 1.75 shall be permitted in Table R603.8. For openings less than or equal to 6 feet (1829 mm) in height that have both a head track and a sill track, multiplying the spans in Table R603.8 by 1.50 shall be permitted.

TABLE R603.8
HEAD AND SILL TRACK SPAN $F_y = 33$ ksi

BASIC ULTIMATE WIND SPEED (mph) AND EXPOSURE CATEGORY		ALLOWABLE HEAD AND SILL TRACK SPAN^{a,b,c} (ft-in.)					
		TRACK DESIGNATION^d					
B	C	350T125-33	350T125-43	350T125-54	550T125-33	550T125-43	550T125-54
85	-	5'-0"	5'-7"	6'-2"	5'-10"	6'-8"	7'-0"
90	-	4'-10"	5'-5"	6'-0"	5'-8"	6'-3"	6'-10"
100	85	4'-6"	5'-1"	5'-8"	5'-4"	5'-11"	6'-5"
110	90	4'-2"	4'-9"	5'-4"	5'-1"	5'-7"	6'-1"
120	100	3'-11"	4'-6"	5'-0"	4'-10"	5'-4"	5'-10"
130	110	3'-8"	4'-2"	4'-9"	4'-1"	5'-1"	5'-7"
140	120	3'-7"	4'-1"	4'-7"	3'-6"	4'-11"	5'-5"
150	130	3'-5"	3'-10"	4'-4"	2'-11"	4'-7"	5'-2"
-	140	3'-1"	3'-6"	4'-1"	2'-3"	4'-0"	4'-10"
-	150	2'-9"	3'-4"	3'-10"	2'-0"	3'-7"	4'-7"

For Si: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s.

- Deflection limit: $L/240$.
- Head and sill track spans are based on components and cladding wind pressures and 48 inch tributary span.
- For openings less than 4 feet in height that have both a head track and sill track, the above spans are permitted to be multiplied by 1.75. For openings less than or equal to 6 feet in height that have both a head track and sill track, the above spans are permitted to be multiplied by a factor of 1.5.
- Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

R603.9 Structural sheathing. Structural sheathing shall be installed in accordance with Figure R603.9 and this section on all sheathable exterior wall surfaces, including areas above and below openings.

R603.9.1 Sheathing materials. Structural sheathing panels shall consist of minimum $7/16$ -inch-thick (11 mm) oriented strand board or $15/32$ -inch-thick (12 mm) plywood.

R603.9.2 Determination of minimum length of full height sheathing. The minimum length of full height sheathing on each *braced wall line* shall be determined by multiplying the length of the *braced wall line* by the percentage obtained from Table R603.9.2(1) and by the plan aspect-ratio adjustment factors obtained from Table R603.9.2(2). The minimum length of full height sheathing shall not be less than 20 percent of the *braced wall line* length.

To be considered full height sheathing, structural sheathing shall extend from the bottom to the top of the wall without interruption by openings. Only sheathed, full height wall sections, uninterrupted by openings, which are a minimum of 48 inches (1219 mm) wide, shall be counted toward meeting the minimum percentages in Table R603.9.2(1). In addition, structural sheathing shall comply with all of the following requirements:

- Be installed with the long dimension parallel to the stud framing (i.e., vertical orientation) and shall cover the full vertical height of wall from the bottom of the bottom track to the top of the top track of each story. Installing the long dimension perpendicular to the stud framing or using shorter segments shall be permitted provided that the horizontal joint is blocked as described in Item 2.
- Be blocked when the long dimension is installed perpendicular to the stud framing (i.e., horizontal orientation). Blocking shall be a minimum of 33 mil (0.84 mm) thickness. Each horizontal structural sheathing panel shall be fastened with No. 8 screws spaced at 6 inches (152 mm) on center to the blocking at the joint.

3. Be applied to each end (corners) of each of the exterior walls with a minimum 48-inch-wide (1219 mm) panel.

R603.9.2.1 Full height sheathing. The minimum percentage of full-height structural sheathing shall be multiplied by 1.10 for 9-foot-high (2743 mm) walls and multiplied by 1.20 for 10-foot-high (3048 mm) walls.

R603.9.2.2 Full height sheathing in hip roof homes. For hip-roofed homes, the minimum percentages of full height sheathing in Table R603.9.2(1), based upon wind, shall be permitted to be multiplied by a factor of 0.95 for roof slopes not exceeding 7:12 and a factor of 0.9 for roof slopes greater than 7:12.

R603.9.2.3 Full height sheathing in lowest story. In the lowest story of a dwelling, multiplying the percentage of full height sheathing required in Table R603.9.2(1) by 0.6, shall be permitted provided hold down anchors are provided in accordance with Section R603.9.4.2.

FIGURE R603.9.4.2 CORNER STUD HOLD DOWN DETAIL

(Figure remains unchanged)

TABLE R603.9.2(1)
MINIMUM PERCENTAGE OF FULL HEIGHT STRUCTURAL SHEATHING ON EXTERIOR WALLS^{a,b}

WALL SUPPORTING	ROOF SLOPE	ULTIMATE BASIC WIND SPEED AND EXPOSURE CATEGORY (mph)					
		85 B	90115 B	100126 B	< 110139 B	100126C	< 110139 C
				85110 C	90115C		
Roof and ceiling only (One story or top floor of two or three story building)	3:12	8	9	9	12	16	20
	6:12	12	13	15	20	26	35
	9:12	24	23	25	30	50	58
	12:12	30	33	35	40	66	75
One story, roof and ceiling (First floor of a two-story building or second floor of a three story building)	3:12	24	27	30	35	50	66
	6:12	25	28	30	40	58	74
	9:12	35	38	40	55	74	91
	12:12	40	45	50	65	100	115
Two story, roof and ceiling (First floor of a three story building)	3:12	40	45	51	58	84	112
	6:12	38	43	45	60	90	113
	9:12	49	53	55	80	98	124
	12:12	50	57	65	90	134	155

For SI: 1 mile per hour = 0.447 m/s.

a. Linear interpolation is permitted.

b. For hip-roofed homes the minimum percentage of full height sheathing, based upon wind, is permitted to be multiplied by a factor of 0.95 for roof slopes not exceeding 7:12 and a factor of 0.9 for roof slopes greater than 7:12.

TABLE R603.9.2(2)
FULL HEIGHT SHEATHING LENGTH ADJUSTMENT FACTORS

PLAN ASPECT RATIO	LENGTH ADJUSTMENT FACTORS	
	Short wall	Long wall
1:1	1.0	1.0
1.5:1	1.5	0.67
2:1	2.0	0.50
3:1	3.0	0.33
4:1	4.0	0.25

R603.9.3 Structural sheathing fastening. All edges and interior areas of structural sheathing panels shall be fastened to framing members and tracks in accordance with Figure R603.9 and Table R603.3.2(1). Screws for attachment of structural sheathing panels shall be bugle-head, flat-head, or similar head style with a minimum head diameter of 0.29 inch (8 mm).

For continuously-sheathed *braced wall lines* using wood structural panels installed with No. 8 screws spaced 4-inches (102 mm) on center at all panel edges and 12 inches (304.8 mm) on center on intermediate framing members, the following shall apply:

1. Multiplying the percentages of full height sheathing in Table R603.9.2(1) by 0.72 shall be permitted.
2. For bottom track attached to foundations or framing below, the bottom track anchor or screw connection spacing in Table R505.3.1(1) and Table R603.3.1 shall be multiplied by two-thirds.

R603.9.4 Uplift connection requirements. Uplift connections shall be provided in accordance with this section.

R603.9.4.1 Ultimate design wind speeds greater than 100 126 mph. Where ultimate design wind speeds ~~are in excess of~~ exceed 100/126 miles per hour (5645 m/s), Exposure Category C, walls shall be provided ~~wind with~~ direct uplift connections in accordance with AISI S230, Section E13.3, and AISI S230, Section F7.2, as required for 440/139 miles per hour (6249 m/s), Exposure Category C.

R603.9.4.2 Hold-down anchor. Where the percentage of full height sheathing is adjusted in accordance with Section ~~R603.9.2.3~~, R603.9.2.2 a hold-down anchor, with a strength of 4,300 pounds (19 kN), shall be provided at each end of each full-height sheathed wall section used to meet the minimum percent sheathing requirements of Section R603.9.2. Hold-down anchors shall be attached to back-to-back studs; structural sheathing panels shall have edge fastening to the studs, in accordance with Section R603.9.3 and AISI S230, Table E11-1.

A single hold-down anchor, installed in accordance with Figure R603.9.4.2, shall be permitted at the corners of buildings.

R603.9.5 Structural sheathing for stone and masonry veneer. In Seismic Design Category C, where stone and masonry veneer is installed in accordance with Section R703.7, the length of structural sheathing for walls supporting one story, roof and ceiling shall be the greater of the amount required by Section R603.9.2 or 36 percent, as modified by Section R603.9.2.1 and R603.9.2.2, if applicable ~~except Section R603.9.2.2 shall not be permitted~~.

Revise as follows:

M1308.1 Drilling and notching. Wood-framed structural members shall be drilled, notched or altered in accordance with the provisions of Sections R502.8, R602.6, R602.6.1 and R802.7. Holes in load-bearing members of cold-formed steel light-frame construction shall be permitted only in accordance with Sections R505.2.5, ~~R603.2.5~~ R603.2.6 and R804.2.5. In accordance with the provisions of Sections R505.3.5, R603.3.4 and R804.3.4, cutting and notching of flanges and lips of load-bearing members of cold-formed steel light frame construction shall not be permitted. Structural insulated panels (SIPs) shall be drilled and notched or altered in accordance with the provisions of Section R613.7.

Revise as follows:

M2101.6 Drilling and notching. Wood-framed structural members shall be drilled, notched or altered in accordance with the provisions of Sections R502.8, R602.6, R602.6.1 and R802.7. Holes in load bearing members of cold-formed steel light-frame construction shall be permitted only in accordance with Sections R505.2.5, ~~R603.2.5~~ R603.2.6 and R804.2.5. In accordance with the provisions of Sections R505.3.5, R603.3.4 and R804.3.4, cutting and notching of flanges and lips of load-bearing members of cold-formed steel light frame construction shall not be permitted. Structural insulated panels (SIPs) shall be drilled and notched or altered in accordance with the provisions of Section R613.

Revise as follows:

P2603.2 Drilling and notching. Wood-framed structural members shall not be drilled, notched or altered in any manner except as provided in Sections R502.8, R602.6, R802.7 and R802.7.1. Holes in load-bearing members of cold-formed steel light-frame construction shall be permitted only in accordance with Sections R505.2.5, ~~R603.2.5~~ R603.2.6 and R804.2.5. In accordance with the provisions in Sections R505.3.5, R603.3.4 and R804.3.4, cutting and notching of flanges and lips of load-bearing members of cold-formed steel light frame construction shall not be permitted. Structural insulated panels (SIPs) shall be drilled and notched or altered in accordance with the provisions of Section R613.7.

Reason: This proposal is one in a series intended to both update and streamline the cold-formed steel (CFS) light frame construction provisions of the IRC. The revisions are based upon recommendations made by the AISI Committee on Framing Standards (COFS) Prescriptive Methods Subcommittee, which is responsible for the requirements' base document -- AISI S230, *Standard for Cold-Formed Steel Framing – Prescriptive Method for One and Two Family Dwellings*. For the most part, the changes are editorial in nature and work to focus the cold-formed steel solutions presented in the IRC on the most popular and readily available options. The changes also align the cold-formed steel provisions with the latest reference standards, including AISI S230-07 w/S3-12, *Standard for Cold-Formed Steel Framing – Prescriptive Method for One and Two Family Dwellings*, 2007, with Supplement 3, 2012.

Changes specific to Section R603 include the following:

- **R603:** Title correction.
- **R603.1:** The wind speeds are updated to reflect "ultimate" design wind speeds from ASCE 7-10 and editorial adjustments are made to the language. The design wind speeds are changed based upon the following direct conversion table, which was incorporated into AISI S230-07 w/S3-12:

ASCE 7-10 Wind Speed (mph)	110	115	126	139	152	164	177	190
AISI S230 Wind Speed (mph)	85	90	100	110	120	130	140	150

- **R603.2:** Requirements are relocated to new Section R603.2.3, which is specific to dimension, thickness and material grade.
- **R603.2.1:** The references to ASTM A653 and ASTM A792 are deleted. Since these materials are included under ASTM A1003, they do not need to be repeated in this section.
- **R603.2.2:** The corrosion protection requirements are relocated from Section R603.2.3 for better flow in section.
- **R603.2.3:** Requirements from Section R603.2 are relocated into new section on dimension, thickness and material grade and Table R603.2(1) and Table R603.2(2) are combined into new Table R603.2.3. The minimum flange width, maximum flange width, and minimum lip size are moved into the charging language for the table, since these properties do not vary based upon the member designation. Also, to further streamline the provisions, the most popular and readily available grade-thickness combinations are being retained and the less popular and readily available grade-thickness combinations are being removed. For Grade 33 ksi steel, 33 and 43 mil thicknesses are specified; while, for Grade 50 ksi steel, 54 mil and 68 mil thicknesses are specified. This language is added to Section R603.2.3. Finally, the reference to 97 mil product is deleted. It is very uncommon in residential construction, and, if need be, the user can still use AISI S230, where solutions include 97 mil product.
- **R603.2.5:** The title is fixed to match others in section and the screw substitution factor is eliminated. This is seldom used in prescriptive design and adds complexity to the provisions.
- **Figures R603.2.6.1 and R603.2.6.3:** Title correction.
- **Table R603.3.1:** In Table R603.3.1, the wind speeds are updated to reflect "ultimate" design wind speeds from ASCE 7-10 and editorial modifications are made to the column headings to clarify the applicability of the CFSF provisions. Also, an unnecessary wind speed – 110 mph (old 85 mph) Exposure Category B – is eliminated. Provisions at this lower wind speed are not substantively different than at the next higher wind speed. Finally, entries on wind uplift connector strength are brought into agreement with AISI S230-07 w/S3-12, which includes the addition of a new Figure R603.3.1(4) – both in the text and in the table notes.
- **Tables R603.3.1.1(1) and R603.1.1(2):** In Tables R603.3.1.1(1) and R603.3.1.1(2), wind speeds are updated to reflect "ultimate" design wind speeds from ASCE 7-10 and editorial modifications are made to the row headings to clarify the applicability of the CFSF provisions. Also, an unnecessary wind speed – 110 mph (old 85 mph) Exposure Category B – is eliminated. Provisions at this lower wind speed are not substantively different than at the next higher wind speed.
- **R603.3.2, Tables R603.3.2(2) through R603.3.2(16), and Tables R603.3.2.1(1) and R603.3.2.1(2):** In the Section's charging language, Tables R603.3.2(2) through R603.2(16), and Tables R603.3.2.1(1) and R603.3.2.1(2), wind speeds are updated to reflect "ultimate" design wind speeds from ASCE 7-10 and editorial modifications are made to the row headings in the tables to clarify the applicability of the CFSF provisions. Also, an unnecessary wind speed – 110 mph (old 85 mph) Exposure Category B – is eliminated from all the tables. Provisions at this lower wind speed are not

substantively different than at the next higher wind speed. Also, Tables R603.3.2(3) through R603.3.2(6) incorporate errata where the cells change from 33 mil to 43 mil. The reference to 97 mil product is deleted from all tables. In each situation, the Grades 33ksi and 50 ksi tables are combined into one table, thus retaining the most popular and readily available grade-thickness combinations. For Grade 33 ksi steel, 33 and 43 mil thicknesses are specified; while, for Grade 50 ksi steel, 54 mil and 68 mil thicknesses are specified. This language is added to the table notes in each table. Finally, a cross-reference in Section R603.3.2, Item 2 is corrected.

- **Table R603.3.2(1):** The first row is covered in Section R505 and last row is covered in Section R804. Therefore, both can be deleted. Addition of gypsum board row is to follow what is specified in AISI S230-07 w/S3-12.
- **R603.3.3:** A cross-reference in Section R603.3.3, Item 1 is corrected.
- **R603.6 and Tables R603.6(1) through R603.6(6):** In the Section's charging language and Tables R603.6(1) through R603.6(6), the specific back-to-back header tables are deleted. The back-to-back tables add volume and complexity, but do not provide significant improvement over the box header tables. Instead, users are now permitted to use the box beam header tables for back-to-back headers, which is a conservative solution. Also, the reference to 97 mil product is deleted from all tables. Finally, in each situation, the Grades 33ksi and 50 ksi tables are combined into one table, thus retaining the most popular and readily available grade-thickness combinations. For Grade 33 ksi steel, 33 and 43 mil thicknesses are specified; while, for Grade 50 ksi steel, 54 mil and 68 mil thicknesses are specified. This language is added to the table notes in each table.
- **Table R603.7(2):** The wind speeds are updated to reflect "ultimate" design wind speeds from ASCE 7-10. Also, an unnecessary wind speed – 110 mph (old 85 mph) Exposure Category B – is eliminated from the table. Provisions at this lower wind speed are not substantively different than at the next higher wind speed.
- **Table R603.8:** The wind speeds are updated to reflect "ultimate" design wind speeds from ASCE 7-10 and editorial modifications are made to the row headings to clarify the applicability of the CFSF provisions. Also, an unnecessary wind speed – 110 mph (old 85 mph) Exposure Category B – is eliminated from the table. Provisions at this lower wind speed are not substantively different than at the next higher wind speed. To be consistent with changes in other sections, Table R603.8 now applies to both Grade 33 ksi and Grade 50 ksi. For Grade 33 ksi steel, 33 and 43 mil thicknesses are specified; while, for Grade 50 ksi steel, 54 mil and 68 mil thicknesses are specified. This language is added to a new table note. Please note that, while Grade 50 ksi steel is now required for 54 mil and 68 mil product, no changes are made to the allowable spans, thus resulting in additional conservatism. Finally, a small change is made to correct the terminology used in table note b.
- **R603.9.2.2:** The provisions for full height sheathing in hip roof homes is deleted, since a companion proposal for Section R804 is recommending that the hip roof option be deleted.
- **Table R603.9.2(1):** The wind speeds are updated to reflect "ultimate" design wind speeds from ASCE 7-10. Also, an unnecessary wind speed – 110 mph (old 85 mph) Exposure Category B – is eliminated from all the tables. Provisions at this lower wind speed are not substantively different than at the next higher wind speed.
- **R603.9.4:** In Section R603.9.4.1, the wind speeds are updated to reflect "ultimate" design wind speeds from ASCE 7-10 and editorial adjustments are made to the language. In Section R603.9.4.2, a cross reference is corrected.
- **R603.9.5:** Changes coordinate with the changes in Section R603.9.2.2.
- **M1308.1, M2101.6, and P2603.2:** Cross-references are updated in each of these sections.

Cost Impact: The code change proposal will not increase the cost of construction.

RB330-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R603-RB-MANLEY.doc

RB331– 13

R604.3

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

R604.3 Installation. Wood structural panel wall sheathing shall be attached to framing in accordance with Table R602.3(1) or R602.3(3). ~~Wood structural panels marked as Exposure I or Exterior are considered water-repellent sheathing under the code.~~

Reason: Water-repellent sheathing is a term no longer recognized in the IRC. The term now used is weather-resistive barrier. The current provisions of Section R703.2 require a weather-resistive barrier under all products including wood structural panels. Wood structural panels are not recognized as a weather-resistive barrier as the term is currently used in Chapter 7. We ask the committee to approve our proposal to remove the last reference to water-repellent sheathing from the IRC.

Cost Impact: The code change proposal will not increase the cost of construction.

RB331-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R604.3-RB-KEITH.doc

RB332 – 13

R606.2 , R606.2.1, R606.2.2, R606.2.3, R606.2.4, R606.2.5 (NEW), R606.2.6 (NEW), R606.2.7 (NEW), R606.2.8 (NEW), R606.2.9 (NEW), R606.2.10 (NEW), R606.2.12 (NEW), R606.3, R606.3.4 (NEW), R606.3.4.1 (NEW), R606.3.4.2 (NEW), R606.3.4.3 (NEW), R606.8, R606.11, R606.12, R606.12.3, R606.13, R606.14 (NEW), R606.14.1 (NEW), R606.14.2 (NEW), R606.15, R606.15.1, Table R606.15.1, R607.1.1, R607, R607.1.2, R607.1.3, R607.2.1, R607.2.1.1, R607.2.2, R607.2.2.1, R607.2.2.2, R607.3, R608, R608.1, R608.1.1, R608.1.1.1, R608.1.1.2, R608.1.2, R608.1.2.1, R608.1.2.2, R608.1.2.3, R608.1.3, R608.1.3.1, R608.1.3.2, R608.2, R608.2.1, R608.2.2, R609, R609.1, R609.1.1, Table R609.1.1, R609.1.2, Table R609.1.2, R609.1.3, R609.1.4, R609.1.4.1, R609.1.5, R609.1.5.1, R609.1.5.2, R609.2, R609.2.1, R609.2.2, R609.2.3, R609.3, R609.3.1, R609.4, R609.4.1, Chapter 44

Proponent: Jason Thompson, National Concrete Masonry Association representing Masonry Alliance for Codes and Standards (jthompson@ncma.org)

Revise as follows:

R606.2 Masonry construction materials.

R606.2.1 Concrete masonry units. Concrete masonry units shall conform to the following standards: ASTM C55 for concrete brick; ASTM C73 for calcium silicate face brick; ASTM C90 for load-bearing concrete masonry units; ASTM C744 for prefaced concrete and calcium silicate masonry units or ASTM C1634 for concrete facing brick.

R606.2.2 Clay or shale masonry units. Clay or shale masonry units shall conform to the following standards: ASTM C34 for structural clay *load-bearing wall* tile; ASTM C56 for structural clay nonload-bearing wall tile; ASTM C62 for building brick (solid masonry units made from clay or shale); ASTM C1088 for solid units of thin veneer brick; ASTM C126 for ceramic-glazed structural clay facing tile, facing brick and solid masonry units; ASTM C212 for structural clay facing tile; ASTM C216 for facing brick (solid masonry units made from clay or shale); ASTM C652 for hollow brick (hollow masonry units made from clay or shale) or ASTM C1405 for glazed brick (single-fired solid brick units).

Exception: Structural clay tile for nonstructural use in fireproofing of structural members and in wall furring shall not be required to meet the compressive strength specifications. The fire-resistance rating shall be determined in accordance with ASTM E119 or UL 263 and shall comply with the requirements of Section R302.

R606.2.3 AAC masonry. AAC masonry units shall conform to ASTM C1386 for the strength class specified.

R606.2.4 Stone masonry units. Stone masonry units shall conform to the following standards: ASTM C503 for marble building stone (exterior); ASTM C568 for limestone building stone; ASTM C615 for granite building stone; ASTM C616 for sandstone building stone; or ASTM C629 for slate building stone.

R606.2.5 Architectural cast stone. Architectural cast stone shall conform to ASTM C1364.

R606.2.6 Second-hand units. Second-hand masonry units shall not be reused unless they conform to the requirements of new units. The units shall be of whole, sound materials and free from cracks and other defects that will interfere with proper laying or use. Old mortar shall be cleaned from the unit before reuse.

R606.2.7 Mortar. Except for mortars listed in Sections R606.2.8, R606.2.9, and R606.2.10, mortar for use in masonry construction shall meet the proportion specifications of Table R606.2.7 or the property specifications of ASTM C270. The type of mortar shall be in accordance with Sections R606.2.7.1, R606.2.7.2, and R606.2.7.3.

R607.1.4 R606.2.7.1 Foundation walls. ~~Masonry Mortar~~ Mortar for masonry foundation walls constructed as set forth in Tables R404.1.1(1) through R404.1.1(4) ~~and mortar shall be Type M or S mortar.~~

R607.1.2 R606.2.7.2 Masonry in Seismic Design Categories A, B and C. Mortar for masonry serving as the lateral-force-resisting system in Seismic Design Categories A, B and C shall be Type M, S or N mortar.

R607.1.3 R606.2.7.3 Masonry in Seismic Design Categories D₀, D₁ and D₂. Mortar for masonry serving as the lateral-force-resisting system in Seismic Design Categories D₀, D₁ and D₂ shall be Type M or S Portland cement-lime or mortar cement mortar.

**TABLE R607.1 R606.2.7
MORTAR PROPORTIONS^{a, b}**

		PROPORTIONS BY VOLUME (cementitious materials)								
MORTAR	TYPE	Portland cement or blended cement	Mortar cement			Masonry cement			Hydrated lime ^c or lime putty	Aggregate ratio (measured in damp, loose conditions)
			M	S	N	M	S	N		
Cement-lime	M	1	—	—	—	—	—	—	¹ / ₄	Not less than 2 ¹ / ₄ and not more than 3 times the sum of separate volumes of lime, if used, and cement
	S	1	—	—	—	—	—	—	over ¹ / ₄ to ¹ / ₂	
	N	1	—	—	—	—	—	—	over ¹ / ₂ to 1 ¹ / ₄	
	O	1	—	—	—	—	—	—	over 1 ¹ / ₄ to 2 ¹ / ₂	
Mortar cement	M	1	—	—	1	—	—	—	—	
	M	—	1	—	—	—	—	—		
	S	¹ / ₂	—	—	1	—	—	—		
	S	—	—	1	—	—	—	—		
	N	—	—	—	1	—	—	—		
	O	—	—	—	1	—	—	—		
Masonry cement	M	1				—	—	1	—	
	M	—				1	—	—		
	S	¹ / ₂				—	—	1		
	S	—				—	1	—		
	N	—				—	—	1		
	O	—				—	—	1		

For SI: 1 cubic foot = 0.0283 m³, 1 pound = 0.454 kg.

a. For the purpose of these specifications, the weight of 1 cubic foot of the respective materials shall be considered to be as follows:

Portland Cement	94 pounds	Masonry Cement	Weight printed on bag
Mortar Cement	Weight printed on bag	Hydrated Lime	40 pounds
Lime Putty (Quicklime)	80 pounds	Sand, damp and loose	80 pounds of dry sand

b. Two air-entraining materials shall not be combined in mortar.

c. Hydrated lime conforming to the requirements of ASTM C 207.

R606.2.8 Surface-bonding mortar. Surface-bonding mortar shall comply with ASTM C887. Surface bonding of concrete masonry units shall comply with ASTM C946.

R606.2.9 Mortar for AAC masonry. Thin-bed mortar for AAC masonry shall comply with Article 2.1 C.1 of TMS 602/ACI 530.1/ASCE 6. Mortar used for the leveling courses of AAC masonry shall comply with Article 2.1 C.2 of TMS 602/ACI 530.1/ASCE 6.

R606.2.10 Mortar for adhered masonry veneer. Mortar for use with adhered masonry veneer shall conform to ASTM C270 Type S or Type N or shall comply with ANSI A118.4 for latex-modified portland cement mortar.

R609.1.4 R606.2.11 Grout. Grout shall consist of cementitious material and aggregate in accordance with ASTM C476 or and the proportion specifications of Table R609.1.1 R606.2.11. Type M or Type S mortar to which sufficient water has been added to produce pouring consistency ~~can~~ shall be permitted to be used as grout.

**TABLE ~~R609.1.1~~ R606.2.11
GROUT PROPORTIONS BY VOLUME FOR MASONRY CONSTRUCTION**

TYPE	PORTLAND CEMENT OR BLENDED CEMENT SLAG CEMENT	HYDRATED LIME OR LIME PUTTY	AGGREGATE MEASURED IN A DAMP, LOOSE CONDITION	
			Fine	Coarse
Fine	1	0 to 1/10	2 ¹ / ₄ to 3 times the sum of the volume of the cementitious materials	—
Coarse	1	0 to 1/10	2 ¹ / ₄ to 3 times the sum of the volume of the cementitious materials	1 to 2 times the sum of the volumes of the cementitious materials

R606.2.12 Metal reinforcement and accessories. Metal reinforcement and accessories shall conform to Article 2.4 of TMS 602/ACI 530.1/ASCE 6.

R606.3 Construction requirements.

R607.2.1 R606.3.1 Bed and head joints. Unless otherwise required or indicated on the project drawings, head and bed joints shall be 3/8 inch (10 mm) thick, except that the thickness of the bed joint of the starting course placed over foundations shall not be less than 1/4 inch (7 mm) and not more than 3/4 inch (19 mm).

R607.2.1.1 Mortar joint thickness tolerance. Mortar joint thickness for load-bearing masonry shall be within the following tolerances from the specified dimensions:

1. Bed joint: + 1/8 inch (3 mm).
2. Head joint: - 1/4 inch (7 mm), + 3/8 inch (10 mm).
3. Collar joints: - 1/4 inch (7 mm), + 3/8 inch (10 mm).

R607.2.2 R606.3.2 Masonry unit placement. The mortar shall be sufficiently plastic and units shall be placed with sufficient pressure to extrude mortar from the joint and produce a tight joint. Deep furrowing of bed joints that produces voids shall not be permitted. Any units disturbed to the extent that initial bond is broken after initial placement shall be removed and relaid in fresh mortar. Surfaces to be in contact with mortar shall be clean and free of deleterious materials.

R607.2.2.1 R606.3.2.1 Solid masonry. *Solid masonry* units shall be laid with full head and bed joints and all interior vertical joints that are designed to receive mortar shall be filled.

R607.2.2.2 R606.3.2.2 Hollow masonry. For hollow masonry units, head and bed joints shall be filled solidly with mortar for a distance in from the face of the unit not less than the thickness of the face shell.

R607.3 R606.3.3 Installation of wall ties. The installation of wall ties shall be as follows:

1. The ends of wall ties shall be embedded in mortar joints. Wall ties shall have a minimum of 5/8-inch (15.9 mm) mortar coverage from the exposed face.
2. Wall ties shall not be bent after being embedded in grout or mortar.

3. For solid masonry units, solid grouted hollow units, or hollow units in anchored masonry veneer, wall ties shall be embedded in mortar bed at least 1 1/2 inches (38 mm).
4. For hollow masonry units in other than anchored masonry veneer, wall ties shall engage outer face shells by at least 1/2 inch (13 mm).

~~R606.13~~ R606.3.4 Protection for reinforcement. Bars shall be completely embedded in mortar or grout. Joint reinforcement embedded in horizontal mortar joints shall not have less than 5/8-inch (15.9 mm) mortar coverage from the exposed face. All other reinforcement shall have a minimum coverage of one bar diameter over all bars, but not less than 3/4 inch (19 mm), except where exposed to weather or soil, in which case the minimum coverage shall be 2 inches (51 mm).

~~R606.15.1~~ R606.3.4.1 Corrosion protection. Minimum corrosion protection of joint reinforcement, anchor ties and wire fabric for use in masonry wall construction shall conform to Table ~~R606.15.1~~ R606.3.4.1.

**TABLE ~~R606.15.1~~ R606.3.4.1
MINIMUM CORROSION PROTECTION**

MASONRY METAL ACCESSORY	STANDARD
Joint reinforcement, interior walls	ASTM A 641, Class 1
Wire ties or anchors in exterior walls completely embedded in mortar or grout	ASTM A 641, Class 3
Wire ties or anchors in exterior walls not completely embedded in mortar or grout	ASTM A 153, Class B-2
Joint reinforcement in exterior walls or interior walls exposed to moist environment	ASTM A 153, Class B-2
Sheet metal ties or anchors exposed to weather	ASTM A 153, Class B-2
Sheet metal ties or anchors completely embedded in mortar or grout	ASTM A 653, Coating Designation G60
Stainless steel hardware for any exposure	ASTM A 167, Type 304

R606.3.4 Grouting requirements.

R606.3.4.1 Grout placement. Grout shall be a plastic mix suitable for pumping without segregation of the constituents and shall be mixed thoroughly. Grout shall be placed by pumping or by an *approved alternate method* and shall be placed before any initial set occurs and in no case more than 1 1/2 hours after water has been added. Grout shall be consolidated by puddling or mechanical vibrating during placing and reconsolidated after excess moisture has been absorbed but before plasticity is lost. Grout shall not be pumped through aluminum pipes.

Maximum pour heights and the minimum dimensions of spaces provided for grout placement shall conform to Table R606.3.4.1. Grout shall be poured in lifts of 8-foot (2438 mm) maximum height. When a total grout pour exceeds 8 feet (2438 mm) in height, the grout shall be placed in lifts not exceeding 64 inches (1626 mm) and special inspection during grouting shall be required. If the work is stopped for one hour or longer, the horizontal construction joints shall be formed by stopping all tiers at the same elevation and with the grout 1 inch (25 mm) below the top.

**TABLE R609.4.2 R606.3.4.1
GROUT SPACE DIMENSIONS AND POUR HEIGHTS**

GROUT TYPE	GROUT POUR MAXIMUM HEIGHT (feet)	MINIMUM WIDTH OF GROUT SPACES ^{a, b} (inches)	MINIMUM GROUT ^{b, c} SPACE DIMENSIONS FOR GROUTING CELLS OF HOLLOW UNITS (inches × inches)
Fine	1	0.75	1.5 × 2
	5	2	2 × 3
	12	2.5	2.5 × 3
	24	3	3 × 3
Coarse	1	1.5	1.5 × 3
	5	2	2.5 × 3
	12	2.5	3 × 3
	24	3	3 × 4

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

a. For grouting between masonry wythes.

b. Grout space dimension is the clear dimension between any masonry protrusion and shall be increased by the horizontal projection of the diameters of the horizontal bars within the cross section of the grout space.

c. Area of vertical reinforcement shall not exceed 6 percent of the area of the grout space.

R606.3.4.2 Cleanouts. Provision shall be made for cleaning the space to be grouted. Mortar that projects more than 1/2 inch (13 mm) into the grout space and any other foreign matter shall be removed from the grout space prior to inspection and grouting. Where required by the *building official*, cleanouts shall be provided in the bottom course of masonry for each grout pour when the grout pour height exceeds 64 inches (1626 mm). In solid grouted masonry, cleanouts shall be spaced horizontally a maximum of 32 in. (813 mm) on center. The cleanouts shall be sealed before grouting and after inspection.

R606.3.4.3 Construction. Requirements for grouted masonry construction shall be as follows:

1. Masonry shall be built to preserve the unobstructed vertical continuity of the cells or spaces to be filled. In partially grouted construction, cross webs forming cells to be filled shall be full-bedded in mortar to prevent leakage of grout. Head and end joints shall be solidly filled with mortar for a distance in from the face of the wall or unit not less than the thickness of the longitudinal face shells.
2. Vertical reinforcement shall be held in position at top and bottom and at intervals not exceeding 200 diameters of the reinforcement.
3. Cells containing reinforcement shall be filled solidly with grout.
4. The thickness of grout or mortar between masonry units and reinforcement shall not be less than 1/4 inch (7 mm), except that 1/4-inch (7 mm) bars may be laid in horizontal mortar joints at least 1/2 inch (13 mm) thick, and steel wire reinforcement may be laid in horizontal mortar joints at least twice the thickness of the wire diameter.

R609.2 R606.3.5 Grouted multiple-wythe masonry. Grouted multiple-wythe masonry shall conform to all the requirements specified in Section R609.4 R606.3.4 and the requirements of this section.

R609.2.1 R606.3.5.1 Bonding of backup wythe. Where all interior vertical spaces are filled with grout in multiple-wythe construction, masonry headers shall not be permitted. Metal wall ties shall be used in accordance with Section R609.4.2 R606.13.2 to prevent spreading of the wythes and to maintain the

vertical alignment of the wall. Wall ties shall be installed in accordance with Section ~~R608.4.2~~ R606.13.2 when the backup wythe in multiple-wythe construction is fully grouted.

~~R609.2.3~~ R606.3.5.2 Grout barriers. Vertical grout barriers or dams shall be built of *solid masonry* across the grout space the entire height of the wall to control the flow of the grout horizontally. Grout barriers shall not be more than 25 feet (7620 mm) apart. The grouting of any section of a wall between control barriers shall be completed in one day with no interruptions greater than one hour.

~~R608.2~~ R606.3.6 Masonry bonding pattern. Masonry laid in running and stack bond shall conform to Sections ~~R608.2.4~~ and ~~R608.2.2~~ R606.3.6.1 and R606.3.6.2.

~~R608.2.4~~ R606.3.6.1 Masonry laid in running bond. In each wythe of masonry laid in running bond, head joints in successive courses shall be offset by not less than one-fourth the unit length, or the masonry walls shall be reinforced longitudinally as required in Section ~~R608.2.2~~ R606.3.6.2.

~~R608.2.2~~ R606.3.6.2 Masonry laid in stack bond. Where unit masonry is laid with less head joint offset than in Section ~~R608.2.4~~ R606.3.6.1, the minimum area of horizontal reinforcement placed in mortar bed joints or in bond beams spaced not more than 48 inches (1219 mm) apart, shall be 0.0007 times the vertical cross-sectional area of the wall.

~~R606.2~~ R606.4 Thickness of masonry. The nominal thickness of masonry walls shall conform to the requirements of Sections ~~R606.2.4~~ R606.4.1 through ~~R606.2.4~~ R606.4.4.

~~R606.2.4~~ R606.4.1 Minimum thickness. The minimum thickness of masonry bearing walls more than one *story* high shall be 8 inches (203 mm). *Solid masonry* walls of one-story *dwelling*s and garages shall not be less than 6 inches (152 mm) in thickness when not greater than 9 feet (2743 mm) in height, provided that when gable construction is used, an additional 6 feet (1829 mm) is permitted to the peak of the gable. Masonry walls shall be laterally supported in either the horizontal or vertical direction at intervals as required by Section ~~R606.9~~ R606.6.4.

~~R606.2.2~~ R606.4.2 Rubble stone masonry wall. The minimum thickness of rough, random or coursed rubble stone masonry walls shall be 16 inches (406 mm).

~~R606.2.3~~ R606.4.3 Change in thickness. Where walls of masonry of hollow units or masonry-bonded hollow walls are decreased in thickness, a course of *solid masonry* or masonry units filled with mortar or grout shall be constructed between the wall below and the thinner wall above, or special units or construction shall be used to transmit the loads from face shells or wythes above to those below.

~~R606.2.4~~ R606.4.4 Parapet walls. Unreinforced *solid masonry* parapet walls shall not be less than 8 inches (203 mm) thick and their height shall not exceed four times their thickness. Unreinforced hollow unit masonry parapet walls shall be not less than 8 inches (203 mm) thick, and their height shall not exceed three times their thickness. Masonry parapet walls in areas subject to wind loads of 30 pounds per square foot (1.44 kPa) located in Seismic Design Category D₀, D₁ or D₂, or on townhouses in Seismic Design Category C shall be reinforced in accordance with Section R606.12.

~~R606.3~~ R606.5 Corbeled masonry. Corbeled masonry shall be in accordance with Sections ~~R606.3.4~~ R606.5.1 through ~~R606.3.3~~ R606.5.3.

~~R606.3.4~~ R606.5.1 Units. *Solid masonry* units or masonry units filled with mortar or grout shall be used for corbeling.

~~R606.3.2~~ R606.5.2 Corbel projection. The maximum projection of one unit shall not exceed one-half the height of the unit or one-third the thickness at right angles to the wall. The maximum corbeled projection beyond the face of the wall shall not exceed:

1. One-half of the wall thickness for multi-wythe walls bonded by mortar or grout and wall ties or masonry headers, or
2. One-half the wythe thickness for single wythe walls, masonry-bonded hollow walls, multiwythe walls with open collar joints and veneer walls.

~~R606.3.3~~ R606.5.3 Corbeled masonry supporting floor or roof-framing members. When corbeled masonry is used to support floor or roof-framing members, the top course of the corbel shall be a header course or the top course bed joint shall have ties to the vertical wall.

~~R606.4~~ R606.6 Support conditions. Bearing and support conditions shall be in accordance with Sections ~~R606.4.1 and R606.4.2~~ R606.6.1 through R606.6.4.

~~R606.4.1~~ R606.6.1 Bearing on support. Each masonry wythe shall be supported by at least two-thirds of the wythe thickness.

~~R606.4.2~~ R606.6.2 Support at foundation. Cavity wall or masonry veneer construction ~~may~~ shall be permitted to be supported on an 8-inch (203 mm) foundation wall, provided the 8-inch (203 mm) wall is corbeled to the width of the wall system above with masonry constructed of *solid masonry* units or masonry units filled with mortar or grout. The total horizontal projection of the corbel shall not exceed 2 inches (51 mm) with individual corbels projecting not more than one-third the thickness of the unit or one-half the height of the unit. The hollow space behind the corbeled masonry shall be filled with mortar or grout.

~~R606.14~~ R606.6.3 Beam supports. Beams, girders or other concentrated loads supported by a wall or column shall have a bearing of at least 3 inches (76 mm) in length measured parallel to the beam upon *solid masonry* not less than 4 inches (102 mm) in thickness, or upon a metal bearing plate of adequate design and dimensions to distribute the load safely, or upon a continuous reinforced masonry member projecting not less than 4 inches (102 mm) from the face of the wall.

~~R606.14.1~~ R606.6.3.1 Joist bearing. Joists shall have a bearing of not less than 1 1/2 inches (38 mm), except as provided in Section ~~R606.14~~ R606.6.3, and shall be supported in accordance with Figure R606.11(1).

~~R606.9~~ R606.6.4 Lateral support. Masonry walls shall be laterally supported in either the horizontal or the vertical direction. The maximum spacing between lateral supports shall not exceed the distances in Table ~~R606.9~~ R606.6.4. Lateral support shall be provided by cross walls, pilasters, buttresses or structural frame members when the limiting distance is taken horizontally, or by floors or roofs when the limiting distance is taken vertically.

**TABLE ~~R606.9~~ R606.6.4
SPACING OF LATERAL SUPPORT FOR MASONRY WALLS**

(Portions of Table not shown remain unchanged)

- a. Except for cavity walls and cantilevered walls, the thickness of a wall shall be its nominal thickness measured perpendicular to the face of the wall. For cavity walls, the thickness shall be determined as the sum of the nominal thicknesses of the individual wythes. For cantilever walls, except for parapets, the ratio of height to nominal thickness shall not exceed 6 for solid masonry, or 4 for hollow masonry. For parapets, see Section ~~R606.2.4~~ R606.4.4.

~~R606.9.4~~ R606.6.4.1 Horizontal lateral support. Lateral support in the horizontal direction provided by intersecting masonry walls shall be provided by one of the methods in Section ~~R606.9.1.1~~ R606.6.4.1.1 or Section ~~R606.9.1.2~~ R606.6.4.1.2.

~~R606.9.1.1~~ R606.6.4.1.1 Bonding pattern. Fifty percent of the units at the intersection shall be laid in an overlapping masonry bonding pattern, with alternate units having a bearing of not less than 3 inches (76 mm) on the unit below.

R606.9.1.2 R606.6.4.1.2 Metal reinforcement. Interior nonloadbearing walls shall be anchored at their intersections, at vertical intervals of not more than 16 inches (406 mm) with joint reinforcement of at least 9 gage [0.148 inch (4mm)], or 1/4-inch (6 mm) galvanized mesh hardware cloth. Intersecting masonry walls, other than interior nonloadbearing walls, shall be anchored at vertical intervals of not more than 8 inches (203 mm) with joint reinforcement of at least 9 gage and shall extend at least 30 inches (762 mm) in each direction at the intersection. Other metal ties, joint reinforcement or anchors, if used, shall be spaced to provide equivalent area of anchorage to that required by this section.

R606.9.2 R606.6.4.2 Vertical lateral support. Vertical lateral support of masonry walls in Seismic Design Category A, B or C shall be provided in accordance with one of the methods in Section R606.9.2.1 R606.6.4.2.1 or Section R606.9.2.2 R606.6.4.2.2.

R606.9.2.1 R606.6.4.2.1 Roof structures. Masonry walls shall be anchored to roof structures with metal strap anchors spaced in accordance with the manufacturer's instructions, 1/2-inch (13 mm) bolts spaced not more than 6 feet (1829 mm) on center, or other *approved* anchors. Anchors shall be embedded at least 16 inches (406 mm) into the masonry, or be hooked or welded to bond beam reinforcement placed not less than 6 inches (152 mm) from the top of the wall.

R606.6.4.2.2 R606.9.2.2 Floor diaphragms. Masonry walls shall be anchored to floor *diaphragm* framing by metal strap anchors spaced in accordance with the manufacturer's instructions, 1/2-inch-diameter (13 mm) bolts spaced at intervals not to exceed 6 feet (1829 mm) and installed as shown in Figure R606.11(1), or by other *approved* methods.

R606.7 R606.6 Piers. The unsupported height of masonry piers shall not exceed ten times their least dimension. When structural clay tile or hollow concrete masonry units are used for isolated piers to support beams and girders, the cellular spaces shall be filled solidly with concrete grout or Type M or S mortar, except that unfilled hollow piers may be used if their unsupported height is not more than four times their least dimension. Where hollow masonry units are solidly filled with concrete grout or Type M, S or N mortar, the allowable compressive stress shall be permitted to be increased as provided in Table R606.5 R606.9.

R606.6.1 R606.7.1 Pier cap. Hollow piers shall be capped with 4 inches (102 mm) of *solid masonry* or concrete, a masonry cap block, or shall have cavities of the top course filled with concrete or grout.

R606.7 R606.8 Chases. Chases and recesses in masonry walls shall not be deeper than one-third the wall thickness, and the maximum length of a horizontal chase or horizontal projection shall not exceed 4 feet (1219 mm), and shall have at least 8 inches (203 mm) of masonry in back of the chases and recesses and between adjacent chases or recesses and the jambs of openings. Chases and recesses in masonry walls shall be designed and constructed so as not to reduce the required strength or required fire resistance of the wall and in no case shall a chase or recess be permitted within the required area of a pier. Masonry directly above chases or recesses wider than 12 inches (305 mm) shall be supported on noncombustible lintels.

R606.5 R606.9 Allowable stresses. Allowable compressive stresses in masonry shall not exceed the values prescribed in Table R606.5 R606.9. In determining the stresses in masonry, the effects of all loads and conditions of loading and the influence of all forces affecting the design and strength of the several parts shall be taken into account.

R606.5.1 R606.9.1 Combined units. In walls or other structural members composed of different kinds or grades of units, materials or mortars, the maximum stress shall not exceed the allowable stress for the weakest of the combination of units, materials and mortars of which the member is composed. The net thickness of any facing unit that is used to resist stress shall not be less than 1.5 inches (38 mm).

TABLE ~~R606.5~~ R606.9
ALLOWABLE COMPRESSIVE STRESSES FOR
EMPIRICAL DESIGN OF MASONRY

CONSTRUCTION; COMPRESSIVE STRENGTH OF UNIT, GROSS AREA	ALLOWABLE COMPRESSIVE STRESSES ^a GROSS CROSS-SECTIONAL AREA ^b	
	Type M or S mortar	Type N mortar
Solid masonry of brick and other solid units of clay or shale; sand-lime or concrete brick: 8,000 + psi 4,500 psi 2,500 psi 1,500 psi	 350 225 160 115	 300 200 140 100
Grouted ^c masonry, of clay or shale; sand-lime or concrete: 4,500 + psi 2,500 psi 1,500 psi	 225 160 115	 200 140 100
Solid masonry of solid concrete masonry units: 3,000 + psi 2,000 psi 1,200 psi	 225 160 115	 200 140 100
Masonry of hollow load- bearing units: 2,000 + psi 1,500 psi 1,000 psi 700 psi	 140 115 75 60	 120 100 70 55
Hollow walls (cavity or masonry bonded ^d) solid units: 2,500 + psi 1,500 psi Hollow units	 160 115 75	 140 100 70
Stone ashlar masonry: Granite Limestone or marble Sandstone or cast stone	 720 450 360	 640 400 320
Rubble stone masonry: Coarse, rough or random	 120	 100

For SI: 1 pound per square inch = 6.895 kPa.

a. Linear interpolation shall be used for determining allowable stresses for masonry units having compressive strengths that are intermediate between those given in the table.

b. Gross cross-sectional area shall be calculated on the actual rather than nominal dimensions.

c. See Section ~~R606~~ R606.13.

d. Where floor and roof loads are carried upon one wythe, the gross cross-sectional area is that of the wythe under load; if both wythes are loaded, the gross cross-sectional area is that of the wall minus the area of the cavity between the wythes. Walls bonded with metal ties shall be considered as cavity walls unless the collar joints are filled with mortar or grout.

R606.11 Anchorage. Masonry walls shall be anchored to floor and roof systems in accordance with the details shown in Figure R606.11(1), R606.11(2) or R606.11(3). Footings ~~may~~ shall be permitted to be considered as points of lateral support.

R606.12 Seismic requirements. The seismic requirements of this section shall apply to the design of masonry and the construction of masonry building elements located in Seismic Design Category D₀, D₁ or D₂. Townhouses in Seismic Design Category C shall comply with the requirements of Section R606.12.2. These requirements shall not apply to glass unit masonry conforming to Section R610 ~~or~~ anchored masonry veneer conforming to Section R703.7, or adhered masonry veneer conforming to Section R703.12.

R606.12.3 Seismic Design Category D₀ or D₁. Structures in Seismic Design Category D₀ or D₁ shall comply with the requirements of Seismic Design Category C and the additional requirements of this section. AAC masonry shall not be used for the design of masonry elements that are part of the lateral force-resisting system.

SECTION R608 MULTIPLE-WYTHE MASONRY

~~R608.1 General.~~ **R606.13 Multiple-Wythe Masonry.** The facing and backing of multiple-wythe masonry walls shall be bonded in accordance with Section ~~R608.1.1, R608.1.2 or R608.1.3~~ R606.13.1, R606.13.2 or R606.13.3. In cavity walls, neither the facing nor the backing shall be less than 3 inches (76 mm) nominal in thickness and the cavity shall not be more than 4 inches (102 mm) nominal in width. The backing shall be at least as thick as the facing.

Exception: Cavities shall be permitted to exceed the 4-inch (102 mm) nominal dimension provided tie size and tie spacing have been established by calculation.

~~R608.1.1~~ **R606.13.1 Bonding with masonry headers.** Bonding with solid or hollow masonry headers shall comply with Sections ~~R608.1.1.1 and R608.1.1.2~~ R606.13.1.1 and R606.13.1.2.

~~R608.1.1.1~~ **R606.13.1.1 Solid units.** Where the facing and backing (adjacent wythes) of *solid masonry* construction are bonded by means of masonry headers, no less than 4 percent of the wall surface of each face shall be composed of headers extending not less than 3 inches (76 mm) into the backing. The distance between adjacent full-length headers shall not exceed 24 inches (610 mm) either vertically or horizontally. In walls in which a single header does not extend through the wall, headers from the opposite sides shall overlap at least 3 inches (76 mm), or headers from opposite sides shall be covered with another header course overlapping the header below at least 3 inches (76 mm).

~~R608.1.1.2~~ **R606.13.1.2 Hollow units.** Where two or more hollow units are used to make up the thickness of a wall, the stretcher courses shall be bonded at vertical intervals not exceeding 34 inches (864 mm) by lapping at least 3 inches (76 mm) over the unit below, or by lapping at vertical intervals not exceeding 17 inches (432 mm) with units that are at least 50 percent thicker than the units below.

~~R608.1.2~~ **R606.13.2 Bonding with wall ties or joint reinforcement.** Bonding with wall ties or joint reinforcement shall comply with Sections R606.13.2.1 ~~R608.1.2.1 through R608.1.2.3~~ R606.13.2.3.

~~R608.1.2.1~~ **R606.13.2.1 Bonding with wall ties.** Bonding with wall ties, except as required by Section R610, where the facing and backing (adjacent wythes) of masonry walls are bonded with 3/16-inch-diameter (5 mm) wall ties embedded in the horizontal mortar joints, there shall be at least one metal tie for each 4.5 square feet (0.418 m²) of wall area. Ties in alternate courses shall be staggered. The maximum vertical distance between ties shall not exceed 24 inches (610 mm), and the maximum horizontal distance shall not exceed 36 inches (914 mm). Rods or ties bent to rectangular shape shall be used with

hollow masonry units laid with the cells vertical. In other walls, the ends of ties shall be bent to 90- degree (0.79 rad) angles to provide hooks no less than 2 inches (51 mm) long. Additional bonding ties shall be provided at all openings, spaced not more than 3 feet (914 mm) apart around the perimeter and within 12 inches (305 mm) of the opening.

R608.1.2.2 R606.13.2.2 Bonding with adjustable wall ties. Where the facing and backing (adjacent wythes) of masonry are bonded with adjustable wall ties, there shall be at least one tie for each 2.67 square feet (0.248 m²) of wall area. Neither the vertical nor the horizontal spacing of the adjustable wall ties shall exceed 24 inches (610 mm). The maximum vertical offset of bed joints from one wythe to the other shall be 1.25 inches (32 mm). The maximum clearance between connecting parts of the ties shall be 1/16 inch (2 mm). When pintle legs are used, ties shall have at least two 3/16-inch-diameter (5 mm) legs.

R608.1.2.3 R606.13.2.3 Bonding with prefabricated joint reinforcement. Where the facing and backing (adjacent wythes) of masonry are bonded with prefabricated joint reinforcement, there shall be at least one cross wire serving as a tie for each 2.67 square feet (0.248 m²) of wall area. The vertical spacing of the joint reinforcement shall not exceed 16 inches (406 mm). Cross wires on prefabricated joint reinforcement shall not be smaller than No. 9 gage. The longitudinal wires shall be embedded in the mortar.

R608.1.3 R606.13.3 Bonding with natural or cast stone. Bonding with natural and cast stone shall conform to Sections ~~R608.1.3.1 and R608.1.3.2~~ R606.13.3.1 and R606.13.3.2.

R608.1.3.1 R606.13.3.1 Ashlar masonry. In ashlar masonry, bonder units, uniformly distributed, shall be provided to the extent of not less than 10 percent of the wall area. Such bonder units shall extend not less than 4 inches (102 mm) into the backing wall.

R608.1.3.2 R606.13.3.2 Rubble stone masonry. Rubble stone masonry 24 inches (610 mm) or less in thickness shall have bonder units with a maximum spacing of 3 feet (914 mm) vertically and 3 feet (914 mm) horizontally, and if the masonry is of greater thickness than 24 inches (610 mm), shall have one bonder unit for each 6 square feet (0.557 m²) of wall surface on both sides.

R606.14 Anchored and adhered masonry veneer.

R606.14.1 Anchored veneer. Anchored masonry veneer installed over a backing of wood or cold-formed steel shall meet the requirements of Section R703.7.

R606.14.2 Adhered veneer. Adhered masonry veneer shall be installed in accordance with the requirements of Section R703.12.

R606.8 Stack bond. In unreinforced masonry where masonry units are laid in stack bond, longitudinal reinforcement consisting of not less than two continuous wires each with a minimum aggregate cross-sectional area of 0.017 square inch (11 mm²) shall be provided in horizontal bed joints spaced not more than 16 inches (406 mm) on center vertically.

R606.15 Metal accessories. Joint reinforcement, anchors, ties and wire fabric shall conform to the following: ASTM A 82 for wire anchors and ties; ASTM A 36 for plate, headed and bent bar anchors; ASTM A 510 for corrugated sheet metal anchors and ties; ASTM A 951 for joint reinforcement; ASTM B 227 for copper-clad steel wire ties; or ASTM A 167 for stainless steel hardware.

SECTION R607 UNIT MASONRY

R607.1 Mortar. Mortar for use in masonry construction shall comply with ASTM C 270. The type of mortar shall be in accordance with Sections R607.1.1, R607.1.2 and R607.1.3 and shall meet the proportion specifications of Table R607.1 or the property specifications of ASTM C 270.

~~R607.2 Placing mortar and masonry units.~~

SECTION R609 GROUTED MASONRY

~~R609.1 General.~~ Grouted multiple-wythe masonry is a form of construction in which the space between the wythes is solidly filled with grout. It is not necessary for the cores of masonry units to be filled with grout. Grouted hollow unit masonry is a form of construction in which certain cells of hollow units are continuously filled with grout.

~~R609.1.2 Grouting requirements.~~ Maximum pour heights and the minimum dimensions of spaces provided for grout placement shall conform to Table R609.1.2. If the work is stopped for one hour or longer, the horizontal construction joints shall be formed by stopping all tiers at the same elevation and with the grout 1 inch (25 mm) below the top.

~~R609.1.3 Grout space (cleaning).~~ Provision shall be made for cleaning grout space. Mortar projections that project more than 1/2 inch (13 mm) into grout space and any other foreign matter shall be removed from grout space prior to inspection and grouting.

~~R609.1.4 Grout placement.~~ Grout shall be a plastic mix suitable for pumping without segregation of the constituents and shall be mixed thoroughly. Grout shall be placed by pumping or by an *approved* alternate method and shall be placed before any initial set occurs and in no case more than 1 1/2 hours after water has been added. Grouting shall be done in a continuous pour, in lifts not exceeding 5 feet (1524 mm). It shall be consolidated by puddling or mechanical vibrating during placing and reconsolidated after excess moisture has been absorbed but before plasticity is lost.

~~R609.1.4.1 Grout pumped through aluminum pipes.~~ Grout shall not be pumped through aluminum pipes.

~~R609.1.5 Cleanouts.~~ Where required by the *building official*, cleanouts shall be provided as specified in this section. The cleanouts shall be sealed before grouting and after inspection.

~~R609.1.5.1 Grouted multiple-wythe masonry.~~ Cleanouts shall be provided at the bottom course of the exterior wythe at each pour of grout where such pour exceeds 5 feet (1524 mm) in height.

~~R609.1.5.2 Grouted hollow unit masonry.~~ Cleanouts shall be provided at the bottom course of each cell to be grouted at each pour of grout, where such pour exceeds 4 feet (1219 mm) in height.

~~R609.2.2 Grout spaces.~~ Fine grout shall be used when interior vertical space to receive grout does not exceed 2 inches (51 mm) in thickness. Interior vertical spaces exceeding 2 inches (51 mm) in thickness shall use coarse or fine grout.

~~R609.3 Reinforced grouted multiple-wythe masonry.~~ Reinforced grouted multiple-wythe masonry shall conform to all the requirements specified in Sections R609.1 and R609.2 and the requirements of this section.

~~R609.3.1 Construction.~~ The thickness of grout or mortar between masonry units and reinforcement shall not be less than 1/4 inch (7 mm), except that 1/4-inch (7 mm) bars may be laid in horizontal mortar joints at least 1/2 inch (13 mm) thick, and steel wire reinforcement may be laid in horizontal mortar joints at least twice the thickness of the wire diameter.

~~R609.4 Reinforced hollow unit masonry.~~ Reinforced hollow unit masonry shall conform to all the requirements of Section R609.1 and the requirements of this section.

~~R609.4.1 Construction.~~ Requirements for construction shall be as follows:

1. ~~Reinforced hollow-unit masonry shall be built to preserve the unobstructed vertical continuity of the cells to be filled. Walls and cross webs forming cells to be filled shall be full-bedded in mortar to prevent leakage of grout. Head and end joints shall be solidly filled with mortar for a distance in from the face of the wall or unit not less than the thickness of the longitudinal face shells. Bond shall be provided by lapping units in successive vertical courses.~~
2. ~~Cells to be filled shall have vertical alignment sufficient to maintain a clear, unobstructed continuous vertical cell of dimensions prescribed in Table R609.1.2.~~
3. ~~Vertical reinforcement shall be held in position at top and bottom and at intervals not exceeding 200 diameters of the reinforcement.~~
4. ~~Cells containing reinforcement shall be filled solidly with grout. Grout shall be poured in lifts of 8-foot (2438 mm) maximum height. When a total grout pour exceeds 8 feet (2438 mm) in height, the grout shall be placed in lifts not exceeding 5 feet (1524 mm) and special inspection during grouting shall be required.~~
5. ~~Horizontal steel shall be fully embedded by grout in an uninterrupted pour.~~

Add new standards to Chapter 44 as follows:

ASTM

C56 Standard Specification for Structural Clay Nonloadbearing Tile
C126 Standard Specification for Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units
C212 Standard Specification for Structural Clay Facing Tile
C503 Standard Specification for Marble Dimension Stone
C568 Standard Specification for Limestone Dimension Stone
C615 Standard Specification for Granite Dimension Stone
C629 Standard Specification for Slate Dimension Stone
C744 Standard Specification for Prefaced Concrete and Calcium Silicate Masonry Units
C946 Standard Practice for Construction of Dry-Stacked, Surface-Bonded Walls
C1088 Standard Specification for Thin Veneer Brick Units Made From Clay or Shale
C1364 Standard Specification for Architectural Cast Stone
C1386 Standard Specification for Precast Autoclaved Aerated Concrete (AAC) Wall Construction Units
C1405 Standard Specification for Glazed Brick (Single Fired, Brick Units)
C1634 Standard Specification for Concrete Facing Brick

ANSI

A118.4 American National Standard Specifications for Latex-Portland Cement Mortar

Reason: This change proposal is largely a clean-up and consolidation of the masonry design and construction requirements currently scattered throughout Sections R606, R607, R608, and R609. The provisions of these four sections have evolved over time somewhat autonomously resulting in conflicts and disconnects. For example, mortar requirements for masonry construction are covered in Section R607; however these requirements are not cited by Sections R606, R608, or R609.

Given the substantial reorganization, there are some technical differences proposed here compared to the existing requirements of Sections R606, R607, R608, and R609:

- A new Section R602.2 has been added to define the minimum requirements for masonry materials. While the IRC covers material requirements for mortar and grout, masonry unit requirements are not explicitly defined and as such are proposed to be added. Where the IRC does not define masonry material requirements, the provisions of the IBC are proposed.
- There are several conflicts in the existing grouting requirements. Grout pour height triggering cleanouts vary depending upon whether the masonry construction is multi-wythe, single wythe, or reinforced. Here, the grout lift requirements triggering cleanouts is changed to 64 inches for all masonry construction to be consistent with current IBC requirements. Similarly, grout lift requirements triggering special inspection are increased from 60 to 64 inches for consistency.
- Some non-mandatory language is revised.
- Section R606.12.3 introduces a limit on the use of AAC masonry in shear walls assigned to SDC D consistent with existing IBC limits.
- Redundant provisions are removed. For example, Section R606.8, which addresses minimum horizontal reinforcement requirements for masonry laid in stack bond, is already covered by Section R606.3.6.2. Likewise, grout space requirements per Section R609.2.2 are covered by the grout space requirements of Table R606.3.4.1.

- A new Section R606.14 is added that provides a pointer to the anchored and adhered veneer provisions of Chapter 7.

Cost Impact: This code change will not increase the cost of construction.

Analysis: A review of the standards proposed for inclusion in the code, ASTM C 56, ASTM C 126, ASTM C212, ASTM C 503, ASTM C 568, ASTM C 615, ASTM C 616, ASTM C 629, ASTM C 744, ASTM C 946, ASTM C 1088, ASTM C1364, ASTM C1386, ASTM C 1405, ASTM C 1634 and ANSI A 118.4 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

RB332-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

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Figure R606.11(1)

Proponent: Jason Thompson, National Concrete Masonry Association representing Masonry Alliance for Codes and Standards (jthompson@ncma.org)

Revise as follows:

LEDGER BOLT SIZE AND SPACING		
JOIST SPAN	BOLT SIZE AND SPACING	
	ROOF	FLOOR
10 FT.	1/2 AT 2 FT. 06 IN. 7/8 AT 3 FT. 46 IN.	1/2 AT 2 FT. 0 IN. 7/8 AT 2 FT. 89 IN.
10-15 FT.	1/2 AT 1 FT. 49 IN. 7/8 AT 2 FT. 06 IN.	1/2 AT 1 FT. 4 IN. 7/8 AT 2 FT. 0 IN.
15-20 FT.	1/2 AT 04 FT. 83 IN. 7/8 AT 2 FT. 0 IN.	1/2 AT 04 FT. 80 IN. 7/8 AT 1 FT. 46 IN.

FIGURE R606.11(1)
ANCHORAGE REQUIREMENTS FOR MASONRY WALLS LOCATED IN SEISMIC DESIGN
CATEGORY a, B OR c AND WHERE WIND LOADS ARE LESS THAN 30 PSF

(Portions of Figure not shown remain unchanged)

Reason: The ledger bolt spacing options currently shown in Figure R606.11(1) have caused confusion because the spacings are not based on a standard masonry module. This change proposal conservatively reduces the anchor spacing to correspond to an 8 inch module.

Cost Impact: This code change will increase the cost of construction.

RB333-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R606.11(1)F-RB-THOMPSON.doc

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R611.2, R611.6.2, Table R611.6(1), Table R611.6(2), Table R611.6(3), Table R611.6(4), R611.7.1.1, Table R611.7(1A), Table R611.7(1B), Table R611.7(1C), Figure R611.9(1), Table R611.9(1), Figure R611.9(2), Table R611.9(2), Figure R611.9(3), Table R611.9(3), Figure R611.9(4), Table R611.9(4), Figure R611.9(5), Table R611.9(5), Figure R611.9(6), Table R611.9(6), Figure R611.9(7), Table R611.9(7), Figure R611.9(8), Table R611.9(8), Figure R611.9(9), Table R611.9(9), Figure R611.9(10), Table R611.9(10), Figure R611.9(11), Table R611.9(11), Figure R611.9(12), Table R611.9(12), R611.9.2, R611.9.3, R611.10

Proponent: Stephen S. Szoke, P.E., Portland Cement Association

Revise as follows:

R611.2 Applicability limits. The provisions of this section shall apply to the construction of exterior concrete walls for buildings not greater than 60 feet (18 288 mm) in plan dimensions, floors with clear spans not greater than 32 feet (9754 mm) and roofs with clear spans not greater than 40 feet (12 192 mm). Buildings shall not exceed 35 feet (10 668 mm) in mean roof height or two stories in height above-grade. Floor/ceiling dead loads shall not exceed 10 pounds per square foot (479 Pa), roof/ceiling dead loads shall not exceed 15 pounds per square foot (718 Pa) and *attic* live loads shall not exceed 20 pounds per square foot (958 Pa). Roof overhangs shall not exceed 2 feet (610 mm) of horizontal projection beyond the exterior wall and the dead load of the overhangs shall not exceed 8 pounds per square foot (383 Pa).

Walls constructed in accordance with the provisions of this section shall be limited to buildings subjected to a maximum design wind speed of ~~130 miles per hour (58 m/s)~~ 160 miles per hour (72 m/s) Exposure B, ~~110 miles per hour (49 m/s)~~ 136 miles per hour (61 m/s) Exposure C and ~~100 miles per hour (45 m/s)~~ 125 miles per hour (56 m/s) Exposure D. Walls constructed in accordance with the provisions of this section shall be limited to detached one- and two-family *dwelling*s and townhouses assigned to Seismic Design Category A or B, and detached one- and two-family *dwelling*s assigned to Seismic Design Category C.

Buildings that are not within the scope of this section shall be designed in accordance with PCA 100 or ACI 318.

R611.6.2 Wall reinforcement for wind. Vertical wall reinforcement for resistance to out-of-plane wind forces shall be determined from Table R611.6(1), R611.6(2), R611.6(3) or R611.6(4). For the design of non-loadbearing walls, in Tables R611.6(1), R611.6(2) and R611.6(3) use the appropriate column labeled "top." Also, see Sections R611.7.2.2.2 and R611.7.2.2.3. There shall be a vertical bar at all corners of exterior walls. Unless more horizontal reinforcement is required by Section R611.7.2.2.1, the minimum horizontal reinforcement shall be four No. 4 bars [Grade 40 (280 MPa)] placed as follows: top bar within 12 inches (305 mm) of the top of the wall, bottom bar within 12 inches (305 mm) of the finish floor, and one bar each at approximately one-third and two-thirds of the wall height.

TABLE R611.6(1)
MINIMUM VERTICAL REINFORCEMENT FOR FLAT ABOVE-GRADE WALLS^{a, b, c, d, e}

MAXIMUM WIND SPEED (mph)			MAXIMUM UNSUPPORTED WALL HEIGHT PER STORY (feet)	MINIMUM VERTICAL REINFORCEMENT-BAR SIZE AND SPACING (inches) ^{f, g}							
				Nominal ^h wall thickness (inches)							
Exposure Category				4		6		8		10	
B	C	D		Top ⁱ	Side ⁱ	Top ⁱ	Side ⁱ	Top ⁱ	Side ⁱ	Top ⁱ	Side ⁱ

85	—	—	8	4@48	4@48	4@48	4@48	4@48	4@48	4@48	4@48
			9	4@48	4@43	4@48	4@48	4@48	4@48	4@48	4@48
			10	4@47	4@36	4@48	4@48	4@48	4@48	4@48	4@48
90	—	—	8	4@48	4@47	4@48	4@48	4@48	4@48	4@48	4@48
			9	4@48	4@39	4@48	4@48	4@48	4@48	4@48	4@48
			10	4@42	4@34	4@48	4@48	4@48	4@48	4@48	4@48
100	85	—	8	4@48	4@40	4@48	4@48	4@48	4@48	4@48	4@48
			9	4@42	4@34	4@48	4@48	4@48	4@48	4@48	4@48
			10	4@34	4@34	4@48	4@48	4@48	4@48	4@48	4@48
110	90	85	8	4@44	4@34	4@48	4@48	4@48	4@48	4@48	4@48
			9	4@34	4@34	4@48	4@48	4@48	4@48	4@48	4@48
			10	4@34	4@31	4@48	4@37	4@48	4@48	4@48	4@48
120	100	90	8	4@36	4@34	4@48	4@48	4@48	4@48	4@48	4@48
			9	4@34	4@32	4@48	4@38	4@48	4@48	4@48	4@48
			10	4@30	4@27	4@48	5@48	4@48	4@48	4@48	4@48
130	110	100	8	4@34	4@34	4@48	4@48	4@48	4@48	4@48	4@48
			9	4@32	4@28	4@48	4@33	4@48	4@48	4@48	4@48
			10	4@26	4@23	4@48	5@43	4@48	4@48	4@48	4@48

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s, 1 pound per square inch = 1.895 kPa, 1 square foot = 0.0929 m².

- Table is based on ASCE 7 components and cladding wind pressures for an enclosed building using a mean roof height of 35 feet, interior wall area 4, an effective wind area of 10 square feet, and topographic factor, K_{zt} , and importance factor, I , equal to 1.0.
- Table is based on concrete with a minimum specified compressive strength of 2,500 psi.
- See Section R611.6.5 for location of reinforcement in wall.
- Deflection criterion is $L/240$, where L is the unsupported height of the wall in inches.
- Interpolation is not permitted.
- Where No. 4 reinforcing bars at a spacing of 48 inches are specified in the table, use of bars with a minimum yield strength of 40,000 psi or 60,000 psi is permitted.
- Other than for No. 4 bars spaced at 48 inches on center, table values are based on reinforcing bars with a minimum yield strength of 60,000 psi. Vertical reinforcement with a yield strength of less than 60,000 psi and/or bars of a different size than specified in the table are permitted in accordance with Section R611.5.4.7 and Table R611.5.4(2).
- See Table R611.3 for tolerances on nominal thicknesses.
- Top means gravity load from roof and/or floor construction bears on top of wall. Side means gravity load from floor construction is transferred to wall from a wood ledger or cold-formed steel track bolted to side of wall. Where floor framing members span parallel to the wall, use of the top bearing condition is permitted.

TABLE R611.6(1)
MINIMUM VERTICAL REINFORCEMENT FOR FLAT ABOVE-GRADE
WALLS^{a, b, c, d, e}

MAXIMUM WIND SPEED (mph)			MINIMUM VERTICAL REINFORCEMENT-BAR SIZE AND SPACING (inches)^{f, g}							
			Nominal^h wall thickness (inches)							
Exposure Category			4		6		8		10	
			Topⁱ	Sideⁱ	Topⁱ	Sideⁱ	Topⁱ	Sideⁱ	Topⁱ	Sideⁱ
B	C	D								

115			8	4@48	4@48	4@48	4@48	4@48	4@48	4@48	4@48
			9	4@48	4@39	4@48	4@48	4@48	4@48	4@48	4@48
			10	4@41	4@34	4@48	4@48	4@48	4@48	4@48	4@48
120			8	4@48	4@43	4@48	4@48	4@48	4@48	4@48	4@48
			9	4@48	4@36	4@48	4@48	4@48	4@48	4@48	4@48
			10	4@37	4@34	4@48	4@48	4@48	4@48	4@48	4@48
130	110		8	4@48	4@38	4@48	4@48	4@48	4@48	4@48	4@48
			9	4@39	4@34	4@48	4@48	4@48	4@48	4@48	4@48
			10	4@34	4@34	4@48	4@48	4@48	4@48	4@48	4@48
140	119	110	8	4@43	4@34	4@48	4@48	4@48	4@48	4@48	4@48
			9	4@34	4@34	4@48	4@48	4@48	4@48	4@48	4@48
			10	4@34	4@31	4@48	4@48	4@48	4@48	4@48	4@48
150	127	117	8	4@37	4@34	4@48	4@48	4@48	4@48	4@48	4@48
			9	4@34	4@33	4@48	4@48	4@48	4@48	4@48	4@48
			10	4@31	4@27	4@48	4@48	4@48	4@48	4@48	4@48
160	136	125	8	4@34	4@34	4@48	4@48	4@48	4@48	4@48	4@48
			9	4@34	4@29	4@48	4@48	4@48	4@48	4@48	4@48
			10	4@27	4@24	4@48	4@48	4@48	4@48	4@48	4@48

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s, 1 pound per square inch = 1.895 kPa, 1 square foot = 0.0929 m².

a. Table is based on ASCE 7 components and cladding wind pressures for an enclosed building using a mean roof height of 35 feet, interior wall area 4, an effective wind area of 10 square feet, topographic factor, K_z , equal to 1.0, and Risk Category II.

b. Table is based on concrete with a minimum specified compressive strength of 2,500 psi.

c. See Section R611.6.5 for location of reinforcement in wall.

d. Deflection criterion is $L/240$, where L is the unsupported height of the wall in inches.

e. Interpolation is not permitted.

f. Where No. 4 reinforcing bars at a spacing of 48 inches are specified in the table as indicated by shaded cells, use of bars with a minimum yield strength of 40,000 psi or 60,000 psi is permitted.

g. Other than for No. 4 bars spaced at 48 inches on center, table values are based on reinforcing bars with a minimum yield strength of 60,000 psi. Vertical reinforcement with a yield strength of less than 60,000 psi and/or bars of a different size than specified in the table are permitted in accordance with Section R611.5.4.7 and Table R611.5.4(2).

h. See Table R611.3 for tolerances on nominal thicknesses.

i. "Top" means gravity load from roof and/or floor construction bears on top of wall. "Side" means gravity load from floor construction is transferred to wall from a wood ledger or cold-formed steel track bolted to side of wall. For nonloadbearing walls and where floor framing members span parallel to the wall, use of the "top" bearing condition is permitted.

TABLE R611.6(2)
MINIMUM VERTICAL REINFORCEMENT FOR WAFFLE GRID ABOVE-GRADE WALLS^{a, b, c, d, e}

MAXIMUM WIND SPEED (mph)			MAXIMUM UNSUPPORTED WALL HEIGHT PER STORY (feet)	MINIMUM VERTICAL REINFORCEMENT-BAR SIZE AND SPACING (inches) ^{f,g}			
				Nominal ^h wall thickness (inches)			
Exposure Category				6		8	
				Top ⁱ	Side ⁱ	Top ⁱ	Side ⁱ
85	—	—	8	4@48	4@36, 5@48	4@48	4@48
			9	4@48	4@30, 5@47	4@48	4@45
			10	4@48	4@26, 5@40	4@48	4@39

90	—	—	8	4@48	4@33, 5@48	4@48	4@48
			9	4@48	4@28, 5@43	4@48	4@42
			10	4@31, 5@48	4@24, 5@37	4@48	4@36
100	85	—	8	4@48	4@28, 5@44	4@48	4@43
			9	4@31, 5@48	4@24, 5@37	4@48	4@36
			10	4@25, 5@39	4@24, 5@37	4@48	4@31, 5@48
110	90	85	8	4@33, 5@48	4@25, 5@38	4@48	4@38
			9	4@26, 5@40	4@24, 5@37	4@48	4@31, 5@48
			10	4@24, 5@37	4@23, 5@35	4@48	4@27, 5@41
120	100	90	8	4@27, 5@42	4@24, 5@37	4@48	4@33, 5@48
			9	4@24, 5@37	4@23, 5@36	4@48	4@27, 5@43
			10	4@23, 5@35	4@19, 5@30	4@48	4@23, 5@36
130	110	100	8	4@24, 5@37	4@24, 5@37	4@48	4@29, 5@45
			9	4@24, 5@37	4@20, 5@32	4@48	4@24, 5@37
			10	4@19, 5@30	4@17, 5@26	4@23, 5@36	4@20, 5@31

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s, 1 pound per square inch = 6.895 kPa, 1 square foot = 0.0929 m².

- Table is based on ASCE 7 components and cladding wind pressures for an enclosed building using a mean roof height of 35 feet, interior wall area 4, an effective wind area of 10 square feet, and topographic factor, K_{zt} , and importance factor, I , equal to 1.0.
- Table is based on concrete with a minimum specified compressive strength of 2,500 psi.
- See Section R611.6.5 for location of reinforcement in wall.
- Deflection criterion is $L/240$, where L is the unsupported height of the wall in inches.
- Interpolation is not permitted.
- Where No. 4 reinforcing bars at a spacing of 48 inches are specified in the table, use of bars with a minimum yield strength of 40,000 psi or 60,000 psi is permitted.
- Other than for No. 4 bars spaced at 48 inches on center, table values are based on reinforcing bars with a minimum yield strength of 60,000 psi. Maximum spacings shown are the values calculated for the specified bar size. Where the bar used is Grade 60 and the size specified in the table, the actual spacing in the wall shall not exceed a whole-number multiple of 12 inches (i.e., 12, 24, 36 and 48) that is less than or equal to the tabulated spacing. Vertical reinforcement with a yield strength of less than 60,000 psi and/or bars of a different size than specified in the table are permitted in accordance with Section R611.5.4.7 and Table R611.5.4(2).
- See Table R611.3 for minimum core dimensions and maximum spacing of horizontal and vertical cores.
- Top means gravity load from roof and/or floor construction bears on top of wall. Side means gravity load from floor construction is transferred to wall from a wood ledger or cold-formed steel track bolted to side of wall. Where floor framing members span parallel to the wall, the top bearing condition is permitted to be used.

TABLE R611.6(2)
MINIMUM VERTICAL REINFORCEMENT FOR WAFFLE-GRID ABOVE-GRADE WALLS^{a, b, c, d, e}

<u>MAXIMUM WIND SPEED (mph)</u>			<u>MAXIMUM UNSUPPORTED WALL HEIGHT PER STORY (feet)</u>	<u>MINIMUM VERTICAL REINFORCEMENT-BAR SIZE AND SPACING (inches)^{f,g}</u>			
				<u>Nominal^h wall thickness (inches)</u>			
<u>Exposure Category</u>				<u>6</u>		<u>8</u>	
				<u>Topⁱ</u>	<u>Sideⁱ</u>	<u>Topⁱ</u>	<u>Sideⁱ</u>
<u>B</u>	<u>C</u>	<u>D</u>	<u>8</u>	<u>4@48</u>	<u>4@48</u>	<u>4@48</u>	<u>4@48</u>
<u>115</u>			<u>9</u>	<u>4@48</u>	<u>5@43</u>	<u>4@48</u>	<u>4@48</u>
			10	<u>5@47</u>	<u>5@37</u>	<u>4@48</u>	<u>4@48</u>

<u>120</u>			<u>8</u>	<u>4@48</u>	<u>5@48</u>	<u>4@48</u>	<u>4@48</u>
			<u>9</u>	<u>4@48</u>	<u>5@40</u>	<u>4@48</u>	<u>4@48</u>
			<u>10</u>	<u>5@43</u>	<u>5@37</u>	<u>4@48</u>	<u>4@48</u>
<u>130</u>	<u>110</u>		<u>8</u>	<u>4@48</u>	<u>5@42</u>	<u>4@48</u>	<u>4@48</u>
			<u>9</u>	<u>5@45</u>	<u>5@37</u>	<u>4@48</u>	<u>4@48</u>
			<u>10</u>	<u>5@37</u>	<u>5@37</u>	<u>4@48</u>	<u>4@48</u>
<u>140</u>	<u>119</u>	<u>110</u>	<u>8</u>	<u>4@48</u>	<u>5@38</u>	<u>4@48</u>	<u>4@48</u>
			<u>9</u>	<u>5@39</u>	<u>5@37</u>	<u>4@48</u>	<u>4@48</u>
			<u>10</u>	<u>5@37</u>	<u>5@35</u>	<u>4@48</u>	<u>4@48</u>
<u>150</u>	<u>127</u>	<u>117</u>	<u>8</u>	<u>5@43</u>	<u>5@37</u>	<u>4@48</u>	<u>4@48</u>
			<u>9</u>	<u>5@37</u>	<u>5@37</u>	<u>4@48</u>	<u>4@48</u>
			<u>10</u>	<u>5@36</u>	<u>6@44</u>	<u>4@48</u>	<u>4@48</u>
<u>160</u>	<u>136</u>	<u>125</u>	<u>8</u>	<u>5@38</u>	<u>5@37</u>	<u>4@48</u>	<u>4@48</u>
			<u>9</u>	<u>5@37</u>	<u>6@47</u>	<u>4@48</u>	<u>4@48</u>
			<u>10</u>	<u>6@45</u>	<u>6@39</u>	<u>4@48</u>	<u>6@46</u>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s, 1 pound per square inch = 6.895 kPa, 1 square foot = 0.0929 m².

a. Table is based on ASCE 7 components and cladding wind pressures for an enclosed building using a mean roof height of 35 feet, interior wall area 4, an effective wind area of 10 square feet, topographic factor, K_{zt} equal to 1.0, and Risk Category II.

b. Table is based on concrete with a minimum specified compressive strength of 2,500 psi.

c. See Section R611.6.5 for location of reinforcement in wall.

d. Deflection criterion is $L/240$, where L is the unsupported height of the wall in inches.

e. Interpolation is not permitted.

f. Where No. 4 reinforcing bars at a spacing of 48 inches are specified in the table as indicated by shaded cells, use of bars with a minimum yield strength of 40,000 psi or 60,000 psi is permitted.

g. Other than for No. 4 bars spaced at 48 inches on center, table values are based on reinforcing bars with a minimum yield strength of 60,000 psi. Maximum spacings shown are the values calculated for the specified bar size. Where the bar used is Grade 60 and the size specified in the table, the actual spacing in the wall shall not exceed a whole-number multiple of 12 inches (i.e., 12, 24, 36 and 48) that is less than or equal to the tabulated spacing. Vertical reinforcement with a yield strength of less than 60,000 psi and/or bars of a different size than specified in the table are permitted in accordance with Section R611.5.4.7 and Table R611.5.4(2).

h. See Table R611.3 for minimum core dimensions and maximum spacing of horizontal and vertical cores.

i. "Top" means gravity load from roof and/or floor construction bears on top of wall. "Side" means gravity load from floor construction is transferred to wall from a wood ledger or cold-formed steel track bolted to side of wall. For non-loadbearing walls and where floor framing members span parallel to the wall, the "top" bearing condition is permitted to be used.

TABLE R611.6(3)
MINIMUM VERTICAL REINFORCEMENT FOR 6-INCH SCREEN-GRID ABOVE-GRADE WALLS^{a, b, c, d, e}

MAXIMUM WIND SPEED (mph)			MAXIMUM UNSUPPORTED WALL HEIGHT PER STORY (feet)	MINIMUM VERTICAL REINFORCEMENT BAR SIZE AND SPACING (inches) ^{f, g}	
				Nominal ^h wall thickness (inches)	
Exposure Category				6	
				Top ⁱ	Side ⁱ
B	C	D			
85	—	—	8	4@48	4@34, 5@48
			9	4@48	4@29, 5@45
			40	4@48	4@25, 5@39
90	—	—	8	4@48	4@31, 5@48

			9	4@48	4@27, 5@41
			10	4@30, 5@47	4@23, 5@35
100	85	—	8	4@48	4@27, 5@42
			9	4@30, 5@47	4@23, 5@35
			10	4@24, 5@38	4@22, 5@34
110	90	85	8	4@48	4@24, 5@37
			9	4@25, 5@38	4@22, 5@34
			10	4@22, 5@34	4@22, 5@34
120	100	90	8	4@26, 5@41	4@22, 5@34
			9	4@22, 5@34	4@22, 5@34
			10	4@22, 6@34	4@19, 5@26
130	110	100	8	4@22, 5@35	4@22, 5@34
			9	4@22, 5@34	4@20, 5@30
			10	4@19, 5@29	4@16, 5@25

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s, 1 pound per square inch = 6.895 kPa, 1 square foot = 0.0929 m².

- Table is based on ASCE 7 components and cladding wind pressures for an enclosed building using a mean roof height of 35 feet, interior wall area 4, an effective wind area of 10 square feet, and topographic factor, K_{zt} , and importance factor, I , equal to 1.0.
- Table is based on concrete with a minimum specified compressive strength of 2,500 psi.
- See Section R611.6.5 for location of reinforcement in wall.
- Deflection criterion is $L/240$, where L is the unsupported height of the wall in inches.
- Interpolation is not permitted.
- Where No. 4 reinforcing bars at a spacing of 48 inches are specified in the table, use of bars with a minimum yield strength of 40,000 psi or 60,000 psi is permitted.
- Other than for No. 4 bars spaced at 48 inches on center, table values are based on reinforcing bars with a minimum yield strength of 60,000 psi. Maximum spacings shown are the values calculated for the specified bar size. Where the bar used is Grade 60 and the size specified in the table, the actual spacing in the wall shall not exceed a whole-number multiple of 12 inches (i.e., 12, 24, 36 and 48) that is less than or equal to the tabulated spacing. Vertical reinforcement with a yield strength of less than 60,000 psi and/or bars of a different size than specified in the table are permitted in accordance with Section R611.5.4.7 and Table R611.5.4(2).
- See Table R611.3 for minimum core dimensions and maximum spacing of horizontal and vertical cores.
- Top means gravity load from roof and/or floor construction bears on top of wall. Side means gravity load from floor construction is transferred to wall from a wood ledger or cold-formed steel track bolted to side of wall. Where floor framing members span parallel to the wall, use of the top bearing condition is permitted.

TABLE R611.6(3)
MINIMUM VERTICAL REINFORCEMENT FOR 6-INCH SCREEN-GRID
ABOVE-GRADE WALLS^{a, b, c, d, e}

<u>MAXIMUM WIND SPEED (mph)</u>			<u>MAXIMUM UNSUPPORTED WALL HEIGHT PER STORY (feet)</u>	<u>MINIMUM VERTICAL REINFORCEMENT-BAR SIZE AND SPACING (inches)</u> ^{f,g}	
<u>Exposure Category</u>				<u>Nominal^h wall thickness (inches)</u>	
<u>B</u>	<u>C</u>	<u>D</u>		<u>6</u>	
				<u>Top</u> ⁱ	<u>Side</u> ⁱ
115			<u>8</u>	4@48	4@48
			<u>9</u>	4@48	5@41
			10	4@48	6@48

120			8	4@48	4@48
			9	4@48	5@38
			10	5@42	6@48
130	110		8	4@48	5@41
			9	5@44	6@48
			10	5@35	6@48
140	119	110	8	4@48	5@36
			9	5@38	6@48
			10	6@48	6@48
150	127	117	8	5@42	6@48
			9	6@48	6@48
			10	6@48	6@42
160	136	125	8	5@37	6@48
			9	6@48	6@45
			10	6@44	6@38

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s, 1 pound per square inch = 6.895 kPa, 1 square foot = 0.0929 m².

a. Table is based on ASCE 7 components and cladding wind pressures for an enclosed building using a mean roof height of 35 feet, interior wall area 4, an effective wind area of 10 square feet, topographic factor, K_{zt} , equal to 1.0, and Risk Category II.

b. Table is based on concrete with a minimum specified compressive strength of 2,500 psi.

c. See Section R611.6.5 for location of reinforcement in wall.

d. Deflection criterion is $L/240$, where L is the unsupported height of the wall in inches.

e. Interpolation is not permitted.

f. Where No. 4 reinforcing bars at a spacing of 48 inches are specified in the table as indicated by shaded cells, use of bars with a minimum yield strength of 40,000 psi or 60,000 psi is permitted.

g. Other than for No. 4 bars spaced at 48 inches on center, table values are based on reinforcing bars with a minimum yield strength of 60,000 psi. Maximum spacings shown are the values calculated for the specified bar size. Where the bar used is Grade 60 and the size specified in the table, the actual spacing in the wall shall not exceed a whole-number multiple of 12 inches (i.e., 12, 24, 36 and 48) that is less than or equal to the tabulated spacing. Vertical reinforcement with a yield strength of less than 60,000 psi and/or bars of a different size than specified in the table are permitted in accordance with Section R611.5.4.7 and Table R611.5.4(2).

h. See Table R611.3 for minimum core dimensions and maximum spacing of horizontal and vertical cores.

i. "Top" means gravity load from roof and/or floor construction bears on top of wall. "Side" means gravity load from floor construction is transferred to wall from a wood ledger or cold-formed steel track bolted to side of wall. For non-loadbearing wall and where floor framing members span parallel to the wall, use of the "top" bearing condition is permitted.

TABLE R611.6(4)
MINIMUM VERTICAL REINFORCEMENT FOR FLAT, WAFFLE- AND SCREEN-GRID
ABOVE-GRADE WALLS DESIGNED CONTINUOUS WITH FOUNDATION STEM WALLS^{a, b, c, d, e, k, l}

MAXIMUM WIND SPEED (mph)			HEIGHT OF STEM WALL ^{h,i} (feet)	MAXIMUM DESIGN LATERAL SOIL LOAD (psf/ft)	MAXIMUM UNSUPPORTED HEIGHT OF ABOVE-GRADE WALL (feet)	MINIMUM VERTICAL REINFORCEMENT-BAR SIZE AND SPACING (inches) ^{f,g}						
						Wall type and nominal thickness ^j (inches)						
Exposure Category						Flat				Waffle		Screen
						4	6	8	10	6	8	6
85	—	—	3	30	8	4@33	4@39	4@48	4@48	4@24	4@28	4@22
					10	4@26	5@48	4@41	4@48	4@19	4@22	4@18
				60	10	4@21	5@40	5@48	4@44	4@16	4@19	4@15
			6	30	10	DR	5@22	6@35	6@43	DR	4@11	DR

				60	10	DR	DR	6@26	6@28	DR	DR	DR
90	—	—	3	30	8	4@30	4@36	4@48	4@48	4@22	4@26	4@21
					10	4@24	5@44	4@38	4@48	4@17	4@21	4@17
				60	10	4@20	5@37	4@48	4@41	4@15	4@18	4@14
			6	30	10	DR	5@21	6@35	6@41	DR	4@10	DR
				60	10	DR	DR	6@26	6@28	DR	DR	DR
100	85	—	3	30	8	4@26	5@48	4@42	4@48	4@19	4@23	4@18
					10	4@20	5@37	4@33	4@41	4@15	4@18	4@14
			6	60	10	4@17	5@34	5@44	4@36	4@13	4@17	4@12
				30	10	DR	5@20	6@35	6@38	DR	4@9	DR
				60	10	DR	DR	6@24	6@28	DR	DR	DR
110	90	85	3	30	8	4@22	5@42	4@37	4@46	4@16	4@20	4@16
					10	4@17	5@34	5@44	4@35	4@12	4@17	4@12
				60	10	4@15	5@34	5@39	5@48	4@11	4@17	4@11
			6	30	10	DR	5@18	6@35	6@35	DR	4@9	DR
				60	10	DR	DR	6@23	6@28	DR	DR	DR
120	100	90	3	30	8	4@19	5@37	5@48	4@40	4@14	4@17	4@14
					10	4@14	5@34	5@38	5@48	4@11	4@17	4@10
				60	10	4@13	5@33	6@48	5@43	4@10	4@16	4@9
			6	30	10	DR	5@16	6@33	6@32	DR	4@8	DR
				60	10	DR	DR	6@22	6@28	DR	DR	DR
130	110	100	3	30	8	4@17	5@34	5@44	4@36	4@12	4@17	4@10
					10	DR	5@32	6@47	5@42	4@9	4@15	DR
				60	10	DR	5@29	6@43	5@39	DR	4@14	DR
			6	30	10	DR	5@15	6@30	6@29	DR	4@7	DR
				60	10	DR	DR	6@21	6@27	DR	DR	DR

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s, 1 pound per square inch = 6.895 kPa, 1 square foot = 0.0929 m².

a. Table is based on ASCE 7 components and cladding wind pressures for an enclosed building using a mean roof height of 35 feet, interior wall area 4, an effective wind area of 10 square feet, and topographic factor, K_{zt} , and importance factor, I , equal to 1.0.

b. Table is based on concrete with a minimum specified compressive strength of 2,500 psi.

c. See Section R611.6.5 for location of reinforcement in wall.

d. Deflection criterion is $L/240$, where L is the height of the wall in inches from the exterior finish ground level to the top of the above-grade wall.

e. Interpolation is not permitted. For intermediate values of basic wind speed, heights of stem wall and above-grade wall, and design lateral soil load, use next higher value.

- f. Where No. 4 reinforcing bars at a spacing of 48 inches are specified in the table, use of bars with a minimum yield strength of 40,000 psi or 60,000 psi is permitted.
- g. Other than for No. 4 bars spaced at 48 inches on center, table values are based on reinforcing bars with a minimum yield strength of 60,000 psi. Maximum spacings shown are the values calculated for the specified bar size. In waffle and screen-grid walls where the bar used is Grade 60 and the size specified in the table, the actual spacing in the wall shall not exceed a whole-number multiple of 12 inches (i.e., 12, 24, 36 and 48) that is less than or equal to the tabulated spacing. Vertical reinforcement with a yield strength of less than 60,000 psi and/or bars of a different size than specified in the table are permitted in accordance with Section R611.5.4.7 and Table R611.5.4(2).
- h. Height of stem wall is the distance from the exterior finish ground level to the top of the slab-on-ground.
- i. Where the distance from the exterior finish ground level to the top of the slab-on-ground is equal to or greater than 4 feet, the stem wall shall be laterally supported at the top and bottom before backfilling. Where the wall is designed and constructed to be continuous with the above-grade wall, temporary supports bracing the top of the stem wall shall remain in place until the above-grade wall is laterally supported at the top by floor or roof construction.
- j. See Table R611.3 for tolerances on nominal thicknesses, and minimum core dimensions and maximum spacing of horizontal and vertical cores for waffle and screen-grid walls.
- k. Tabulated values are applicable to construction where gravity loads bear on top of wall, and conditions where gravity loads from floor construction are transferred to wall from a wood ledger or cold-formed steel track bolted to side of wall. See Tables R611.6(1), R611.6(2) and R611.6(3).
- l. DR indicates design required.

TABLE R611.6(4)
MINIMUM VERTICAL REINFORCEMENT FOR FLAT, WAFFLE-
AND SCREEN-GRID ABOVE-GRADE WALLS DESIGNED CONTINUOUS WITH
FOUNDATION STEM WALLS^{a, b, c, d, e, k, l}

MAXIMUM WIND SPEED (mph)			HEIGHT OF STEM WALL ^{h, i} (feet)	MAXIMUM DESIGN LATERAL SOIL LOAD (psf/ft)	MAXIMUM UNSUPPORTED HEIGHT OF ABOVE-GRADE WALL (feet)	MINIMUM VERTICAL REINFORCEMENT-BAR SIZE AND SPACING (inches) ^{f, g}						
						Wall type and nominal thickness ^l (inches)						
Exposure Category						Flat				Waffle		Screen
						4	6	8	10	6	8	6
B	C	D				4	6	8	10	6	8	6
115			3	30	8	4@30	4@48	4@48	4@48	4@22	4@26	4@21
					10	4@23	5@43	4@48	4@48	4@17	4@20	4@16
			6	60	10	4@19	5@37	4@48	4@48	4@14	4@17	4@14
				30	10	DR	5@21	6@35	4@48	DR	4@10	DR
				60	10	DR	5@12	6@25	6@28	DR	DR	DR
120			3	30	8	4@28	4@48	4@48	4@48	4@21	4@48	4@20
					10	4@22	5@41	4@48	4@48	4@16	4@19	4@15
			6	60	10	4@18	5@35	4@48	4@48	4@14	4@17	4@13
				30	10	DR	5@21	6@35	4@48	DR	4@10	DR
				60	10	DR	5@12	6@25	6@28	DR	DR	DR
130	110		3	30	8	4@25	4@48	4@48	4@48	4@18	4@22	4@18
					10	4@19	5@36	4@48	4@48	4@14	4@17	4@13
			6	60	10	4@16	5@34	4@48	4@48	4@12	4@17	4@12
				30	10	DR	5@19	6@35	4@48	DR	4@9	DR
				60	10	DR	5@12	6@24	6@28	DR	DR	DR
140	119	110	3	30	8	4@22	5@42	4@48	4@48	4@16	4@20	4@16
					10	4@17	5@34	4@48	4@48	4@21	4@17	4@12
			6	60	10	4@15	5@34	4@48	4@48	4@11	4@17	4@10
				30	10	DR	5@18	6@35	6@35	DR	4@48	DR
				60	10	DR	5@11	6@23	6@28	DR	DR	DR
150	127	117	3	30	8	4@20	5@37	4@48	4@48	4@15	4@18	4@14
					10	4@15	5@34	4@48	4@48	4@11	4@17	4@11
				60	10	4@13	5@34	4@48	4@48	4@10	4@16	4@9

			6	30	10	DR	5@17	6@33	6@32	DR	4@8	DR
				60	10	DR	DR	6@22	6@28	DR	DR	DR
			3	30	8	4@18	5@34	4@48	4@48	4@13	4@17	4@13
					10	4@13	5@34	4@48	4@48	4@10	4@16	4@9
160	136	125		60	10	4@11	5@31	6@45	4@48	4@9	4@14	4@8
			6	30	10	DR	5@15	6@31	6@30	DR	4@7	DR
				60	10	DR	DR	6@21	6@27	DR	DR	DR

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s, 1 pound per square inch = 6.895 kPa, 1 square foot = 0.0929 m².

a. Table is based on ASCE 7 components and cladding wind pressures for an enclosed building using a mean roof height of 35 feet, interior wall area 4, an effective wind area of 10 square feet topographic factor, K_{zt} , equal to 1.0, and Risk Category II.

b. Table is based on concrete with a minimum specified compressive strength of 2,500 psi.

c. See Section R611.6.5 for location of reinforcement in wall.

d. Deflection criterion is $L/240$, where L is the height of the wall in inches from the exterior finish ground level to the top of the above-grade wall.

e. Interpolation is not permitted. For intermediate values of basic wind speed, heights of stem wall and above-grade wall, and design lateral soil load, use next higher value.

f. Where No. 4 reinforcing bars at a spacing of 48 inches are specified in the table as indicated by shaded cells, use of bars with a minimum yield strength of 40,000 psi or 60,000 psi is permitted.

g. Other than for No. 4 bars spaced at 48 inches on center, table values are based on reinforcing bars with a minimum yield strength of 60,000 psi. Maximum spacings shown are the values calculated for the specified bar size. In waffle and screen-grid walls where the bar used is Grade 60 and the size specified in the table, the actual spacing in the wall shall not exceed a whole-number multiple of 12 inches (i.e., 12, 24, 36 and 48) that is less than or equal to the tabulated spacing. Vertical reinforcement with a yield strength of less than 60,000 psi and/or bars of a different size than specified in the table are permitted in accordance with Section R611.5.4.7 and Table R611.5.4(2).

h. Height of stem wall is the distance from the exterior finish ground level to the top of the slab-on-ground.

i. Where the distance from the exterior finish ground level to the top of the slab-on-ground is equal to or greater than 4 feet, the stem wall shall be laterally supported at the top and bottom before backfilling. Where the wall is designed and constructed to be continuous with the above-grade wall, temporary supports bracing the top of the stem wall shall remain in place until the above-grade wall is laterally supported at the top by floor or roof construction.

j. See Table R611.3 for tolerances on nominal thicknesses, and minimum core dimensions and maximum spacing of horizontal and vertical cores for waffle- and screen-grid walls.

k. Tabulated values are applicable to construction where gravity loads bear on top of wall, and conditions where gravity loads from floor construction are transferred to wall from a wood ledger or cold-formed steel track bolted to side of wall. See Tables R611.6(1), R611.6(2) and R611.6(3).

l. DR indicates design required.

R611.7.1.1 Length of solid wall for wind. All buildings shall have solid walls in each exterior endwall line (the side of a building that is parallel to the span of the roof or floor framing) and sidewall line (the side of a building that is perpendicular to the span of the roof or floor framing) to resist lateral in-plane wind forces. The site-appropriate basic wind speed and exposure category shall be used in Tables R611.7(1A) through (1C) to determine the unreduced total length, U_R , of solid wall required in each exterior endwall line and sidewall line. For buildings with a mean roof height of less than 35 feet (10,668 mm), the unreduced values determined from Tables R611.7(1A) through (1C) ~~is~~ are permitted to be reduced by multiplying by the applicable factor, R_1 , from Table R611.7(2); however, reduced values shall not be less than the minimum values in Tables R611.7(1A) through (1C). Where the floor-to-ceiling height of a story is less than 10 feet (3048 mm), the unreduced values determined from Tables R611.7(1A) through (C), including minimum values, ~~is~~ are permitted to be reduced by multiplying by the applicable factor, R_2 , from Table R611.7(3). To account for different design strengths than assumed in determining the values in Tables R611.7(1A) through (1C), the unreduced lengths determined from Tables R611.7(1A) through (1C), including minimum values, are permitted to be reduced by multiplying by the applicable factor, R_3 , from Table R611.7(4). The reductions permitted by Tables R611.7(2), R611.7(3) and R611.7(4) are cumulative.

The total length of solid wall segments, TL , in a wall line that comply with the minimum length requirements of Section R611.7.2.1 [see Figure R611.7(1)] shall be equal to or greater than the product

of the unreduced length of solid wall from Tables R611.7(1A) through (1C), UR and the applicable reduction factors, if any, from Tables R611.7(2), R611.7(3) and R611.7(4) as indicated by Equation R6-1.

$$TL \geq R_1 \cdot R_2 \cdot R_3 \cdot UR \quad \text{(Equation R6-1)}$$

where:

TL = Total length of solid wall segments in a wall line that comply with Section R611.7.2.1 [see Figure R611.7(1)];

R_1 = 1.0 or reduction factor for mean roof height from Table R611.7(2);

R_2 = 1.0 or reduction factor for floor-to-ceiling wall height from Table R611.7(3);

R_3 = 1.0 or reduction factor for design strength from Table R611.7(4), and

UR = Unreduced length of solid wall from Tables R611.7(1A) through (1C).

The total length of solid wall in a wall line, TL , shall not be less than that provided by two solid wall segments complying with the minimum length requirements of Section R611.7.2.1.

To facilitate determining the required wall thickness, wall type, number and *grade* of vertical bars at the each end of each solid wall segment, and whether shear reinforcement is required, use of Equation R6-2 is permitted.

$$R_3 \leq \frac{TL}{R_1 \cdot R_2 \cdot UR} \quad \text{(Equation R6-2)}$$

After determining the maximum permitted value of the reduction factor for design strength, R_3 , in accordance with Equation R6-2, select a wall type from Table R611.7(4) with R_3 less than or equal to the value calculated.

TABLE R611.7(1A)
UNREDUCED LENGTH, UR , OF SOLID WALL REQUIRED IN EACH EXTERIOR ENDWALL
FOR WIND PERPENDICULAR TO RIDGE ONE STORY OR TOP STORY OF TWO STORY^{a, c, d, e, f, g}

SIDEWALL LENGTH (feet)	ENDWALL LENGTH (feet)	ROOF SLOPE	UNREDUCED LENGTH, UR , OF SOLID WALL REQUIRED IN ENDWALLS FOR WIND PERPENDICULAR TO RIDGE (feet)						
			Basic Wind Speed (mph) Exposure						
			85B	90B	100B	110B	120B	130B	Minimum ^b
			-	-	85C	90C	100C	110C	
			-	-	-	85D	90D	100D	
45	15	<4:12	0.90	1.01	1.25	1.51	1.80	2.11	0.98
		5:12	1.25	1.40	1.73	2.09	2.49	2.92	1.43
		7:12	1.75	1.96	2.43	2.93	3.49	4.10	1.64
		12:12	2.80	3.13	3.87	4.68	5.57	6.54	2.21
	30	<4:12	0.90	1.01	1.25	1.51	1.80	2.11	1.09
		5:12	1.25	1.40	1.73	2.09	2.49	2.92	2.01
		7:12	2.43	2.73	3.37	4.08	4.85	5.69	2.42
		12:12	4.52	5.07	6.27	7.57	9.01	10.58	3.57

	45	<1:12	0.90	1.01	1.25	1.51	1.80	2.11	1.21
		5:12	1.25	1.40	1.73	2.09	2.49	2.92	2.59
		7:12	3.12	3.49	4.32	5.22	6.24	7.29	3.21
		12:12	6.25	7.00	8.66	10.47	12.45	14.61	4.93
	60	<1:12	0.90	1.01	1.25	1.51	1.80	2.11	1.33
		5:12	1.25	1.40	1.73	2.09	2.49	2.92	3.16
		7:12	3.80	4.26	5.26	6.36	7.57	8.89	3.99
		12:12	7.97	8.94	11.05	13.36	15.89	18.65	6.29
30	15	<1:12	1.61	1.80	2.23	2.70	3.21	3.77	1.93
		5:12	2.24	2.51	3.10	3.74	4.45	5.23	2.75
		7:12	3.15	3.53	4.37	5.28	6.28	7.37	3.12
		12:12	4.90	5.49	6.79	8.21	9.77	11.46	4.14
	30	<1:12	1.61	1.80	2.23	2.70	3.21	3.77	2.14
		5:12	2.24	2.51	3.10	3.74	4.45	5.23	3.78
		7:12	4.30	4.82	5.96	7.20	8.57	10.05	4.52
		12:12	7.79	8.74	10.80	13.06	15.53	18.23	6.57
	45	<1:12	1.61	1.80	2.23	2.70	3.21	3.77	2.35
		5:12	2.24	2.51	3.10	3.74	4.45	5.23	4.81
		7:12	5.44	6.10	7.54	9.12	10.85	12.73	5.92
		12:12	10.69	11.98	14.81	17.90	21.30	25.00	9.00
	60	<1:12	1.61	1.80	2.23	2.70	3.21	3.77	2.56
		5:12	2.24	2.51	3.10	3.74	4.45	5.23	5.84
		7:12	6.59	7.39	9.13	11.04	13.14	15.41	7.32
		12:12	13.58	15.22	18.82	22.75	27.07	31.77	11.43
60	15	<1:12	2.99	3.35	4.14	5.00	5.95	6.98	3.83
		5:12	4.15	4.65	5.75	6.95	8.27	9.70	5.37
		7:12	5.91	6.63	8.19	9.90	11.78	13.83	6.07
		12:12	9.05	10.14	12.54	15.16	18.03	21.16	8.00
	30	<1:12	2.99	3.35	4.14	5.00	5.95	6.98	4.23
		5:12	4.15	4.65	5.75	6.95	8.27	9.70	7.31
		7:12	7.97	8.94	11.05	13.36	15.89	18.65	8.71
		12:12	14.25	15.97	19.74	23.86	28.40	33.32	12.57
	45	<1:12	3.11	3.48	4.30	5.20	6.19	7.26	4.63

		5:12	4.31	4.84	5.98	7.23	8.60	10.09	9.25
		7:12	10.24	11.47	14.19	17.15	20.40	23.84	11.35
		12:12	19.84	22.24	27.49	33.23	39.54	46.40	17.14
	60	< 1:12	3.22	3.61	4.46	5.39	6.42	7.53	5.03
		5:12	4.47	5.01	6.19	7.49	8.91	10.46	11.19
		7:12	12.57	14.09	17.42	21.05	25.05	29.39	13.99
		12:12	25.61	28.70	35.49	42.90	51.04	59.90	21.71

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s, 1 pound-force per linear foot = 0.146 kN/m, 1 pound per square foot = 47.88 Pa.

- Tabulated lengths were derived by calculating design wind pressures in accordance with Figure 6-10 of ASCE 7 for a building with a mean roof height of 35 feet. For wind perpendicular to the ridge, the effects of a 2-foot overhang on each endwall are included. The design pressures were used to calculate forces to be resisted by solid wall segments in each endwall [Table R611.7(1A) or R611.7(1B) or sidewall (Table R611.7(1C))], as appropriate. The forces to be resisted by each wall line were then divided by the default design strength of 840 pounds per linear foot of length to determine the required solid wall length. The actual mean roof height of the building shall not exceed the least horizontal dimension of the building.
- Tabulated lengths in the "minimum" column are based on the requirement of Section 6.1.4.1 of ASCE 7 that the main windforce-resisting system be designed for a minimum service level force of 10 psf multiplied by the area of the building projected onto a vertical plane normal to the assumed wind direction. Tabulated lengths in shaded cells are less than the "minimum" value. Where the minimum controls, it is permitted to be reduced in accordance with Notes c, d and e. See Section R611.7.1.1.
- For buildings with a mean roof height of less than 35 feet, tabulated lengths are permitted to be reduced by multiplying by the appropriate factor, R_1 , from Table R611.7(2). The reduced length shall not be less than the "minimum" value shown in the table.
- Tabulated lengths for "one story or top story of two story" are based on a floor-to-ceiling height of 10 feet. Tabulated lengths for "first story of two story" are based on floor-to-ceiling heights of 10 feet each for the first and second story. For floor-to-ceiling heights less than assumed, use the lengths in Table R611.7(1A), (1B) or (1C), or multiply the value in the table by the reduction factor, R_2 , from Table R611.7(3).
- Tabulated lengths are based on the default design shear strength of 840 pounds per linear foot of solid wall segment. The tabulated lengths are permitted to be reduced by multiplying by the applicable reduction factor for design strength, R_3 , from Table R611.7(4).
- The reduction factors, R_1 , R_2 and R_3 , in Tables R611.7(2), R611.7(3), and R611.7(4), respectively, are permitted to be compounded, subject to the limitations of Note b. However, the minimum number and minimum length of solid walls segments in each wall line shall comply with Sections R611.7.1 and R611.7.2.1, respectively.
- For intermediate values of sidewall length, endwall length, roof slope and basic wind speed, use the next higher value, or determine by interpolation.

TABLE R611.7(1A)
UNREDUCED LENGTH, U_R , OF SOLID WALL REQUIRED IN EACH EXTERIOR ENDWALL FOR
WIND PERPENDICULAR TO RIDGE ONE STORY OR TOP STORY OF TWO STORY^{a, c, d, e, f, g}

SIDEWALL LENGTH (feet)	ENDWALL LENGTH (feet)	ROOF SLOPE	UNREDUCED LENGTH, U_R, OF SOLID WALL REQUIRED IN ENDWALLS FOR WIND PERPENDICULAR TO RIDGE (feet)						
			Basic Wind Speed (mph) Exposure						Minimum^b
			115B	120B	130B	140B	150B	160B	
					110C	119C	127C	136C	
						110D	117D	125D	
15	15	< 1:12	1.03	1.12	1.32	1.53	1.76	2.00	0.92
		5:12	1.43	1.56	1.83	2.12	2.43	2.77	1.15
		7:12	2.00	2.18	2.56	2.97	3.41	3.88	1.25
		12:12	3.20	3.48	4.09	4.74	5.44	6.19	1.54
	30	< 1:12	1.03	1.12	1.32	1.53	1.76	2.00	0.98
		5:12	1.43	1.56	1.83	2.12	2.43	2.77	1.43
		7:12	2.78	3.03	3.56	4.13	4.74	5.39	1.64

	<u>45</u>	<u>12:12</u>	<u>5.17</u>	<u>5.63</u>	<u>6.61</u>	<u>7.67</u>	<u>8.80</u>	<u>10.01</u>	<u>2.21</u>
		<u>< 1:12</u>	<u>1.03</u>	<u>1.12</u>	<u>1.32</u>	<u>1.53</u>	<u>1.76</u>	<u>2.00</u>	<u>1.04</u>
		<u>5:12</u>	<u>1.43</u>	<u>1.56</u>	<u>1.83</u>	<u>2.12</u>	<u>2.43</u>	<u>2.77</u>	<u>1.72</u>
		<u>7:12</u>	<u>3.57</u>	<u>3.88</u>	<u>4.56</u>	<u>5.28</u>	<u>6.07</u>	<u>6.90</u>	<u>2.03</u>
	<u>60</u>	<u>12:12</u>	<u>7.15</u>	<u>7.78</u>	<u>9.13</u>	<u>10.59</u>	<u>12.16</u>	<u>13.84</u>	<u>2.89</u>
		<u>< 1:12</u>	<u>1.03</u>	<u>1.12</u>	<u>1.32</u>	<u>1.53</u>	<u>1.76</u>	<u>2.00</u>	<u>1.09</u>
		<u>5:12</u>	<u>1.43</u>	<u>1.56</u>	<u>1.83</u>	<u>2.12</u>	<u>2.43</u>	<u>2.77</u>	<u>2.01</u>
		<u>7:12</u>	<u>4.35</u>	<u>4.73</u>	<u>5.55</u>	<u>6.44</u>	<u>7.39</u>	<u>8.41</u>	<u>2.42</u>
<u>30</u>	<u>15</u>	<u>12:12</u>	<u>9.12</u>	<u>9.93</u>	<u>11.66</u>	<u>13.52</u>	<u>15.52</u>	<u>17.66</u>	<u>3.57</u>
		<u>< 1:12</u>	<u>1.84</u>	<u>2.01</u>	<u>2.35</u>	<u>2.73</u>	<u>3.13</u>	<u>3.57</u>	<u>1.82</u>
		<u>5:12</u>	<u>2.56</u>	<u>2.78</u>	<u>3.27</u>	<u>3.79</u>	<u>4.35</u>	<u>4.95</u>	<u>2.23</u>
		<u>7:12</u>	<u>3.61</u>	<u>3.93</u>	<u>4.61</u>	<u>5.34</u>	<u>6.13</u>	<u>6.98</u>	<u>2.42</u>
	<u>30</u>	<u>12:12</u>	<u>5.61</u>	<u>6.10</u>	<u>7.16</u>	<u>8.31</u>	<u>9.54</u>	<u>10.85</u>	<u>2.93</u>
		<u>< 1:12</u>	<u>1.84</u>	<u>2.01</u>	<u>2.35</u>	<u>2.73</u>	<u>3.13</u>	<u>3.57</u>	<u>1.93</u>
		<u>5:12</u>	<u>2.56</u>	<u>2.78</u>	<u>3.27</u>	<u>3.79</u>	<u>4.35</u>	<u>4.95</u>	<u>2.75</u>
		<u>7:12</u>	<u>4.92</u>	<u>5.35</u>	<u>6.28</u>	<u>7.29</u>	<u>8.37</u>	<u>9.52</u>	<u>3.12</u>
	<u>45</u>	<u>12:12</u>	<u>8.92</u>	<u>9.71</u>	<u>11.39</u>	<u>13.22</u>	<u>15.17</u>	<u>17.26</u>	<u>4.14</u>
		<u>< 1:12</u>	<u>1.84</u>	<u>2.01</u>	<u>2.35</u>	<u>2.73</u>	<u>3.13</u>	<u>3.57</u>	<u>2.03</u>
		<u>5:12</u>	<u>2.56</u>	<u>2.78</u>	<u>3.27</u>	<u>3.79</u>	<u>4.35</u>	<u>4.95</u>	<u>3.26</u>
		<u>7:12</u>	<u>6.23</u>	<u>6.78</u>	<u>7.96</u>	<u>9.23</u>	<u>10.60</u>	<u>12.06</u>	<u>3.82</u>
	<u>60</u>	<u>12:12</u>	<u>12.23</u>	<u>13.31</u>	<u>15.63</u>	<u>18.12</u>	<u>20.80</u>	<u>23.67</u>	<u>5.36</u>
		<u>< 1:12</u>	<u>1.84</u>	<u>2.01</u>	<u>2.35</u>	<u>2.73</u>	<u>3.13</u>	<u>3.57</u>	<u>2.14</u>
		<u>5:12</u>	<u>2.56</u>	<u>2.78</u>	<u>3.27</u>	<u>3.79</u>	<u>4.35</u>	<u>4.95</u>	<u>3.78</u>
		<u>7:12</u>	<u>7.54</u>	<u>8.21</u>	<u>9.64</u>	<u>11.17</u>	<u>12.83</u>	<u>14.60</u>	<u>4.52</u>
<u>60</u>	<u>15</u>	<u>12:12</u>	<u>15.54</u>	<u>16.92</u>	<u>19.86</u>	<u>23.03</u>	<u>26.44</u>	<u>30.08</u>	<u>6.57</u>
		<u>< 1:12</u>	<u>3.42</u>	<u>3.72</u>	<u>4.36</u>	<u>5.06</u>	<u>5.81</u>	<u>6.61</u>	<u>3.63</u>
		<u>5:12</u>	<u>4.75</u>	<u>5.17</u>	<u>6.06</u>	<u>7.03</u>	<u>8.07</u>	<u>9.19</u>	<u>4.40</u>
		<u>7:12</u>	<u>6.76</u>	<u>7.36</u>	<u>8.64</u>	<u>10.02</u>	<u>11.51</u>	<u>13.09</u>	<u>4.75</u>
	<u>30</u>	<u>12:12</u>	<u>10.35</u>	<u>11.27</u>	<u>13.23</u>	<u>15.34</u>	<u>17.61</u>	<u>20.04</u>	<u>5.71</u>
		<u>< 1:12</u>	<u>3.42</u>	<u>3.72</u>	<u>4.36</u>	<u>5.06</u>	<u>5.81</u>	<u>6.61</u>	<u>3.83</u>
		<u>5:12</u>	<u>4.75</u>	<u>5.17</u>	<u>6.06</u>	<u>7.03</u>	<u>8.07</u>	<u>9.19</u>	<u>5.37</u>
		<u>7:12</u>	<u>9.12</u>	<u>9.93</u>	<u>11.66</u>	<u>13.52</u>	<u>15.52</u>	<u>17.66</u>	<u>6.07</u>
	<u>45</u>	<u>12:12</u>	<u>16.30</u>	<u>17.75</u>	<u>20.83</u>	<u>24.16</u>	<u>27.73</u>	<u>31.55</u>	<u>8.00</u>
		<u>< 1:12</u>	<u>3.55</u>	<u>3.87</u>	<u>4.54</u>	<u>5.27</u>	<u>6.05</u>	<u>6.88</u>	<u>4.03</u>
		<u>5:12</u>	<u>4.94</u>	<u>5.37</u>	<u>6.31</u>	<u>7.31</u>	<u>8.40</u>	<u>9.55</u>	<u>6.34</u>
		<u>7:12</u>	<u>11.71</u>	<u>12.75</u>	<u>14.97</u>	<u>17.36</u>	<u>19.93</u>	<u>22.67</u>	<u>7.39</u>
	<u>60</u>	<u>12:12</u>	<u>22.70</u>	<u>24.71</u>	<u>29.00</u>	<u>33.64</u>	<u>38.62</u>	<u>43.94</u>	<u>10.29</u>
		<u>< 1:12</u>	<u>3.68</u>	<u>4.01</u>	<u>4.71</u>	<u>5.46</u>	<u>6.27</u>	<u>7.13</u>	<u>4.23</u>
		<u>5:12</u>	<u>5.11</u>	<u>5.57</u>	<u>6.54</u>	<u>7.58</u>	<u>8.70</u>	<u>9.90</u>	<u>7.31</u>
		<u>7:12</u>	<u>14.38</u>	<u>15.66</u>	<u>18.37</u>	<u>21.31</u>	<u>24.46</u>	<u>27.83</u>	<u>8.71</u>
	<u>60</u>	<u>12:12</u>	<u>29.30</u>	<u>31.90</u>	<u>37.44</u>	<u>43.42</u>	<u>49.85</u>	<u>56.72</u>	<u>12.57</u>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s, 1 pound-force per linear foot = 0.146 kN/m, 1 pound per square foot = 47.88 Pa.

a. Tabulated lengths were derived by calculating design wind pressures in accordance with Figure 28.4-1 of ASCE 7 for a building with a mean roof height of 35 feet, topographic factor, K_{zt} , equal to 1.0, and Risk Category II. For wind perpendicular to the ridge, the effects of a 2-foot overhang on each endwall are included. The design pressures were used to calculate forces to be resisted by solid wall segments in each. The forces to be resisted by each wall line were then divided by the default design strength of 840 pounds per linear foot of length to determine the unreduced length, U_R , of solid wall length required in each endwall. The actual mean roof height of the building shall not exceed the least horizontal dimension of the building.

b. Tabulated lengths in the "minimum" column are based on the requirement of Section 28.4.4 of ASCE 7 that the main windforce-resisting system be designed for a minimum pressure of 16 psf multiplied by the wall area of the building and 8 psf multiplied by the roof area of the building projected onto a vertical plane normal to the assumed wind direction. Tabulated lengths in shaded cells are less than the "minimum" value. Where the minimum controls, it is permitted to be reduced in accordance with Notes c, d and e. See Section R611.7.1.1.

c. For buildings with a mean roof height of less than 35 feet, tabulated lengths are permitted to be reduced by multiplying by the appropriate factor, R_1 , from Table R611.7(2). The reduced length shall not be less than the "minimum" value shown in the table.

d. Tabulated lengths for "one story or top story of two story" are based on a floor-to-ceiling height of 10 feet. Tabulated lengths for "first story of two story" are based on floor-to-ceiling heights of 10 feet each for the first and second story. For floor-to-ceiling heights less than assumed, use the lengths in Table R611.7(1A), (1B) or (1C), or multiply the value in the table by the reduction factor, R_2 , from Table R611.7(3).

e. Tabulated lengths are based on the default design shear strength of 840 pounds per linear foot of solid wall segment. The tabulated lengths are permitted to be reduced by multiplying by the applicable reduction factor for design strength, R_3 , from Table R611.7(4).

f. The reduction factors, R_1 , R_2 and R_3 , in Tables R611.7(2), R611.7(3), and R611.7(4), respectively, are permitted to be compounded, subject to the limitations of Note b. However, the minimum number and minimum length of solid walls segments in each wall line shall comply with Sections R611.7.1 and R611.7.2.1, respectively.

g. For intermediate values of sidewall length, endwall length, roof slope and basic wind speed, use the next higher value, or determine by interpolation.

TABLE R611.7(1B)
UNREDUCED LENGTH, U_R , OF SOLID WALL REQUIRED IN EACH EXTERIOR ENDWALL
FOR WIND PERPENDICULAR TO RIDGE FIRST STORY OF TWO STORY^{a, c, d, e, f, g}

SIDEWALL LENGTH (feet)	ENDWALL LENGTH (feet)	ROOF SLOPE	UNREDUCED LENGTH, U_R , OF SOLID WALL REQUIRED IN ENDWALLS FOR WIND PERPENDICULAR TO RIDGE (feet)						
			Basic Wind Speed (mph) Exposure						
			85B	90B	100B	110B	120B	130B	Minimum ^b
			-	-	85C	90C	100C	110C	
			-	-	-	85D	90D	100D	
			Velocity pressure (psf)						
11.51	12.90	15.95	19.28	22.94	26.92	-			
15	45	<1:12	2.60	2.92	3.61	4.36	5.19	6.09	2.59
		5:12	3.61	4.05	5.00	6.05	7.20	8.45	3.05
		7:12	3.77	4.23	5.23	6.32	7.52	8.82	3.26
		12:12	4.81	5.40	6.67	8.06	9.60	11.26	3.83
	30	<1:12	2.60	2.92	3.61	4.36	5.19	6.09	2.71
		5:12	3.61	4.05	5.00	6.05	7.20	8.45	3.63
		7:12	4.45	4.99	6.17	7.46	8.88	10.42	4.04
		12:12	6.54	7.33	9.06	10.96	13.04	15.30	5.19
	45	<1:12	2.60	2.92	3.61	4.36	5.19	6.09	2.83
		5:12	3.61	4.05	5.00	6.05	7.20	8.45	4.20
		7:12	5.14	5.76	7.12	8.60	10.24	12.01	4.83

		12:12	8.27	9.27	11.46	13.85	16.48	19.34	6.55
	60	< 1:12	2.60	2.92	3.64	4.36	5.19	6.09	2.95
		5:12	3.64	4.05	5.00	6.05	7.20	8.45	4.78
		7:12	5.82	6.52	8.06	9.75	11.60	13.64	5.64
		12:12	9.99	11.20	13.85	16.74	19.92	23.37	7.90
30	15	< 1:12	4.65	5.21	6.45	7.79	9.27	10.88	5.16
		5:12	6.46	7.24	8.95	10.82	12.87	15.10	5.98
		7:12	6.94	7.78	9.62	11.62	13.83	16.23	6.35
		12:12	8.69	9.74	12.04	14.55	17.32	20.32	7.38
	30	< 1:12	4.65	5.21	6.45	7.79	9.27	10.88	5.38
		5:12	6.46	7.24	8.95	10.82	12.87	15.10	7.04
		7:12	8.09	9.06	11.21	13.54	16.12	18.91	7.76
		12:12	11.58	12.98	16.05	19.40	23.08	27.09	9.81
	45	< 1:12	4.65	5.21	6.45	7.79	9.27	10.88	5.59
		5:12	6.46	7.24	8.95	10.82	12.87	15.10	8.04
		7:12	9.23	10.35	12.79	15.46	18.40	21.59	9.16
		12:12	14.48	16.22	20.06	24.25	28.85	33.86	12.24
	60	< 1:12	4.65	5.21	6.45	7.79	9.27	10.88	5.80
		5:12	6.46	7.24	8.95	10.82	12.87	15.10	9.08
		7:12	10.38	11.63	14.38	17.38	20.69	24.27	10.56
		12:12	17.37	19.47	24.07	29.10	34.62	40.63	14.67
60	15	< 1:12	8.62	9.67	11.95	14.45	17.19	20.17	10.30
		5:12	11.98	13.43	16.61	20.07	23.88	28.03	11.85
		7:12	13.18	14.78	18.27	22.08	26.28	30.83	12.54
		12:12	16.32	18.29	22.62	27.34	32.53	38.17	14.48
	30	< 1:12	8.62	9.67	11.95	14.45	17.19	20.17	10.70
		5:12	11.98	13.43	16.61	20.07	23.88	28.03	13.79
		7:12	15.25	17.09	21.13	25.54	30.38	35.66	15.18
		12:12	21.52	24.12	29.82	36.05	42.89	50.33	19.05
	45	< 1:12	8.97	10.06	12.43	15.03	17.88	20.99	11.10
		5:12	12.46	13.97	17.27	20.88	24.84	29.15	15.73
		7:12	17.67	19.80	24.48	29.59	35.21	41.32	17.82
		12:12	27.27	30.56	37.79	45.68	54.35	63.78	23.62

60	< 1:12	9.30	10.43	12.89	15.58	18.54	21.76	11.50
	5:12	12.91	14.47	17.90	21.63	25.74	30.20	17.67
	7:12	20.14	22.58	27.91	33.74	40.15	47.11	20.46
	12:12	33.19	37.19	45.99	55.59	66.14	77.62	28.19

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s, 1 pound force per linear foot = 0.146 kN/m, 1 pound per square foot = 47.88 Pa.

- Tabulated lengths were derived by calculating design wind pressures in accordance with Figure 6-10 of ASCE 7 for a building with a mean roof height of 35 feet. For wind perpendicular to the ridge, the effects of a 2-foot overhang on each endwall are included. The design pressures were used to calculate forces to be resisted by solid wall segments in each endwall [Table R611.7(1A) or R611.7(1B)] or sidewall [Table R611.7(1C)], as appropriate. The forces to be resisted by each wall line were then divided by the default design strength of 840 pounds per linear foot of length to determine the required solid wall length. The actual mean roof height of the building shall not exceed the least horizontal dimension of the building.
- Tabulated lengths in the "minimum" column are based on the requirement of Section 6.1.4.1 of ASCE 7 that the main windforce-resisting system be designed for a minimum service level force of 10 psf multiplied by the area of the building projected onto a vertical plane normal to the assumed wind direction. Tabulated lengths in shaded cells are less than the "minimum" value. Where the minimum controls, it is permitted to be reduced in accordance with Notes c, d and e. See Section R611.7.1.1.
- For buildings with a mean roof height of less than 35 feet, tabulated lengths are permitted to be reduced by multiplying by the appropriate factor, R_1 , from Table R611.7(2). The reduced length shall not be less than the "minimum" value shown in the table.
- Tabulated lengths for "one story or top story of two story" are based on a floor-to-ceiling height of 10 feet. Tabulated lengths for "first story of two story" are based on floor-to-ceiling heights of 10 feet each for the first and second story. For floor-to-ceiling heights less than assumed, use the lengths in Table R611.7(1A), (1B) or (1C), or multiply the value in the table by the reduction factor, R_2 , from Table R611.7(3).
- Tabulated lengths are based on the default design shear strength of 840 pounds per linear foot of solid wall segment. The tabulated lengths are permitted to be reduced by multiplying by the applicable reduction factor for design strength, R_3 , from Table R611.7(4).
- The reduction factors, R_1 , R_2 and R_3 , in Tables R611.7(2), R611.7(3), and R611.7(4), respectively, are permitted to be compounded, subject to the limitations of Note b. However, the minimum number and minimum length of solid walls segments in each wall line shall comply with Sections R611.7.1 and R611.7.2.1, respectively.
- For intermediate values of sidewall length, endwall length, roof slope and basic wind speed, use the next higher value, or determine by interpolation.

TABLE R611.7(1B)
UNREDUCED LENGTH, U_R , OF SOLID WALL REQUIRED IN EACH EXTERIOR ENDWALL FOR
WIND PERPENDICULAR TO RIDGE FIRST STORY OF TWO STORY^{a, c, d, e, f, g}

SIDEWALL LENGTH (feet)	ENDWALL LENGTH (feet)	ROOF SLOPE	UNREDUCED LENGTH, U_R , OF SOLID WALL REQUIRED IN ENDWALLS FOR WIND PERPENDICULAR TO RIDGE (feet)						
			Basic Wind Speed (mph) Exposure						
			115B	120B	130B	140B	150B	160B	Minimum ^b
					110C	119C	127C	136C	
						110D	117D	125D	
15	15	< 1:12	2.98	3.25	3.81	4.42	5.07	5.77	2.54
		5:12	4.13	4.50	5.28	6.12	7.03	8.00	2.76
		7:12	4.31	4.70	5.51	6.39	7.34	8.35	2.87
		12:12	5.51	6.00	7.04	8.16	9.37	10.66	3.15
	30	< 1:12	2.98	3.25	3.81	4.42	5.07	5.77	2.59
		5:12	4.13	4.50	5.28	6.12	7.03	8.00	3.05
		7:12	5.09	5.55	6.51	7.55	8.67	9.86	3.26
		12:12	7.48	8.15	9.56	11.09	12.73	14.49	3.83
	45	< 1:12	2.98	3.25	3.81	4.42	5.07	5.77	2.65
		5:12	4.13	4.50	5.28	6.12	7.03	8.00	3.34
		7:12	5.88	6.40	7.51	8.71	10.00	11.37	3.65

	60	<u>12:12</u>	<u>9.46</u>	<u>10.30</u>	<u>12.09</u>	<u>14.02</u>	<u>16.09</u>	<u>18.31</u>	<u>4.51</u>
		<u>< 1:12</u>	<u>2.98</u>	<u>3.25</u>	<u>3.81</u>	<u>4.42</u>	<u>5.07</u>	<u>5.77</u>	<u>2.71</u>
		<u>5:12</u>	<u>4.13</u>	<u>4.50</u>	<u>5.28</u>	<u>6.12</u>	<u>7.03</u>	<u>8.00</u>	<u>3.63</u>
		<u>7:12</u>	<u>6.66</u>	<u>7.25</u>	<u>8.51</u>	<u>9.87</u>	<u>11.32</u>	<u>12.89</u>	<u>4.04</u>
		<u>12:12</u>	<u>11.43</u>	<u>12.45</u>	<u>14.61</u>	<u>16.94</u>	<u>19.45</u>	<u>22.13</u>	<u>5.19</u>
<u>30</u>	<u>15</u>	<u>< 1:12</u>	<u>5.32</u>	<u>5.79</u>	<u>6.80</u>	<u>7.89</u>	<u>9.05</u>	<u>10.30</u>	<u>5.06</u>
		<u>5:12</u>	<u>7.39</u>	<u>8.04</u>	<u>9.44</u>	<u>10.95</u>	<u>12.57</u>	<u>14.30</u>	<u>5.47</u>
		<u>7:12</u>	<u>7.94</u>	<u>8.65</u>	<u>10.15</u>	<u>11.77</u>	<u>13.51</u>	<u>15.37</u>	<u>5.65</u>
		<u>12:12</u>	<u>9.94</u>	<u>10.82</u>	<u>12.70</u>	<u>14.73</u>	<u>16.91</u>	<u>19.24</u>	<u>6.17</u>
	<u>30</u>	<u>< 1:12</u>	<u>5.32</u>	<u>5.79</u>	<u>6.80</u>	<u>7.89</u>	<u>9.05</u>	<u>10.30</u>	<u>5.16</u>
		<u>5:12</u>	<u>7.39</u>	<u>8.04</u>	<u>9.44</u>	<u>10.95</u>	<u>12.57</u>	<u>14.30</u>	<u>5.98</u>
		<u>7:12</u>	<u>9.25</u>	<u>10.07</u>	<u>11.82</u>	<u>13.71</u>	<u>15.74</u>	<u>17.91</u>	<u>6.35</u>
		<u>12:12</u>	<u>13.25</u>	<u>14.43</u>	<u>16.93</u>	<u>19.64</u>	<u>22.54</u>	<u>25.65</u>	<u>7.38</u>
	<u>45</u>	<u>< 1:12</u>	<u>5.32</u>	<u>5.79</u>	<u>6.80</u>	<u>7.89</u>	<u>9.05</u>	<u>10.30</u>	<u>5.27</u>
		<u>5:12</u>	<u>7.39</u>	<u>8.04</u>	<u>9.44</u>	<u>10.95</u>	<u>12.57</u>	<u>14.30</u>	<u>6.50</u>
		<u>7:12</u>	<u>10.56</u>	<u>11.50</u>	<u>13.50</u>	<u>15.65</u>	<u>17.97</u>	<u>20.45</u>	<u>7.06</u>
		<u>12:12</u>	<u>16.56</u>	<u>18.03</u>	<u>21.16</u>	<u>24.55</u>	<u>28.18</u>	<u>32.06</u>	<u>8.60</u>
	<u>60</u>	<u>< 1:12</u>	<u>5.32</u>	<u>5.79</u>	<u>6.80</u>	<u>7.89</u>	<u>9.05</u>	<u>10.30</u>	<u>5.38</u>
		<u>5:12</u>	<u>7.39</u>	<u>8.04</u>	<u>9.44</u>	<u>10.95</u>	<u>12.57</u>	<u>14.30</u>	<u>7.01</u>
		<u>7:12</u>	<u>11.87</u>	<u>12.93</u>	<u>15.17</u>	<u>17.60</u>	<u>20.20</u>	<u>22.98</u>	<u>7.76</u>
		<u>12:12</u>	<u>19.87</u>	<u>21.64</u>	<u>25.40</u>	<u>29.45</u>	<u>33.81</u>	<u>38.47</u>	<u>9.81</u>
<u>60</u>	<u>15</u>	<u>< 1:12</u>	<u>9.87</u>	<u>10.74</u>	<u>12.61</u>	<u>14.62</u>	<u>16.79</u>	<u>19.10</u>	<u>10.10</u>
		<u>5:12</u>	<u>13.71</u>	<u>14.93</u>	<u>17.52</u>	<u>20.32</u>	<u>23.33</u>	<u>26.54</u>	<u>10.87</u>
		<u>7:12</u>	<u>15.08</u>	<u>16.42</u>	<u>19.27</u>	<u>22.35</u>	<u>25.66</u>	<u>29.20</u>	<u>11.22</u>
		<u>12:12</u>	<u>18.67</u>	<u>20.33</u>	<u>23.86</u>	<u>27.67</u>	<u>31.77</u>	<u>36.14</u>	<u>12.19</u>
	<u>30</u>	<u>< 1:12</u>	<u>9.87</u>	<u>10.74</u>	<u>12.61</u>	<u>14.62</u>	<u>16.79</u>	<u>19.10</u>	<u>10.30</u>
		<u>5:12</u>	<u>13.71</u>	<u>14.93</u>	<u>17.52</u>	<u>20.32</u>	<u>23.33</u>	<u>26.54</u>	<u>11.85</u>
		<u>7:12</u>	<u>17.44</u>	<u>18.99</u>	<u>22.29</u>	<u>25.85</u>	<u>29.67</u>	<u>33.76</u>	<u>12.54</u>
		<u>12:12</u>	<u>24.62</u>	<u>26.81</u>	<u>31.46</u>	<u>36.49</u>	<u>41.89</u>	<u>47.66</u>	<u>14.48</u>
	<u>45</u>	<u>< 1:12</u>	<u>10.27</u>	<u>11.18</u>	<u>13.12</u>	<u>15.21</u>	<u>17.47</u>	<u>19.87</u>	<u>10.50</u>
		<u>5:12</u>	<u>14.26</u>	<u>15.52</u>	<u>18.22</u>	<u>21.13</u>	<u>24.26</u>	<u>27.60</u>	<u>12.82</u>
		<u>7:12</u>	<u>20.21</u>	<u>22.01</u>	<u>25.83</u>	<u>29.95</u>	<u>34.39</u>	<u>39.12</u>	<u>13.86</u>
		<u>12:12</u>	<u>31.20</u>	<u>33.97</u>	<u>39.87</u>	<u>46.23</u>	<u>53.07</u>	<u>60.39</u>	<u>16.76</u>
	<u>60</u>	<u>< 1:12</u>	<u>10.64</u>	<u>11.59</u>	<u>13.60</u>	<u>15.77</u>	<u>18.11</u>	<u>20.60</u>	<u>10.70</u>
		<u>5:12</u>	<u>14.77</u>	<u>16.09</u>	<u>18.88</u>	<u>21.90</u>	<u>25.14</u>	<u>28.60</u>	<u>13.79</u>
		<u>7:12</u>	<u>23.05</u>	<u>25.09</u>	<u>29.45</u>	<u>34.15</u>	<u>39.21</u>	<u>44.61</u>	<u>15.18</u>
		<u>12:12</u>	<u>37.97</u>	<u>41.34</u>	<u>48.52</u>	<u>56.27</u>	<u>64.60</u>	<u>73.49</u>	<u>19.05</u>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s, 1 pound force per linear foot = 0.146 kN/m, 1 pound per square foot = 47.88 Pa.

a. Tabulated lengths were derived by calculating design wind pressures in accordance with Figure 28.4-1 of ASCE 7 for a building with a mean roof height of 35 feet, topographic factor, K_{zt} , equal to 1.0, and Risk Category II. For wind perpendicular to the ridge, the effects of a 2-foot overhang on each endwall are included. The design pressures were used to calculate forces to be resisted by solid wall segments in each endwall. The forces to be resisted by each wall line were then divided by the default design strength of 840 pounds per linear foot of length to determine the unreduced length, **UR**, of solid wall length required in each endwall. The actual mean roof height of the building shall not exceed the least horizontal dimension of the building.

b. Tabulated lengths in the "minimum" column are based on the requirement of Section 28.4.4 of ASCE 7 that the main windforce-resisting system be designed for a minimum pressure of 1016 psf multiplied by the wall area of the building and 8 psf multiplied by the roof area of the building projected onto a vertical plane normal to the assumed wind direction. Tabulated lengths in shaded cells are less than the "minimum" value. Where the minimum controls, it is permitted to be reduced in accordance with Notes c, d and e. See Section R611.7.1.1.

c. For buildings with a mean roof height of less than 35 feet, tabulated lengths are permitted to be reduced by multiplying by the appropriate factor, R_1 , from Table R611.7(2). The reduced length shall not be less than the "minimum" value shown in the table.

d. Tabulated lengths for "one story or top story of two story" are based on a floor-to-ceiling height of 10 feet. Tabulated lengths for "first story of two story" are based on floor-to-ceiling heights of 10 feet each for the first and second story. For floor-to-ceiling heights less than assumed, use the lengths in Table R611.7(1A), (1B) or (1C), or multiply the value in the table by the reduction factor, R_2 , from Table R611.7(3).

e. Tabulated lengths are based on the default design shear strength of 840 pounds per linear foot of solid wall segment. The tabulated lengths are permitted to be reduced by multiplying by the applicable reduction factor for design strength, R_3 , from Table R611.7(4).

f. The reduction factors, R_1 , R_2 and R_3 , in Tables R611.7(2), R611.7(3), and R611.7(4), respectively, are permitted to be compounded, subject to the limitations of Note b. However, the minimum number and minimum length of solid walls segments in each wall line shall comply with Sections R611.7.1 and R611.7.2.1, respectively.

g. For intermediate values of sidewall length, endwall length, roof slope and basic wind speed, use the next higher value, or determine by interpolation.

TABLE R611.7(1C)
UNREDUCED LENGTH, U_R , OF SOLID WALL REQUIRED IN EACH
EXTERIOR SIDEWALL FOR WIND PARALLEL TO RIDGE^{a, c, d, e, f, g}

SIDEWALL LENGTH (feet)	ENDWALL LENGTH (feet)	ROOF SLOPE	UNREDUCED LENGTH, <i>U_R</i> , OF SOLID WALL REQUIRED IN ENDWALLS FOR WIND PERPENDICULAR TO RIDGE (feet)						
			Basic Wind Speed (mph) Exposure						
			85B	90B	100B	110B	120B	130B	Minimum ^b
			-	-	85C	90C	100C	110C	
			-	-	-	85D	90D	100D	
One story or top story of two story									
<30	15	< 1:12	0.95	1.06	1.34	1.59	1.89	2.22	0.90
		5:12	1.13	1.26	1.56	1.88	2.24	2.63	1.08
		7:12	1.21	1.35	1.67	2.02	2.40	2.82	1.17
		12:12	1.43	1.60	1.98	2.39	2.85	3.34	1.39
	30	< 1:12	1.77	1.98	2.45	2.96	3.53	4.14	1.90
		5:12	2.38	2.67	3.30	3.99	4.75	5.57	2.62
		7:12	2.66	2.98	3.69	4.46	5.31	6.23	2.95
		12:12	3.43	3.85	4.76	5.75	6.84	8.03	3.86
	45	< 1:12	2.65	2.97	3.67	4.43	5.27	6.19	2.99
		5:12	3.98	4.46	5.54	6.66	7.93	9.34	4.62
		7:12	4.58	5.14	6.35	7.68	9.14	10.72	5.36
		12:12	6.25	7.04	8.67	10.48	12.47	14.63	7.39
	60	< 1:12	3.59	4.03	4.98	6.02	7.16	8.40	4.18
		5:12	5.93	6.65	8.22	9.93	11.82	13.87	7.07
		7:12	6.99	7.83	9.69	11.74	13.93	16.35	8.38

		12:12	9.92	11.12	13.75	16.62	19.77	23.21	12.00
60	45	< 1:12	2.77	3.11	3.84	4.65	5.53	6.49	2.99
		5:12	4.15	4.66	5.76	6.96	8.28	9.72	4.62
		7:12	4.78	5.36	6.63	8.01	9.53	11.18	5.36
		12:12	6.51	7.30	9.03	10.91	12.98	15.23	7.39
	60	< 1:12	3.86	4.32	5.35	6.46	7.69	9.02	4.18
		5:12	6.31	7.08	8.75	10.57	12.58	14.76	7.07
		7:12	7.43	8.32	10.29	12.44	14.80	17.37	8.38
		12:12	10.51	11.78	14.56	17.60	20.94	24.57	12.00
First story of two story									
<30	15	< 1:12	2.65	2.97	3.67	4.44	5.28	6.20	2.52
		5:12	2.83	3.17	3.92	4.74	5.64	6.62	2.70
		7:12	2.91	3.26	4.03	4.87	5.80	6.80	2.79
		12:12	3.13	3.51	4.34	5.25	6.24	7.32	3.01
	30	< 1:12	4.81	5.39	6.67	8.06	9.59	11.25	5.14
		5:12	5.42	6.08	7.52	9.09	10.81	12.69	5.86
		7:12	5.70	6.39	7.90	9.55	11.37	13.34	6.19
		12:12	6.47	7.25	8.97	10.84	12.90	15.14	7.10
	45	< 1:12	6.99	7.83	9.69	11.71	13.93	16.35	7.85
		5:12	8.32	9.33	11.53	13.94	16.59	19.47	9.48
		7:12	8.93	10.01	12.37	14.95	17.79	20.88	10.21
		12:12	10.60	11.88	14.69	17.75	21.13	24.79	12.25
	60	< 1:12	9.23	10.35	12.79	15.46	18.40	21.59	10.65
		5:12	11.57	12.97	16.03	19.38	23.06	27.06	13.54
		7:12	12.63	14.15	17.50	21.15	25.17	29.54	14.85
		12:12	15.56	17.44	21.56	26.06	31.01	36.39	18.48
60	45	< 1:12	7.34	8.22	10.17	12.29	14.62	17.16	7.85
		5:12	8.72	9.77	12.08	14.60	17.37	20.39	9.48
		7:12	9.34	10.47	12.95	15.65	18.62	21.85	10.21
		12:12	11.08	12.41	15.35	18.55	22.07	25.90	12.25
	60	< 1:12	9.94	11.14	13.77	16.65	19.81	23.25	10.65
		5:12	12.40	13.89	17.18	20.76	24.70	28.99	13.54
		7:12	13.51	15.14	18.72	22.63	26.92	31.60	14.85

		12:12	16.59	18.59	22.99	27.79	33.06	38.80	48.48
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For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s, 1 pound force per linear foot = 0.146 kN/m, 1 pound per square foot = 47.88 Pa.

- Tabulated lengths were derived by calculating design wind pressures in accordance with Figure 6-10 of ASCE 7 for a building with a mean roof height of 35 feet. For wind perpendicular to the ridge, the effects of a 2-foot overhang on each endwall are included. The design pressures were used to calculate forces to be resisted by solid wall segments in each endwall [Table R611.7(1A) or R611.7(1B)] or sidewall [(Table R611.7(1C))], as appropriate. The forces to be resisted by each wall line were then divided by the default design strength of 840 pounds per linear foot of length to determine the required solid wall length. The actual mean roof height of the building shall not exceed the least horizontal dimension of the building.
- Tabulated lengths in the "minimum" column are based on the requirement of Section 6.1.4.1 of ASCE 7 that the main windforce-resisting system be designed for a minimum service level force of 10 psf multiplied by the area of the building projected onto a vertical plane normal to the assumed wind direction. Tabulated lengths in shaded cells are less than the "minimum" value. Where the minimum controls, it is permitted to be reduced in accordance with Notes c, d and e. See Section R611.7.1.1.
- For buildings with a mean roof height of less than 35 feet, tabulated lengths are permitted to be reduced by multiplying by the appropriate factor, R_1 , from Table R611.7(2). The reduced length shall not be less than the "minimum" value shown in the table.
- Tabulated lengths for "one story or top story of two story" are based on a floor-to-ceiling height of 10 feet. Tabulated lengths for "first story of two story" are based on floor-to-ceiling heights of 10 feet each for the first and second story. For floor-to-ceiling heights less than assumed, use the lengths in Table R611.7(1A), (1B) or (1C), or multiply the value in the table by the reduction factor, R_2 , from Table R611.7(3).
- Tabulated lengths are based on the default design shear strength of 840 pounds per linear foot of solid wall segment. The tabulated lengths are permitted to be reduced by multiplying by the applicable reduction factor for design strength, R_3 , from Table R611.7(4).
- The reduction factors, R_1 , R_2 and R_3 , in Tables R611.7(2), R611.7(3), and R611.7(4), respectively, are permitted to be compounded, subject to the limitations of Note b. However, the minimum number and minimum length of solid walls segments in each wall line shall comply with Sections R611.7.1 and R611.7.2.1, respectively.
- For intermediate values of sidewall length, endwall length, roof slope and basic wind speed, use the next higher value, or determine by interpolation.

TABLE R611.7(1C)
UNREDUCED LENGTH, U_R , OF SOLID WALL REQUIRED IN EACH EXTERIOR SIDEWALL FOR
WIND PARALLEL TO RIDGE^{a, c, d, e, f, g}

<u>SIDEWALL LENGTH</u> <u>(feet)</u>	<u>ENDWALL LENGTH</u> <u>(feet)</u>	<u>ROOF SLOPE</u>	<u>UNREDUCED LENGTH, U_R, OF SOLID WALL REQUIRED IN SIDEWALLS FOR WIND PARALLEL TO RIDGE (feet)</u>						
			<u>Basic Wind Speed (mph) Exposure</u>						<u>Minimum^b</u>
			<u>115B</u>	<u>120B</u>	<u>130B</u>	<u>140B</u>	<u>150B</u>	<u>160B</u>	
					<u>110C</u>	<u>119C</u>	<u>127C</u>	<u>136C</u>	
						<u>110D</u>	<u>117D</u>	<u>125D</u>	
			<u>One story or top story of two story</u>						
<u>< 30</u>	<u>15</u>	<u>< 1:12</u>	<u>1.08</u>	<u>1.18</u>	<u>1.39</u>	<u>1.61</u>	<u>1.84</u>	<u>2.10</u>	<u>0.90</u>
		<u>5:12</u>	<u>1.29</u>	<u>1.40</u>	<u>1.65</u>	<u>1.91</u>	<u>2.19</u>	<u>2.49</u>	<u>1.08</u>
		<u>7:12</u>	<u>1.38</u>	<u>1.50</u>	<u>1.76</u>	<u>2.04</u>	<u>2.35</u>	<u>2.67</u>	<u>1.17</u>
		<u>12:12</u>	<u>1.63</u>	<u>1.78</u>	<u>2.09</u>	<u>2.42</u>	<u>2.78</u>	<u>3.16</u>	<u>1.39</u>
	<u>30</u>	<u>< 1:12</u>	<u>2.02</u>	<u>2.20</u>	<u>2.59</u>	<u>3.00</u>	<u>3.44</u>	<u>3.92</u>	<u>1.90</u>
		<u>5:12</u>	<u>2.73</u>	<u>2.97</u>	<u>3.48</u>	<u>4.04</u>	<u>4.64</u>	<u>5.28</u>	<u>2.62</u>
		<u>7:12</u>	<u>3.05</u>	<u>3.32</u>	<u>3.89</u>	<u>4.51</u>	<u>5.18</u>	<u>5.89</u>	<u>2.95</u>
		<u>12:12</u>	<u>3.93</u>	<u>4.27</u>	<u>5.02</u>	<u>5.82</u>	<u>6.68</u>	<u>7.60</u>	<u>3.86</u>
	<u>45</u>	<u>< 1:12</u>	<u>3.03</u>	<u>3.30</u>	<u>3.87</u>	<u>4.49</u>	<u>5.15</u>	<u>5.86</u>	<u>2.99</u>
		<u>5:12</u>	<u>4.55</u>	<u>4.96</u>	<u>5.82</u>	<u>6.75</u>	<u>7.74</u>	<u>8.81</u>	<u>4.62</u>
		<u>7:12</u>	<u>5.24</u>	<u>5.71</u>	<u>6.70</u>	<u>7.77</u>	<u>8.92</u>	<u>10.15</u>	<u>5.36</u>
		<u>12:12</u>	<u>7.16</u>	<u>7.79</u>	<u>9.14</u>	<u>10.61</u>	<u>12.17</u>	<u>13.85</u>	<u>7.39</u>
	<u>60</u>	<u>< 1:12</u>	<u>4.11</u>	<u>4.47</u>	<u>5.25</u>	<u>6.09</u>	<u>6.99</u>	<u>7.96</u>	<u>4.18</u>
		<u>5:12</u>	<u>6.78</u>	<u>7.39</u>	<u>8.67</u>	<u>10.05</u>	<u>11.54</u>	<u>13.13</u>	<u>7.07</u>
		<u>7:12</u>	<u>8.00</u>	<u>8.71</u>	<u>10.22</u>	<u>11.85</u>	<u>13.61</u>	<u>15.48</u>	<u>8.38</u>

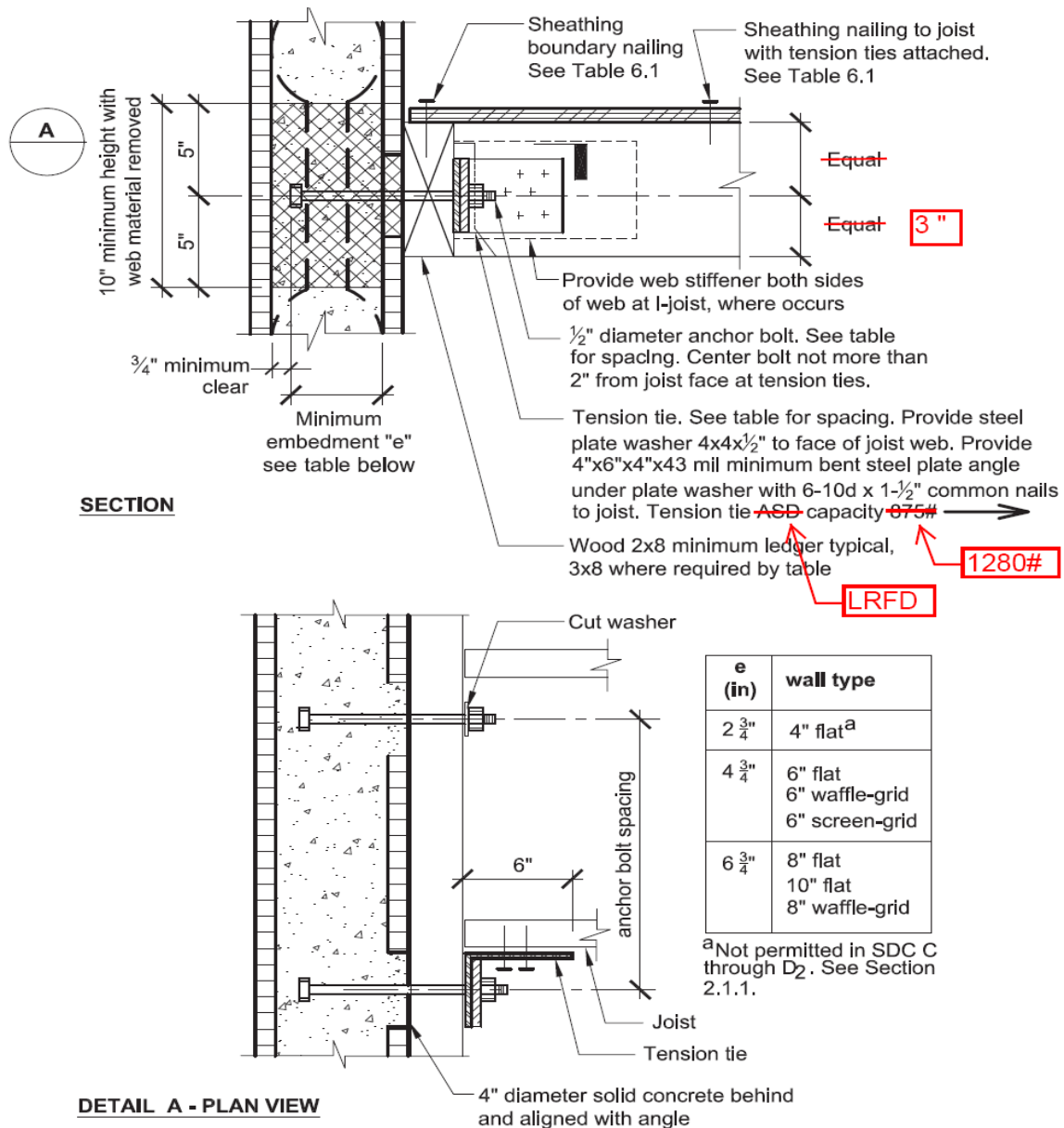
		<u>12:12</u>	<u>11.35</u>	<u>12.36</u>	<u>14.51</u>	<u>16.82</u>	<u>19.31</u>	<u>21.97</u>	<u>12.00</u>
<u>60</u>	<u>45</u>	<u>< 1:12</u>	<u>3.17</u>	<u>3.46</u>	<u>4.06</u>	<u>4.70</u>	<u>5.40</u>	<u>6.14</u>	<u>2.99</u>
		<u>5:12</u>	<u>4.75</u>	<u>5.18</u>	<u>6.07</u>	<u>7.04</u>	<u>8.09</u>	<u>9.20</u>	<u>4.62</u>
		<u>7:12</u>	<u>5.47</u>	<u>5.96</u>	<u>6.99</u>	<u>8.11</u>	<u>9.31</u>	<u>10.59</u>	<u>5.36</u>
		<u>12:12</u>	<u>7.45</u>	<u>8.11</u>	<u>9.52</u>	<u>11.04</u>	<u>12.68</u>	<u>14.43</u>	<u>7.39</u>
	<u>60</u>	<u>< 1:12</u>	<u>4.41</u>	<u>4.81</u>	<u>5.64</u>	<u>6.54</u>	<u>7.51</u>	<u>8.54</u>	<u>4.18</u>
		<u>5:12</u>	<u>7.22</u>	<u>7.86</u>	<u>9.23</u>	<u>10.70</u>	<u>12.29</u>	<u>13.98</u>	<u>7.07</u>
		<u>7:12</u>	<u>8.50</u>	<u>9.25</u>	<u>10.86</u>	<u>12.59</u>	<u>14.46</u>	<u>16.45</u>	<u>8.38</u>
		<u>12:12</u>	<u>12.02</u>	<u>13.09</u>	<u>15.36</u>	<u>17.81</u>	<u>20.45</u>	<u>23.27</u>	<u>12.00</u>
<u>First story of two story</u>									
<u>< 30</u>	<u>15</u>	<u>< 1:12</u>	<u>3.03</u>	<u>3.30</u>	<u>3.88</u>	<u>4.49</u>	<u>5.16</u>	<u>5.87</u>	<u>2.52</u>
		<u>5:12</u>	<u>3.24</u>	<u>3.52</u>	<u>4.14</u>	<u>4.80</u>	<u>5.51</u>	<u>6.26</u>	<u>2.70</u>
		<u>7:12</u>	<u>3.33</u>	<u>3.62</u>	<u>4.25</u>	<u>4.93</u>	<u>5.66</u>	<u>6.44</u>	<u>2.79</u>
		<u>12:12</u>	<u>3.58</u>	<u>3.90</u>	<u>4.58</u>	<u>5.31</u>	<u>6.10</u>	<u>6.94</u>	<u>3.01</u>
	<u>30</u>	<u>< 1:12</u>	<u>5.50</u>	<u>5.99</u>	<u>7.03</u>	<u>8.16</u>	<u>9.36</u>	<u>10.65</u>	<u>5.14</u>
		<u>5:12</u>	<u>6.21</u>	<u>6.76</u>	<u>7.93</u>	<u>9.20</u>	<u>10.56</u>	<u>12.01</u>	<u>5.86</u>
		<u>7:12</u>	<u>6.52</u>	<u>7.10</u>	<u>8.34</u>	<u>9.67</u>	<u>11.10</u>	<u>12.63</u>	<u>6.19</u>
		<u>12:12</u>	<u>7.41</u>	<u>8.06</u>	<u>9.46</u>	<u>10.97</u>	<u>12.60</u>	<u>14.33</u>	<u>7.10</u>
	<u>45</u>	<u>< 1:12</u>	<u>8.00</u>	<u>8.71</u>	<u>10.22</u>	<u>11.85</u>	<u>13.61</u>	<u>15.48</u>	<u>7.85</u>
		<u>5:12</u>	<u>9.52</u>	<u>10.37</u>	<u>12.17</u>	<u>14.11</u>	<u>16.20</u>	<u>18.43</u>	<u>9.48</u>
		<u>7:12</u>	<u>10.21</u>	<u>11.12</u>	<u>13.05</u>	<u>15.14</u>	<u>17.38</u>	<u>19.77</u>	<u>10.21</u>
		<u>12:12</u>	<u>12.13</u>	<u>13.20</u>	<u>15.50</u>	<u>17.97</u>	<u>20.63</u>	<u>23.47</u>	<u>12.25</u>
	<u>60</u>	<u>< 1:12</u>	<u>10.56</u>	<u>11.50</u>	<u>13.50</u>	<u>15.65</u>	<u>17.97</u>	<u>20.44</u>	<u>10.65</u>
		<u>5:12</u>	<u>13.24</u>	<u>14.41</u>	<u>16.91</u>	<u>19.62</u>	<u>22.52</u>	<u>25.62</u>	<u>13.54</u>
		<u>7:12</u>	<u>14.45</u>	<u>15.73</u>	<u>18.46</u>	<u>21.41</u>	<u>24.58</u>	<u>27.97</u>	<u>14.85</u>
		<u>12:12</u>	<u>17.80</u>	<u>19.38</u>	<u>22.75</u>	<u>26.38</u>	<u>30.29</u>	<u>34.46</u>	<u>18.48</u>
<u>60</u>	<u>45</u>	<u>< 1:12</u>	<u>8.39</u>	<u>9.14</u>	<u>10.72</u>	<u>12.44</u>	<u>14.28</u>	<u>16.25</u>	<u>7.85</u>
		<u>5:12</u>	<u>9.97</u>	<u>10.86</u>	<u>12.74</u>	<u>14.78</u>	<u>16.97</u>	<u>19.30</u>	<u>9.48</u>
		<u>7:12</u>	<u>10.69</u>	<u>11.64</u>	<u>13.66</u>	<u>15.84</u>	<u>18.19</u>	<u>20.69</u>	<u>10.21</u>
		<u>12:12</u>	<u>12.67</u>	<u>13.80</u>	<u>16.19</u>	<u>18.78</u>	<u>21.56</u>	<u>24.53</u>	<u>12.25</u>
	<u>60</u>	<u>< 1:12</u>	<u>11.37</u>	<u>12.38</u>	<u>14.53</u>	<u>16.85</u>	<u>19.35</u>	<u>22.01</u>	<u>10.65</u>
		<u>5:12</u>	<u>14.18</u>	<u>15.44</u>	<u>18.12</u>	<u>21.02</u>	<u>24.13</u>	<u>27.45</u>	<u>13.54</u>
		<u>7:12</u>	<u>15.46</u>	<u>16.83</u>	<u>19.75</u>	<u>22.91</u>	<u>26.29</u>	<u>29.92</u>	<u>14.85</u>
		<u>12:12</u>	<u>18.98</u>	<u>20.66</u>	<u>24.25</u>	<u>28.13</u>	<u>32.29</u>	<u>36.74</u>	<u>18.48</u>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s, 1 pound force per linear foot = 0.146 kN/m, 1 pound per square foot = 47.88 Pa.

a. Tabulated lengths were derived by calculating design wind pressures in accordance with Figure 28.4-1 of ASCE 7 for a building with a mean roof height of 35 feet, topographic factor, K_{zt} , equal to 1.0, and Risk Category II. The design pressures were used to calculate forces to be resisted by solid wall segments in each sidewall. The forces to be resisted by each wall line were then divided by the default design strength of 840 pounds per linear foot of length to determine the unreduced length, UR, of solid wall length required in each sidewall. The actual mean roof height of the building shall not exceed the least horizontal dimension of the building.

b. Tabulated lengths in the "minimum" column are based on the requirement of Section 28.4.4 of ASCE 7 that the main windforce-resisting system be designed for a minimum pressure of 16 psf multiplied by the wall area of the building and 8 psf multiplied by the roof area of the building projected onto a vertical plane normal to the assumed wind direction. Tabulated lengths in shaded cells are less than the "minimum" value. Where the minimum controls, it is permitted to be reduced in accordance with Notes c, d and e. See Section R611.7.1.1.

- c. For buildings with a mean roof height of less than 35 feet, tabulated lengths are permitted to be reduced by multiplying by the appropriate factor, R_1 , from Table R611.7(2). The reduced length shall not be less than the "minimum" value shown in the table.
- d. Tabulated lengths for "one story or top story of two story" are based on a floor-to-ceiling height of 10 feet. Tabulated lengths for "first story of two story" are based on floor-to-ceiling heights of 10 feet each for the first and second story. For floor-to-ceiling heights less than assumed, use the lengths in Table R611.7(1A), (1B) or (1C), or multiply the value in the table by the reduction factor, R_2 , from Table R611.7(3).
- e. Tabulated lengths are based on the default design shear strength of 840 pounds per linear foot of solid wall segment. The tabulated lengths are permitted to be reduced by multiplying by the applicable reduction factor for design strength, R_3 , from Table R611.7(4).
- f. The reduction factors, R_1 , R_2 and R_3 , in Tables R611.7(2), R611.7(3), and R611.7(4), respectively, are permitted to be compounded, subject to the limitations of Note b. However, the minimum number and minimum length of solid walls segments in each wall line shall comply with Sections R611.7.1 and R611.7.2.1, respectively.
- g. For intermediate values of sidewall length, endwall length, roof slope and basic wind speed, use the next higher value, or determine by interpolation.



For SI: 1 mil = 0.0254 mm, 1 inch = 25.4 mm, 1 pound-force = 4.448 N.

FIGURE R611.9(1)
WOOD-FRAMED FLOOR TO SIDE OF CONCRETE WALL, FRAMING PERPENDICULAR

TABLE R611.9(1)
WOOD-FRAMED FLOOR TO SIDE OF CONCRETE WALL, FRAMING PERPENDICULAR^{a, b, c}

ANCHOR BOLT SPACING (inches)	TENSION TIE SPACING (inches)	BASIC WIND SPEED (mph)					
		85B	90B	100B	110B	120B	130B
		-	-	85C	90C	100C	110C
		-	-	-	85D	90D	100D
12	12	-	-	-	-	-	-
12	24	-	-	-	-	-	-
12	36	-	-	-	-	-	-
12	48	-	-	-	-	-	-
16	16	-	-	-	-	A	A
16	32	-	-	-	-	-	-
16	48	-	-	-	-	-	-
19.2	19.2	A	A	A	A	A	-
19.2	38.4	A	A	A	-	-	-

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

a. This table is for use with the detail in Figure R611.9(1). Use of this detail is permitted where a cell is not shaded and prohibited where shaded.

b. Wall design per other provisions of Section R611 is required.

c. Letter "A" indicates that a minimum nominal 3 × 8 ledger is required.

TABLE R611.9(1)
WOOD-FRAMED FLOOR TO SIDE OF CONCRETE WALL, FRAMING PERPENDICULAR^{a, b}

ANCHOR BOLT SPACING (inches)	TENSION TIE SPACING (inches)	BASIC WIND SPEED (mph)					
		115B	120B	130B	140B	150B	160B
				110C	119C	127C	136C
					110D	117D	125D
12	12						
12	24						
12	36						
12	48						
16	16						
16	32						
16	48						
19.2	19.2						
19.2	38.4						

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

a. This table is for use with the detail in Figure R611.9(1). Use of this detail is permitted where a cell is not shaded and prohibited where shaded.

b. Wall design per other provisions of Section R611 is required.

FIGURE R611.9(2) WOOD-FRAMED FLOOR TO SIDE OF CONCRETE WALL FRAMING PARALLEL

In Figure R611.9(2), in SECTION view note about tension tie, revise last sentence to read:

“Tension tie ASDLRFD capacity 875#1280# →”

TABLE R611.9(2)
WOOD-FRAMED FLOOR TO SIDE OF CONCRETE WALL, FRAMING PARALLEL^{a, b}

ANCHOR BOLT SPACING (inches)	TENSION TIE SPACING (inches)	BASIC WIND SPEED (mph) AND WIND EXPOSURE CATEGORY					
		85b	90B	100B	110B	120B	130B
		-	-	85C	90C	100C	110C
		-	-	-	85D	90D	100D
12	12	-	-	-	-	-	-
12	24	-	-	-	-	-	-
12	36	-	-	-	-	-	-
12	48	-	-	-	-	-	-
16	16	-	-	-	-	-	-
16	32	-	-	-	-	-	-
16	48	-	-	-	-	-	-
19.2	19.2	-	-	-	-	-	-
19.2	38.4	-	-	-	-	-	-
24	24	-	-	-	-	-	-
24	48	-	-	-	-	-	-

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

a. This table is for use with the detail in Figure R611.9(2). Use of this detail is permitted where a cell is not shaded and prohibited where shaded.

b. Wall design per other provisions of Section R611 is required.

TABLE R611.9(2)
WOOD-FRAMED FLOOR TO SIDE OF CONCRETE WALL, FRAMING PARALLEL^{a, b}

ANCHOR BOLT SPACING (inches)	TENSION TIE SPACING (inches)	BASIC WIND SPEED (mph) AND WIND EXPOSURE CATEGORY					
		115B	120B	130B	140B	150B	160B
				110C	119C	127C	136C
					110D	117D	125D
12	12						
12	24						
12	36						
12	48						
16	16						
16	32						
16	48						
19.2	19.2						

<u>19.2</u>	<u>38.4</u>						
<u>24</u>	<u>24</u>						
<u>24</u>	<u>48</u>						

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

a. This table is for use with the detail in Figure R611.9(2). Use of this detail is permitted where a cell is not shaded and prohibited where shaded.

b. Wall design per other provisions of Section R611 is required.

FIGURE R611.9(3) WOOD-FRAMED FLOOR TO TOP OF CONCRETE WALL FRAMING PERPENDICULAR

In Figure R611.9(3), in PLAN VIEW bottom note about tension tie, revise last sentence to read:
 "Tension tie ASDLRFD capacity 760#1280# for both angles (380#640# per angle) →"

TABLE R611.9(3)
WOOD-FRAMED FLOOR TO TOP OF CONCRETE WALL, FRAMING PERPENDICULAR^{a, b, c, d, e}

ANCHOR BOLT SPACING (inches)	TENSION TIE SPACING (inches)	BASIC WIND SPEED (mph) AND WIND EXPOSURE CATEGORY					
		85B-	90B-	100B-	110B-	120B-	130B-
		-	-	85C-	90C-	100C-	110C-
		-	-	-	85D-	90D-	100D-
<u>12-</u>	<u>12-</u>	-	-	-	-	-	-
<u>12-</u>	<u>24-</u>	-	-	-	-	-	-
<u>12-</u>	<u>36-</u>	-	-	-	-	-	-
<u>12-</u>	<u>48-</u>	-	-	-	-	-	-
<u>16-</u>	<u>16-</u>	-	-	-	-	6 A	6 B
<u>16-</u>	<u>32-</u>	-	-	-	-	6 A	6 B
<u>16-</u>	<u>48-</u>	-	-	-	-	-	-
<u>19.2</u>	<u>19.2</u>	-	-	-	6 A	6 A	6 B
<u>19.2</u>	<u>38.4</u>	-	-	-	6 A	6 A	-
<u>24-</u>	<u>24-</u>	-	-	6 A	6 B	6 A	-
<u>24-</u>	<u>48-</u>	-	-	6 A	-	-	-

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

a. This table is for use with the detail in Figure R611.9(3). Use of this detail is permitted where cell is not shaded, prohibited where shaded.

b. Wall design per other provisions in Section R611 is required.

c. For wind design, minimum 4-inch-nominal wall is permitted in unshaded cells with no number.

d. Number 6 indicates minimum permitted nominal wall thickness in inches necessary to develop required strength (capacity) of connection. As a minimum, this nominal thickness shall occur in the portion of the wall indicated by the cross-hatching in Figure R611.9(3). For the remainder of the wall, see Note b.

e. Letter "A" indicates that a minimum nominal 3 x 6 sill plate is required. Letter "B" indicates that a ⁵/₈-inch-diameter anchor bolt and a minimal nominal 3 x 6 sill plate are required.

TABLE R611.9(3)
WOOD-FRAMED FLOOR TO TOP OF CONCRETE WALL, FRAMING PERPENDICULAR^{a, b, c, d, e}

ANCHOR BOLT SPACING (inches)	TENSION TIE SPACING (inches)	BASIC WIND SPEED (mph) AND WIND EXPOSURE CATEGORY					
		115B	120B	130B	140B	150B	160B
				110C	119C	127C	136C
					110D	117D	125D
<u>12</u>	<u>12</u>						<u>6</u>
<u>12</u>	<u>24</u>					<u>6</u>	<u>6</u>
<u>12</u>	<u>36</u>					<u>6</u>	<u>6</u>
<u>12</u>	<u>48</u>				<u>6</u>	<u>6</u>	<u>6</u>
<u>16</u>	<u>16</u>					<u>6</u>	<u>6A</u>
<u>16</u>	<u>32</u>				<u>6</u>	<u>6</u>	<u>6A</u>
<u>16</u>	<u>48</u>			<u>6</u>	<u>6</u>	<u>6</u>	<u>6A</u>
<u>19.2</u>	<u>19.2</u>				<u>6A</u>	<u>6A</u>	<u>6B</u>
<u>19.2</u>	<u>38.4</u>			<u>6</u>	<u>6A</u>	<u>6A</u>	<u>6B</u>
<u>24</u>	<u>24</u>			<u>6A</u>	<u>6B</u>	<u>6B</u>	<u>6B</u>
<u>24</u>	<u>48</u>		<u>6</u>	<u>6A</u>	<u>6B</u>	<u>6B</u>	<u>8B</u>

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

a. This table is for use with the detail in Figure R611.9(3). Use of this detail is permitted where cell is not shaded, prohibited where shaded.

b. Wall design per other provisions in Section R611 is required.

c. For wind design, minimum 4-inch-nominal wall is permitted in unshaded cells with no number.

d. Numbers 6 and 8 indicates minimum permitted nominal wall thickness in inches necessary to develop required strength (capacity) of connection. As a minimum, this nominal thickness shall occur in the portion of the wall indicated by the cross-hatching in Figure R611.9(3). For the remainder of the wall, see Note b.

e. Letter "A" indicates that a minimum nominal 3 x 6 sill plate is required. Letter "B" indicates that a $\frac{5}{8}$ -inch-diameter anchor bolt and a minimal nominal 3 x 6 sill plate are required.

FIGURE R611.9(4) WOOD-FRAMED FLOOR TO TOP OF CONCRETE WALL FRAMING PARALLEL

In Figure R611.9(4), in PLAN VIEW note about tension tie, revise last sentence to read:
 "Tension tie ASD/LRFD capacity ~~760#~~1280# for both angles (~~360#~~640# per angle) →"

TABLE R611.9(4)
WOOD-FRAMED FLOOR TO TOP OF CONCRETE WALL, FRAMING PARALLEL^{a, b, c, d, e}

ANCHOR BOLT SPACING (inches)	TENSION TIE SPACING (inches)	BASIC WIND SPEED (mph) AND WIND EXPOSURE CATEGORY					
		85B	90B	100B	110B	120B	130B
		-	-	85C	90C	100C	110C
		-	-	-	85D	90D	100D
-	12	-	-	-	-	-	-
12	24	-	-	-	-	-	-

12	36	-	-	-	-	-	-
12	48	-	-	-	-	-	-
16	16	-	-	-	-	6 A	6 B
16	32	-	-	-	-	6 A	6 B
16	48	-	-	-	-	-	-
19.2	19.2	-	-	-	6 A	6 A	6 B
19.2	38.4	-	-	-	6 A	6 A	-
24	24	-	-	6 A	6 B	6 B	-
24	48	-	-	6 A	-	-	-

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

- a. This table is for use with the detail in Figure R611.9(4). Use of this detail is permitted where a cell is not shaded, prohibited where shaded.
- b. Wall design per other provisions of Section R611 is required.
- c. For wind design, minimum 4-inch-nominal wall is permitted in unshaded cells with no number.
- d. Number 6 indicates minimum permitted nominal wall thickness in inches necessary to develop required strength (capacity) of connection. As a minimum, this nominal thickness shall occur in the portion of the wall indicated by the cross-hatching in Figure R611.9(4). For the remainder of the wall, see Note b.
- e. Letter "A" indicates that a minimum nominal 3 × 6 sill plate is required. Letter "B" indicates that a $\frac{5}{8}$ -inch-diameter anchor bolt and a minimal nominal 3 × 6 sill plate are required.

TABLE R611.9(4) WOOD-FRAMED FLOOR TO TOP OF CONCRETE WALL, FRAMING PARALLEL ^{a, b,}
_{c, d, e}

ANCHOR BOLT SPACING (inches)	TENSION TIE SPACING (inches)	BASIC WIND SPEED (mph) AND WIND EXPOSURE CATEGORY					
		115B	120B	130B	140B	150B	160B
				110C	119C	127C	136C
					110D	117D	125D
12	12						6
12	24					6	6
12	36					6	6
12	48				6	6	6
16	16					6	6A
16	32				6	6	6A
16	48			6	6	6	6A
19.2	19.2				6A	6A	6B
19.2	38.4			6	6A	6A	6B
24	24			6A	6B	6B	6B
24	48		6	6A	6B	6B	8B

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

- a. This table is for use with the detail in Figure R611.9(4). Use of this detail is permitted where a cell is not shaded, prohibited where shaded.
- b. Wall design per other provisions of Section R611 is required.
- c. For wind design, minimum 4-inch-nominal wall is permitted in unshaded cells with no number.
- d. Numbers 6 and 8 indicates minimum permitted nominal wall thickness in inches necessary to develop required strength (capacity) of connection. As a minimum, this nominal thickness shall occur in the portion of the wall indicated by the cross-hatching in Figure R611.9(4). For the remainder of the wall, see Note b.
- e. Letter "A" indicates that a minimum nominal 3 x 6 sill plate is required. Letter "B" indicates that a $\frac{5}{8}$ -inch-diameter anchor bolt and a minimal nominal 3 x 6 sill plate are required.

FIGURE R611.9(5) COLD-FORMED STEEL FLOOR TO SIDE OF CONCRETE WALL, FRAMING PERPENDICULAR

In Figure R611.9(5), in SECTION view note about tension tie, revise last sentence to read:
 "Tension tie ASDLRFD capacity 2010#3200# →"

TABLE R611.9(5)
COLD-FORMED STEEL-FRAMED FLOOR TO SIDE OF CONCRETE WALL, FRAMING PERPENDICULAR^{a, b, c, d}

ANCHOR BOLT SPACING (inches)	TENSION TIE SPACING (inches)	BASIC WIND SPEED (mph) AND WIND EXPOSURE CATEGORY					
		85B	90B	100B	110B	120B	130B
		-	-	85C	90C	100C	110C
		-	-	-	85D	90D	100D
42	42	-	-	-	-	-	-
42	24	-	-	-	-	-	-
42	36	-	-	-	-	-	6
42	48	-	-	-	-	6	6
46	46	-	-	-	-	-	-
46	32	-	-	-	-	-	-
46	48	-	-	-	-	6	6
49.2	49.2	-	-	-	-	-	-
49.2	38.4	-	-	-	-	-	6
24	24	-	-	-	-	-	-
24	48	-	-	-	-	6	6

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.4470 m/s.

- a. This table is for use with the detail in Figure R611.9(5). Use of this detail is permitted where a cell is not shaded.
- b. Wall design per other provisions of Section R611 is required.
- c. For wind design, minimum 4-inch-nominal wall is permitted in unshaded cells with no number.
- d. Number 6 indicates minimum permitted nominal wall thickness in inches necessary to develop required strength (capacity) of connection. As a minimum, this nominal thickness shall occur in the portion of the wall indicated by the cross-hatching in Figure R611.9(5). For the remainder of the wall, see Note b.

TABLE R611.9(5)
COLD-FORMED STEEL-FRAMED FLOOR TO SIDE OF CONCRETE WALL, FRAMING
PERPENDICULAR^{a, b, c}

ANCHOR BOLT SPACING (inches)	TENSION TIE SPACING (inches)	BASIC WIND SPEED (mph) AND WIND EXPOSURE CATEGORY					
		115B	120B	130B	140B	150B	160B
				110C	119C	127C	136C
					110D	117D	125D
<u>12</u>	<u>12</u>						
<u>12</u>	<u>24</u>						
<u>12</u>	<u>36</u>						
<u>12</u>	<u>48</u>						
<u>16</u>	<u>16</u>						
<u>16</u>	<u>32</u>						
<u>16</u>	<u>48</u>						
<u>19.2</u>	<u>19.2</u>						
<u>19.2</u>	<u>38.4</u>						
<u>24</u>	<u>24</u>						
<u>24</u>	<u>48</u>						

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.4470 m/s.

a. This table is for use with the detail in Figure R611.9(5). Use of this detail is permitted where a cell is not shaded.

b. Wall design per other provisions of Section R611 is required.

c. For wind design, minimum 4-inch-nominal wall is permitted in unshaded cells with no number.

FIGURE R611.9(6) COLD-FORMED STEEL FLOOR TO SIDE OF CONCRETE WALL, FRAMING
PARALLEL

In Figure R611.9(6), in SECTION view bottom note about tension tie, revise last sentence to read:
 "Tension tie ASDLRFD capacity 2010#3200# →"

TABLE R611.9(6)
COLD-FORMED STEEL-FRAMED FLOOR TO SIDE OF CONCRETE WALL, FRAMING PARALLEL^{a, b, c, d}

ANCHOR BOLT SPACING (inches)	TENSION TIE SPACING (inches)	BASIC WIND SPEED (mph) AND WIND EXPOSURE CATEGORY					
		85B	90B	100B	110B	120B	130B
				85C	90C	100C	110C
					85D	90D	100D
42	42						
42	24						
42	36						6
42	48					6	6
46	46						
46	32						
46	48					6	6

19.2	19.2						
19.2	38.4						6
24	24						
24	48					6	6

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

a. This table is for use with the detail in Figure R611.9(6). Use of this detail is permitted where a cell is not shaded.

b. Wall design per other provisions of Section R611 is required.

c. For wind design, minimum 4-inch-nominal wall is permitted in unshaded cells with no number.

d. Number 6 indicates minimum permitted nominal wall thickness in inches necessary to develop required strength (capacity) of connection. As a minimum, this nominal thickness shall occur in the portion of the wall indicated by the cross-hatching in Figure R611.9(6). For the remainder of the wall, see Note b.

TABLE R611.9(6)
COLD-FORMED STEEL-FRAMED FLOOR TO SIDE OF CONCRETE WALL, FRAMING
PARALLEL^{a, b, c}

ANCHOR BOLT SPACING (inches)	TENSION TIE SPACING (inches)	BASIC WIND SPEED (mph) AND WIND EXPOSURE CATEGORY					
		115B	120B	130B	140B	150B	160B
				110C	119C	127C	136C
					110D	117D	125D
12	12						
12	24						
12	36						
12	48						
16	16						
16	32						
16	48						
19.2	19.2						
19.2	38.4						
24	24						
24	48						

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

a. This table is for use with the detail in Figure R611.9(6). Use of this detail is permitted where a cell is not shaded.

b. Wall design per other provisions of Section R611 is required.

c. For wind design, minimum 4-inch-nominal wall is permitted in unshaded cells with no number.

**FIGURE R611.9(7) COLD-FORMED STEEL FLOOR TO TOP OF CONCRETE WALL FRAMING
PERPENDICULAR**

In Figure R611.9(7), in PLAN VIEW note about tension tie, revise last sentence to read:

"Tension tie ASDLRFD capacity 700#1280# →"

TABLE R611.9(7)
COLD-FORMED STEEL-FRAMED FLOOR TO TOP OF CONCRETE WALL, FRAMING PERPENDICULAR^{a, b, c, d, e}

ANCHOR BOLT SPACING (inches)	TENSION TIE SPACING (inches)	BASIC WIND SPEED (mph) AND WIND EXPOSURE CATEGORY					
		85B	90B	100B	110B	120B	130B

		-	-	858C	90C	100C	110C
		-	-	-	85D	90D	100D
12	12	-	-	-	-	-	-
12	24	-	-	-	-	-	-
16	16	-	-	-	-	6 A	6 B
16	32	-	-	-	-	6 A	6 B
19.2	19.2	-	-	-	6 A	8 B	8 B
19.2	38.4	-	-	-	6 A	8 B	8 B
24	24	-	-	6 A	8 B	8 B	

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

a. This table is for use with the detail in Figure R611.9(7). Use of this detail is permitted where a cell is not shaded, prohibited where shaded.

b. Wall design per other provisions of Section R611 is required.

c. For wind design, minimum 4-inch-nominal wall is permitted in unshaded cells with no number.

d. Numbers 6 and 8 indicate minimum permitted nominal wall thickness in inches necessary to develop required strength (capacity) of connection. As a minimum, this nominal thickness shall occur in the portion of the wall indicated by the cross-hatching in Figure R611.9(7). For the remainder of the wall, see Note b.

e. Letter "A" indicates that a minimum nominal 3 × 6 sill plate is required. Letter "B" indicates that a $\frac{5}{8}$ -inch-diameter anchor bolt and a minimum nominal 3 × 6 sill plate are required.

TABLE R611.9(7)
COLD-FORMED STEEL-FRAMED FLOOR TO TOP OF CONCRETE WALL, FRAMING
PERPENDICULAR^{a, b, c, d, e}

<u>ANCHOR BOLT</u> <u>SPACING</u> <u>(inches)</u>	<u>TENSION TIE</u> <u>SPACING</u> <u>(inches)</u>	<u>BASIC WIND SPEED (mph) AND WIND EXPOSURE</u> <u>CATEGORY</u>					
		<u>115B</u>	<u>120B</u>	<u>130B</u>	<u>140B</u>	<u>150B</u>	<u>160B</u>
				<u>110C</u>	<u>119C</u>	<u>127C</u>	<u>136C</u>
					<u>110D</u>	<u>117D</u>	<u>125D</u>
<u>12</u>	<u>12</u>	-	-	-	-	-	<u>6</u>
<u>12</u>	<u>24</u>	-	-	-	-	<u>6</u>	<u>6</u>
<u>16</u>	<u>16</u>	-	-	-	-	<u>6</u>	<u>6 A</u>
<u>16</u>	<u>32</u>	-	-	-	<u>6</u>	<u>6</u>	<u>6A</u>
<u>19.2</u>	<u>19.2</u>	-	-	-	<u>6A</u>	<u>6A</u>	<u>6B</u>
<u>19.2</u>	<u>38.4</u>	-	-	<u>6</u>	<u>6A</u>	<u>6A</u>	<u>6B</u>
<u>24</u>	<u>24</u>	-	-	<u>6A</u>	<u>6B</u>	<u>6B</u>	<u>6B</u>

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

a. This table is for use with the detail in Figure R611.9(7). Use of this detail is permitted where a cell is not shaded, prohibited where shaded.

b. Wall design per other provisions of Section R611 is required.

c. For wind design, minimum 4-inch-nominal wall is permitted in unshaded cells with no number.

d. Number 6 indicates minimum permitted nominal wall thickness in inches necessary to develop required strength (capacity) of connection. As a minimum, this nominal thickness shall occur in the portion of the wall indicated by the cross-hatching in Figure R611.9(7). For the remainder of the wall, see Note b.

e. Letter "A" indicates that a minimum nominal 3 x 6 sill plate is required. Letter "B" indicates that a $\frac{5}{8}$ -inch-diameter anchor bolt and a minimum nominal 3 x 6 sill plate are required.

FIGURE R611.9(8) COLD-FORMED STEEL FLOOR TO TOP OF CONCRETE WALL, FRAMING PARALLEL

In Figure R611.9(8), in PLAN VIEW note about tension tie, revise last sentence to read:
"Tension tie ASDLRFD capacity 750#1280# →"

TABLE R611.9(8)
COLD-FORMED STEEL-FRAMED FLOOR TO TOP OF CONCRETE WALL, FRAMING PARALLEL ^{a, b, c, d, e}

ANCHOR BOLT SPACING (inches)	TENSION TIE SPACING (inches)	BASIC WIND SPEED (mph) AND WIND EXPOSURE CATEGORY					
		85B	90B	100B	110B	120B	130B
				85C	90C	100C	110C
					85D	90D	100D
42	42						
42	24						
46	46					6 A	6 B
46	32					6 A	6 B
49.2	49.2				6 A	8 B	8 B
49.2	38.4				6 A	8 B	8 B
24	24			6 A	8 B	8 B	

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

a. This table is for use with the detail in Figure R611.9(8). Use of this detail is permitted where a cell is not shaded, prohibited where shaded.

b. Wall design per other provisions of Section R611 is required.

c. For wind design, minimum 4-inch-nominal wall is permitted in unshaded cells with no number.

d. Numbers 6 and 8 indicate minimum permitted nominal wall thickness in inches necessary to develop required strength (capacity) of connection. As a minimum, this nominal thickness shall occur in the portion of the wall indicated by the cross-hatching in Figure R611.9(8). For the remainder of the wall, see Note b.

e. Letter "A" indicates that a minimum nominal 3 x 6 sill plate is required. Letter "B" indicates that a $\frac{5}{8}$ -inch-diameter anchor bolt and a minimum nominal 3 x 6 sill plate are required.

TABLE R611.9(8)
COLD-FORMED STEEL-FRAMED FLOOR TO TOP OF CONCRETE WALL, FRAMING PARALLEL ^{a, b, c, d, e}

ANCHOR BOLT SPACING (inches)	TENSION TIE SPACING (inches)	BASIC WIND SPEED (mph) AND WIND EXPOSURE CATEGORY					
		115B	120B	130B	140B	150B	160B
				110C	119C	127C	136C
					110D	117D	125D
12	12	-	-	-	-	-	6
12	24	-	-	-	-	6	6
16	16	-	-	-	-	6	6A

<u>16</u>	<u>32</u>	-	-	-	<u>6</u>	<u>6</u>	<u>6A</u>
<u>19.2</u>	<u>19.2</u>	-	-	-	<u>6A</u>	<u>6A</u>	<u>6B</u>
<u>19.2</u>	<u>38.4</u>	-	-	<u>6</u>	<u>6A</u>	<u>6A</u>	<u>6B</u>
<u>24</u>	<u>24</u>	-	-	<u>6A</u>	<u>6B</u>	<u>6B</u>	<u>6B</u>

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

a. This table is for use with the detail in Figure R611.9(8). Use of this detail is permitted where a cell is not shaded, prohibited where shaded.

b. Wall design per other provisions of Section R611 is required.

c. For wind design, minimum 4-inch-nominal wall is permitted in unshaded cells with no number.

d. Number 6 indicates minimum permitted nominal wall thickness in inches necessary to develop required strength (capacity) of connection. As a minimum, this nominal thickness shall occur in the portion of the wall indicated by the cross-hatching in Figure R611.9(8). For the remainder of the wall, see Note b.

e. Letter "A" indicates that a minimum nominal 3 x 6 sill plate is required. Letter "B" indicates that a $\frac{5}{8}$ -inch-diameter anchor bolt and a minimum nominal 3 x 6 sill plate are required.

FIGURE R611.9(9) WOOD-FRAMED ROOF TO TOP OF CONCRETE WALL, FRAMING PERPENDICULAR

In Figure R611.9(9), in PLAN VIEW note about tension tie, revise last sentence to read:
 "Tension tie ASDLRFD capacity ~~760#1280#~~ both angles, ~~360#640#~~ per angle →"

TABLE R611.9(9)
WOOD-FRAMED ROOF TO TOP OF CONCRETE WALL, FRAMING PERPENDICULAR^{a, b, c, d, e}

ANCHOR-BOLT SPACING (inches)	TENSION-TIE SPACING (inches)	BASIC WIND SPEED (mph) AND WIND EXPOSURE CATEGORY					
		85B	90B	100B	110B	120B	130B
		-	-	85C	90C	100C	110C
		-	-	-	85D	90D	100D
12	12	-	-	-	-	-	-
12	24	-	-	-	-	-	-
12	36	-	-	-	-	-	-
12	48	-	-	-	-	-	-
16	16	-	-	-	-	-	6
16	32	-	-	-	-	-	6
16	48	-	-	-	-	-	-
<u>19.2</u>	<u>19.2</u>	-	-	-	-	6	6 A
<u>19.2</u>	<u>38.4</u>	-	-	-	-	6	-
24	24	-	-	-	6 A	6 A	6 B
24	48	-	-	-	-	-	-

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

a. This table is for use with the detail in Figure R611.9(9). Use of this detail is permitted where cell a is not shaded, prohibited where shaded.

b. Wall design per other provisions of Section R611 is required.

- c. For wind design, minimum 4-inch-nominal wall is permitted in unshaded cells with no number.
- d. Number 6 indicates minimum permitted nominal wall thickness in inches necessary to develop required strength (capacity) of connection. As a minimum, this nominal thickness shall occur in the portion of the wall indicated by the cross-hatching in Figure R611.9(9). For the remainder of the wall, see Note b.
- e. Letter "A" indicates that a minimum nominal 3 × 6 sill plate is required. Letter "B" indicates that a $\frac{5}{8}$ -inch-diameter anchor bolt and a minimum nominal 3 × 6 sill plate are required.

TABLE R611.9(9) WOOD-FRAMED ROOF TO TOP OF CONCRETE WALL, FRAMING PERPENDICULAR^{a, b, c, d, e}

ANCHOR BOLT SPACING (inches)	TENSION TIE SPACING (inches)	BASIC WIND SPEED (mph) AND WIND EXPOSURE CATEGORY					
		115B	120B	130B	140B	150B	160B
				110C	119C	127C	136C
					110D	117D	125D
<u>12</u>	<u>12</u>	-	-	-	-	-	<u>6</u>
<u>12</u>	<u>24</u>	-	-	-	-	-	<u>6</u>
<u>12</u>	<u>36</u>	-	-	-	-	<u>6</u>	<u>6</u>
<u>12</u>	<u>48</u>	-	-	-	<u>6</u>	<u>6</u>	<u>6</u>
<u>16</u>	<u>16</u>	-	-	-	-	<u>6</u>	<u>6</u>
<u>16</u>	<u>32</u>	-	-	-	-	<u>6</u>	<u>6</u>
<u>16</u>	<u>48</u>	-	-	-	<u>6</u>	<u>6</u>	<u>6</u>
<u>19.2</u>	<u>19.2</u>	-	-	-	-	<u>6</u>	<u>6</u>
<u>19.2</u>	<u>38.4</u>	-	-	-	<u>6</u>	<u>6</u>	-
<u>24</u>	<u>24</u>	-	-	-	<u>6</u>	-	-
<u>24</u>	<u>48</u>	-	-	<u>6</u>	<u>8B</u>	-	-

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

a. This table is for use with the detail in Figure R611.9(9). Use of this detail is permitted where cell a is not shaded, prohibited where shaded.

b. Wall design per other provisions of Section R611 is required.

c. For wind design, minimum 4-inch-nominal wall is permitted in unshaded cells with no number.

d. Numbers 6 and 8 indicates minimum permitted nominal wall thickness in inches necessary to develop required strength (capacity) of connection. As a minimum, this nominal thickness shall occur in the portion of the wall indicated by the cross-hatching in Figure R611.9(9). For the remainder of the wall, see Note b.

e. Letter "B" indicates that a $\frac{5}{8}$ -inch-diameter anchor bolt and a minimum nominal 3 × 6 sill plate are required.

FIGURE R611.9(10) WOOD-FRAMED ROOF TO TOP OF CONCRETE WALL FRAMING PARALLEL

In Figure R611.9(10), in SECTION view note about tension tie, revise last sentence to read:

"Tension tie ASDLRFD capacity 1340#2140# →"

**TABLE R611.9(10)
WOOD-FRAMED ROOF TO TOP OF CONCRETE WALL, FRAMING PARALLEL^{a, b, c, d, e}**

ANCHOR BOLT SPACING (inches)	TENSION TIE SPACING (inches)	BASIC WIND SPEED (mph) AND WIND EXPOSURE CATEGORY					
		85B	90B	100B	110B	120B	130B
		-	-	85C	90C	100C	110C
		-	-	-	85D	90D	100D
42	42	-	-	-	-	-	-
42	24	-	-	-	-	-	-

12	36	-	-	-	-	-	-
12	48	-	-	-	-	-	-
16	16	-	-	-	-	6	6
16	32	-	-	-	-	6	6
16	48	-	-	-	-	6	6
19.2	19.2	-	-	-	6	6	6 A
19.2	38.4	-	-	-	6	6	6 A
24	24	-	-	6	6 A	6 A	6 B
24	48	-	-	6	6 A	6 B	6 B

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

a. This table is for use with the detail in Figure R611.9(10). Use of this detail is permitted where a cell is not shaded.

b. Wall design per other provisions of Section R611 is required.

c. For wind design, minimum 4-inch-nominal wall is permitted in cells with no number.

d. Number 6 indicates minimum permitted nominal wall thickness in inches necessary to develop required strength (capacity) of connection. As a minimum, this nominal thickness shall occur in the portion of the wall indicated by the cross-hatching in Figure R611.9(10). For the remainder of the wall, see Note b.

e. Letter "A" indicates that a minimum nominal 3 × 6 sill plate is required. Letter "B" indicates that a $\frac{5}{8}$ -inch-diameter anchor bolt and a minimum nominal 3 × 6 sill plate are required.

TABLE R611.9(10) WOOD-FRAMED ROOF TO TOP OF CONCRETE WALL, FRAMING PARALLEL ^{a, b, c, d, e}

ANCHOR BOLT SPACING (inches)	TENSION TIE SPACING (inches)	BASIC WIND SPEED (mph) AND WIND EXPOSURE CATEGORY					
		115B	120B	130B	140B	150B	160B
				110C	119C	127C	136C
					110D	117D	125D
12	12						6
12	24						6
12	36					6	6
12	48				6	6	6
16	16					6	6
16	32					6	6
16	48				6	6	6
19.2	19.2					6	6
19.2	38.4				6	6	
24	24				6		
24	48			6	8B		

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

a. This table is for use with the detail in Figure R611.9(10). Use of this detail is permitted where a cell is not shaded.

b. Wall design per other provisions of Section R611 is required.

c. For wind design, minimum 4-inch-nominal wall is permitted in cells with no number.

d. Numbers 6 and 8 indicates minimum permitted nominal wall thickness in inches necessary to develop required strength (capacity) of connection. As a minimum, this nominal thickness shall occur in the portion of the wall indicated by the cross-hatching in Figure

R611.9(10). For the remainder of the wall, see Note b.

e.. Letter "B" indicates that a $\frac{5}{8}$ -inch-diameter anchor bolt and a minimum nominal 3 x 6 sill plate are required.

FIGURE R611.9(11) COLD-FORMED STEEL ROOF TO TOP OF CONCRETE WALL, FRAMING PERPENDICULAR

In Figure R611.9(11), in PLAN VIEW note about tension tie, revise last sentence to read:
"Tension tie ASDLRFD capacity 700#1280# →"

TABLE R611.9(11)
WOOD-FRAMED ROOF TO TOP OF CONCRETE WALL, FRAMING PERPENDICULAR^{a, b, c, d, e}

ANCHOR BOLT SPACING (inches)	TENSION TIE SPACING (inches)	BASIC WIND SPEED (mph) AND WIND EXPOSURE CATEGORY					
		85B	90B	100B	110B	120B	130B
				85C	90C	100C	110C
					85D	90D	100D
12	12						
12	24						
16	16					6	6
16	32					6	6
19.2	19.2				6	6	8 B
19.2	38.4				6	6	8 B
24	24			6	6	8 B	

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

a. This table is for use with the detail in Figure R611.9(11). Use of this detail is permitted where a cell is not shaded, prohibited where shaded.

b. Wall design per other provisions of Section R611 is required.

c. For wind design, minimum 4-inch-nominal wall is permitted in unshaded cells with no number.

d. Numbers 6 and 8 indicate minimum permitted nominal wall thickness in inches necessary to develop required strength (capacity) of connection. As a minimum, this nominal thickness shall occur in the portion of the wall indicated by the cross-hatching in Figure R611.9(11). For the remainder of the wall, see Note b.

e. Letter "B" indicates that a $\frac{5}{8}$ -inch-diameter anchor bolt and a minimum nominal 3 x 6 sill plate are required.

For SI: 1 mil = 0.0254 mm, 1 inch = 25.4 mm, 1 pound-force = 4.448 N.

TABLE R611.9(11) WOOD-FRAMED ROOF TO TOP OF CONCRETE WALL, FRAMING PERPENDICULAR^{a, b, c, d, e}

ANCHOR BOLT SPACING (inches)	TENSION TIE SPACING (inches)	BASIC WIND SPEED (mph) AND WIND EXPOSURE CATEGORY					
		115B	120B	130B	140B	150B	160B
				110C	119C	127C	136C
					110D	117D	125D
12	12	-	-	-	-	-	6
12	24	-	-	-	-	-	6
16	16	-	-	-	-	6	6
16	32	-	-	-	-	6	6

<u>19.2</u>	<u>19.2</u>	-	-	-		<u>6</u>	<u>6</u>
<u>19.2</u>	<u>38.4</u>	-	-	-	<u>6</u>	<u>6</u>	<u>6</u>
<u>24</u>	<u>24</u>	-	-		<u>6</u>	<u>6A</u>	<u>6B</u>

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

a. This table is for use with the detail in Figure R611.9(11). Use of this detail is permitted where a cell is not shaded, prohibited where shaded.

b. Wall design per other provisions of Section R611 is required.

c. For wind design, minimum 4-inch-nominal wall is permitted in unshaded cells with no number.

d. Number 6 indicates minimum permitted nominal wall thickness in inches necessary to develop required strength (capacity) of connection. As a minimum, this nominal thickness shall occur in the portion of the wall indicated by the cross-hatching in Figure R611.9(11). For the remainder of the wall, see Note b.

e. Letter "A" indicates that a minimum nominal 3 x 6 sill plate is required. Letter "B" indicates that a $\frac{5}{8}$ -inch-diameter anchor bolt and a minimum nominal 3 x 6 sill plate are required.

FIGURE R611.9(12) COLD-FORMED STEEL ROOF TO TOP OF CONCRETE WALL, FRAMING PARALLEL

In Figure R611.9(12), in SECTION view note about tension tie, revise last sentence to read:
"Tension tie ASDLRFD capacity 800#1600# →"

TABLE R611.9(12)
COLD-FORMED STEEL ROOF TO TOP OF CONCRETE WALL, FRAMING PARALLEL ^{a, b, c, d, e}

ANCHOR BOLT SPACING (inches)	TENSION TIE SPACING (inches)	BASIC WIND SPEED (mph) AND WIND EXPOSURE CATEGORY					
		85B	90B	100B	110B	120B	130B
		-	-	85G	90G	100G	110G
		-	-	-	85D	90D	100D
42	42	-	-	-	-	-	-
42	24	-	-	-	-	-	-
46	46	-	-	-	-	-	-
46	32	-	-	-	-	-	-
<u>19.2</u>	<u>19.2</u>	-	-	-	-	<u>6</u>	<u>6</u>
<u>19.2</u>	<u>38.4</u>	-	-	-	-	<u>6</u>	<u>6</u>
24	24	-	-	<u>6</u>	<u>6</u>	<u>8</u> <u>B</u>	<u>8</u> <u>B</u>

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

a. This table is for use with the detail in Figure R611.9(12). Use of this detail is permitted where a cell is not shaded.

b. Wall design per other provisions of Section R611 is required.

c. For wind design, minimum 4-inch-nominal wall is permitted in cells with no number.

d. Numbers 6 and 8 indicate minimum permitted nominal wall thickness in inches necessary to develop required strength (capacity) of connection. As a minimum, this nominal thickness shall occur in the portion of the wall indicated by the cross-hatching in Figure R611.9(12). For the remainder of the wall, see Note b.

e. Letter "B" indicates that a $\frac{6}{8}$ -inch-diameter anchor bolt is required.

TABLE R611.9(12) COLD-FORMED STEEL ROOF TO TOP OF CONCRETE WALL, FRAMING PARALLEL ^{a, b, c, d, e}

ANCHOR BOLT	TENSION TIE	BASIC WIND SPEED (mph) AND WIND EXPOSURE CATEGORY					
		<u>115B</u>	<u>120B</u>	<u>130B</u>	<u>140B</u>	<u>150B</u>	<u>160B</u>

<u>SPACING</u> <u>(inches)</u>	<u>SPACING</u> <u>(inches)</u>			<u>110C</u>	<u>119C</u> <u>110D</u>	<u>127C</u> <u>117D</u>	<u>136C</u> <u>125D</u>
<u>12</u>	<u>12</u>	-	-	-	-	-	<u>6</u>
<u>12</u>	<u>24</u>	-	-	-	-	-	<u>6</u>
<u>16</u>	<u>16</u>	-	-	-	-	<u>6</u>	<u>6</u>
<u>16</u>	<u>32</u>	-	-	-	-	<u>6</u>	<u>6</u>
<u>19.2</u>	<u>19.2</u>	-	-	-	-	<u>6</u>	<u>6</u>
<u>19.2</u>	<u>38.4</u>	-	-	-	<u>6</u>	<u>6</u>	<u>6</u>
<u>24</u>	<u>24</u>	-	-	-	<u>6</u>	<u>6</u>	<u>6B</u>

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

a. This table is for use with the detail in Figure R611.9(12). Use of this detail is permitted where a cell is not shaded.

b. Wall design per other provisions of Section R611 is required.

c. For wind design, minimum 4-inch-nominal wall is permitted in cells with no number.

d. Number 6 indicates minimum permitted nominal wall thickness in inches necessary to develop required strength (capacity) of connection. As a minimum, this nominal thickness shall occur in the portion of the wall indicated by the cross-hatching in Figure R611.9(12). For the remainder of the wall, see Note b.

e. Letter "B" indicates that a $\frac{5}{8}$ -inch-diameter anchor bolt is required.

R611.9.2 Connections between concrete walls and light-framed floor systems. Connections between concrete walls and light-framed floor systems shall be in accordance with one of the following:

1. For floor systems of wood frame construction, the provisions of Section R611.9.1 and the prescriptive details of Figures R611.9(1) through R611.9(4), where permitted by the tables accompanying those figures. Portions of connections of wood-framed floor systems not noted in the figures shall be in accordance with Section R502, or AF&PA/WFCM, if applicable. Wood framing members shall be of a species having a specific gravity equal to or greater than 0.42.
2. For floor systems of cold-formed steel construction, the provisions of Section R611.9.1 and the prescriptive details of Figures R611.9(5) through R611.9(8), where permitted by the tables accompanying those figures. Portions of connections of cold-formed-steel framed floor systems not noted in the figures shall be in accordance with Section R505, or AISI S230, if applicable.
3. Proprietary connectors selected to resist loads and load combinations in accordance with Appendix A (ASD) or Appendix B (LRFD) of PCA 100.
4. An engineered design using loads and load combinations in accordance with Appendix A (ASD) or Appendix B (LRFD) of PCA 100.
5. An engineered design using loads and material design provisions in accordance with this code, or in accordance with ASCE 7, ACI 318, and AF&PA/NDS for wood frame construction or AISI S100 for cold-formed steel frame construction.

R611.9.3 Connections between concrete walls and light-framed ceiling and roof systems.

Connections between concrete walls and light-framed ceiling and roof systems shall be in accordance with one of the following:

1. For ceiling and roof systems of wood frame construction, the provisions of Section R611.9.1 and the prescriptive details of Figures R611.9(9) and R611.9(10), where permitted by the tables accompanying those figures. Portions of connections of wood-framed ceiling and roof systems not noted in the figures shall be in accordance with Section R802, or AF&PA/WFCM, if applicable. Wood framing members shall be of a species having a specific gravity equal to or greater than 0.42.
2. For ceiling and roof systems of cold-formed-steel construction, the provisions of Section R611.9.1 and the prescriptive details of Figures R611.9(11) and R611.9(12), where permitted by the tables accompanying those figures. Portions of connections of cold-formed-steel

- framed ceiling and roof systems not noted in the figures shall be in accordance with Section R804, or AISI S230, if applicable.
3. Proprietary connectors selected to resist loads and load combinations in accordance with Appendix A (ASD) or Appendix B (LRFD) of PCA 100.
 4. An engineered design using loads and load combinations in accordance with Appendix A (ASD) or Appendix B (LRFD) of PCA 100.
 5. An engineered design using loads and material design provisions in accordance with this code, or in accordance with ASCE 7, ACI 318, and AF&PA/NDS for wood-frame construction or AISI S100 for cold-formed-steel frame construction.

R611.10 Floor, roof and ceiling diaphragms. Floors and roofs in all buildings with exterior walls of concrete shall be designed and constructed as *diaphragms*. Where gable-end walls occur, ceilings shall also be designed and constructed as *diaphragms*. The design and construction of floors, roofs and ceilings of wood framing or cold-formed-steel framing serving as *diaphragms* shall comply with the applicable requirements of this code, or AF&PA/WFCM or AISI S230, if applicable. Wood framing members shall be of a species having a specific gravity equal to or greater than 0.42.

Reason: Background. The provisions currently in Section R611 are based on *PCA 100-2007, Prescriptive Design of Exterior Concrete Walls for One- and Two-Family Dwellings* (PCA 100). The provisions of PCA 100-2007 are based on ACI 318-05 and ASCE 7-05, and the 2006 IBC. Recently the 2012 edition of PCA 100 was issued which is based on ACI 318-11, ASCE 7-10, and the 2012 IBC. Therefore, the purpose of this code change is to update the code's provisions to agree with PCA 100-2012; therefore, to agree with ACI 318-11, ASCE 7-10, and the 2012 IBC.

A significant change was made to the wind load provisions of ASCE 7-10 involving the basic wind speed map. Prior to the 2010 edition of ASCE 7, its wind load provisions yielded service-level design wind pressures, which were used to compute loads for use in the various load combinations. For strength design (LRFD), the computed loads were multiplied by a load factor that generally was 1.6. Over the past 20 years, seismic design provisions of ASCE 7 have been based on strength level loads, with the load factor for strength design being 1.0. Because there was a desire within the engineering community to convert the wind load provisions to strength-level forces, which would then be multiplied by a load factor of 1.0, ASCE 7-10 was revised with this in mind.

In order to reduce the load factor on wind for strength design from 1.6 to 1.0, the basic wind speeds were increased. Since wind pressure varies as the square of the wind velocity, wind speeds were increased by the square root of 1.6, which is 1.265. Computed velocities were rounded to the nearest 5 mph for areas away from the hurricane coast lines of the Atlantic Ocean and Gulf of Mexico. For example, under ASCE 7-05 for an occupancy category ("risk category" under ASCE 7-10) II structure (with an Importance Factor of 1.0), the basic wind speed was 90 mph away from the coast line. Under the new map of Figure 26.5-1A of ASCE 7-10 for Risk Category II structures, the basic wind speed away from the coast line is 115 mph ($90 \times 1.265 = 113.85$, which was rounded to 115). Also, two additional (2) maps were created for ASCE 7-10 (Figures 26.5-1B and 26.5-1C), which allow the old wind importance factor to be abandoned. All three maps reflect revisions to basic wind speeds based on analysis of newer wind-speed data for areas near the Atlantic Ocean and Gulf of Mexico. Generally speaking, for areas away from the hurricane coast lines, wind loads calculated utilizing strength design procedures will be approximately the same under ASCE 7-10 as under ASCE 7-05. For most areas near the hurricane coast lines, wind loads under ASCE 7-10 will be somewhat less than under ASCE 7-05.

Because of the changes to basic wind speeds in ASCE 7-10, the provisions of PCA 100-2007, which are based on ASCE 7-05, had to be revised. The grouping of basic wind speeds over the three exposure categories shown in the proposed changes to the various tables was accomplished as follows. Since most one- and two-family dwellings are constructed in exposure category B, the velocity pressures, q , were calculated for a building with a mean roof height, h , of 35 feet based on exposure category B, for basic wind speeds of 115, 120, 130, 140, 150 and 160 mph. Using those velocity pressures, the basic wind speeds were calculated that would result in the same velocity pressures for exposure categories C and D. For example, a basic wind speed of 160 mph in exposure B for a 35-foot high building will give the same velocity pressure as 136 mph and 125 mph in exposures C and D, respectively. These velocities and corresponding exposure categories are the limits of application of these provisions. The proposed upper limits on velocities result in design pressures that are similar to those in the existing code when considering that the load factor for strength design has been reduced from 1.6 to 1.0.

It will be noted in the proposal that the lowest tabulated wind speed for exposure B is 115 mph; whereas, the basic wind speed for California and the Pacific northwest is 110 mph. To accommodate 110 mph, it would have been necessary to expand the tables, which was not desirable. In addition, a review of the various tables will show that generally it does not make any difference since the solution for 115 mph, exposure B, is the minimum acceptable one. Also, where most construction is taking place in the area with the 110 mph basic wind speed, dwellings will be Seismic Design Category D, which these provisions do not cover.

Part 1 - Section R611.2 – See **background** reason.

Part 2 - Section R611.6 - The primary reason changes have been made to this section is due to the change in basis of the basic wind speeds of ASCE 7-10 which were discussed in the **background** reason for the change.

In addition, the existing tables are based on ACI 318-05; therefore, they are being updated to ACI 318-11. One change to ACI 318 made between the 2005 and 2011 editions increased the strength reduction factor, ϕ , for plain concrete from 0.55 to 0.60. Everything else remaining equal, this resulted in an increase of 9% in design strength. This change resulted in more conditions (i.e., cells) where plain concrete is acceptable (i.e., #4 bars at 48 inches on center).

Other changes are essentially editorial in nature and are intended to clarify and facilitate use of the provisions. Some of these include:

1. Adding text to Section R611.6.2 and some table notes to clarify how to use the table for non-loadbearing walls, and
2. Shading of cells which signifies that plain concrete is permitted (note that some reinforcement is still required in the form of #4 bars at 48 inches on center).

Part 3 - Section R611.7 - The primary reason changes have been made to this section is due to the change in basic wind speeds of ASCE 7-10 which were discussed in the **background** reason for the change.

In addition, under ASCE 7-05 and earlier editions, the main wind-force resisting system of an enclosed or partially enclosed building had to be designed for a minimum load of 10 psf multiplied by the area of the building projected onto a vertical plane normal to the assumed wind direction. Applying these loads resulted in the unreduced length of solid wall shown under the "minimum" column of the existing tables. ASCE 7-10 changed this provision in two ways. Because of the switch to strength-based wind loads, 10 psf was multiplied by the former strength load factor, 1.6. This resulted in the status quo since the load factor on wind is now 1.0. However, a significant change was made to the load to be applied to the roof portion of the building that is projected onto the vertical plane. That load was reduced 50% from 16 to 8 psf. This change is reflected in the proposed tables by lower minimum values, and fewer shaded cells which alert the user that the minimum value governs.

Other changes are either editorial in nature, to correlate with the new changes in ASCE 7-10, or correct errors and omissions in the existing provisions.

Part 4 - Section R611.9 - The primary reason changes have been made to this section is due to the change in basic wind speeds of ASCE 7-10 which were discussed in the **background** reason for the change. Other reasons follow.

ASCE 7-10 Figure 28.4-1 includes a revised description of Load Case B governing wind blowing generally parallel to the ridge of a building. In some cases this redefined load case created controlling loads and thus required revisions to PCA 100 and the IRC.

Consistent with Table 1.1 of PCA 100 and IRC Table R301.5, the second floor live load was reduced from 40 psf to 30 psf based on sleeping rooms.

Also, consistent with the change to strength (LRFD) level wind loads, LRFD capacity calculations were used, in some cases affecting tabulated locations where details are applicable.

Part 5 - Sections R611.9.2 and R611.9.3 – Design of connections involving wood framing members requires that certain mechanical properties of the wood be known. Many mechanical properties of wood used by the structural engineer are related to the specific gravity (or density) of the wood. This property can vary widely depending upon the species of the wood. Therefore, in order to simplify the design of the prescriptive connection details in Section R611.9, it was decided that rather than have several groups of two or more wood species per group, a lower-bound value on the specific gravity would be used as the method of differentiating between species included in the scope of PCA 100-2012 and those requiring engineered design.

Part 6 - Section R611.10 - See reason for Part 5.

Cost Impact: The code change proposal will not increase the cost of construction.

RB334-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R611.2-RB-SZKE.doc

RB335 – 13

R611.5.1

Proponent: Stephen S. Szoke, P.E., Portland Cement Association

Revise as follows:

R611.5.1 Concrete and materials for concrete. Materials used in concrete, and concrete itself, shall conform to the requirements of this section, PCA 100, or ACI 318.

Reason: There are three design methods permitted by the code. Design and construction may be in compliance with:
The criteria of Section R611 of the IRC which is based on transcription from the *PCA100 Standard Prescriptive Design of Exterior Concrete Walls for One- and Two-Family Dwellings*;
PCA100 Standard Prescriptive Design of Exterior Concrete Walls for One- and Two-Family Dwellings which includes design scenarios too voluminous to be transcribed into the IRC;
ACI 318 Building Code Requirements for Structural Concrete for structures not suitable for simplistic prescriptive design.
This change simply allows materials to comply with the requirements of PCA 100 where PCA 100 is used for the design of structures

Cost Impact: The code change proposal will not increase the cost of construction.

RB335-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R611.5.1-RB-SZKE.doc

RB336 – 13

R611.5.1.1 (NEW), Chapter 44

Proponent: Stephen S. Szoke, P.E., Portland Cement Association/Portland Cement Association

Add new text as follows:

R611.5.1.1 Cements. The following standards as referenced in Chapter 44 shall be permitted to be used.

1. ASTM C 150
2. ASTM C 595
3. ASTM C 1157

Add new standard to Chapter 44 as follows:

ASTM

C1157 - 11 Standard Performance Specification for Hydraulic Cement

Reason: To update the specifications standards for Portland Cement, Blended Hydraulic Cement, and Hydraulic Cement referenced for use in concrete. Due to the change in the cycles for code and standards development referenced standards may not be referring the appropriate edition of standards for cement or even editions of standards that reflect cement that is available. Due to the rapid changes in the manufacturing processes due to both technological advancements and government rules and regulations, the requirements for cements are also changing more rapidly than can be accommodated by the code and referenced design standard processes. This change helps assure that cements complying with the most current edition of the standard specifications are used for construction. Without this modification and the potential to be referring an out-of-date standard specifications could result in requiring products that are no longer available. This change allows for cements with the appropriate restrictions on ingredients to be properly referenced in the IRC 2015. This change does not introduce new types of cement for use in concrete, but provides the mechanism to assure that the most recent, to the extent possible, product standard specifications are cited in the code. This change is consistent with a similar code change approved for the IBC.

Examples of the types of modifications may by ASTM International Committee C01 on Cements that need to be accommodated in code development are as follows:

ASTM C150-12

Compared to ASTM C150-09 referenced in ACI 318-11, ASTM C150-12 includes revisions that:

1. Make the air permeability test the default method for determining compliance with specific surface fineness requirements and moves determination by the turbidimetric method to the optional table. This reflects industry practice.
2. Clarification on Type II (MH) moderate heat and moderate sulfate resistant cement heat index requirements, clarification on procedure for determining potential phase (Bogue) composition, and some additional minor improvements. No changes are made to the physical or chemical requirements of C150.

Additionally, compared to ASTM C150-07a referenced in IBC 2012 Chapter 35, ASTM C150-12 includes revisions to:

1. Distinguish between organic and inorganic processing additions and include a limit of 5% on inorganic processing additions and 1% on organic processing additions.
2. Modify procedures for determining potential phase composition to account for effect of inorganic processing additions in cement on potential phase composition calculations.
3. Include provisions for a Type II (MH) designation for moderate heat and moderate sulfate resistant cement.
4. Various other minor improvements. Again no changes were made to the physical or chemical requirements of C150 for portland cements.

The variations in product that will result from the use of C150-12 versus C150-07 will not adversely impact the performance of concrete with regard to compliance with ACI 318, PCA 100, or the provisions of the IRC.

C595-12

Compared to C595-09 referenced in ACI 318-11, ASTM C595-12 includes revisions to:

1. Include provisions for a new Type IL portland-limestone blended cement designation for cement containing from 5% to 15% limestone. C595 Type IL has same physical requirements as Type IP and IS (<70), which are also comparable to ASTM C150 physical requirements. Portland-limestone cement provides an alternative for improving the sustainability of concrete.
2. Several clarifications and improvements to the C595 provisions for Type IT ternary blended cements.

3. Clarifications and improvements to C595 naming practice used to identify amount slag, pozzolan or limestone contained in blended cements.

Additionally, compared to C595-08a referenced in IBC 2012 Chapter 35, ASTM C595-12 also includes provisions for Type IT ternary blended cement (cements containing portland cement with either a combination of two different pozzolans, or slag cement and a pozzolan, a pozzolan and a limestone, or a slag cement and a limestone). Ternary blended cements have the same physical requirements as Type IT and Type IS (<70) cements. Ternary blended cements were first introduced in the 2009 edition of ASTM C595.

The variations in product that will result from the use of C595-12 versus C595-08a will not adversely impact the performance of concrete with regard to compliance with ACI 318, PCA-100, or the provisions of the IRC.

ASTM C1157-11

Compared to C1157-09 referenced in ACI 318-11, ASTM C595-12 includes revisions to:

1. Include provisions for distinguishing between air entraining and non air-entraining C1157 cements with appropriate designations and limits consistent with those of ASTM C150 and C595 for air entraining and non air entraining cements.
2. A minor modification to correct the significant figures for minimum strength limits for SI unit values listed in Table 1.

The variations in product that will result from the use of C1157-12 versus C1157-09 will not adversely impact the performance of concrete with regard to compliance with ACI 318, PCA 100, or the provisions of the IRC.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standards proposed for inclusion in the code, ASTM D 1157 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

The update for ASTM C150-07 and ASTM C595-08a is in the ADM proposal which is heard by the Administrative Code Development Committee. The promulgator ASTM has proposed to update to ASTM C150-07 12 and ASTM C595-08a 12.

RB336-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R611.5.1.1 (NEW)-RB-SZKE.doc

RB337 – 13

R612.1

Proponent: Jeff Inks, Window and Door Manufacturers Association

Revise as follows:

R612.1 General. This section prescribes performance and construction requirements for exterior windows and doors installed in walls. Windows and doors shall be installed ~~and flashed~~ in accordance with the fenestration manufacturer's written installation instructions. Window and door openings shall be flashed in accordance with Section R703.8. Written installation instructions shall be provided by the fenestration manufacturer for each window or door.

Reason: The intent of this proposal is to clarify that flashing requirements for window and door assemblies are provided exclusively in Chapter 7, Section 703.8. The proposal also corrects conflicting language with 703.8 which expressly allows the use of flashing installation alternatives in addition to the window or door manufacturer's installation instructions when applicable.

In addition this proposal provides an editorial correction by making "door", "window", and "wall" in the first sentence plural.

Cost Impact: The code change will not increase the cost of construction.

RB337-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R612.1 #1-RB-INKS.doc

RB338 – 13

R612.1

Proponent: Jeff Inks, Window and Door Manufacturers Association

Revise as follows:

R612.1 General. This section prescribes performance and construction requirements for windows and doors installed in walls. Windows and doors shall be installed and flashed in accordance with the fenestration manufacturer's ~~written~~ published installation instructions. Window and door openings shall be flashed in accordance with Section R703.8. Written installation instructions shall be provided by the fenestration manufacturer for each window or door.

Reason: This proposals provides an editorial correction by making "door", "window", and "wall" in the first sentence plural and in addition replaces the term "written" with "published" given manufacturers provide installation instructions in both printed and electronic format which can also be printed by the user. The term "published" more clearly reflects how installation instructions are being provided by manufacturers.

Cost Impact: The code change will not increase the cost of construction.

RB338-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R612.1 #2-RB-INKS.doc

RB339 – 13

R612.1, R612.2, R612.3

Proponent: Julie Ruth/JRuth Code Consulting, representing American Architectural Manufacturers Association (julruth@aol.com)

Revise as follows:

R612.1 General. This section prescribes performance and construction requirements for exterior window and door assemblies installed in walls. Windows and doors shall be installed and flashed in accordance with the fenestration manufacturer's written installation instructions. Window and door openings shall be flashed in accordance with Section R703.8. Written installation instructions shall be provided by the fenestration manufacturer for each window or door.

R612.2 Performance. Exterior windows and doors assemblies shall be designed to resist the design wind loads specified in Table R301.2(2) adjusted for height and exposure in accordance with Table R301.2(3).

R612.3 Testing and labeling. Exterior windows and sliding door assemblies shall be tested by an *approved* independent laboratory, and bear a *label* identifying manufacturer, performance characteristics and *approved* inspection agency to indicate compliance with AAMA/WDMA/CSA 101/I.S.2/A440. Exterior side-hinged door assemblies shall be tested and *labeled* as conforming to AAMA/WDMA/CSA 101/I.S.2/A440 or comply with Section R612.5.

Reason: This proposal clarifies that the performance of the entire window or door assembly must be evaluated to determine compliance with the IRC. Window and door assemblies include the frame, hardware, weather stripping, thresholds, etc as well as the sash (window) or door slab (door). Only by evaluating the entire assembly can it be determined if the opening provides appropriate resistance to wind load, water penetration and air leakage.

Cost Impact: The code change proposal will not increase the cost of construction.

RB339-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R612.1-RB-RUTH.doc

RB340 – 13

R612.3, Chapter 44

Proponent: Jessica Ferris, Association of Millwork Distributors (jferris@amdweb.com)

Revise as follows:

R612.3 Testing and labeling. Exterior windows and sliding doors shall be tested by an *approved* independent laboratory, and bear a *label* identifying manufacturer, performance characteristics and *approved* inspection agency to indicate compliance with AAMA/WDMA/CSA 101/I.S.2/A440. Exterior side-hinged doors shall be tested and *labeled* as conforming to AAMA/WDMA/CSA 101/I.S.2/A440 or AMD 100, or comply with Section R612.5.

Add new standard to Chapter 44 as follows:

AMD Association of Millwork Distributors
10047 Robert Trent Jones Parkway
New Port Richey, FL 34655-4649

AMD 100 - Structural Performance Rating of Side-Hinged Exterior Door Systems and Procedures for Component Substitution

Reason: The purpose of this proposed code change is to add a new standard to this section of the code, which provides manufacturers of side-hinged exterior doors the option to certify to a structural standard that includes procedures for component substitution.

Incorporating reference to the AMD 100 standard in Section 612.3 will provide producers of side-hinged exterior door systems (SHEDS) with an acceptable alternative method for testing and labeling structural performance requirements. AMD 100 allows for the interchange or substitution of components while maintaining a structurally rated system, which eases the burden of having to test each door configuration assembled for the marketplace. Like AAMA/WDMA/CSA 101/I.S.2/A440, AMD 100 utilizes the ASTM E330 test method for obtaining design pressure ratings of SHEDS.

SHEDS have requirements that are quite different from exterior windows and sliding doors, and as such, have different considerations. The door industry is comprised of not only manufacturers but also smaller distributor and pre-hanger companies, dealers, and builders that purchase their door components from multiple suppliers and interchange these components in their systems regularly depending on customer needs. AMD 100 upgrades SHEDS without negatively affecting this supply chain.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standards proposed for inclusion in the code, AMD 100 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

RB340-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R612.3-RB-FERRIS.doc

RB341 – 13

R612.3

Proponent: Julie Ruth, JRuth Code Consulting, representing American Architectural Manufacturers Association (julruth@aol.com)

Revise as follows:

R612.3 Testing and labeling. Exterior windows and sliding doors shall be tested by an *approved* independent laboratory, and bear a *label* identifying manufacturer, performance characteristics and *approved* inspection agency to indicate compliance with AAMA/WDMA/CSA 101/I.S.2/A440. ~~Exterior side-hinged doors shall be tested and labeled as conforming to AAMA/WDMA/CSA 101/I.S.2/A440 or comply with Section R612.5.~~

Exceptions:

1. Decorative glazed openings.
2. Door assemblies installed where the overhang (OH) ratio is equal to or more than 1 need not be tested for water infiltration. The overhang ratio shall be calculated by the following equation:

OH ratio = OH length/OH height

Where:

OH length = The horizontal measure of how far an overhang over the door projects out from the door's surface.

OH height = The measure of the distance from the door's sill to the bottom of the overhang over the door.

The required width of the overhang projection shall be as determined below:

$W > (1.0 * \text{Door width}) + (2.0 * \text{OH length})$

Where:

W = Width of projection

3. Door assemblies installed in nonhabitable areas where the door assembly and area are designed to accept water infiltration need not be tested for water infiltration.

4. Doors that comply with Section R612.4.

Reason: The requirements for the residential building envelope have vastly improved over the course of the last 20 years. This proposal seeks to address one of the remaining weak elements in the building envelope for homes built under the IRC. This weak element is exterior swinging doors.

The integrity of the building envelope is critical to the health and life safety of the home's occupants. This is true not only during and after extreme wind and rain events, but also over the course of the building envelope's exposure to typical weather during the service life of the home. It is vitally important that all components of the building envelope perform at least 2 functions well. The first is resistance to the structural loads imposed by the wind. The second is resistance to wind driven rain.

A number of entries on the website of The Institute for Building and Home Safety (IBHS) emphasize the need to preserve the integrity of openings such as doors in the building envelope. These include:

- "The roof, windows and all doors in your home or business are the most vulnerable to damage when hurricane-force winds and rains pummel an area."
- "Once an opening is created, air rushes inside the structure and pressurizes it like inflating a balloon. The internal pressures build up and put pressure on ceilings and the roof, which is also getting uplift pressures from external wind forces. If the connections between the roof and walls are weak, these wind forces will drive the roof and walls to give way. Once the roof blows off the entire structure can collapse within seconds."

- “Don’t open your windows. You won’t save the house, as once thought and you will put yourself at risk of injury from breaking glass. You also may actually make things worse by giving wind and rain a greater chance of getting inside.”
- Older entry doors and particularly double doors and garage doors may be weak points where wind pressures and wind borne debris may force them open or push them out of their tracks. Glass windows, glass in doors and sliding glass doors are susceptible to failures from both pressure and wind borne debris impact. When any of these openings are breached, wind and water can enter your home and completely ruin the inside.
- In older homes, which are not well connected from top to bottom, the failure of a large window or a door can allow enough wind pressure to build up in your home that it almost doubles the effects of the winds howling around the outside. This can lead to significant structural failures.

Although the IBHS postings focus upon the need to maintain the structural integrity of all openings in the building envelope under extreme wind and rain events, penetration of wind driven rain through openings in the building envelope can have long term effects on the overall health of the home’s occupants. As observed by the American Lung Association:

- “Areas with this high level humidity and moist materials provide an ideal environment for the growth of microorganisms, which could result in continued or additional health hazards such as allergic reactions”.
- “Exposure to these microorganisms may increase the risk of developing lung disease. Damp buildings and furnishings promote the growth of microorganisms, cockroaches and mold, which can aggravate asthma and allergies and may cause the development of asthma, wheeze, cough and hypersensitivity pneumonitis in susceptible persons.”
- “Long-term high levels of humidity can foster growth of dust mites, which can cause asthma and trigger allergic reactions and asthma attacks. “

Documents posted in the IBHS website specifically refer to the International Building Code (IBC) and International Residential Code (IRC), developed by the International Code Council, as guides for building wind-resistant structures.

The IRC and IBC have required exterior windows and sliding doors to be tested and labeled to AAMA/WDMA/CSA 101/I.S.2/A440 since the first edition of both codes in 2000. In more recent editions garage doors have been required to be tested either in accordance with ASTM E330 or ANSI/DASMA 108. It seems likely that the reference to older doors and windows quoted above from the IBHS website refer to products installed before these criteria were put in place and widely enforced across the U.S.

Although other exterior doors, including swinging doors, are required by Section R612.5 to be tested for resistance to structural load in accordance with ASTM E330, the code official often does not have the resources needed to verify that the appropriate testing has occurred. If these doors were required to be tested and labeled in accordance with AAMA/WDMA/CSA 101/I.S.2/A440 then the code official would only need to verify the presence of the appropriate label on the door during field inspection. Since the standard also addresses the water penetration and air infiltration resistance of the door, along with other characteristics, the overall performance of the building envelope is improved by installing fenestration products that comply with it. Hence, the code official or field inspector could significantly improve the safety and performance of the home through a relatively simple inspection step rather than undertaking the more arduous task of reviewing an ASTM E330 test report simply to verify structural performance.

Previous proposals to require swinging doors to be tested and labeled in accordance with AAMA/WDMA/CSA 101/I.S.2/A440 were opposed on the basis that in many cases exterior doors are sheltered from the wind and rain, and therefore it is not necessary for them to protect the integrity of the building envelope to the same extent that is required for windows. This proposal recognizes that residential entry doors are often sheltered by a roof, awning or other type of overhang to protect building occupants who are waiting to enter the home from wind, rain and snow by including an exception for doors with overhang protection. The dimensions proposed are based upon current provisions of the 2010 Florida Building Code. Exceptions are also offered for doors that open to a nonhabitable area where water infiltration is acceptable, such as a swinging garage door, and overhead garage doors that comply with Section R612.4.

The IRC committee is urged to address this last weak element of the residential building envelope by approving this code change proposal.

Cost Impact: The code change proposal will not increase the cost of construction. The additional cost of testing and labeling exterior swinging doors in accordance with AAMA/WDMA/CSA 101/I.S.2/A440 instead of testing each door assembly provided in accordance with ASTM E330, is none.

RB341-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R612.3-RB-RUTH.doc

RB342 – 13

R612.3.1, R612.5.1 (New)

Proponent: Julie Ruth, P.E., JRuth Code Consulting, representing American Architectural Manufacturers Association (julruth@aol.com)

Revise as follows:

R612.3.1 Comparative Analysis. Structural wind load design pressures for window and door units ~~smaller other~~ than the size tested in accordance with Section R612.3 shall be permitted to be different ~~higher~~ than the design value of the tested unit provided such ~~different higher~~ pressures are determined by accepted engineering analysis that is signed and sealed by a registered design professional. All components of the ~~other small~~ unit shall be the same as those of the tested unit. ~~Where such calculated design pressures are used, they shall be validated by an additional test of the window or door unit having the highest allowable design pressure. Windows and doors rated in this manner shall comply with the following:~~

1. The frame area of the alternate size unit shall not exceed the frame area of the tested unit .
2. The alternate size unit shall vary from the tested unit only in width, height or load requirements.
3. The air and water infiltration resistance rating of the alternate size unit shall not exceed the air and water infiltration resistance rating of the tested unit.
4. The maximum cyclic pressure rating of the alternate size unit shall not exceed the maximum cyclic pressure rating of the tested unit when tested per ASTM E 1886 and ASTM E 1996, where applicable.

R612.5.1 Comparative Analysis. Structural wind load design pressures for window and door units ~~other~~ than the size tested in accordance with Section R612.3 shall be permitted to be different than the design value of the tested unit provided such different pressures are determined by accepted engineering analysis that is signed and sealed by a registered design professional. All components of the other unit shall be the same as those of the tested unit and the glass shall comply with Section R308.5. Windows and doors rated in this manner shall comply with the following:

1. The frame area of the alternate size unit shall not exceed the frame area of the tested unit.
2. The alternate size unit shall vary from the tested unit only in width, height or load requirements.
3. The maximum cyclic pressure rating of the alternate size unit shall not exceed the maximum cyclic pressure rating of the tested unit when tested per ASTM E 1886 and ASTM E 1996, where applicable.

Reason: Section R612.3 requires exterior windows and sliding doors to be tested and labeled in accordance with AAMA/WDMA/CSA 101/I.S.2/A440 – 11. This specification establishes criteria for various performance classes and design pressure ratings for windows, doors and unit skylights. The manufacturer of the product chooses the performance class and design pressure rating for which they would like to demonstrate compliance. The size and width of the test specimen is then dictated by the largest size and width for which the manufacturer wishes to demonstrate compliance for that particular class and design pressure rating.

As an example, a manufacturer may have a product line of vertical sliding windows that they would like to have designated as performance class R, with a design pressure rating of 30 psf. If they would like to demonstrate compliance with AAMA/WDMA/CSA 101/I.S.2/A440 for windows up to 3 feet wide and 5 feet high, then the test specimen must be a minimum of 3 feet wide and 5 feet high. If the test specimen passes all the test criteria for an R Vertical Sliding Window with a DP 30 rating, than that rating can also be applied to any other windows in that same product line (i.e. same framing material and profile, same glass package, etc) that are smaller than the test specimen.

At some point a smaller window will be able to sustain a higher design pressure. This is true because the framing and glass are spanning shorter distances than they were for the test specimen. The current comparative analysis provisions in Section R612.5 recognize this phenomenon and establish criteria for its application to the rating of smaller window units. A higher design pressure rating can be assigned to a smaller window unit when all of its components (framing, glass package, etc) are identical to the tested unit. Since air infiltration resistance and water penetration resistance are tied to Performance Grade rating in AAMA/WDMA/CSA 101/I.S.2/A440, and this characteristic cannot be determined by calculations, the current provisions also require that the unit to receive the highest design pressure rating is also to be fully tested in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.

In summary, the provisions require that the largest unit be tested to the design pressure rating desired, the smallest unit tested to the highest design pressure rating desired, and then, by interpolation though accepted engineering analysis, the appropriate rating for other sizes can be determined.

There have been some questions, however, from code officials, designers and product approval agencies with regards to how this particular section is to be applied. This proposal seeks to clarify the application of the section. By limiting the air leakage and water penetration resistance ratings of the smaller unit, it also eliminates the need for testing of the smaller unit, even if it is rated to a higher design pressure.

Specifically, this proposal:

1. Clarifies that the provisions are only to be applied to a unit whose frame area does not exceed that of the tested unit. Some confusion has existed as to whether a window unit that is, for example, shorter and wider, would be considered smaller or larger than the tested unit.
2. Maintains the criteria that all of the components of the alternate size unit are to be identical to those of the tested unit, and are to vary only in terms of width, height or load.
3. Limits the air infiltration resistance rating and water penetration resistance rating of the alternate size unit to that of the tested unit. Section R612.5.1 only permits the alternative size unit to be rated to a different structural design wind load pressure. If it is desired to have a unit rated to a higher Performance Grade rating (which includes resistance to air infiltration and water penetration as well as structural load and other associated performance requirements of AAMA/WDMA/CSA 101/I.S.2/A440) then testing of the alternate size unit would be required.
4. Limits the cyclical pressure rating of the alternate size unit, if applicable, to that of the tested unit. This criteria only applies to windows which have been tested as protected openings for resistance to impact by wind borne debris.
5. Expands the current comparative analysis provisions of Section R612.5 to windows and doors that are evaluated for resistance to structural load only under Section R612.5. Section R612.5 applies to exterior windows and door assemblies that are not within Section R612.3, such as site built windows, swinging doors and sloped glazing assemblies other than unit skylights.

We believe that adding these provisions to the IRC will ease the use of this section and result in a more uniform application of it.

Cost Impact: The code change proposal will not increase the cost of construction.

RB342-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R612.3.1-RB-RUTH.doc

RB343 – 13

R612.3.1, Chapter 44

Proponent: Jeff Inks, Window and Door Manufacturers Association

Revise as follows:

R612.3.1 Comparative analysis. Structural wind load design pressures for window and door units different than the size tested in accordance with Section R612.3 shall be permitted to be different than the design value of the tested unit when determined in accordance with one of the following comparative analysis methods:

1. Structural wind load design pressures for window and door units smaller than the size tested in accordance with Section R612.3 shall be permitted to be higher than the design value of the tested unit provided such higher pressures are determined by accepted engineering analysis. All components of the smaller unit shall be the same as those of the tested unit. Where such calculated design pressures are used, they shall be validated by an additional test of the window or door unit having the highest allowable design pressure.
2. In accordance with WDMA I.S. 11.

Add new standard to Chapter 44 as follows:

WDMA

I.S. 11-13 Industry Standard for Analytical Method for Design Pressure (DP) Ratings of Fenestration Products.

Reason: Comparative analysis based on accepted engineering methods provides a proven, accurate and reliable means for determining design pressures of different sized products within a fenestration product line based on testing of specimen unit/s from the respective line. This alleviates the need for costly testing of all sizes within the line saving considerable construction costs and providing greater design flexibility without incurring additional time and costs, especially for specialty/custom products, for testing that isn't necessary in order to determine the correct DP.

While the current provision has been and continues to be widely utilized for the reasons stated above, it is limited only to allowing comparative analysis for units smaller than the unit tested, not larger. However, as indicated above, comparative analysis can also be effectively used to accurately determine DP ratings for fenestration products that are larger in width and/or height than the actual tested specimen provided proper analytical methods are followed. In that case, comparative analysis for determining DP of units larger than tested unit should also be permitted by the IRC for that purpose as long as proper engineering analysis is required.

The intent of this proposal is to provide for that by allowing for comparative analysis to also be used on units larger than the tested unit if determined in accordance with WDMA I.S. 11. Method #1 above is the existing language without change and remains limited to units that are smaller which is appropriate. Proposed method #2, WDMA I.S. 11 - *Industry Standard for Analytical Method for Design Pressure (DP) Ratings of Fenestration Products*, provides more comprehensive alternative methods appropriate for using comparative analysis to determine DP of units different in size, both smaller and larger, than that of the tested unit/s within a product line. The comparative analysis methods included in WDMA I.S. 11 are based on accepted engineering analysis which must also be sealed by a licensed Professional Engineer (PE) making it technically sound for use in the IRC for this purpose.

Copies of the standard are being submitted to ICC for ICC and IRC code committee review accordingly. The standard is also available on WDMA's website via the following link: <https://www.wdma.com/OnlineBookstore/tabid/61/pid/20/WDMA-I-S-11-09-Voluntary-Analytical-Method-for-Design-Pressure-Rating-of-Fenestration-Products-PDF-Download.aspx>

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standards proposed for inclusion in the code, WDMA I.S. with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

RB343-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R612.3.1-RB-INKS.doc

RB344 – 13

Table R613.5(1)

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

TABLE R613.5(1) **MINIMUM THICKNESS FOR SIP WALL SUPPORTING SIP OR LIGHT-FRAME ROOF ONLY (inches)^a**

For SI: 1 inch = 25.4, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479. kPa.

N/A = Not applicable.

- a. Design assumptions:
 - Deflection criteria: L/240
 - Roof load: 7 psf.
 - Ceiling load: 5 psf.
 - Wind loads based on Table R301.2(2).
 - Strength axis of facing materials applied vertically.
 - Maximum deflection criteria: L/240.
 - Maximum roof dead load: 10 psf.
 - Maximum roof live load: 70 psf.
 - Maximum ceiling dead load: 5 psf.
 - Maximum ceiling live load: 20 psf.
 - Wind loads based on Table R301.2 (2).
 - Strength axis of facing material applied vertically.
 - N/A indicates not applicable.

(Portions of Table not shown remain unchanged)

TABLE R613.5(2) **MINIMUM THICKNESS FOR SIP WALLS SUPPORTING SIP OR LIGHT-FRAME ONE STORY AND ROOF (inches)^a**

For SI: 1 inch = 25.4, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479. kPa.

N/A = Not applicable.

- a. Design assumptions:
 - Deflection criteria: L/240
 - Roof load: 7 psf.
 - Ceiling load: 5 psf.
 - Second floor live load: 30 psf.
 - Second floor dead load: 10 psf.
 - Second floor dead load from walls: 10 psf.
 - Wind loads based on Table R301.2(2).
 - Strength axis of facing materials applied vertically.
 - Maximum deflection criteria: L/240.
 - Maximum roof dead load: 10 psf.
 - Maximum roof live load: 70 psf.
 - Maximum ceiling dead load: 5 psf.
 - Maximum ceiling live load: 20 psf.
 - Maximum second floor dead load: 10 psf.
 - Maximum second floor live load: 30 psf.
 - Maximum second floor dead load from walls: 10 psf.
 - Maximum first floor dead load: 10 psf.
 - Maximum first floor live load: 40 psf.
 - Wind loads based on Table R301.2 (2).
 - Strength axis of facing material applied vertically.
 - N/A indicates not applicable.

(Portions of Table not shown remain unchanged)

Reason: This change proposal corrects an error in the 2012 IRC. In the 2007-2008 code cycle with Code Change Proposal RB 178-07/08, the footnotes in Tables R613.5(1) and (2) were changed to the above footnotes with the exception of the phrase "Strength axis of facing material applied vertically." This phrase was added in the 2009-2010 code cycle with code change proposal RB 129-09/10. Unfortunately when the underlined phrase was added, the rest of the footnotes were returned to the 2006 format. This is the fault of the submitter in that at the time RB 129-09/10 was written, the 2009 IRC had not been published. As a result the phrase "Strength axis of facing material applied vertically" was added to the footnotes of the then current 2006 IRC. When the 2009 IRC was made available, the submitter forgot to go back and change to the updated footnotes. Please note that only the phrase above was underlined in change RB 129-09/10.

Cost Impact: The code change proposal will not increase the cost of construction.

RB344-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R613.5(1)T-RB-KEITH.doc

RB345 – 13

R613.7

Proponent: Edward L. Keith, APA – The Engineered Wood Association (ed.keith@apawood.org)

Revise as follows:

R613.7 Drilling and notching. The maximum vertical chase penetration in SIPs shall have a maximum side dimension of 2 inches (51 mm) centered in the panel. Vertical chases shall have a minimum spacing of 24-inches (610 mm) on center. Maximum of two horizontal chases shall be permitted in each wall panel - one at 14 inches (360 mm) plus or minus 2 inches (51 mm) from the bottom of the panel and one ~~at mid-height of the wall panel core~~ at 48 inches (1 220 mm) plus or minus 2 inches (51 mm) from the bottom edge of the SIPs panel. The maximum allowable penetration size in a wall panel shall be as shown on the manufacturer's shop drawings circular or rectangular with a maximum dimension of 12 inches (300 mm). Overcutting of holes in facing panels shall not be permitted.

Reason: The initial wording was written based on an 8-ft tall wall. As Section R613 permits up to 10-ft tall walls, the horizontal chases, which are used for switch-box wiring, need to be properly placed at 48 inches from the bottom edge of the SIPs panel. A plus or minus tolerance was placed on the dimension to ease use in the field.

Cost Impact: The code change proposal will not increase the cost of construction.

RB345-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R613.7 #1-RB-KEITH.doc

RB346 – 13

R613.7

Proponent: Edward L. Keith, APA – The Engineered Wood Association/Structural Insulated Panel Association (ed.keith@apawood.org)

Revise as follows:

R613.7 Drilling and notching. The maximum vertical chase penetration in SIPs shall have a maximum side dimension of 2 inches (51 mm) centered in the panel core. Vertical chases shall have a minimum spacing of 24-inches (610 mm) on center. Maximum of two horizontal chases shall be permitted in each wall panel - one at 14 inches (360 mm) from the bottom of the panel and one at mid-height of the wall panel. ~~The maximum allowable penetration size in a wall panel shall be circular or rectangular with a maximum dimension of 12 inches (300 mm). Overcutting of holes in facing panels shall not be permitted.~~ Additional penetrations are permitted where justified by analysis.

Reason: This proposal takes extraneous information out of the IRC. The portion proposed for removal relates to information that must be provided by the panel manufacturer as it is only by considering the specific loads and structural geometry that such recommendation can be made. Simply providing a maximum hole size prescriptively is worthless if there is not an accompanying limitation on how many may be permitted in a given wall length. We have been unable to get such a limitation placed in the IRC for the last two cycles. Without such a limitation it is prudent to eliminate the maximum hole size provision as having the provision without limits can lead to potentially unsafe applications, while permitting additional penetrations where justified by analysis.

Cost Impact: The code change proposal will not increase the cost of construction.

RB346-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R613.7 #2-RB-KEITH.doc

RB347 – 13

R613.3.1, R613.3.7 (NEW), Figure R613.5(1), Table R613.5(1), Figure R613.5(2), Table R613.5(2), Figure R613.5(3), Figure R613.5(4), Figure R613.5(5), R613.5.3 (NEW), R613.5.4 (NEW), Figure R613.5.1, Figure R613.5.2, Figure R613.8, R613.8, R613.9, Figure R613.9, R613.10, Table R613.10, R613.10.1

Proponent: Stephen Kerr S.E., Josephson Werdowatz and Associates, Inc., representing self

Revise as follows:

R613.3.1 Core. The core material shall be composed of foam plastic insulation meeting one of the following requirements:

1. Expanded Polystyrene (EPS) in accordance with ASTM C 578 and have a minimum density of 0.90 pounds per cubic feet (14.4 kg/m³); or
2. Extruded polystyrene (XPS) in accordance with ASTM C 578 and have a minimum density of 1.3 pounds per cubic feet (14.4 kg/m³); or
23. Polyurethane meeting the physical properties shown in Table R613.3.1, or;
34. An approved alternative.

All cores shall meet the requirements of Section R316.

R613.3.7 Thermal Barrier. SIP walls shall be separated from the interior of a building by an approved thermal barrier in accordance with section R316.4.

R613.5.3 Panel to panel connection. SIPs shall be connected at vertical in-plane joints in accordance with Figure R613.5.3 or by other approved methods.

R613.5.4 Corner framing. Corner framing of SIP walls shall be constructed in accordance with Figure R613.5.4.

R613.5.3 R613.5.5 Wall bracing. SIP walls shall be braced in accordance with Section R602.10. SIP walls shall be considered continuous wood structural panel sheathing for purposes of computing required bracing. SIP walls shall meet the requirements of Section R602.10.4.2 except that SIPs corners shall be fabricated as shown in Figure R613.9. When SIP walls are used for wall bracing, the SIP bottom plate shall be attached to wood framing below in accordance with Table R602.3(1).

~~**R613.8 Connection.** SIPs shall be connected at vertical in-plane joints in accordance with Figure R613.8 or by other approved methods.~~

~~**R613.9 Corner framing.** Corner framing of SIP walls shall be constructed in accordance with Figure R613.9.~~

~~**R613.10 R613.8 Headers.** SIP headers shall be designed and constructed in accordance with Table R613.408 and Figure R613.5.1. SIPs headers shall be continuous sections without splines. Headers shall be at least 11 7/8 inches (302 mm) deep. Headers longer than 4 feet (1219 mm) shall be constructed in accordance with Section R602.7.~~

~~**R613.10.1 Wood structural panel box headers.** Wood structural panel box headers shall be allowed where SIP headers are not applicable. Wood structural panel box headers shall be constructed in accordance with Figure R602.7.2 and Table R602.7.2.~~

TABLE R613.5(1)
MINIMUM THICKNESS FOR SIP WALL SUPPORTING SIP LIGHT-FRAME ROOF ONLY (inches)^{a,b,c}

Building Width (ft) ^d																	
Wind Speed (3-sec gust)		Ground Snow Load (psf)	24			28			32			36			40		
Exp A/B	Exp. C		Wall Height (feet)			Wall Height (feet)			Wall Height (feet)			Wall Height (feet)			Wall Height (feet)		
			8	9	10	8	9	10	8	9	10	8	9	10	8	9	10
85	—	20	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		30	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		50	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		70	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
100	85	20	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		30	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		50	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		70	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	6.5 4.5	4.5	4.5
110	100	20	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		30	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	6.5 4.5
		50	4.5	4.5	4.5	4.5	4.5	6.5 4.5	4.5	4.5	6.5 4.5	4.5	4.5	N/A 4.5	4.5	4.5	N/A 4.5
		70	4.5	4.5	6.5 4.5	4.5	4.5	N/A 4.5	4.5	4.5	N/A 4.5	4.5	6.5 4.5	N/A 4.5	4.5	N/A 4.5	N/A
120	110	20	4.5	4.5	N/A 4.5	4.5	4.5	N/A 4.5	4.5	4.5	N/A 4.5	4.5	4.5	N/A 4.5	4.5	4.5	N/A 4.5
		30	4.5	4.5	N/A 4.5	4.5	4.5	N/A 4.5	4.5	4.5	N/A 4.5	4.5	4.5	N/A 4.5	4.5	6.5 4.5	N/A 4.5
		50	4.5	4.5	N/A 4.5	4.5	6.5 4.5	N/A 4.5	4.5	N/A 4.5	N/A 4.5	4.5	N/A 4.5	N/A 4.5	4.5	N/A 4.5	N/A 4.5
		70	4.5	N/A 4.5	N/A 4.5	4.5	N/A 4.5	N/A 4.5	4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 4.5

For SI: 1 inch = 25.4 mm; 1 foot = 304.8 mm; 1 pound per square foot = 0.0479kPa.

a. N/A = Not Applicable—Design required.

b. Deflection criterion: L/240

c. Design load assumptions:

Deflection criteria: L/240.

Roof dead load: 710 psf.

Ceiling dead load: 5 psf.

Wind loads based on Table R301.2 (2).

Strength axis of facing materials applied vertically.

d. Building width is in the direction of horizontal framing members supported by the header.

TABLE R613.5(2)
MINIMUM THICKNESS FOR SIP WALLS SUPPORTING SIP OR LIGHT-FRAME ONE STORY AND ROOF (inches)^{a,b,c}

Building Width (ft) ^d																	
Wind Speed (3 – sec gust)		Ground Snow Load (psf)	24			28			32			36			40		
Exp A/B	Exp. C		Wall Height (feet)			Wall Height (feet)			Wall Height (feet)			Wall Height (feet)			Wall Height (feet)		
			8	9	10	8	9	10	8	9	10	8	9	10	8	9	10
85	—	20	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		30	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
		50	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	N/A
		70	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	6.5	4.5	4.5	N/A	4.5	N/A

											4.5			6.5	6.5	6.5	6.5
100	85	20	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	6.5 4.5	4.5	4.5	N/A 4.5	4.5	4.5	N/A 4.5
		30	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	N/A 4.5	4.5	4.5	N/A 4.5	4.5	N/A 4.5	N/A 4.5
		50	4.5	4.5	6.5 4.5	4.5	4.5	N/A 4.5	4.5	4.5	N/A 4.5	4.5	N/A 4.5	N/A 4.5	N/A 6.5	N/A 4.5	N/A 6.5
		70	4.5	4.5	N/A 4.5	4.5	6.5	N/A 4.5	4.5	N/A 4.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A 6.5
110	100	20	4.5	4.5	N/A 4.5	4.5	4.5	N/A 4.5	4.5	6.5 4.5	N/A 4.5	4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 6.5
		30	4.5	4.5	N/A 4.5	4.5	4.5	N/A 4.5	4.5	N/A 4.5	N/A 4.5	4.5	N/A 4.5	N/A 6.5	N/A 4.5	N/A 6.5	N/A 6.5
		50	4.5	6.5 4.5	N/A 4.5	4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A 6.5
		70	4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A 6.5
120	110	20	4.5	N/A 4.5	N/A 4.5	4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 6.5	N/A 4.5	N/A 4.5	N/A 6.5	N/A 4.5	N/A 6.5	N/A 6.5
		30	4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 4.5	N/A 6.5	N/A 4.5	N/A 4.5	N/A 6.5	N/A 4.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A 6.5
		50	N/A 4.5	N/A 4.5	N/A 6.5	N/A 4.5	N/A 4.5	N/A 6.5	N/A 4.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A 6.5
		70	N/A 4.5	N/A 4.5	N/A 6.5	N/A 4.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A 6.5	N/A 6.5

For SI: 1 inch = 25.4 mm; 1 foot = 304.8 mm; 1 pound per square foot = 0.0479kPa.

a. N/A = Not Applicable. Design required.

b. Deflection criterion: L/240

c. Design load assumptions:

Deflection criteria: L/240.

Roof dead load: 710 psf.

Ceiling dead load: 5 psf.

Second floor live load: 30 psf.

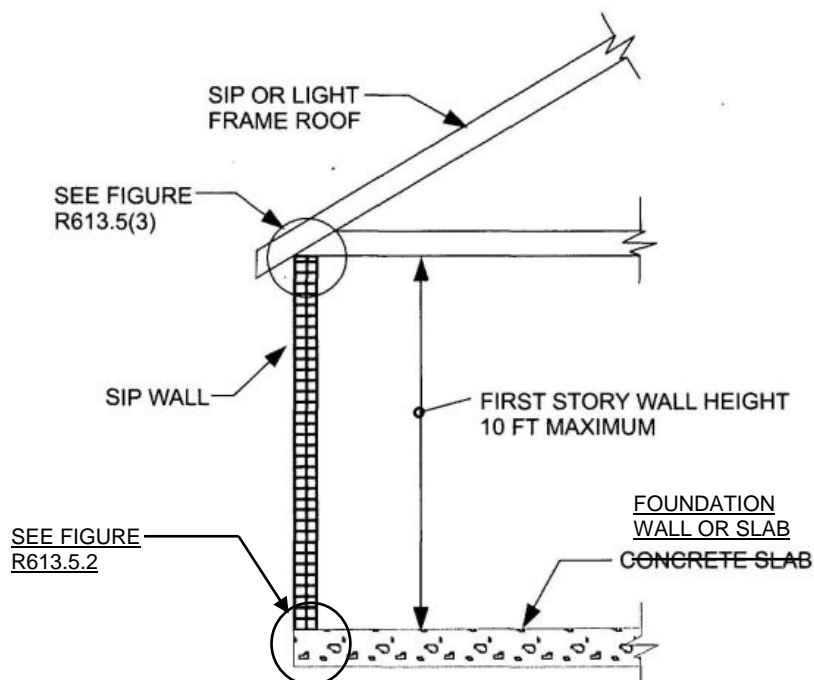
Second floor dead load: 10 psf.

Second floor dead load from walls: 10 psf.

Wind loads based on Table R301.2 (2).

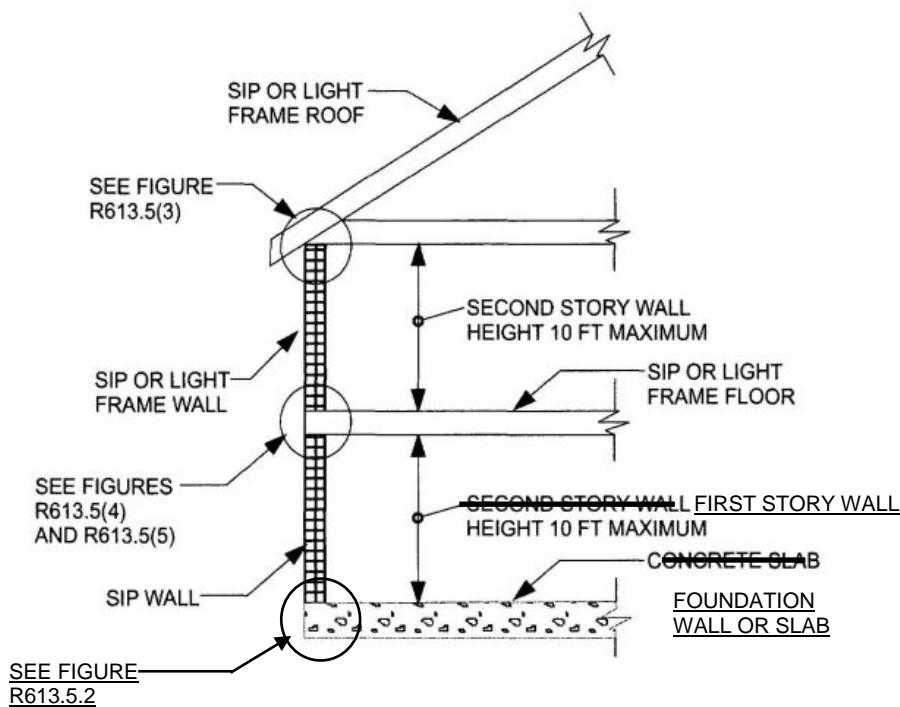
Strength axis of facing materials applied vertically.

d. Building width is in the direction of horizontal framing members supported by the header.



For SI: 1 foot = 304.8 mm.

FIGURE R613.5(1)
MAXIMUM ALLOWABLE HEIGHT OF SIP WALLS



For SI: 1 foot = 304.8 mm.

FIGURE R613.5(2)
MAXIMUM ALLOWABLE HEIGHT OF SIP WALLS

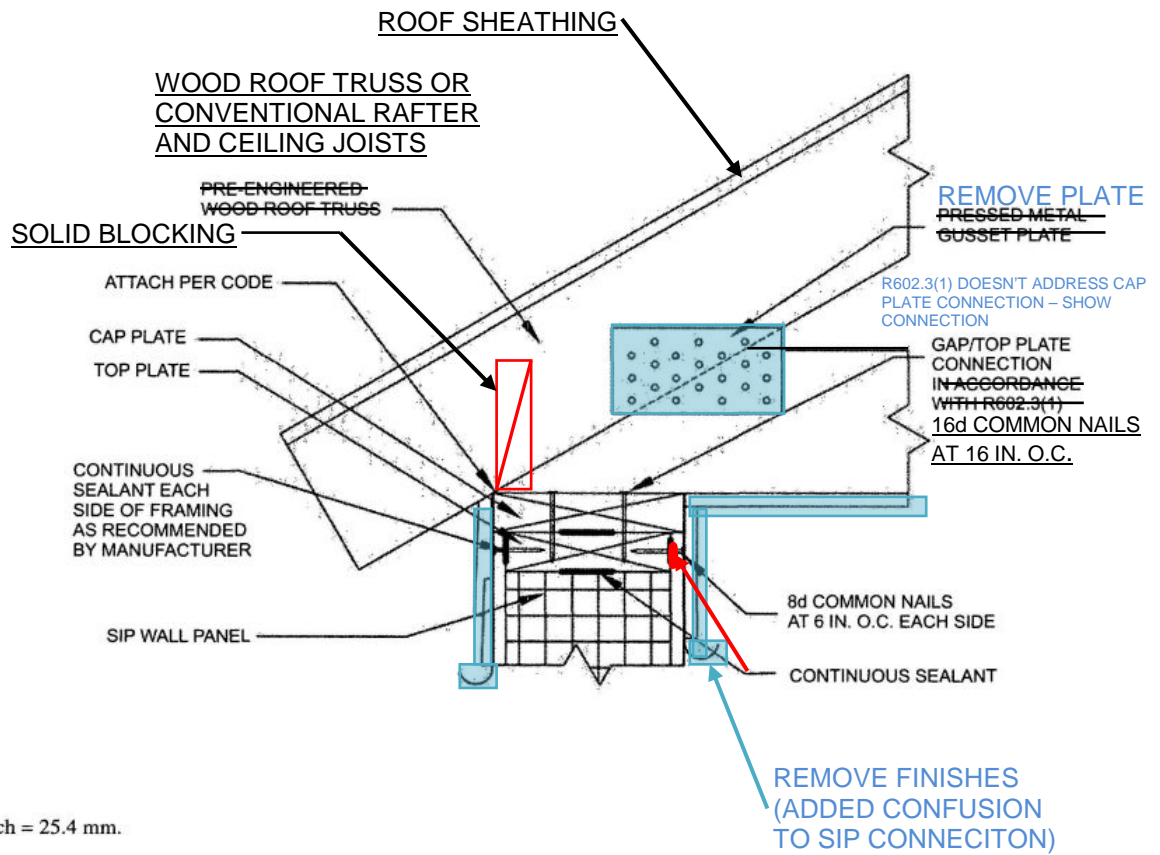
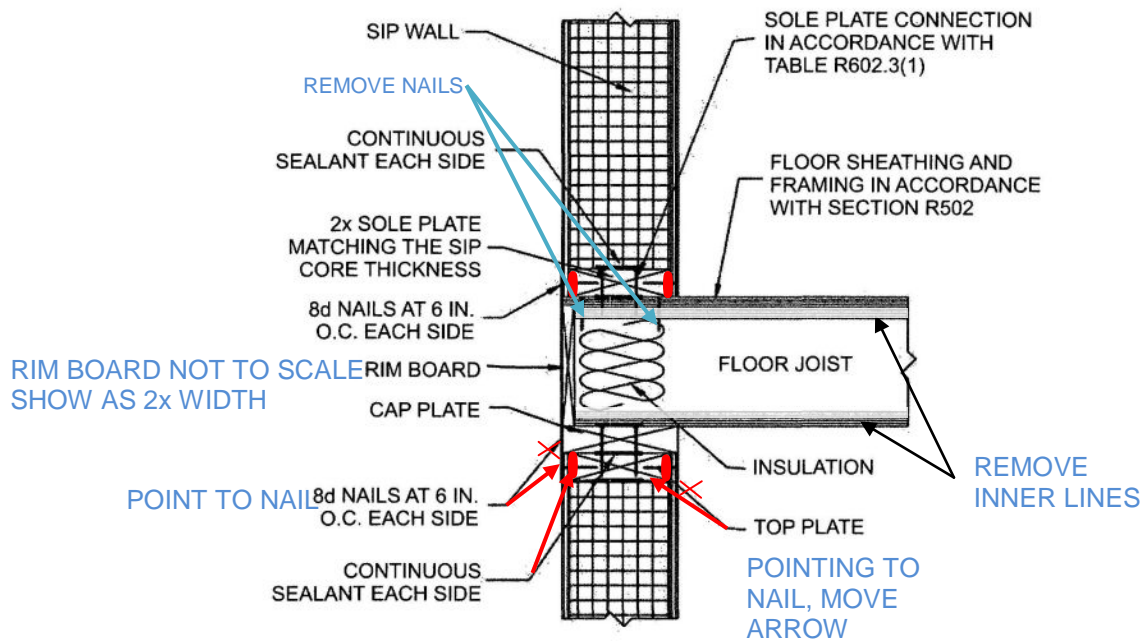


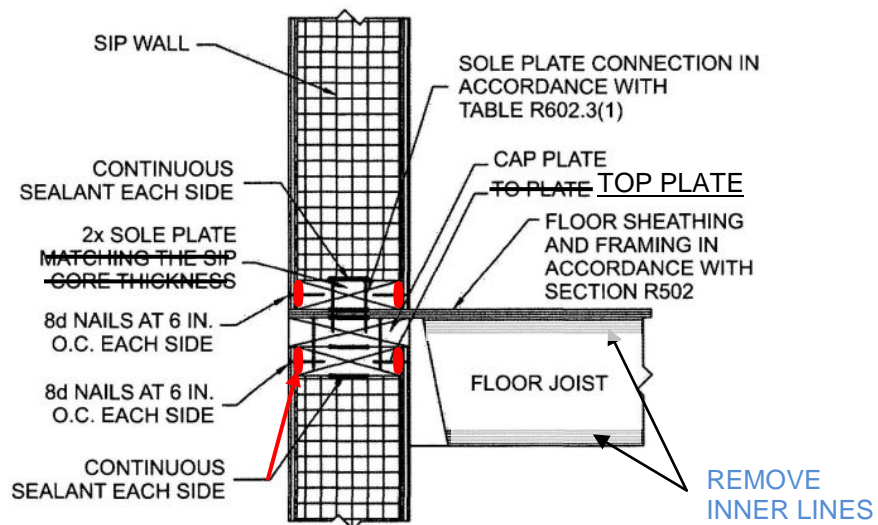
FIGURE R613.5(3)
TRUSSED ROOF TO TOP PLATE CONNECTION



For SI: 1 inch = 25.4 mm.

Note: Figures illustrate SIP-specific attachment requirements. Other connections shall be made in accordance with Table R602.3(1) and (2) as appropriate.

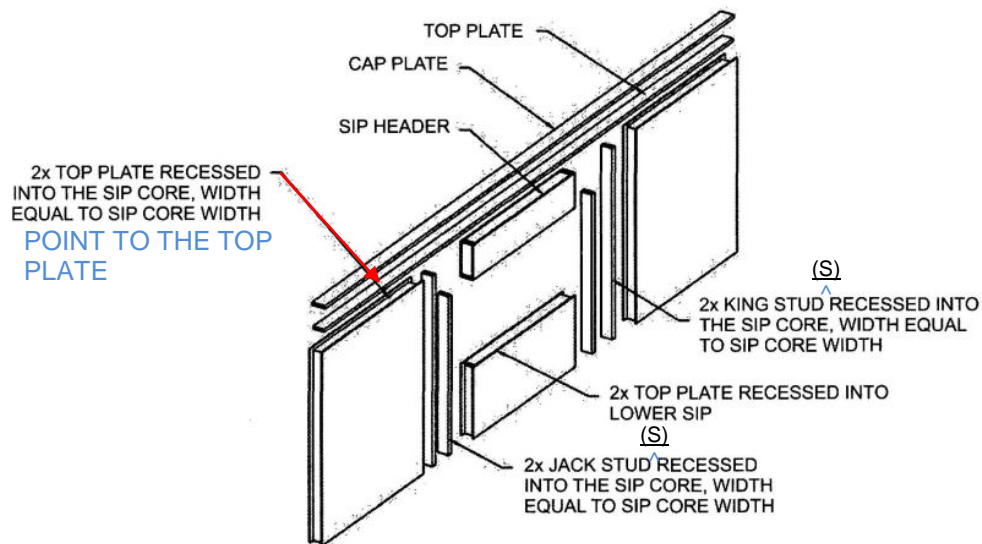
FIGURE R613.5(4)
SIP WALL TO WALL PLATFORM FRAME CONNECTION



For SI: 1 inch = 25.4 mm.

Note: Figures illustrate SIP-specific attachment requirements. Other connections shall be made in accordance with Tables R602.3(1) and (2), as appropriate.

FIGURE R613.5(5)
SIP WALL TO WALL BALLOON HANGING FLOOR FRAME CONNECTION (Joist floor shown for illustration only)



For SI: 1 inch = 25.4 mm.

Notes:

1. Top plates shall be continuous over header.
2. Lower 2x top plate shall have a width equal to the SIP core width and shall be recessed into the top edge of the panel. Cap plate shall be placed over the recessed top plate and shall have a width equal to the SIPs width.
3. SIP facing surfaces shall be nailed to framing and cripples with 8d common or galvanized box nails spaced 6 inches on center.
4. ~~Galvanized nails shall be hot-dipped or tumbled. Framing shall be attached in accordance to Section R602.3(1) unless otherwise provide for in Section R613.~~

ALL

**FIGURE R613.5.1
SIP WALL FRAMING CONFIGURATION**

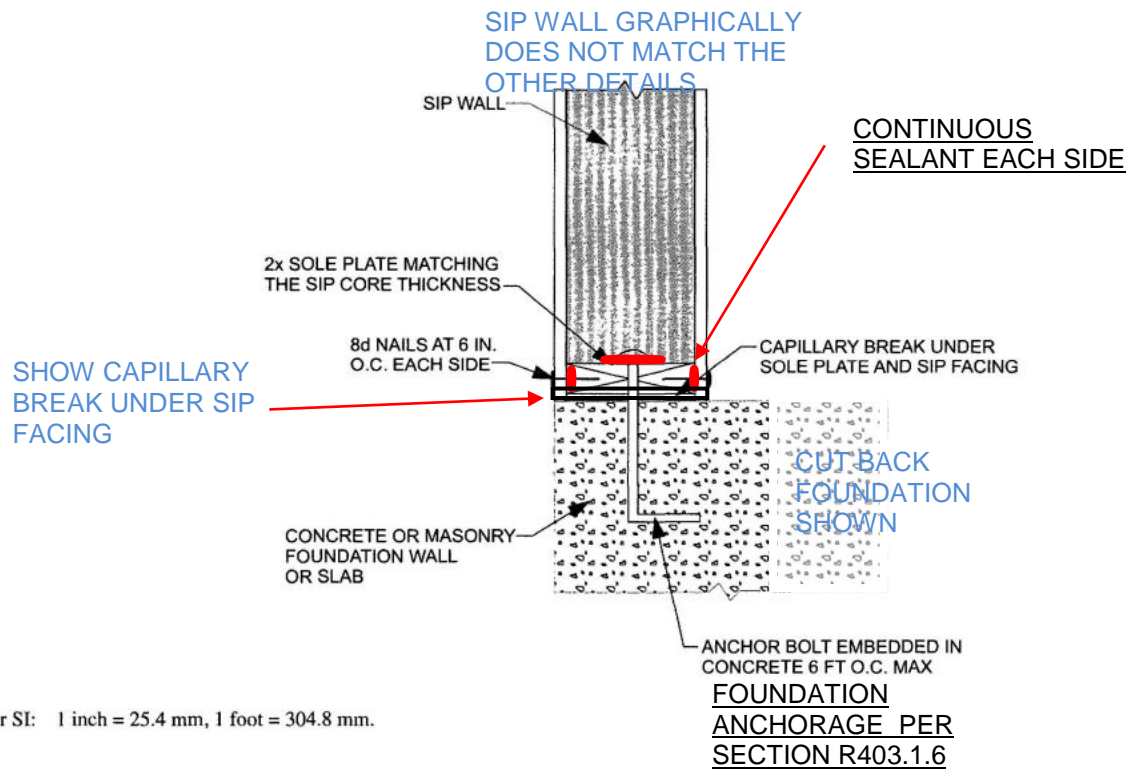
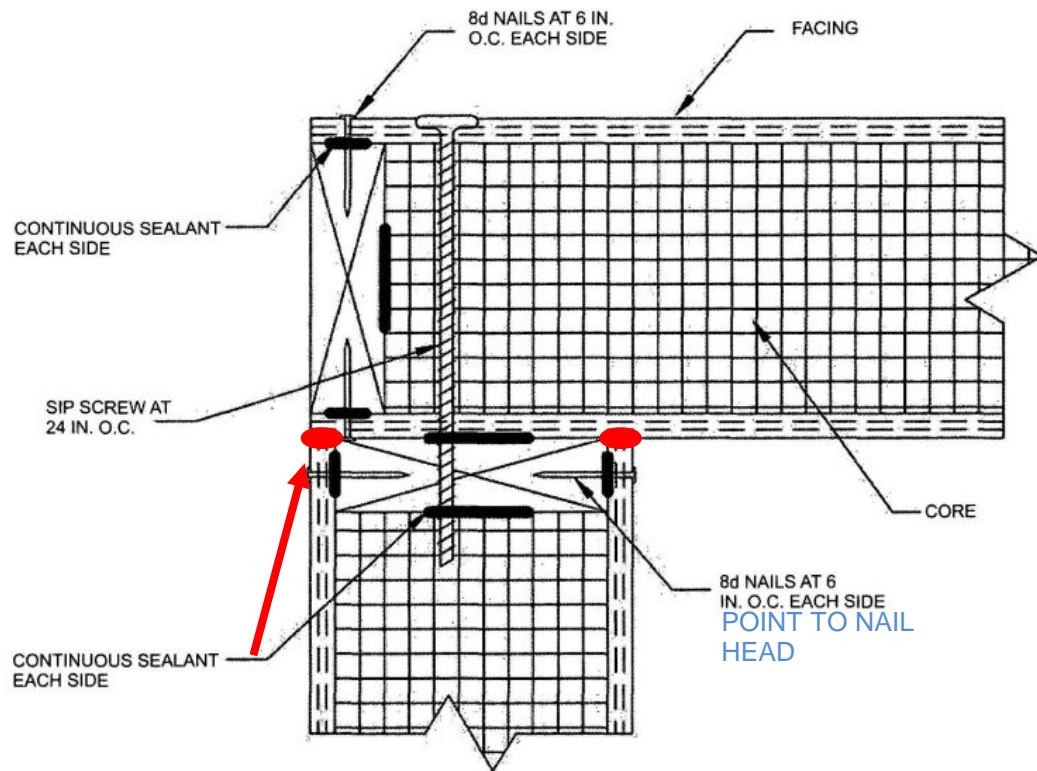


FIGURE R613.5.2
SIP WALL TO CONCRETE SLAB FOR FOUNDATION WALL ATTACHMENT



For SI: 1 inch = 25.4 mm.

**FIGURE R613.5.4
SIP CORNER FRAMING DETAIL**

**TABLE R613.408
MAXIMUM SPANS FOR 1 1/8 INCH DEEP SIP HEADERS (feet)^{a,b}**

LOAD CONDITION	GROUND SNOW LOAD (psf)	Building width (feet) ^c				
		24	28	32	36	40
Supporting roof only	20	4	4	4	4 2	2
	30	4	4	4 2	2	2
	50	2	2	2	2	2
	70	2	2	2	N/A	N/A
Supporting roof and one-story	20	2	2	N/A	N/A	N/A
	30	2	2	N/A	N/A	N/A
	50	2	N/A	N/A	N/A	N/A
	70	N/A	N/A	N/A	N/A	N/A

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479kPa.

N/A = Not Applicable. —Design required.

a. Deflection criterion: $L/240$

b. Design load assumptions:

Maximum deflection criterion: $L/360$.

Maximum roof dead load: 10 psf.

Maximum ceiling dead load: 5 psf.

Maximum second floor live load: 30 psf.

Maximum second floor dead load: 10 psf.

Maximum second floor dead load from walls: 10 psf.

c. The table provides for roof slopes between 3:12 and 12:12

d. Maximum Roof overhang 24 inches (610mm).

e. Building width is in the direction of horizontal framing members supported by the header.

Reason: The proposal is a reorganization of the entire Structural Insulated Panels (SIPs) section. The intention is to add clarity to the proposal as it is currently written. The original SIP language was based on the HUD document Prescriptive Method for Structural Insulated Panels (SIPs) Used In Wall Systems In Residential Construction. Since the inclusion of SIPs in the IRC, there have been several changes that have revised the SIP requirements, however, in some instances the changes have do not match the language used in other materials (wood, cold formed steel, ect.). Proposed changes are intended to bring the SIPs provisions more in line with the other sections of the IRC.

To Summarize the changes:

- R613.3.1 changes to the core requirements – to bring the specifications from the Structural Insulated Panel Association specifications into the code
- R613.3.7 add thermal barrier requirements from the HUD document into section R613.
- R613.5.3/4 move the connection requirements into the section designated for connections.
- R613.10.1 – remove wood structural headers, since section R602.7 already includes wood structural headers. This section is redundant and not necessary.
- Table 613.5 (1) & (2) – add footnotes to match the presentation of the wood and cold form steel tables. Changes to the values are to bring the thickness from the original HUD document back to the tables.
- Figure changes are editorial and take into account the original HUD and the current Structural Insulated Panel Association detail requirements.
- Table 613.10 header span table, based on the allowable HUD header SIP capacities, revise the allowable spans.

Bibliography: *Prescriptive Method for Structural Insulated Panels (SIPs) Used In Wall Systems In Residential Construction*, U.S. Department of Housing and Urban Development Office of Policy Development and Research, Washington, DC, 2007.

Cost Impact: The code change proposal will not increase the cost of construction.

RB347-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R613.3.1-RB-KERR.doc

RB348 – 13

R614 (NEW)

Proponent: Joseph D. Belcher, JDB Code Services, Inc, representing the International Hurricane Protection Association (joe@jdbcodeservices.com)

Add new text as follows:

SECTION R614

IMPACT PROTECTIVE SYSTEMS

R614.1 Safety factor. Impact protective systems shall be tested at 1.5 times the design pressure (positive or negative) expressed in pounds per square feet as determined by the Section R301.2.1.1 of this code for which the specimen is to be tested.

R614.1.1 Labels required. Impact protective systems shall be approved and shall be tested in accordance with Section R301.2.1.2 and shall be labeled as conforming to the standards listed in Section R301.2.1.2 and in accordance with the provisions of this section. Impact resistant glazing shall be labeled in accordance with Section R612.6.1

R614.2 Labels. A permanent label shall be provided on all impact protective systems.

Exception: Wood structural panels permitted at section R301.2.1.2.

R614.2.1 Label information required. The following information shall be included on the labels on impact protective systems:

1. The manufacturer's name and address,
2. The approved testing and labeling agency, and
3. The rated wind design pressure, positive and negative.

Exception: Impact resistant glazing shall comply with Section R612.6.1

R614.3 Location of label. The location of the label on the impact protective systems shall be as follows:

1. Accordions: Bottom of the locking bar or center mate facing the exterior or outside.
2. Rollup: On the bottom of the hood facing the exterior or outside or on the bottom slat facing the exterior or outside.
3. Bahama Awning or Colonial Hinged: On the bottom, placed on the back of the impact protective system.
4. Panels: For metal and plastic panels the label may be embossed or printed spaced not more than every three (3) lineal feet on each panel. The label shall be applied by the manufacturer and shall face the exterior or outside.
5. Framed products: The label shall be on the side or bottom facing the exterior or outside.
6. Labels on all other products shall face the exterior or outside.

Exception: Labels for impact resistant glazing shall comply with Section R612.6.1

R614.4 Installation. All impact protective systems shall be installed in accordance with the manufacturer's installation instructions. Installation instructions shall be provided and shall be available to inspection personnel on the job site.

Reason: Similar provisions have been adopted in the Florida Building Code to assist code enforcement personnel in the inspection of impact protective systems. The Garage Door-Window Labeling Work Group was appointed by the Florida Building Commission in response to problems cited by building officials in determining if the proper impact resistant coverings were provided on a job. In many cases it was found the homeowner was not getting a good product or the product was installed incorrectly. The Workgroup

consisted of broad range of interests including a number of manufacturers of both impact protective covering systems and impact rated glazing products, contractors, insurance industry representatives, and code enforcement personnel which identified and worked on the issues. This proposal incorporates the recommendations of the Workgroup.

Cost Impact: The cost of providing labels on impact resistant covering products is estimated by the industry as follows:

- a. Water Resistant Self-adhering Permanent Labels approximately \$0.15 per label. Such labels would most likely be used on Accordion, Roll, Bahama, and Colonial style shutters.
- b. Embossed or ink jet labels used on metal and plastic panels would cost approximately \$0.05 per label.

There is no added cost to impact resistant glazing products as they are currently required by the code to be labeled.

The industry believes the minor cost involved is by far outweighed by the benefits to the public by providing data permitting inspection personnel and the general public to ascertain the proper impact resistant covering is provided and installed in accordance with the manufacturer's installation instructions.

RB348-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R614 (NEW)-RB-BELCHER.doc

RB349 – 13

R109.1.5.1, R202 (NEW), R702.3, R702.3.1, R702.3.2, R702.3.3, R702.3.5, Table R702.3.5, R702.3.6, R702.3.7, Table R702.3.7, R702.5, R703.11.2.1, R703.11.2.2,

Proponent: Michael Gardner, Gypsum Association (mgardner@gypsum.org)

Revise as follows:

R109.1.5.1 Fire-resistance-rated construction inspection. Where fire-resistance-rated construction is required between *dwelling units* or due to location on property, the *building official* shall require an inspection of such construction after all lathing and/or ~~wallboard~~ is gypsum board or gypsum panel products are in place, but before any plaster is applied, or before ~~wallboard~~ board or panel joints and fasteners are taped and finished.

Add new definition as follows:

GYPSUM PANEL PRODUCT. The general name for a family of sheet products consisting essentially of gypsum.

Revise as follows:

R702.3 Gypsum board and gypsum panel products.

R702.3.1 Materials. All gypsum board and gypsum panel product materials and accessories shall conform to ASTM C 22, C 475, C 514, C1002, C 1047, C 1177, C 1178, C 1278, C 1396 or C 1658 and shall be installed in accordance with the provisions of this section. Adhesives for the installation of gypsum board and gypsum panel products shall conform to ASTM C 557.

R702.3.2 Wood framing. Wood framing supporting gypsum board and gypsum panel products shall not be less than 2 inches (51 mm) nominal thickness in the least dimension except that wood furring strips not less than 1-inch by 2-inch (25 mm by 51 mm) nominal dimension may be used over solid backing or framing spaced not more than 24 inches (610 mm) on center.

R702.3.3 Cold-formed steel framing. Cold-formed steel framing supporting gypsum board and gypsum panel products shall not be less than 1 1/4 inches (32 mm) wide in the least dimension. Nonload-bearing cold-formed steel framing shall comply with ASTM C645. Load-bearing cold-formed steel framing and all cold-formed steel framing from 0.033 inch to 0.112 inch (1 mm to 3 mm) thick shall comply with ASTM C 955.

R702.3.5 Application. Maximum spacing of supports and the size and spacing of fasteners used to attach gypsum board and gypsum panel products shall comply with Table R702.3.5. Gypsum sheathing shall be attached to exterior walls in accordance with Table R602.3(1). Gypsum board and gypsum panel products shall be applied at right angles or parallel to framing members. All edges and ends of gypsum board and gypsum panel products shall occur on the framing members, except those edges and ends that are perpendicular to the framing members. Interior gypsum board shall not be installed where it is directly exposed to the weather or to water.

R702.3.6 Fastening. Screws for attaching gypsum board and gypsum panel products to wood framing shall be Type W or Type S in accordance with ASTM C 1002 and shall penetrate the wood not less than 5/8 inch (16 mm). Gypsum board and gypsum panel products shall be attached to cold-formed steel framing with minimum No. 6 screws. Screws for attaching gypsum board and gypsum panel products to cold-formed steel framing less than 0.033 inch (1 mm) thick shall be Type S in accordance with ASTM C 1002 or bugle head style in accordance with ASTM C 1513 and shall penetrate the steel not less than 3/8 inch (9.5 mm). Screws for attaching gypsum board and gypsum panel products to cold-formed steel framing 0.033 inch to 0.112 inch (1 mm to 3 mm) thick shall be in accordance with ASTM C 954 or bugle

head style in accordance with ASTM C 1513. Screws for attaching gypsum board and gypsum panel products to structural insulated panels shall penetrate the wood structural panel facing not less than 7/16 inch (11 mm).

R702.3.7 Horizontal gypsum board diaphragm ceilings. ~~Use of gypsum~~ Gypsum board and gypsum panel products shall be permitted on wood joists to create a horizontal *diaphragm* in accordance with Table R702.3.7. Gypsum board and gypsum panel products shall be installed perpendicular to ceiling framing members. End joints of adjacent courses of board and panels shall not occur on the same joist. The maximum allowable *diaphragm* proportions shall be 11/2:1 between shear resisting elements. Rotation or cantilever conditions shall not be permitted. Gypsum board or gypsum panel products shall not be used in *diaphragm* ceilings to resist lateral forces imposed by masonry or concrete construction. All perimeter edges shall be blocked using wood members not less than 2-inch by 6-inch (51 mm by 152 mm) nominal dimension. Blocking material shall be installed flat over the top plate of the wall to provide a nailing surface not less than 2 inches (51 mm) in width for the attachment of the gypsum board or gypsum panel product.

R702.5 Other finishes. Wood veneer paneling and hardboard paneling shall be placed on wood or cold-formed steel framing spaced not more than 16 inches (406 mm) on center. Wood veneer and hard board paneling less than 1/4-inch (6mm) nominal thickness shall not have less than a 3/8-inch (10mm) gypsum board or gypsum panel product backer. Wood veneer paneling not less than 1/4-inch (6 mm) nominal thickness shall conform to ANSI/HPVA HP-1. Hardboard paneling shall conform to CPA/ANSI A135.5.

R703.11.2.1 Basic wind speed not exceeding 90 miles per hour and Exposure Category B. Where the basic wind speed does not exceed 90 miles per hour (40 m/s), the Exposure Category is B and gypsum ~~wall~~ board, gypsum panel product or equivalent is installed on the side of the wall opposite the foam plastic sheathing, the minimum siding fastener penetration into wood framing shall be 11/4 inches (32 mm) using minimum 0.120-inch diameter nail (shank) with a minimum 0.313-inch diameter head, 16 inches on center. The foam plastic sheathing shall be minimum 1/2-inch-thick (12.7 mm) (nominal) extruded polystyrene per ASTM C 578, 1/2-inch-thick (12.7 mm) (nominal) polyisocyanurate per ASTM C 1289, or 1-inch-thick (25 mm) (nominal) expanded polystyrene per ASTM C 578.

R703.11.2.2 Basic wind speed exceeding 90 miles per hour or Exposure Categories C and D. Where the basic wind speed exceeds 90 miles per hour (40 m/s) or the Exposure Category is C or D, or all conditions of Section R703.11.2.1 are not met, the adjusted design pressure rating for the assembly shall meet or exceed the loads listed in Tables R301.2(2) adjusted for height and exposure using Table R301.2(3). The design wind pressure rating of the vinyl siding for installation over solid sheathing as provided in the vinyl siding manufacturer's product specifications shall be adjusted for the following wall assembly conditions:

1. For wall assemblies with foam plastic sheathing on the exterior side and gypsum ~~wall~~ board, gypsum panel product, or equivalent on the interior side of the wall, the vinyl siding's design wind pressure rating shall be multiplied by 0.39.
2. For wall assemblies with foam plastic sheathing on the exterior side and no gypsum ~~wall~~ board, gypsum panel product or equivalent on the interior side of wall, the vinyl siding's design wind pressure rating shall be multiplied by 0.27.

TABLE R702.3.5
MINIMUM THICKNESS AND APPLICATION OF GYPSUM BOARD AND GYPSUM PANEL PRODUCTS

THICKNESS OF GYPSUM BOARD OR GYPSUM PANEL PRODUCTS (inches)	APPLICATION	ORIENTATION OF GYPSUM BOARD OR GYPSUM PANEL PRODUCTS TO FRAMING	MAXIMUM SPACING OF FRAMING MEMBERS (inches o.c.)	MAXIMUM SPACING OF FASTENERS (inches)		SIZE OF NAILS FOR APPLICATION TO WOOD FRAMING ^c
				Nails ^a	Screws ^b	

Application without adhesive						
$\frac{3}{8}$	Ceiling ^d	Perpendicular	16	7	12	13 gage, 1 $\frac{1}{4}$ " long, $\frac{19}{64}$ " head; 0.098" diameter, 1 $\frac{1}{4}$ " long, annular-ringed; or 4d cooler nail, 0.080" diameter, 1 $\frac{3}{8}$ " long, $\frac{7}{32}$ " head.
	Wall	Either direction	16	8	16	
$\frac{1}{2}$	Ceiling	Either direction	16	7	12	13 gage, 1 $\frac{3}{8}$ " long, $\frac{19}{64}$ " head; 0.098" diameter, 1 $\frac{1}{4}$ " long, annular-ringed; 5d cooler nail, 0.086" diameter, 1 $\frac{5}{8}$ " long, $\frac{15}{64}$ " head; or gypsum board nail, 0.086" diameter, 1 $\frac{5}{8}$ " long, $\frac{9}{32}$ " head.
	Ceiling ^d	Perpendicular	24	7	12	
	Wall	Either direction	24	8	12	
	Wall	Either direction	16	8	16	
$\frac{5}{8}$	Ceiling	Either direction	16	7	12	13 gage, 1 $\frac{5}{8}$ " long, $\frac{19}{64}$ " head; 0.098" diameter, 1 $\frac{3}{8}$ " long, annular-ringed; 6d cooler nail, 0.092" diameter, 1 $\frac{7}{8}$ " long, $\frac{1}{4}$ " head; or gypsum board nail, 0.0915" diameter, 1 $\frac{7}{8}$ " long, $\frac{19}{64}$ " head.
	Ceiling ^e	Perpendicular	24	7	12	
	Wall	Either direction	24	8	12	
	Wall	Either direction	16	8	16	
Application with adhesive						
$\frac{3}{8}$	Ceiling ^d	Perpendicular	16	16	16	Same as above for $\frac{3}{8}$ " gypsum board <u>and gypsum panel products</u>
	Wall	Either direction	16	16	24	
$\frac{1}{2}$ or $\frac{5}{8}$	Ceiling	Either direction	16	16	16	Same as above for $\frac{1}{2}$ " and $\frac{5}{8}$ " gypsum board, <u>and gypsum panel products</u> respectively
	Ceiling ^d	Perpendicular	24	12	16	
	Wall	Either direction	24	16	24	
Two $\frac{3}{8}$ layers	Ceiling	Perpendicular	16	16	16	Base ply nailed as above for $\frac{1}{2}$ " gypsum board <u>and gypsum panel product</u> ; face ply installed with adhesive
	Wall	Either direction	24	24	24	

For SI: 1 inch = 25.4 mm.

- For application without adhesive, a pair of nails spaced not less than 2 inches apart or more than $2\frac{1}{2}$ inches apart may be used with the pair of nails spaced 12 inches on center.
- Screws shall be in accordance with Section R702.3.6. Screws for attaching gypsum board or gypsum panel products to structural insulated panels shall penetrate the wood structural panel facing not less than $\frac{7}{16}$ inch.
- Where cold-formed steel framing is used with a clinching design to receive nails by two edges of metal, the nails shall be not less than $\frac{5}{8}$ inch longer than the gypsum board or gypsum panel product thickness and shall have ringed shanks. Where the cold-formed steel framing has a nailing groove formed to receive the nails, the nails shall have barbed shanks or be 5d, 13 $\frac{1}{2}$ gage, $\frac{15}{8}$ inches long, $\frac{15}{64}$ -inch head for $\frac{1}{2}$ -inch gypsum board or gypsum panel product; and 6d, 13 gage, $1\frac{7}{8}$ inches long, $\frac{15}{64}$ -inch head for $\frac{5}{8}$ -inch gypsum board or gypsum panel product.
- Three-eighths-inch-thick single-ply gypsum board or gypsum panel product shall not be used on a ceiling where a water-based textured finish is to be applied, or where it will be required to support insulation above a ceiling. On ceiling applications to receive a water-based texture material, either hand or spray applied, the gypsum board or gypsum panel product shall be applied perpendicular to framing. When applying a water-based texture material, the minimum gypsum board thickness shall be increased from $\frac{3}{8}$ inch to $\frac{1}{2}$ inch for 16-inch on center framing, and from $\frac{1}{2}$ inch to $\frac{5}{8}$ inch for 24-inch on center framing or $\frac{1}{2}$ -inch sag-resistant gypsum ceiling board shall be used.
- Type X gypsum board or gypsum panel products for garage ceilings beneath habitable rooms shall be installed perpendicular to the ceiling framing and shall be fastened at maximum 6 inches o.c. by minimum $1\frac{7}{8}$ inches 6d coated nails or equivalent drywall screws.

TABLE R702.3.7
SHEAR CAPACITY FOR HORIZONTAL WOOD-FRAMED GYPSUM BOARD DIAPHRAGM CEILING ASSEMBLIES

MATERIAL	THICKNESS OF MATERIAL (min.) (inch)	SPACING OF FRAMING MEMBERS (max.) (inch)	SHEAR VALUE ^{a, b} (plf of ceiling)	MINIMUM FASTENER SIZE ^{c, d}
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Gypsum board <u>or</u> gypsum panel product	$\frac{1}{2}$	16 o.c.	90	5d cooler or wallboard nail; $1\frac{5}{8}$ -inch long; 0.086-inch shank; $\frac{15}{64}$ -inch head
Gypsum board <u>or</u> gypsum panel product	$\frac{1}{2}$	24 o.c.	70	5d cooler or wallboard nail; $1\frac{5}{8}$ -inch long; 0.086-inch shank; $\frac{15}{64}$ -inch head

For SI: 1 inch = 25.4 mm, 1 pound per linear foot = 1.488 kg/m.

- Values are not cumulative with other horizontal diaphragm values and are for short-term loading caused by wind or seismic loading. Values shall be reduced 25 percent for normal loading.
- Values shall be reduced 50 percent in Seismic Design Categories D₀, D₁, D₂ and E.
- $1\frac{1}{4}$ -inch, #6 Type S or W screws may be substituted for the listed nails.
- Fasteners shall be spaced not more than 7 inches on center at all supports, including perimeter blocking, and not less than $\frac{3}{8}$ inch from the edges and ends of the gypsum board or gypsum panel product.

Reason: This proposal inserts the term gypsum panel product in Chapter 7 where relevant. It also revises Section 109, and adds a definition for gypsum panel products to Chapter 2. It parallels a proposal that was approved and incorporated into the IBC during the 2012 Group A hearing process.

Gypsum panel product is a term that was created by the gypsum manufacturing industry to describe gypsum sheet products that are manufactured unfaced or with a facing other than paper. Glass mat-faced and unfaced gypsum sheet materials are examples of gypsum panel products.

The process of installing a gypsum board and a gypsum panel is identical in nearly every instance addressed by the code. While the ASTM manufacturing standards for many gypsum panel products (ref. C 1278; C1178; C1658; C1177) were incorporated into Chapter 7 during the past decade, the general text of Chapter 7 was not updated to reflect the incorporation of the materials manufactured to the manufacturing standards. This proposal addresses this issue.

A proposal being submitted by the Building Code Action Committee will add a definition for gypsum board to the IRC. The definitions for gypsum board and gypsum panel product are extracted from ASTM International Standard C 11, *Standard Terminology Relating to Gypsum and Related Building Materials and Systems*. Other sections of the IRC requiring parallel modification will be addressed in subsequent editions of the code.

Cost Impact: The code change proposal will not increase the cost of construction.

RB349-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R109.1.5.1-RB-GARNDER.doc

RB350 – 13

R702.3.3, Chapter 44

Proponent: Bonnie Manley, P.E., American Iron and Steel Institute (bmanley@steel.org)

Revise as follows:

R702.3.3 Cold-formed steel framing. Cold-formed steel framing supporting gypsum board shall not be less than 11/4 inches (32 mm) wide in the least dimension. Nonload-bearing cold-formed steel framing shall comply with AISI S200 and ASTM C 645, Section 10. Load-bearing cold-formed steel framing ~~and all cold-formed steel framing from 0.033 inch to 0.112 inch (1 mm to 3 mm) thick shall comply with AISI S200 and ASTM C 955, Section 8.~~

Add new standards to Chapter 44 as follow:

AISI

AISI S200—12 North American Standard for Cold-formed Steel Framing-General Provisions

AISI S220—11 North American Standard for Cold-formed Steel Framing-Nonstructural Members

Reason: This proposal represents the results of a major effort to synchronize and coordinate the industry standards related to cold-formed steel framing. ASTM Committees C11 and A05, and AISI have been working within the steel framing industry on this "Code Synchronization" effort, the goal of which is to organize and maintain a single path for the building code requirements of cold-formed steel light frame construction products. To this end, a new document, AISI S220, was developed to contain all the necessary requirements for nonload-bearing (nonstructural) products. AISI S220 represents a clarification and coordination of industry requirements. The Steel Framing Industry Association (SFIA), the Steel Stud Manufacturers Association (SSMA), the Association of the Wall and Ceiling Industry (AWCI), and the Gypsum Association (GA) all participated in this effort.

The proper integration of AISI S220 into the IRC requires the following changes in Section R702.3.3:

- Because of the addition of the reference for nonload-bearing cold-formed steel framing, the lower limit of the minimum base thickness has been deleted.
- AISI S200 and AISI S220 have been added to the section as the primary references. Only ASTM C645 Section 10, and ASTM C955 Section 8, which cover the requirements for the Penetration Test for screws, have been retained. These sections provide a procedure for evaluating the member's ability to pull the head of a screw below the surface of gypsum sheathing. At this time, AISI S220 does not include this test. Future editions may include it, allowing for the eventual deletion of the specific references to ASTM C645 and C955. AISI S200 and AISI S220 incorporate the material and manufacturing provisions previously included in ASTM C955 and ASTM C645 respectively. Limiting the specific references to ASTM C645 Section 10 and C955 Section 8 removes the "dual paths to code compliance", which has caused confusion in the cold-formed steel framing industry.

Additionally, changes have been made to Chapter 44 to reflect the necessary changes to the referenced standards.

Please note that a coordinating proposal for the IBC – Proposal S245-12 – was approved as submitted in the ICC Group A cycle last year.

AISI has posted a review copy of AISI S220 on their website. To obtain a copy, please do the following:

Go to: www.steel.org

Click on the link "*AISI Codes and Standards*"

Then click on the link "*Standards and Specifications*"

Then click on the title of the standard, which is at the top of the list under "*New Standards: To Be Referenced in Future Codes*"

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standards proposed for inclusion in the code, AISI S200 and AISI S220 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

RB350-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R702.3.3-RB-MANLEY.doc

RB351 – 13

R702.3.5, R702.3.6

Proponent: Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee (bajnaic@chesterfield.gov), and Adolf Zubia, Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee

Revise as follows:

R702.3.5 Application. ~~Maximum spacing of Supports and the size and spacing of fasteners used to~~ attach gypsum board shall comply with Table R702.3.5. Gypsum sheathing shall be attached to exterior walls in accordance with Table R602.3(1). Gypsum board shall be applied at right angles or parallel to framing members. All edges and ends of gypsum board shall occur on the framing members, except those edges and ends that are perpendicular to the framing members. Interior gypsum board shall not be installed where it is directly exposed to the weather or to water.

~~R702.3.6~~ R702.3.5.1 Screw Fastening. Screws for attaching gypsum board to wood framing shall be Type W or Type S in accordance with ASTM C 1002 and shall penetrate the wood not less than 5/8 inch (16 mm). Gypsum board shall be attached to cold-formed steel framing with minimum No. 6 screws. Screws for attaching gypsum board to cold-formed steel framing less than 0.033 inch (1 mm) thick shall be Type S in accordance with ASTM C 1002 or bugle head style in accordance with ASTM C 1513 and shall penetrate the steel not less than 3/8 inch (9.5 mm). Screws for attaching gypsum board to cold-formed steel framing 0.033 inch to 0.112 inch (1 mm to 3 mm) thick shall be in accordance with ASTM C 954 or bugle head style in accordance with ASTM C 1513. Screws for attaching gypsum board to structural insulated panels shall penetrate the wood structural panel facing not less than 7/16 inch (11 mm).

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC) and the ICC Fire Code Action Committee (FCAC). These ICC committees were established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the these committees have held 6 open meetings and numerous workgroup meetings which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the CAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

The intent is to clarify the application of Table R702.3.5, and that the fastening requirements of current Section R702.3.6 are actually a subsection of Section R702.3.5 and the referenced table. There are no technical changes to current text.

Cost Impact: The code change will not increase the cost of construction.

RB351-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R702.3.5-RB-BAJNAI-BCAC.doc

RB352 – 13

R202, Table R702.3.5, R1001.11, Table N1102.4.1.1 (IECC R402.4.1.1)

Proponent: Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee and Virginia Building and Code Officials Association (bajnaiC@chesterfield.gov)

Revise as follows:

TABLE R702.3.5
MINIMUM THICKNESS AND APPLICATION OF GYPSUM BOARD

- e. Type X gypsum board for garage ceilings beneath habitable rooms shall be installed perpendicular to the ceiling framing and shall be fastened at maximum 6 inches o.c. by minimum 1 $\frac{7}{8}$ inches 6d coated nails or equivalent drywall length screws. Screws shall comply with Section R702.3.6.

(Portions of Table not shown remains unchanged)

Add new definition as follows:

GYPSUM BOARD. The generic name for a family of sheet products consisting of a noncombustible core primarily of gypsum with paper surfacing. Gypsum wallboard, gypsum sheathing, gypsum base for gypsum veneer plaster, exterior gypsum soffit board, predecorated gypsum board and water-resistant gypsum backing board complying with the standards listed in Section R702.3 and Part IX of this code are types of gypsum board.

Revise as follows:

R1001.11 Fireplace clearance. All wood beams, joists, studs and other combustible material shall have a clearance of not less than 2 inches (51 mm) from the front faces and sides of masonry fireplaces and not less than 4 inches (102 mm) from the back faces of masonry fireplaces. The air space shall not be filled, except to provide fire blocking in accordance with Section R1001.12.

Exceptions:

1. Masonry fireplaces *listed* and *labeled* for use in contact with combustibles in accordance with UL 127 and installed in accordance with the manufacturer's installation instructions are permitted to have combustible material in contact with their exterior surfaces.
2. When masonry fireplaces are part of masonry or concrete walls, combustible materials shall not be in contact with the masonry or concrete walls less than 12 inches (306 mm) from the inside surface of the nearest firebox lining.
3. Exposed combustible trim and the edges of sheathing materials such as wood siding, flooring and ~~drywall~~ gypsum board shall be permitted to abut the masonry fireplace side walls and hearth extension in accordance with Figure R1001.11, provided such combustible trim or sheathing is a minimum of 12 inches (305 mm) from the inside surface of the nearest firebox lining.
4. Exposed combustible mantels or trim may be placed directly on the masonry fireplace front surrounding the fireplace opening providing such combustible materials are not placed within 6 inches (152 mm) of a fireplace opening. Combustible material within 12 inches (306 mm) of the fireplace opening shall not project more than $\frac{1}{8}$ inch (3 mm) for each 1-inch (25 mm) distance from such an opening.

Revise as follows:

TABLE N1102.4.1.1 (R402.4.1.1)
AIR BARRIER AND INSULATION INSTALLATION

COMPONENT	CRITERIA ^a
Recessed lighting	Recessed light fixtures installed in the building

	thermal envelope shall be air tight, IC rated, and sealed to the drywall gypsum board.
HVAC register boots	HVAC register boots that penetrate building thermal envelope shall be sealed to the subfloor or drywall gypsum board.

(Portions of Table not shown remains unchanged)

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

The term drywall is used as an apparent synonym for gypsum board in the International Residential Code in three instances. In a fourth instance, it is used as an adjective to describe a specific fastener.

The term drywall, however, is not defined in the IRC. As a result, references to it should be removed from the code and replaced with technically correct language.

Unfortunately, the IRC does not include a definition for the technically proper term for drywall: gypsum board. To correct this, the proposal adds a definition for gypsum board that is identical to the definition for gypsum board that will appear in the 2015 edition of the International Building Code. The IBC definition was modified by approved proposal S304-12 during the Group A hearings in 2012.

The proposed definition is also technically identical to the definition contained in the ASTM standards referenced in Section R702.3.

Section R1001.11 and Table N1102.4.1.1 are amended by removing the term drywall and substituting the term gypsum board. Footnote e of Table R702.3.5 is amended by removing the term drywall, adding the term length, and adding a reference to Section R702.3.6.

Standards defining screws appropriate for the application of gypsum board are defined in R702.3.6. Adding the term length to the footnote clarifies that any screw used as a substitute for a nail in a fire-resistive installation of gypsum board must be of an equivalent length to the nail prescribed for the installation.

Cost Impact: The code change proposal will not increase the cost of construction.

RB352-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R702.3.5T-RB-BAJNAI-BCAC.doc

RB353 – 13

R302.6, Table R702.3.5

Proponent: Robert Rice, Josephine County, OR, representing Oregon Building Officials Association (structdesigner@yahoo.com)

Revise as follows:

R302.6 Dwelling/garage fire separation. The garage shall be separated as required by Table R302.6. Attachment of gypsum board shall comply with Table R702.3.5. Openings in garage walls shall comply with Section R302.5. ~~This~~ The wall separation provisions of Table R302.6 does do not apply to garage walls that are perpendicular to the adjacent *dwelling unit* wall.

TABLE R702.3.5
MINIMUM THICKNESS AND APPLICATION OF GYPSUM BOARD

THICKNESS OF GYPSUM BOARD (inches)	APPLICATION	ORIENTATION OF GYPSUM BOARD TO FRAMING	MAXIMUM SPACING OF FRAMING MEMBERS (inches o.c.)	MAXIMUM SPACING OF FASTENERS (inches)		SIZE OF NAILS FOR APPLICATION TO WOOD FRAMING ^c
				Nails ^a	Screws ^b	
Application without adhesive						
³ / ₈	Ceiling ^d	Perpendicular	16	7	12	13 gage, 1 ¹ / ₄ " long, ¹⁹ / ₆₄ " head; 0.098" diameter, 1 ¹ / ₄ " long, annular-ringed; or 4d cooler nail, 0.080" diameter, 1 ³ / ₈ " long, ⁷ / ₃₂ " head.
	Wall	Either direction	16	8	16	
¹ / ₂	Ceiling	Either direction	16	7	12	13 gage, 1 ³ / ₈ " long, ¹⁹ / ₆₄ " head; 0.098" diameter, 1 ¹ / ₄ " long, annular-ringed; 5d cooler nail, 0.086" diameter, 1 ⁵ / ₈ " long, ¹⁵ / ₆₄ " head; or gypsum board nail, 0.086" diameter, 1 ⁵ / ₈ " long, ⁹ / ₃₂ " head.
	Ceiling ^d	Perpendicular	24	7	12	
	Wall	Either direction	24	8	12	
	Wall	Either direction	16	8	16	
⁵ / ₈	Ceiling	Either direction	16	7	12	13 gage, 1 ⁵ / ₈ " long, ¹⁹ / ₆₄ " head; 0.098" diameter, 1 ³ / ₈ " long, annular-ringed; 6d cooler nail, 0.092" diameter, 1 ⁷ / ₈ " long, ¹ / ₄ " head; or gypsum board nail, 0.0915" diameter, 1 ⁷ / ₈ " long, ¹⁹ / ₆₄ " head.
	Ceiling ^e	Perpendicular	24	7	12	
	<u>Type X at garage ceiling beneath habitable rooms</u>	<u>Perpendicular</u>	<u>24</u>	<u>6</u>	<u>6</u>	<u>1 7/8 inches 6d coated nails or equivalent drywall screws.</u>
	Wall	Either direction	24	8	12	13 gage, 1 ⁵ / ₈ " long, ¹⁹ / ₆₄ " head; 0.098" diameter, 1 ³ / ₈ " long, annular-ringed; 6d cooler nail, 0.092" diameter, 1 ⁷ / ₈ " long, ¹ / ₄ " head; or gypsum board nail, 0.0915" diameter, 1 ⁷ / ₈ " long, ¹⁹ / ₆₄ " head.
	Wall	Either direction	16	8	16	
	Application with adhesive					
³ / ₈	Ceiling ^d	Perpendicular	16	16	16	Same as above for ³ / ₈ " gypsum board
	Wall	Either direction	16	16	24	
¹ / ₂ or ⁵ / ₈	Ceiling	Either direction	16	16	16	Same as above for ¹ / ₂ " and ⁵ / ₈ " gypsum

	Ceiling ^d	Perpendicular	24	12	16	board, respectively
	Wall	Either direction	24	16	24	
Two ³ / ₈ layers	Ceiling	Perpendicular	16	16	16	Base ply nailed as above for 1/2" gypsum board; face ply installed with adhesive
	Wall	Either direction	24	24	24	

For SI: 1 inch = 25.4 mm.

- For application without adhesive, a pair of nails spaced not less than 2 inches apart or more than 2 1/2 inches apart may be used with the pair of nails spaced 12 inches on center.
- Screws shall be in accordance with Section R702.3.6. Screws for attaching gypsum board to structural insulated panels shall penetrate the wood structural panel facing not less than 7/16 inch.
- Where cold-formed steel framing is used with a clinching design to receive nails by two edges of metal, the nails shall be not less than 5/8 inch longer than the gypsum board thickness and shall have ringed shanks. Where the cold-formed steel framing has a nailing groove formed to receive the nails, the nails shall have barbed shanks or be 5d, 13 1/2 gage, 15/8 inches long, 15/64-inch head for 1/2-inch gypsum board; and 6d, 13 gage, 1 7/8 inches long, 15/64-inch head for 5/8-inch gypsum board.
- Three-eighths-inch-thick single-ply gypsum board shall not be used on a ceiling where a water-based textured finish is to be applied, or where it will be required to support insulation above a ceiling. On ceiling applications to receive a water-based texture material, either hand or spray applied, the gypsum board shall be applied perpendicular to framing. When applying a water-based texture material, the minimum gypsum board thickness shall be increased from 3/8 inch to 1/2 inch for 16-inch on center framing, and from 1/2 inch to 5/8 inch for 24-inch on center framing or 1/2-inch sag-resistant gypsum ceiling board shall be used.
- Type X gypsum board for garage ceilings beneath habitable rooms shall be installed perpendicular to the ceiling framing and shall be fastened at maximum 6 inches o.c. by minimum 4 7/8 inches 6d coated nails or equivalent drywall screws.

Reason: The existing code requires 5/8" Type X gypsum board on garage ceilings when there are habitable rooms above. The general requirement for separations is stated in R302.6 and that section refers to Table R302.6 (shown below) for the specific requirements. The code also has special attachment requirements for this application that are different from other gypsum board attachments. The problem with the current code is that the requirement for the attachment is in a footnote to Table R702.3(5) and is often overlooked. This proposal is to move the requirement for the attachment from the footnote of Table R702.3(5) to the table itself. A sentence is added to R302.6 to point the user to the attachment requirements in Table R702.3(5).

**TABLE R302.6
DWELLING/GARAGE SEPARATION**

SEPARATION	MATERIAL
From the residence and attics	Not less than 1/2-inch gypsum board or equivalent applied to the garage side
From all habitable rooms above the garage	Not less than 5/8-inch Type X gypsum board or equivalent
Structure(s) supporting floor/ceiling assemblies used for separation required by this section	Not less than 1/2-inch gypsum board or equivalent
Garages located less than 3 feet from a dwelling unit on the same lot	Not less than 1/2-inch gypsum board or equivalent applied to the interior side of exterior walls that are within this area

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

In addition, since Section R302.6 refers to the Table that covers both walls and ceilings, language is added to clarify the existing language. The current text says, "This provision does not apply to garage walls that are perpendicular to the adjacent *dwelling unit* wall". As currently written, it says the provisions of R302.6 don't apply which is the whole section R302.6. Since R302.6 is scoping in nature and sends the user to Table R702.3(5) for technical requirements this change makes it clear that the ceiling requirements still apply.

This proposal does not change any requirements in the existing code.

Cost Impact: The code change proposal will not increase the cost of construction.

RB353-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R702.3.5T-RB-RICE.doc

RB354 – 13

R702.3.8

Proponent: Michael Gardner, Gypsum Association (mgardner@gypsum.org)

Revise as follows:

R702.3.8 Water-resistant gypsum backing board. Gypsum board used as the base or backer for adhesive application of ceramic tile or other required nonabsorbent finish material shall conform to ASTM C 1396, C 1178 or C1278. Use of water-resistant gypsum backing board shall be permitted on ceilings, ~~here framing spacing does not exceed 12 inches (305 mm) on center for 1/2-inch-thick (12.7 mm) or 16 inches (406 mm) for 5/8-inch-thick (16 mm) gypsum board.~~ Water-resistant gypsum board shall not be installed over a Class I or II vapor retarder in a shower or tub compartment. Cut or exposed edges, including those at wall intersections, shall be sealed as recommended by the manufacturer.

Reason: The supplemental framing requirement in R702.3.8 was placed in the Uniform Building Code many decades ago when concerns about sagging of ceiling-applied water-resistant gypsum board were more pronounced. It has become irrelevant because of contemporary board manufacturing practices that incorporate lighter weight water-resistance additives. The newer additives also make the core of the board stiffer and less susceptible to sag.

The gypsum board application standards, ASTM C840 and GA-216, have been modified to eliminate prescriptive requirements mandating the installation of supplemental framing support members when water-resistant gypsum board is applied to a ceiling. The ASTM C 840 standard is a consensus standard and reflects the input of manufacturers, contractors, and other interested parties.

Identical language was removed from Chapter 25 of the IBC during the Group 'A' hearings in 2012. The intent of this proposal is to make the 2015 IRC consistent with referenced industry standards and the 2015 IBC and to remove language that has become an occasionally overlooked catch-point for applicators and designers.

Standard wallboard and water-resistant gypsum board are manufactured to the same standard, ASTM C 1396. The humidified deflection and flexural strength tolerances for both products are identical. On the basis of the manufacturing standard, water-resistant gypsum board is no more susceptible to sag than standard wallboard.

Cost Impact: The code change proposal will not increase the cost of construction. Will create a cost savings a fewer framing members will be required.

RB354-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R702.3.8-RB-GARDNER.doc

RB355 – 13

R702.4.2, Table R702.4.2 (NEW), Chapter 44

Proponent: John Mulder, Intertek Testing Services NA, Inc., representing International Standards Organization Technical Committee 77, *Products in Fibre-reinforced Cement* and Self

Revise as follows:

R702.4.2 Backer Boards ~~Fiber-cement, fiber-mat reinforced cementitious backer units, glass mat gypsum backers and fiber-reinforced gypsum backers.~~ Fiber-cement, fiber mat reinforced cementitious backer units, glass mat gypsum backers or fiber-reinforced gypsum backers in compliance with ASTM C 1288, C 1325, C 1178 or C 1278, respectively, and installed in accordance with manufacturers' recommendations shall be Materials used as backers for wall tile in tub and shower areas and wall panels in shower areas shall be of materials listed in Table R702.4.2, and installed in accordance with the manufacturer's recommendations.

**R702.4.2
BACKER BOARD MATERIALS**

MATERIAL	STANDARD
<u>Glass mat gypsum backing panel</u>	<u>ASTM C 1178</u>
<u>Fiber-reinforced gypsum panels</u>	<u>ASTM C 1278</u>
<u>Nonabestos fiber-cement backer board</u>	<u>ASTM C 1288 or ISO 8336, Category C</u>
<u>Nonasbestos fiber mat reinforced cementitious backer units</u>	<u>ASTM C 1325</u>

Add new standard to Chapter 44 as follows:

ISO

ISO 8336 Fibre-Cement Flat Sheets – Product Specification and Test Methods

Reason: The current wording is cumbersome for the backer board materials permitted for use in this section. The text is revised to reference permitted backer board materials now defined in new TABLE R702.4.2 where all 4 permitted products would now be listed. This revision also makes the addition of future recognized products to the Code easier by simple addition to the table. Performance requirements of ISO 8336, *Fibre-cement flat sheets – Product specification and test methods*, have been harmonized with the performance requirements of ASTM C1288, *Standard Specification for Discrete Non-Asbestos Fiber-Cement Interior Substrate Sheets*. Fiber-cement producers in Mexico, Central and South America, Europe, Asia, Australia and New Zealand currently manufacture and test their fiber-cement products for compliance with ISO 8336. The inclusion of this Standard reference in the IRC will permit manufacturers worldwide to demonstrate product compliance to IBC requirements. The addition of a reference to ISO 8336 in the Code removes a barrier to trade.

IBC Section 2509.2 has, as a result of the Group A IBC Code Hearings, been revised to adopt this format for approved product presentation. The addition of the new referenced ISO standard and "product category" were also approved during the Group A IBC Code Hearings. This proposed revision brings the two building codes (IBC & IRC) and the applicable code sections and standards references into general alignment.

Cost Impact: The code change proposal will not increase the cost of construction because the proposed code change is editorial in nature to better clarify and present the backer board products currently recognized in the Code.

Analysis: A review of the standard proposed for inclusion in the code, ISO 8336 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

RB355-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R702.4.2-RB-MULDER.doc

RB356 – 13

R702.7, R702.7.1, R702.7.2

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

Revise as follows:

R702.7 Vapor retarders. Vapor retarders shall be in accordance with this section.

Exception: Construction where moisture or its freezing will not damage the materials are exempt from Section R702.7.

R702.7.1 Vapor retarders required. ~~Class I or II vapor retarders are required~~ shall be used on the interior side of frame walls in Zones 5, 6, 7, 8 and Marine 4.

Exceptions:

1. Basement walls.
2. Below-grade portion of any wall.
3. ~~Construction where moisture or its freezing will not damage the materials.~~ Where Class III vapor retarders are used as specified in Table R702.7.1.

~~**R702.7.1 Class III vapor retarders.** Class III vapor retarders shall be permitted where any one of the conditions in Table R702.7.1 is met.~~

R702.7.2 Vapor retarders prohibited. The following shall not be used:

1. Class I or II vapor retarders on the interior side of frame walls in Zones 1 and 2.
2. Class I vapor retarders on the interior side of frame walls in Zones 3 and 4.
3. Materials in frame walls with a Class I vapor retarder to either the inside or the outside, shall not have a Class I or II vapor retarder to the other side.

Reason: This change prohibits a number of situations where vapor retarders could cause problems by trapping moisture. This change also splits the "required" from the "prohibited" for clarity.

New items #1 and #2- In cooling climates vapor retarders to the inside can trap moisture in the cooled walls.

New item #3- Exterior wall materials will get wet. Moisture sensitive materials need be allowed to dry. A Class I vapor retarder to one side of a material prevents drying to that side; therefore, that material needs to be able to dry to the other side. This would not prohibit materials with Class II vapor retarders to both sides, which allows slow drying to both sides. It would also allow a Class I vapor retarder to one side and a Class III vapor retarder to the other side.

Cost Impact: The code change proposal may increase the cost of construction, but it will help protect construction materials.

RB356-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R702.7-RB-CONNER.doc

RB357 – 13

R202 (NEW), Table R702.7.1

Proponent: Michael D. Fischer, Kellen Company, representing the Center for the Polyurethanes Industry (mfischer@kellencompany.com)

Revise as follows:

TABLE R702.7.1
CLASS III VAPOR RETARDERS

CLIMATEZONE	CLASS III VAPOR RETARDERS PERMITTED FOR: ^a
Marine 4	<p>Vented cladding over wood structural panels.</p> <p>Vented cladding over fiberboard.</p> <p>Vented cladding over gypsum.</p> <p>Insulated sheathing <u>Continuous insulation</u> with <i>R</i>-value ³ 2.5 over 2 × 4 wall.</p> <p>Insulated sheathing <u>Continuous insulation</u> with <i>R</i>-value ³ 3.75 over 2 × 6 wall.</p>
5	<p>Vented cladding over wood structural panels.</p> <p>Vented cladding over fiberboard.</p> <p>Vented cladding over gypsum.</p> <p>Insulated sheathing <u>Continuous insulation</u> with <i>R</i>-value ≥5 over 2 × 4 wall.</p> <p>Insulated sheathing <u>Continuous insulation</u> with <i>R</i>-value ≥7.5 over 2 × 6 wall.</p>
6	<p>Vented cladding over fiberboard.</p> <p>Vented cladding over gypsum.</p> <p>Insulated sheathing <u>Continuous insulation</u> with <i>R</i>-value ≥7.5 over 2 × 4 wall.</p> <p>Insulated sheathing <u>Continuous insulation</u> with <i>R</i>-value ≥11.25 over 2 × 6 wall.</p>
7 and 8	<p>Insulated sheathing <u>Continuous insulation</u> with <i>R</i>-value ≥10 over 2 × 4 wall.</p> <p>Insulated sheathing <u>Continuous insulation</u> with <i>R</i>-value ≥15 over 2 × 6 wall.</p>

For SI: 1 pound per cubic foot = 16 kg/m³.

- a. Spray foam with a minimum density of 2 lb/ft³, and a maximum permeance of 1.5 perms at the installed thickness, applied to the interior cavity side of wood structural panels, fiberboard, insulating sheathing or gypsum is deemed to meet the insulating sheathing continuous insulation requirement where the spray foam *R*-value meets or exceeds the specified insulating sheathing continuous insulation *R* value.

Add new definition as follows:

CONTINUOUS INSULATION. Insulation that is uncompressed and continuous across all structural members without thermal bridges other than fasteners and service openings. It is installed on the interior or exterior or is integral to any *opaque* surface of the *building envelope*.

Reason: The current IRC vapor retarder requirements specify product application based upon spray foam density. This proposal replaces the density requirement with a permeance requirement that is more appropriate for the intended requirement. Additionally, it will allow the use of more products that meet the intent of the provision but that may fall out of the arbitrary density specification. The addition of the continuous insulation definition is for consistency with ASHRAE 90.1 and other IECC proposals.

Cost Impact: The code change proposal will not increase the cost of construction.

RB357-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R702.7.1T-RB-FISCHER.doc

RB358 – 13

R702.7, R702.7.1, Table R702.7.1, R702.7.2

Proponent: Jay Crandell, P.E., ARES Consulting, representing Foam Sheathing Committee / American Chemistry Council (jcrandell@aresconsulting.biz)

Revise as follows:

R702.7 Vapor retarders. Vapor retarders as described in Section R702.7.3 shall be provided in accordance with Sections R702.7.1 and R702.7.2 or an approved design using accepted engineering practice for hygrothermal analysis.

R702.7.1 Class I and II Vapor Retarders. Class I or II vapor retarder membranes shall not be provided on the interior face of frame walls in Climate Zones 1 and 2. Class I vapor retarder membranes shall not be provided on the interior face of frame walls in Climate Zones 3 and 4. A Class I or II vapor retarder material ~~are required~~ shall be provided on the interior side of frame walls in Climate Zones 5, 6, 7, 8 and Marine 4. The appropriate Climate Zone shall be selected in accordance with Table N1101.10

Exceptions:

1. Basement walls.
2. Below-grade portion of any wall.
3. Construction where moisture or its freezing will not damage the materials.
4. Conditions where Class III vapor retarders are required in Section R702.7.2.

R702.7.4 R702.7.2 Class III vapor retarders. Class III vapor retarders shall be permitted where any one of the conditions in Table R702.7.1 is met. Only Class III vapor retarder membranes in accordance with Section R702.7.3 shall be used on the interior face of frame walls where continuous insulation with perm rating of less than 1 perm is applied in accordance with Table R702.7.1 on the exterior side of the frame wall.

R702.7.2 R702.7.3 Material vapor retarder class. The *vapor retarder class* of any material used as a vapor retarder shall be based on the manufacturer's certified testing or a tested assembly. The following vapor retarder membranes shall be deemed to meet the class specified:

Class I: Sheet polyethylene, nonperforated aluminum foil

Class II: Kraft-faced fiberglass batts or paint with a perm rating greater than 0.1 and less than or equal to 1.0.

Class III: Latex or enamel paint.

**TABLE R702.7.1
CLASS III VAPOR RETARDERS**

CLIMATE ZONE	CLASS III VAPOR RETARDERS PERMITTED FOR: ^a
Marine 4	Vented cladding over wood structural panels. Vented cladding over fiberboard. Vented cladding over gypsum. Insulated sheathing Exterior continuous insulation with R-value ≥ 2.5 over 2x4 wall. Insulated sheathing Exterior continuous insulation with R-value ≥ 3.75 over 2x6 wall
5	Vented cladding over wood structural panels. Vented cladding over fiberboard. Vented cladding over gypsum. Insulated sheathing Exterior continuous insulation with R-value ≥ 5 over 2x4 wall.

	Insulated sheathing <u>Exterior continuous insulation</u> with R-value ≥ 7.5 over 2x6 wall
6	Vented cladding over fiberboard. Vented cladding over gypsum. Insulated sheathing <u>Exterior continuous insulation</u> with R-value ≥ 7.5 over 2x4 wall. Insulated sheathing <u>Exterior continuous insulation</u> with R-value ≥ 11.25 over 2x6 wall
7 and 8	Insulated sheathing <u>Exterior continuous insulation</u> with R-value ≥ 10 over 2x4 wall. Insulated sheathing <u>Exterior continuous insulation</u> with R-value ≥ 15 over 2x6 wall

For SI: 1 pound per cubic foot = 16 kg/m³.

a. Spray foam with minimum density of 2 lb/ft³ applied to the interior cavity side of wood structural panels, fiberboard, insulated sheathing or gypsum is deemed to meet the ~~insulated sheathing~~ exterior continuous insulation requirement where the spray foam R-value or the combination of spray foam and exterior continuous insulation R-value meets or exceeds the specified ~~insulated sheathing~~ exterior continuous insulation R-value.

Reason: A similar proposal was approved as submitted for the 2015 IBC (FS 160-12). In this coordinating proposal for the IRC, vapor retarder provisions are identically strengthened to better promote seasonal drying of walls and avoid a “double vapor barrier” condition in combination with a “warm wall” design using insulating sheathing in cold climates. In addition, requirements are clarified to promote proper application and enforcement. For example, provision is added to clarify that low perm vapor retarder membranes on the interior face of walls shall not be used in the warmer climate zones as indicated to avoid a reversed vapor retarder and creation of a condensation plane. Where appropriate, language also is added to differentiate from membrane-type vapor retarders and other materials or practices, such as use of foam plastics which can control vapor condensation as a vapor retarder material and insulation material to prevent dew-point temperatures from occurring within an envelope assembly. Finally, the term “insulated sheathing” is replaced with “continuous insulation” to provide a more generic requirement that is inclusive of a variety of materials that can be used for this purpose.

Cost Impact: The code change proposal will not increase the cost of construction.

RB358-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R702.7-RB-CRANDELL.doc

RB359 – 13

R703.1

Proponent: Rob Pickett, RobPickett & Associates, LLC, representing Log Homes Council
(robpickett@vermontel.net)

Revise as follows:

R703.1 General. Exterior walls shall provide the building with a weather-resistant exterior wall envelope. The exterior wall envelope shall include flashing as described in Section R703.8.

Exception: Log walls designed and constructed in accordance with the provisions of the ICC-400.

Reason: Where exterior walls are constructed using logs, the log components and joinery system provide the exterior covering, structure, thermal barrier, and interior covering all in one assembly. Log walls are an alternative method of construction that are to be designed and constructed in accordance with ICC400. Weather protection is specifically covered in 305.1.

Cost Impact: The code change proposal will not increase the cost of construction.

RB359-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R703.1-RB-PICKETT.doc

RB360 – 13

R703.1.1

Proponent: Theresa Weston, PhD., DuPont Building Innovations (theresa.a.weston@usa.dupont.com)

Revise as follows:

R703.1.1 Water resistance. The exterior wall envelope shall be designed and constructed in a manner that prevents the accumulation of water within the wall assembly by providing a water-resistant barrier behind the exterior veneer as required by Section R703.2 and a means of draining to the exterior water that enters the assembly. In areas with an average annual rainfall exceeding 35 inches, walls shall have an average minimum drainage efficiency of 75 percent when tested in accordance the requirements of ASTM E 2273. Protection against condensation in the exterior wall assembly shall be provided in accordance with Section R702.7 of this code.

Exceptions:

1. A weather-resistant exterior wall envelope shall not be required over concrete or masonry walls designed in accordance with Chapter 6 and flashed according to Section R703.7 or R703.8.
2. Compliance with the requirements for a means of drainage, and the requirements of Sections R703.2 and R703.8, shall not be required for an exterior wall envelope that has been demonstrated to resist wind-driven rain through testing of the exterior wall envelope, including joints, penetrations and intersections with dissimilar materials, in accordance with ASTM E 331 under the following conditions:
 - 2.1. Exterior wall envelope test assemblies shall include at least one opening, one control joint, one wall/eave interface and one wall sill. All tested openings and penetrations shall be representative of the intended end-use configuration.
 - 2.2. Exterior wall envelope test assemblies shall be at least 4 feet by 8 feet (1219 mm by 2438 mm) in size.
 - 2.3. Exterior wall assemblies shall be tested at a minimum differential pressure of 6.24 pounds per square foot (299 Pa).
 - 2.4. Exterior wall envelope assemblies shall be subjected to the minimum test exposure for a minimum of 2 hours.

The exterior wall envelope design shall be considered to resist wind-driven rain where the results of testing indicate that water did not penetrate control joints in the exterior wall envelope, joints at the perimeter of openings penetration or intersections of terminations with dissimilar materials.

Reason: This proposal adds a method of measuring drainage to the requirement for a means of drainage for high rainfall areas. Drainage is an important component of managing water, especially under high rainfall/ exposure conditions, such as those in the Pacific Northwest (Portland, OR 43.5" avg, Seattle, WA 37.7" avg.). Drainage requirements, including the proposed requirement, have been included in the Oregon State Residential Code.

Cost Impact: The code change proposal will increase the cost of construction in locations with high rainfall.

RB360-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R703.1.1 #1-RB-WESTON.doc

RB361 – 13

R703.1.1

Proponent: Theresa A. Weston, PhD., DuPont Building Innovations
(theresa.a.weston@usa.dupont.com)

Revise as follows:

R703.1.1 Water resistance. The exterior wall envelope shall be designed and constructed in a manner that prevents the accumulation of water within the wall assembly by providing a water-resistant barrier behind the exterior veneer as required by Section R703.2 and a means of draining to the exterior water that enters the assembly. In Marine climate zones in accordance with Section N1101.10 of this code, framed walls shall have either a minimum 1/8" (3mm) airspace between the water-resistive barrier and the exterior veneer or an average minimum drainage efficiency of 75 percent when tested in accordance the requirements of ASTM E 2273. Protection against condensation in the exterior wall assembly shall be provided in accordance with Section R702.7 of this code.

Exceptions:

1. A weather-resistant exterior wall envelope shall not be required over concrete or masonry walls designed in accordance with Chapter 6 and flashed according to Section R703.7 or R703.8.
2. Compliance with the requirements for a means of drainage, and the requirements of Sections R703.2 and R703.8, shall not be required for an exterior wall envelope that has been demonstrated to resist wind-driven rain through testing of the exterior wall envelope, including joints, penetrations and intersections with dissimilar materials, in accordance with ASTM E 331 under the following conditions:
 - 2.1. Exterior wall envelope test assemblies shall include at least one opening, one control joint, one wall/eave interface and one wall sill. All tested openings and penetrations shall be representative of the intended end-use configuration.
 - 2.2. Exterior wall envelope test assemblies shall be at least 4 feet by 8 feet (1219 mm by 2438 mm) in size.
 - 2.3. Exterior wall assemblies shall be tested at a minimum differential pressure of 6.24 pounds per square foot (299 Pa).
 - 2.4. Exterior wall envelope assemblies shall be subjected to the minimum test exposure for a minimum of 2 hours.

The exterior wall envelope design shall be considered to resist wind-driven rain where the results of testing indicate that water did not penetrate control joints in the exterior wall envelope, joints at the perimeter of openings penetration or intersections of terminations with dissimilar materials.

Reason: This proposal adds a method of measuring drainage for high rainfall areas in which wall systems have limited drying capability, to the existing requirement for a means of drainage. Drainage is an important component of managing water, especially under high rainfall/ exposure conditions, such as those in the Pacific Northwest and other Marine climates. Additionally, it is becoming increasingly important to manage the moisture durability as the industry moves to more highly insulated walls. The proposed drainage requirements are consistent with those adopted into the Oregon State Residential Code in 2010.

Cost Impact: The code change proposal will increase the cost of construction in locations with high rainfall.

RB361-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R703.1.1 #2-RB-WESTON.doc

RB362 – 13

R703.2, Chapter 44

Proponent: Theresa A. Weston, PhD., DuPont Building Innovations
(theresa.a.weston@usa.dupont.com)

Revise as follows:

R703.2 Water-resistive barrier. One layer of ~~No. 15 asphalt felt~~ water-resistive barrier, free from holes and breaks, complying with ASTM E 2556, such as ASTM D 226 for Type 1 felt, or other approved water-resistive barrier shall be applied over studs or sheathing of all exterior walls. ~~Such felt or material~~ The water-resistive barrier shall be applied horizontally, with the upper layer lapped over the lower layer not less than 2 inches (51 mm). Where joints occur, ~~felt the water-resistive barrier~~ shall be lapped not less than 6 inches (152 mm). The ~~felt or other approved material~~ water-resistive barrier shall be continuous to the top of walls and terminated at penetrations and building appendages in a manner to meet the requirements of the exterior wall envelope as described in Section R703.1.

Exception: Omission of the water-resistive barrier is permitted in the following situations:

1. In detached accessory buildings.
2. Under exterior wall finish materials as permitted in Table R703.4.
3. Under paperbacked stucco lath when the paper backing is an approved water-resistive barrier.

Add new standard to Chapter 44 as follows:

ASTM

E2556-10 Standard Specification for Vapor Permeable Flexible Sheet Water-Resistive Barriers Intended for Mechanical Attachment

Reason: The proposal updates the water-resistive barrier reference to the most consensus standard. ASTM E2556 includes house wrap materials, and building papers in addition to traditional felt, and therefore is more representative of the state of the industry. ASTM E2556 is consistent with the current ICC-ES acceptance criteria for water-resistive barriers and therefore should not limit the use of current WRB's. The materials included in ASTM E2556 – felt, Grad D paper, and building wraps – are all installed in the manner currently prescribed in this section of the code.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, ASTM E 2556 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

RB362-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R703.2 #2-RB-WESTON.doc

RB363 – 13

R703.2

Proponent: Jerry Anderson, City of Overland Park, KS, representing self (jerry.anderson@opkansas.org)

Revise as follows:

R703.2 Water-resistive barrier. One layer of No. 15 asphalt felt, free from holes and breaks, complying with ASTM D 226 for Type 1 felt or other approved water-resistive barrier shall be applied over studs or sheathing of all exterior walls.

Such felt or material shall be applied horizontally, with the upper layer lapped over the lower layer not less than 2 inches (51 mm). Where joints occur, felt shall be lapped not less than 6 inches (152 mm). The felt or other approved material shall be continuous to the top of walls and terminated at penetrations and building appendages in a manner to meet the requirements of the exterior wall envelope as described in Section R703.1.

Exception: Omission of the water-resistive barrier is permitted in the following situations:

1. In detached accessory buildings.
2. Under exterior wall finish materials as permitted in Table R703.4.
- ~~3. Under paperbacked stucco lath when the paper backing is an approved water-resistive barrier.~~

Reason: The purpose of the code change is to add clarity to the code. The 3rd exception to the requirement for a water resistive barrier has often caused confusion. The requirements for water-resistive barriers as they pertain to exterior plaster (stucco) are found in Section R703.6.3. It is not necessary to have section R703.2 address a product used for exterior plaster when section R703.6.3 properly addresses the requirements pertaining to water-resistive barriers for exterior plaster. The exception makes the code confusing.

Cost Impact: The code change proposal will not increase the cost of construction.

RB363-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R703.2-RB-ANDERSON.doc

RB364 – 13

R703.2, Chapter 44

Proponent: Theresa A. Weston, PhD., DuPont Building Innovations
(theresa.a.weston@usa.dupont.com)

Revise as follows:

R703.2 Water-resistive barrier. One layer of No. 15 asphalt felt, free from holes and breaks, complying with ASTM D 226 for Type 1 felt or other approved water-resistive barrier shall be applied over studs or sheathing of all exterior walls. Such felt or material shall be applied horizontally, with the upper layer lapped over the lower layer not less than 2 inches (51 mm). Where joints occur, felt shall be lapped not less than 6 inches (152 mm). The felt or other approved material shall be continuous to the top of walls and terminated at penetrations and building appendages in a manner to meet the requirements of the exterior wall envelope as described in Section R703.1.

Exception: Omission of the water-resistive barrier is permitted in the following situations:

1. In detached accessory buildings.
2. Under exterior wall finish materials as permitted in Table R703.4.
3. Under paperbacked stucco lath when the paper backing is an approved water-resistive barrier.
4. In a wall assembly that has been tested in accordance with and meets the requirements of AAMA 504.

Add new standard to Chapter 44 as follows:

AAMA

AAMA 504-05 Voluntary Laboratory Test Method to Qualify Fenestration Installation Procedures

Reason: This proposal provides a testing alternative to the prescriptive water-resistive barrier material and installation provided in R703.2. This will allow for innovation while still ensuring the performance and durability of the WRB system. AAMA 504 is an industry standard that includes the water resistance testing of assemblies including "*certain physical loading and temperature cycling conditions to simulate service conditions*". The inclusion of physical loading and temperature cycling as a durability assessment is important to water-resistive barrier systems as they have low accessibility after construction and are critical to moisture performance of the wall system.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, AAMA 504 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

RB364-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R703.2 #1-RB-WESTON.docc

RB365 – 13

R703.1.1, R703.2, R703.2.1 (NEW), R703.2.2 (NEW), R703.8

Proponent: Jay Crandell, P.E., ARES Consulting, representing Foam Sheathing Committee and American Chemistry Council (jcrandell@aresconsulting.biz)

Revise as follows:

R703.1.1 Water resistance. The exterior wall envelope shall be designed and constructed in a manner that prevents the accumulation of water within the wall assembly by providing a water-resistant barrier behind the exterior veneer as required by Section R703.2 and a means of draining to the exterior water that enters the assembly.

Protection against condensation in the exterior wall assembly shall be provided in accordance with Section R702.7 of this code.

Exceptions:

1. A weather-resistant exterior wall envelope shall not be required over concrete or masonry walls designed in accordance with Chapter 6 and flashed according to Section R703.7 or R703.8.
2. Compliance with the requirements for a means of drainage, and the requirements of Sections R703.2 and R703.8, shall not be required for an exterior wall envelope that has been demonstrated to resist wind-driven rain through testing of the exterior wall envelope, including joints, penetrations and intersections with dissimilar materials, in accordance with ASTM E 331 under the following conditions:
 - 2.1. Exterior wall envelope test assemblies shall include at least one opening, one control joint, one wall/eave interface and one wall sill. All tested openings and penetrations shall be representative of the intended end-use configuration.
 - 2.2. Exterior wall envelope test assemblies shall be at least 4 feet by 8 feet (1219 mm by 2438 mm) in size.
 - 2.3. Exterior wall assemblies shall be tested at a minimum differential pressure of 6.24 pounds per square foot (299 Pa).
 - 2.4. Exterior wall envelope assemblies shall be subjected to the minimum test exposure for a minimum of 2 hours.

The exterior wall envelope design shall be considered to resist wind-driven rain where the results of testing indicate that water did not penetrate control joints in the exterior wall envelope, joints at the perimeter of openings penetration or intersections of terminations with dissimilar materials.

3. Water resistive barrier materials and methods used as an alternative to Section R703.2.1 or R703.2.2 shall comply with the following:

1. The testing required by Exception 2 of Section R703.1.1 applies except:
 - 1.1. Cladding is not required.
 - 1.2. The minimum pressure differential shall be 2.86 pounds per square foot (137Pa).
 - 1.3. The minimum test exposure time shall be 15 minutes.
 - 1.4. The performance need not exceed the performance of the water resistive barrier installation specified in Section R703.2.1 or R703.2.2 as tested under identical minimum pressure and exposure time conditions.
2. The alternative water resistive barrier shall be installed in accordance with the manufacturer's installation instructions.

Comment [J1]: Larry, edited this to better align with intent of the original proposal on this matter.

R703.2 Water-resistive barrier. Water-resistive barriers shall comply with Section R703.2.1 or R703.2.2, or shall be approved in accordance with Section R703.1.1, exception #3.

Exception: Omission of the water-resistive barrier is permitted in the following situations:

1. In detached accessory buildings.
2. Under exterior wall finish materials as permitted in Table R703.4.
3. Under paperbacked stucco lath when the paper backing is an approved water-resistive barrier.

R703.2.1 No. 15 asphalt felt. One layer of No. 15 asphalt felt, free from holes and breaks, complying with ASTM D 226 for Type 1 felt ~~or other approved water-resistive barrier~~ shall be applied over studs or sheathing of all exterior walls. Such felt ~~or material~~ shall be applied horizontally, with the upper layer lapped over the lower layer not less than 2 inches (51 mm). Where joints occur, felt shall be lapped not less than 6 inches (152 mm). The felt ~~or other approved material~~ shall be continuous to the top of walls and terminated at penetrations and building appendages in a manner to meet the requirements of the exterior wall envelope as described in Section R703.1.

R703.2.2 Grade D paper. Grade D paper behind exterior plaster and lath shall installed in accordance with Section R703.6.3.

R703.8 Flashing. *Approved* corrosion-resistant flashing shall be applied shingle-fashion in a manner to prevent entry of water into the wall cavity or penetration of water to the building structural framing components. Self-adhered membranes used as flashing shall comply with AAMA 711. The flashing shall extend to the surface of the exterior wall finish or a water-resistive barrier complying with Section R703.2. *Approved* corrosion-resistant flashings shall be installed at all of the following locations:

1. Exterior window and door openings. Flashing at exterior window and door openings shall extend to the surface of the exterior wall finish or to the water-resistive barrier for subsequent drainage. Flashing at exterior window and door openings shall be installed in accordance with one or more of the following:
 - 1.1. The fenestration manufacturer's installation and flashing instructions, or for applications not addressed in the fenestration manufacturer's instructions, in accordance with the flashing manufacturer's instructions. Where flashing instructions or details are not provided, pan flashing shall be installed at the sill of exterior window and door openings. Pan flashing shall be sealed or sloped in such a manner as to direct water to the surface of the exterior wall finish or to the water-resistive barrier for subsequent drainage. Openings using pan flashing shall also incorporate flashing or protection at the head and sides.
 - 1.2. In accordance with the flashing design or method of a registered design professional.
 - 1.3. In accordance with other approved methods.
2. At the intersection of chimneys or other masonry construction with frame or stucco walls, with projecting lips on both sides under stucco copings.
3. Under and at the ends of masonry, wood or metal copings and sills.
4. Continuously above all projecting wood trim.
5. Where exterior porches, decks or stairs attach to a wall or floor assembly of wood-frame construction.
6. At wall and roof intersections.
7. At built-in gutters.

Reason:

This proposal reorganizes Section R703.2 and coordinates with water-resistance requirements of Section R703.1.1 to more completely and clearly address the types of water-resistive barriers currently included in the IRC and define requirements for alternatives. It also coordinates proper integration of flashing with the water-resistive barrier layer in Section R703.8.

Most importantly, this proposal addresses a critical gap in the code by establishing a uniform water penetration performance requirement for all types of "other approved" (alternative) water resistive barriers. The proposed water resistance requirements rely on the same test method already include in Section R703.1.1 and modifies the criteria to be appropriate for testing the WRB layer alone (not including cladding) such that alternative WRB's can be used with any cladding material without having to test a full assembly for each type of cladding or apply criteria in Section R703.1.1 that are meant to be applied with cladding present. The proposed water resistance test criteria (2.86 psf and 15 minute duration) are identical to requirements for water penetration testing of water-resistive barrier coatings in accordance with ASTM E2570 and are appropriately more restrictive than the water-resistance criteria applied to water-resistive air-barrier materials per ASTM E1677.

This change is necessary because some alternative water-resistive barrier materials, such as polymer-based barriers (i.e., "building wraps") are approved for use only requiring a material property to be tested and standards for this type of material, such as ASTM E2556, do not address actual installed performance of the water-resistive barrier including penetrations, fastenings, joint detailing and other factors representative of end-use conditions. In fact, ASTM E 2556 states in its scope that "this specification is limited to the evaluation of materials and does not address installed performance." Installed performance is surely the most important consideration and it is neglected in current standards for some materials.

The main reason for this proposal is that WRB performance is largely governed by how it performs as an installed assembly under in-service moisture exposure conditions. This concern is addressed for some types of WRB materials and installations (e.g., WRB panels, WRB coatings, etc.), but not for others (e.g., polymer-based barriers or wraps).

The significance of this concern over the lack of a uniform water-penetration resistance requirement is documented in the literature (Hall, G.D. and Hoigard, K.R., "Water-Resistive Barriers: How do they compare?", *Interface*, November 2005). In particular, this reference evaluated current code requirements, acceptance criteria, and field experience. It also reports comparative test data under installed water exposure conditions. The primary conclusions from the study include:

"Current building code provisions offer no rational means of assessing the equivalency of alternative WRB products to ASTM D-266 type 1 asphalt-saturated felt..."

"The three water resistance test methods specified in AC308 vary so significantly in test duration and applied hydrostatic pressure that no meaningful comparison of test data can be made. They fail to address several important moisture transport mechanisms that affect the in-service performance of WRBs."

"Laboratory tests performed by the authors to simulate potential in-service conditions not addressed by AC308 resulted in water penetration through several commercially available WRB materials that, according to published manufacturer information, passed the requirements of AC308 for Grade D barriers."

Clearly, these issues must be addressed in the IRC to ensure acceptable and consistent performance of various types of WRB materials and assemblies. Your approval of this proposal will establish a sound foundation for evaluation of alternative WRB materials and installations to avoid inconsistent requirements resulting in poor or inconsistent performance among alternative WRB materials.

Cost Impact: This proposal will not increase the cost of construction.

RB365-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R703.1.1-RB-CRANDELL.doc

RB366 – 13

R703.4, R703.11.2.1, R703.11.2.2

Proponent: Gary J. Ehrlich, P.E., National Association of Home Builders (NAHB) (gehrlich@nahb.org); Jay Crandell, P.E., ARES Consulting

Revise as follows:

R703.4 Attachments. Unless specified otherwise, all wall coverings shall be securely fastened in accordance with Table R703.4 or with other approved aluminum, stainless steel, zinc-coated or other approved corrosion-resistive fasteners. Where the ~~basic~~ ultimate design wind speed per Figure R301.2(4)A is ~~140-140~~ miles per hour (~~49-63~~ m/s) or higher, the attachment of wall coverings shall be designed to resist the component and cladding loads specified in Table R301.2(2), adjusted for height and exposure in accordance with Table R301.2(3).

R703.11.2.1 Basic wind speed not exceeding 90 115 miles per hour and Exposure Category B.

Where the ~~basic~~ultimate design wind speed does not exceed 90 115 miles per hour (40 51 m/s), the Exposure Category is B and gypsum wall board or equivalent is installed on the side of the wall opposite the foam plastic sheathing, the minimum siding fastener penetration into wood framing shall be 1 1/4 inches (32mm) using minimum 0.120-inch diameter nail (shank) with a minimum 0.313-inch diameter head, 16 inches on center. The foam plastic sheathing shall be minimum 1/2-inch-thick (12.7 mm) (nominal) extruded polystyrene per ASTM C578, 1/2-inch-thick (12.7 mm) (nominal) polyisocyanurate per ASTM C1289, or 1-inch-thick (25 mm)(nominal) expanded polystyrene perASTMC578.

R703.11.2.2 Basic wind speed exceeding 90 115 miles per hour or Exposure Categories C and D.

Where the ultimate design ~~basic~~ wind speed exceeds 90 115 miles per hour (40-51 m/s) or the Exposure Category is C or D, or all conditions of Section R703.11.2.1 are not met, the adjusted design pressure rating for the assembly shall meet or exceed the loads listed in Tables R301.2(2) adjusted for height and exposure using Section R301.2(3). The design wind pressure rating of the vinyl siding for installation over solid sheathing as provided in the vinyl siding manufacturer's product specifications shall be adjusted for the following wall assembly conditions:

1. For wall assemblies with foam plastic sheathing on the exterior side and gypsum wall board or equivalent on the interior side of the wall, the vinyl siding's design wind pressure rating shall be multiplied by 0.39.
2. For wall assemblies with foam plastic sheathing on the exterior side and no gypsum wall board or equivalent on the interior side of wall, the vinyl siding's design wind pressure rating shall be multiplied by 0.27.

Reason: The purpose of this code change is to bring the wind provisions of the IRC in line with the 2012 IBC and ASCE 7-10. As a result of the schedule changes implemented during the 2009-2010 ICC code development cycle, there was not sufficient time to revise the IRC to fully implement the new ultimate wind speed basis of ASCE 7-10 and the 2012 IBC, due to the extent of prescriptive IRC provisions and tables which are directly related to basic wind speed.. New maps based on the ASCE 7-10 ultimate wind speed data but converted back down to nominal (ASD) basis were provided in the IRC. This has led to a fair amount of confusion among those stakeholders who work with both codes.

A working group of stakeholders including NAHB, the major material associations, ASCE, and the Insurance Institute for Business and Home Safety developed a series of IRC proposals to implement the new ultimate wind speed basis. This proposal updates wind speed triggers in Chapter 7 for attachment of wall cladding and for vinyl siding installed over foam sheathing to the equivalent ultimate design wind speed.

Cost Impact: The code change proposal will not increase the cost of construction.

RB366-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R703.4-RB-CRANDELL-EHRLICH.doc

RB367 – 13

R703.4, Table R703.5 (NEW)

Proponent: Andrew Herseth, US Dept of Homeland Security, Federal Emergency Management Agency (FEMA) and Glenn Overcash, URS Corporation representing FEMA

Revise as follows:

R703.4 Attachments. Unless specified otherwise, all wall coverings shall be securely fastened in accordance with Table R703.4 or with other *approved* aluminum, stainless steel, zinc-coated or other *approved* corrosion-resistive fasteners. The use of Table R703.4 shall be limited according to the building mean roof height, ultimate design wind speed in accordance with Figure R301.2(4)A, and exposure category in accordance with Section R301.2.1.4 as shown in Table R703.5. Where the basic wind speed in accordance with Figure R301.2(4)A is 110 miles per hour (49 m/s) or higher the limits of Table R703.5 are exceeded, the attachment of wall coverings shall be designed to resist the component and cladding loads specified in Table R301.2(2), adjusted for height and exposure in accordance with Table R301.2(3). For the determination of wall covering attachment, component and cladding loads shall be determined using an effective wind area of 10 ft².

TABLE R703.5
LIMITS FOR ATTACHMENT PER TABLE R703.4

Maximum Mean Roof Height			
Basic Wind Speed (mph-3-second gust)	Exposure		
-	<u>B</u>	<u>C</u>	<u>D</u>
115	NL	50'	20'
120	NL	30'	DR
130	60'	15'	DR

NL = not limited by Table R703.5, DR = Design Required
For SI: 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s

Reason: The proposal is intended to better establish the current limits of the prescriptive fastening table for wall coverings. The prescriptive fastening requirements in Table R703.4 are limited to a maximum design pressure of 30 psf. According to Table R301.2(2), for Zone 5 and an effective wind area of 10 ft², the maximum negative pressure for a basic wind speed of 110 mph is 29.1 psf. This value – less than 30 psf – correlates directly with the 110 mph limitation in Section R703.4. However, the tabulated pressures in Table R301.2(2) are for an assumed Exposure B site condition and a mean roof height of 30 feet. For residential buildings with a basic wind speed of 110 mph and Exposure C or D, or a mean roof height greater than 30 feet, the maximum negative pressure would be substantially higher than 30 psf. For example, consider the case of a residential building located in Exposure C, with a mean roof height of 45 ft. The adjustment factor from Table R301.2(3) would be 1.53. The resulting maximum negative design pressure for a basic wind speed of 110 mph would be (29.1 psf) x 1.53 = 44.5 psf. This wall cladding load far exceeds the current implied limitation of Table R703.4 which is 30 psf.

Table R703.5 has been added to simplify the determination of whether prescriptive fastening provisions of Table R703.4 apply to a specific building. The limits in the table indicate where component and cladding pressures exceed 30 psf as a function of wind speed exposure and mean roof height. In most cases, especially in areas with lower wind speeds, the prescriptive fastening requirements in Table R703.4 will be verified as applicable. Chapter 7 of ICC 600 includes prescriptive attachment schedules for exterior wall coverings that may be applied when mean roof height limits per Table R703.5 are exceeded.

FEMA P-499, *Home Builder's Guide to Coastal Construction* (FEMA, 2009), includes Technical Fact Sheet 5.3 which addresses the attachment of siding in areas where wind loads for wall cladding exceed 30 psf as a result of wind speed, and/or exposure category and/or roof mean height by recommending the selection of a siding product rated for those conditions or higher. The manufacturer's product literature or installation instructions should specify the fastener type, size and spacing, and any other installation details such as requirements for the sheathing materials behind vinyl siding that is needed to achieve the product rating.

New language is also added to require design wind pressures to be determined using an effective wind area of 10 ft². For wall cladding, the effective wind area will be governed by the effective wind area of an individual fastener which will almost always be less than 10 ft². Guidance for Determining Site-Specific Loads in Chapter 8 of FEMA P-55, *Coastal Construction Manual* (FEMA, 2011), recommends that "for cladding and fasteners, the effective wind area should not be greater than the area that is tributary to

an individual fastener. In ASCE 7-10, there is no adjustment for wind areas less than 10 ft²; therefore, sheathing suction loads (should be) based on an effective wind area of 10 ft² for different zones on the roof.”

Changing the trigger for using Table R703.4 from a wind speed limit to a pressure limit will result in better correlation of the actual limits of the table. The new attachment criteria would also make IRC consistent w/ ICC 600 and the Florida Building Code (FBC) where attachment provisions for exterior wall coverings are pressure-triggered.

Cost Impact: The code change proposal will not increase the cost of construction.

RB367-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R703.4-RB-HERSETH-OVERCASH.doc

RB368 – 13

Table R703.4, Chapter 44

Proponent: Louis Wagner, Wagner in the Woods, representing Composite Panel Association
(lwagner@fiberboard.org)

Revise as follows:

TABLE R703.4 WEATHER-RESISTANT SIDING ATTACHMENT AND MINIMUM THICKNESS

k. Hardboard siding shall comply with CPA/ANSI A135.6. When used as architectural trim it shall comply with CPA/ANSI A135.7.

(Portions of Table not shown remain unchanged)

Add new standard to Chapter 44 as follows:

CPA

ANSI A135.7 – 12 Engineered Wood Trim

Reason: A new hardboard standard has been completed under the ANSI consensus process.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, CPA /ANSI A135.7with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

RB368-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R703.4T-RB-WAGNER.doc

RB369 – 13

R703.5.1, R703.5.3, Table R703.5.1(2) (New), Table R703.5.1(3) (NEW), Table R703.5.2, R703.5.3.1, R905.7.5, Table R905.7.5(2) (NEW), R905.8.6

Proponent: David Roodvoets, DLR Consultants, representing Cedar Shake & Shingle Bureau

Revise as follows:

R703.5.1 Application. Wood shakes or shingles shall be installed according to this chapter and the manufacturer's installation instructions. Wood shakes or shingles shall be applied either single-course or double-course over nominal $\frac{1}{2}$ -inch (13 mm) wood-based sheathing or to furring strips over $\frac{1}{2}$ -inch (13 mm) nominal nonwood sheathing. A permeable water-resistive barrier shall be provided over all sheathing, with horizontal overlaps in the membrane of not less than 2 inches (51 mm) and vertical overlaps of not less than 6 inches (152 mm). Where furring strips are used, they shall be 1 inch by 3 inches or 1 inch by 4 inches (25 mm by 76 mm or 25 mm by 102 mm) and shall be fastened horizontally to the studs with 7d or 8d box nails and shall be spaced a distance on center equal to the actual weather exposure of the shakes or shingles, not to exceed the maximum exposure specified in Table R703.5.2. The spacing between adjacent shingles to allow for expansion shall ~~not exceed $\frac{1}{4}$ -inch (6 mm)~~ be $\frac{1}{8}$ inch (3 mm) to $\frac{1}{4}$ inch (6 mm) apart and between adjacent shakes, it shall ~~not exceed $\frac{1}{2}$ -inch (13 mm)~~ be $\frac{3}{8}$ inch (10 mm) to $\frac{1}{2}$ inch (13 mm) apart. The offset spacing between joints in adjacent courses shall be a minimum of $1\frac{1}{2}$ inches (38 mm).

TABLE R703.5.1(2)
SINGLE COURSE SIDEWALL FASTENERS

Product Type	Nail Type & Minimum Length
<u>R & R and Sanded Shingles</u>	<u>Type (in)</u>
<u>16" and 18" shingles</u>	<u>3d Box 1 $\frac{1}{4}$</u>
<u>24" Shingles</u>	<u>4d Box 1 $\frac{1}{2}$</u>
<u>Grooved Shingles</u>	<u>Type (in)</u>
<u>16" and 18" shingles</u>	<u>3d Box 1 $\frac{1}{4}$</u>
<u>24" shingles</u>	<u>4d Box 1 $\frac{1}{2}$</u>
<u>Split and Sawn Shakes</u>	<u>Type (in)</u>
<u>18" Straight-Split Shakes</u>	<u>5d Box 1 $\frac{3}{4}$</u>
<u>18" and 24" Handsplit Shakes</u>	<u>6d Box 2</u>
<u>24" Tapersplit Shakes</u>	<u>5d Box 1 $\frac{3}{4}$</u>
<u>18" and 24" Tapersawn Shakes</u>	<u>6d Box 2</u>

TABLE R703.5.1(3)
DOUBLE COURSE SIDEWALL FASTENERS

Product Type	Nail Type & Minimum Length
<u>R & R and Sanded Shingles</u>	<u>Type (in)</u>
<u>16" and 18" and 24" shingles</u>	<u>5d Box 1 $\frac{3}{4}$ or same size casing nails</u>
<u>Grooved Shingles</u>	<u>Type (in)</u>
<u>16" and 18" and 24" shingles</u>	<u>5d Box 1 $\frac{3}{4}$</u>
<u>Split and Sawn Shakes</u>	<u>Type (in)</u>
<u>18" Straight-Split Shakes</u>	<u>7d Box 2 $\frac{1}{4}$ or 8d 2 $\frac{1}{2}$</u>
<u>18" and 24" Handsplit Shakes</u>	<u>7d Box 2 $\frac{1}{4}$ or 8d 2 $\frac{1}{2}$</u>
<u>24" Tapersplit Shakes</u>	<u>7d Box 2 $\frac{1}{4}$ or 8d 2 $\frac{1}{2}$</u>
<u>18" and 24" Tapersawn Shakes</u>	<u>7d Box 2 $\frac{1}{4}$ or 8d 2 $\frac{1}{2}$</u>

TABLE R703.5.2
MAXIMUM WEATHER EXPOSURE FOR WOOD SHAKES AND SHINGLES ON EXTERIOR WALLS^{a,b,c}
(Dimensions are in inches)

LENGTH	EXPOSURE FOR SINGLE	EXPOSURE FOR DOUBLE
---------------	----------------------------	----------------------------

	COURSE	COURSE
Shingles ^a		
16	$7\frac{1}{2}$ 7	12 ^b
18	$8\frac{1}{2}$ 8	14 ^c
24	$11\frac{1}{2}$ 10 $\frac{1}{2}$	16 ^d
Shakes ^a		
18	$8\frac{1}{2}$ 8	14
24	$11\frac{1}{2}$ 10 $\frac{1}{2}$	18

For SI: 1 inch = 25.4 mm.

- Dimensions given are for No. 1 grade.
- A maximum 10-inch 9-inch exposure is permitted for No. 2 grade.
- A maximum 11-inch 10-inch exposure is permitted for No. 2 grade.
- A maximum 14-inch exposure is permitted for No. 2 grade.

R703.5.3 Attachment. Each shake or shingle shall be held in place by two hot-dipped zinc-coated, stainless steel, or aluminum nails or staples. The fasteners shall be long enough to penetrate the sheathing or furring strips by a minimum of $\frac{1}{2}$ -inch (13 mm) and shall not be overdriven.

703.5.3 Attachment. Wood shakes or shingles shall be installed according to this chapter and the manufacturer's installation instructions. Each shake or shingle shall be held in place by two- stainless steel Type 304 , Type 316 or hot-dipped zinc coated galvanized (conforming to minimum standard ASTM A 153 D (1.0 oz./ft²)) corrosion resistant box nails in accordance with Table R703.5.1(2) or R703.5.1 (3). Alternatively, 16 gauge stainless steel Type 304 or Type 316 staples with crown widths 7/16 inch (11 mm) minimum, $\frac{3}{4}$ inch (19 mm) maximum shall be used and the crown of the staple shall be placed parallel with the butt of the shake or the shingle. In single-course application, the fasteners shall be concealed by the course above and shall be driven approximately 1 inch (25 mm) above the butt line of the succeeding course and $\frac{3}{4}$ " (19 mm) from the edge. In double-course applications, the exposed shake or shingle shall be face-nailed with two fasteners, driven approximately 2 inches (51 mm) above the butt line and 3/4 inch (19 mm) from each edge. Fasteners installed within 15 miles 24 km) of salt water coastal areas shall be stainless steel Type 316. Fasteners for fire-retardant-treated in accordance with Section R902 or pressure-impregnated-preservative-treated shakes or shingles in accordance with AWP A U1 shall be, stainless steel Type 316. The fasteners shall be long enough to penetrate and shall penetrate the sheathing or furring strips by a minimum of $\frac{1}{2}$ inch (13mm) and shall not be overdriven. Fasteners for untreated (natural) and treated products shall comply with ASTM F1667.

R703.5.3.1 Staple attachment. Wood shakes or shingles shall be installed according to this chapter and the manufacturer's installation instructions. Staples for untreated (natural) wood shakes or wood shingles shall be 16 gauge Stainless Steel Type 304, Type 316 (Fasteners installed within 15 miles of salt water coastal areas shall be stainless steel Type 316.) Staples shall not be less than 16 gauge and shall have a crown width of not less than minimum 7/16 inch (11mm), maximum of $\frac{3}{4}$ " and the crown of the staples shall be parallel with the butt of the shake or shingle.

In single-course application, the fasteners shall be concealed by the course above and shall be driven approximately 1 inch (25mm) above the butt line of the succeeding course and $\frac{3}{4}$ " (19mm) from the edge. In double-course applications, the exposed shake or shingle shall be face-nailed with two casing nails staples, driven approximately 2 inches (51mm) above the butt line and 3/4" inch (19mm) from each edge. In all application, staples shall be concealed by the course above. With shingles wider than 810 inches (203254mm) two additional nails staples shall be required and shall be nailed driven approximately 1 inch (25mm) apart near the center of the shingle. Fasteners for fire-retardant-treated (as defined in section R902.2) shingles, shakes or pressure-impregnated-preservative-treated shingles or shakes in accordance with AWP A U1 shall be Stainless Steel Type 316, applied as above. Fasteners for untreated (natural) and treated products shall comply with ASTM F1667.

Revise as follows:

R905.7.5 Application. Wood shingles shall be installed according to this chapter and the manufacturer's installation instructions. Wood shingles shall be laid with a side lap not less than 1 $\frac{1}{2}$ " (38mm) between joints in courses, and no two joints in any three adjacent courses shall be in direct alignment. Spacing

between shingles shall not be less than ¼" to 3/8" (6mm to 10mm). Weather exposures for wood shingles shall not exceed those set in Table R905.7.5. Fasteners for untreated (naturally durable) wood shingles shall be corrosion resistant with a minimum penetration of ½ inch (13mm) into the sheathing. For sheathing less than ½ inch (13mm) in thickness, the fasteners shall extend through the sheathing. stainless steel Type 304, Type 316 or hot-dipped zinc coated galvanized (conforming to minimum standard ASTM A 153 D (1.0 oz./ft²)) box nails in accordance with table R905.7.5 (2). Alternatively, 16 gauge stainless steel Type 304, or Type 316 staples with crown widths 7/16" (11mm) minimum, ¾" (19 mm) maximum shall be used. Fasteners installed within 15 miles (24km) of salt water coastal areas shall be stainless steel Type 316. All fasteners shall have a minimum penetration into the sheathing of ¾ inch (19 mm). For roof sheathing less than ½" ¾" in (19 mm) thickness, each fastener shall extend penetrate through the sheathing. Wood shingles shall be attached to the roof with two fasteners per shingle positioned no more than ¾" from each edge and no more than 1 inch (25mm) above the exposure line. in accordance with the manufacturers installation instructions. Fasteners for fire-retardant-treated shingles in accordance with Section R902 or pressure-impregnated-preservative-treated shingles of naturally durable wood in accordance with AWP A U1 shall be stainless steel Type 316 and applied as above. Fasteners for untreated (natural) and treated products shall comply with ASTM F1667.

TABLE R905.7.5 (2)
NAIL REQUIREMENTS FOR WOOD SHAKES AND WOOD SHINGLES

<u>Shakes</u>	<u>ASTM F 1667 Nail Type and Minimum Length</u>
18" Straight-Split	5d Box 1 ¾"
18" and 24" Handsplit and Resawn	6d Box 2
24" Tapersplit	5d Box 1 ¾"
18" and 24" Tapersawn	6d Box 2
<u>Shingles</u>	<u>ASTM F 1667 Nail Type and Minimum Length</u>
16" and 18"	3d Box 1 ¼"
24"	4d Box 1 ½"

R905.8.6 Application. Wood shakes shall be installed according to this chapter and the manufacturer's installation instructions. Wood shakes shall be laid with a side lap not less than 1 ½" (38mm) between joints in adjacent courses. Spacing between shakes in the same course shall be 3/8 inch to 5/8 inch (9.5mm to 15.9mm) for shakes and including tapersawn shakes of naturally durable wood shall be 3/8 inch to 5/8 inch (9.5 mm to 15.9 mm) for preservative-treated taper sawn shakes. Weather exposures for wood shakes shall not exceed those set in Table R905.8.6. Fasteners for untreated (naturally durable) wood shakes shall be corrosion resistant with a minimum penetration of ½ inch (12.7mm) into the sheathing. For sheathing less than ½ inch (13mm) thick, the fasteners shall extend through the sheathing. stainless steel Type 304, Type 316 or hot-dipped zinc coated galvanized (conforming to minimum standard ASTM A 153 D (1.0 oz./ft²)) corrosion resistant box nails in accordance with Table R905.7.5.(2). Alternatively, 16 gauge Type 304 or Type 316 stainless steel staples, with crowns width 7/16" minimum, ¾" maximum shall be used. Fasteners installed within 15 miles (24 km) of salt water coastal areas shall be stainless steel Type 316. All fasteners shall have a minimum penetration into the sheathing of ¾" inch (19 mm). Where the roof is less than ¾" (19 mm) thick, each fastener shall penetrate through the sheathing. Wood shakes shall be attached to the roof with two fasteners per shake positioned no more than 1 inch (25mm) no more than 2 inches (25 mm) above the exposure line. in accordance with the manufacturer's installation instructions Fasteners for fire-retardant-treated (as defined in section R902) shakes or pressure-impregnated-preservative-treated shakes of naturally durable wood in accordance with AWP A U1 shall be stainless steel Type 316 and applied as above. Fasteners for untreated (natural) and treated products shall comply with ASTM F1667.

Reason: There are known cases of wood shakes and shingles falling off roofs due to the use of inferior fasteners and rather than waiting for these incidents to include wall applications it is a proactive measure to increase the specifics of the fasteners used. Specifying "corrosion resistant" is no longer sufficient; the type of fastener to be used is determined by various environmental factors and product types. Increased specifics will improve wall system integrity and lifespan.

Shakes and shingles shall not be applied with the vertical edges tight together as doing this does not leave room for expansion. Defining the spacing requirements further will eliminate this incorrect application method which causes fish-mouthing, cupping and curling.

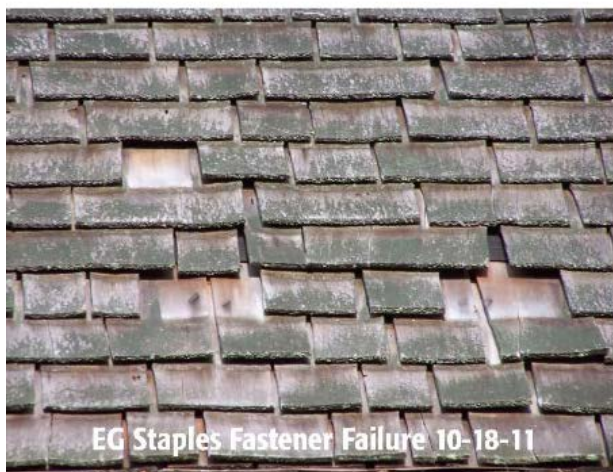
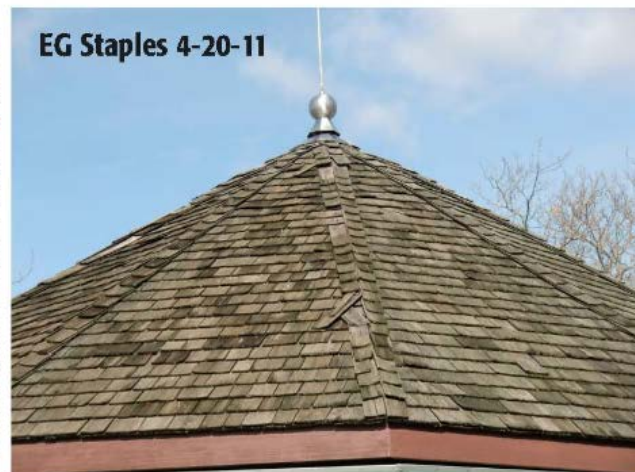
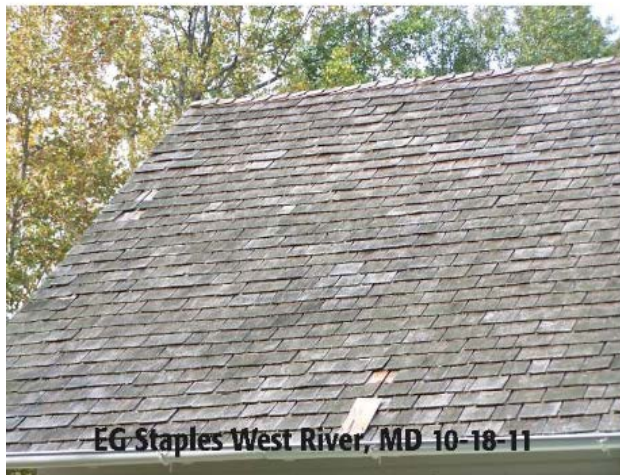
There are known cases of wood shakes and shingles falling off roofs due to the use of inferior fasteners. Specifying "corrosion resistant" is no longer sufficient; the type of fastener to be used is determined by various environmental factors and product type. Increased specifics will improve roof system integrity and lifespan.

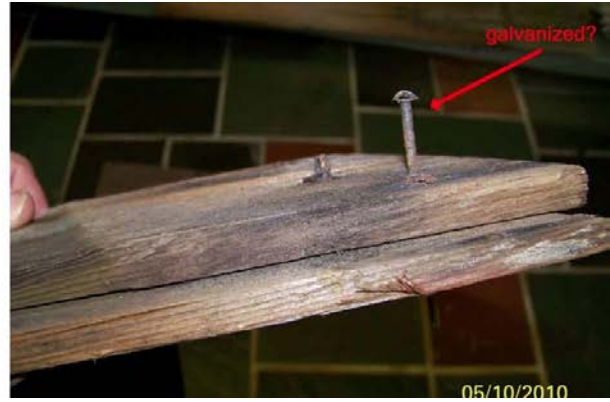
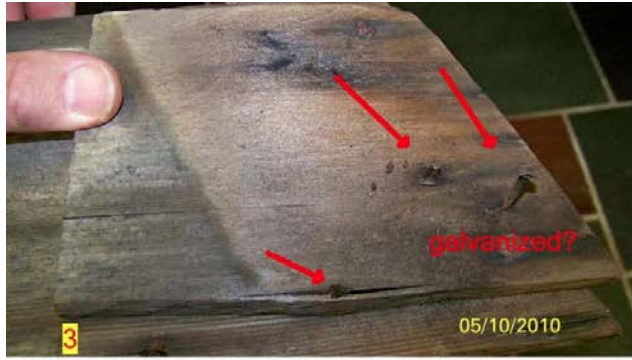
Penetration into sheathing more than $\frac{1}{2}$ " thick must be at minimum $\frac{3}{4}$ " or all the way through the sheathing in order to attach the product strongly enough to hold in place and prevent loosening of the fastener.

This change simplifies the code.

Following are examples of the failures that this code change is designed to prevent:

Shingles falling off buildings because of corroded fasteners or fasteners that did not adequately penetrate the substrate.





Cost Impact: The increased cost of these changes in comparison to the cost of the entire wall application is negligible.

RB369-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R703.5.1-RB-ROODVOETS.doc

RB370 – 13

R703.6.3. Chapter 44

Proponent: Theresa Weston, DuPont Building Innovations (Theresa.a.weston@usa.dupont.com)

Revise as follows:

R703.6.3 Water-resistive barriers. Water-resistive barriers shall be installed as required in Section R703.2 and, where applied over wood-based sheathing, shall include a water-resistive vapor-permeable barrier with a performance at least equivalent to two layers of ~~Grade D paper~~ water-resistive barrier complying with ASTM E 2556 Type I. The individual layers shall be installed independently such that each layer provides a separate continuous plane and any flashing (installed in accordance with Section R703.8) intended to drain to the water-resistive barrier is directed between the layers.

Exception: Where the water-resistive barrier that is applied over wood-based sheathing has a water resistance equal to or greater than that of ~~60 minute Grade D paper~~ a water-resistive barrier complying with ASTM E 2556 Type II and is separated from the stucco by an intervening, substantially nonwater-absorbing layer or designed drainage space.

Add new standard to Chapter 44 as follows:

ASTM

E 2556 Standard Specification for Vapor Permeable Flexible Sheet Water-Resistive Barriers Intended for Mechanical Attachment

Reason: The proposal updates the water-resistive barrier reference to the most recent consensus standard. ASTM E2556 includes housewrap materials, building papers and felt, instead of just building paper and therefore is more representative of the state of the industry. Within ASTM E2556 Grade D paper is a Type I WRB and 60 minute Grade D paper is a Type II WRB. ASTM E2556 is consistent with the current ICC-ES acceptance criteria for water-resistive barriers (AC-308) and therefore should not limit the use of current WRBs.

Cost Impact: This code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, ASTM E 2556 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

RB370-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R703.6.3-RB-WESTON.doc

RB371 – 13

R603.9.2, R603.9.5, Table R603.9.5(1) (NEW), Table R603.9.5(2) (NEW), Table R603.9.5(3) (NEW), Table R603.9.5(4), R603.9.5.1 (NEW), R603.9.5.2 (NEW), Table R703.7(2)

Proponent: J. Daniel Dolan, P.E., Ph.D., Washington State University, representing self (jddolan@wsu.edu)

Revise as follows:

TABLE R703.7(2)
STONE OR MASORY VENEER LIMITATIONS AND REQUIREMENTS,
ONE- AND TWO-FAMILY DETACHED DWELLINGS, ~~WOOD FRAMING~~, SEISMIC DESIGN
CATERGORIES D₀, D₁, AND D₂

SEISMIC DESIGN CATEGORY	NUMBER OF WOOD FRAMED STORIES ^a	MAXIMUM HEIGHT OF VENEER ABOVE NONCOMBUSTIBLE FOUNDATION OR WALL (feet)	MAXIMUM NOMINAL THICKNESS OF VENEER (inches)	MAXIMUM WEIGHT OF VENEER (psf) ^b
D ₀	1	20 ^c	4	40
	2	20 ^c	4	40
	3	30 ^d	4	40
D ₁	1	20 ^c	4	40
	2	20 ^c	4	40
	3	20 ^c	4	40
D ₂	1	20 ^c	3	30
	2	20 ^c	3	30

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.479 kPa, 1 pound-force = 4.448 N.

a. Cripple walls are not permitted in Seismic Design Categories D₀, D₁ and D₂.

b. Maximum weight is installed weight and includes weight of mortar, grout and lath, and other materials used for installation.

c. The veneer shall not exceed 20 feet in height above a noncombustible foundation, with an additional 8 feet permitted for gable end walls, or 30 feet in height with an additional 8 feet for gable end walls where the lower 10 feet has a backing of concrete or masonry wall. See also story height limitations of Section R301.3.

d. The veneer shall not exceed 30 feet in height above a noncombustible foundation, with an additional 8 feet permitted for gable end walls. See also story height limitations of Section R301.3.

R603.9.2 Determination of minimum length of full height sheathing. The minimum length of full height sheathing on each *braced wall line* shall be determined by multiplying the length of the *braced wall line* by the percentage obtained from Table R603.9.2(1) and by the plan aspect-ratio adjustment factors obtained from Table R603.9.2(2). The minimum length of full height sheathing shall not be less than 20 percent of the *braced wall line* length.

To be considered full height sheathing, structural sheathing shall extend from the bottom to the top of the wall without interruption by openings. Only sheathed, full height wall sections, uninterrupted by openings, which are a minimum of 48 inches (1219 mm) wide, shall be counted toward meeting the minimum percentages in Table R603.9.2(1). In addition, structural sheathing shall comply with all of the following requirements:

1. Be installed with the long dimension parallel to the stud framing (i.e., vertical orientation) and shall cover the full vertical height of wall from the bottom of the bottom track to the top of the top track of each story. Installing the long dimension perpendicular to the stud framing or using shorter segments shall be permitted provided that the horizontal joint is blocked as described in Item 2.
2. Be blocked when the long dimension is installed perpendicular to the stud framing (i.e., horizontal orientation). Blocking shall be a minimum of 33 mil (0.84 mm) thickness. Each horizontal

structural sheathing panel shall be fastened with No. 8 screws spaced at 6 inches (152 mm) on center to the blocking at the joint.

3. Be applied to each end (corners) of each of the exterior walls with a minimum 48-inch-wide (1219 mm) panel.

Exception: When stone or masonry veneer is installed, the required length of length of full-height sheathing and overturning anchorage required shall be determined in accordance with Section R603.9.5.

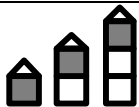



R603.9.5 Structural sheathing for stone and masonry veneer. In Seismic Design Category C, where stone and masonry veneer is installed in accordance with Section R703.7, the length of structural sheathing for walls supporting one story, roof and ceiling shall be the greater of the amount required by Section R603.9.2 or 36 percent, modified by Section R603.9.2 except Section R603.9.2.2 shall not be permitted.

R603.9.5 Structural sheathing for stone and masonry veneer. Where stone and masonry veneer are installed in accordance with Section R703.7, the length of full-height sheathing for exterior and interior wall lines backing or perpendicular to and laterally supporting walls with veneer shall comply with this section.

R603.9.5.1 Seismic Design Category C. In Seismic Design Category C, the length of structural sheathing for walls supporting one story, roof and ceiling shall be the greater of the amount required by Section R603.9.2, except Section R603.9.2.2 shall be permitted.

R603.9.5.2 Seismic Design Categories D₀, D₁, and D₂. In Seismic Design Categories D₀, D₁, and D₂, The required length of structural sheathing and overturning anchorage shall be determined in accordance with Tables R603.9.5(1), R603.9.5(2), R603.9.5(3), and R603.9.5(4). Overturning anchorage shall be installed on the doubled studs at the end of each full height wall segment.

TABLE R603.9.5(1)
REQUIRED LENGTH OF FULL HEIGHT SHEATHING AND ASSOCIATED OVERTURNING
ANCHORAGE FOR WALLS SUPPORTING WALLS WITH STONE OR MASONRY VENEER AND
USING 33-MIL COLD-FORMED STEEL FRAMING AND 6-INCH SCREW SPACING ON THE
PERIMETER OF EACH PANEL OF STRUCTURAL SHEATHING

SEISMIC DESIGN CATEGORY	STORY	BRACED WALL LINE LENGTH (FEET)						SINGLE- STORY HOLD- DOWN FORCE (pounds)	CUMMULATIVE HOLD-DOWN FORCE (pounds)
		10	20	30	40	50	60		
		MINIMUM TOTAL LENGTH (FEET) OF BRACED WALL PANELS REQUIRED ALONG EACH BRACED WALL LINE							
D ₀		<u>3.3</u>	<u>4.7</u>	<u>6.1</u>	<u>7.4</u>	<u>8.8</u>	<u>10.2</u>	<u>3,360</u>	--
		<u>5.3</u>	<u>8.7</u>	<u>12.1</u>	<u>15.4</u>	<u>18.8</u>	<u>22.2</u>	<u>3,360</u>	<u>6,720</u>
		<u>7.3</u>	<u>12.7</u>	<u>18.0</u>	<u>23.4</u>	<u>28.8</u>	<u>34.2</u>	<u>3,360</u>	<u>10,080</u>
D ₁		<u>4.1</u>	<u>5.8</u>	<u>7.5</u>	<u>9.2</u>	<u>10.9</u>	<u>12.7</u>	<u>3,360</u>	--

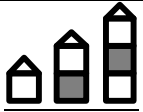




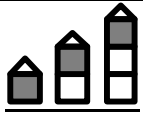






		<u>6.6</u>	<u>10.7</u>	<u>14.9</u>	<u>19.1</u>	<u>23.3</u>	<u>27.5</u>	<u>3,360</u>	<u>6,720</u>
		<u>9/0</u>	<u>15.7</u>	<u>22.4</u>	<u>29.0</u>	<u>35.7</u>	<u>42.2</u>	<u>3,360</u>	<u>10,080</u>
<u>D₂</u>		<u>5.7</u>	<u>8.2</u>	<u>10.6</u>	<u>13.0</u>	<u>15.4</u>	<u>17.8</u>	<u>3,360</u>	--
		<u>9.2</u>	<u>15.1</u>	<u>21.1</u>	<u>27.0</u>	<u>32.9</u>	<u>38.8</u>	<u>3,360</u>	<u>6,720</u>
		<u>12.7</u>	<u>22.1</u>	<u>31.5</u>	<u>40.9</u>	<u>50.3</u>	<u>59.7</u>	<u>3,360</u>	<u>10,080</u>

TABLE R603.9.5(2)
REQUIRED LENGTH OF FULL HEIGHT SHEATHING AND ASSOCIATED OVERTURNING
ANCHORAGE FOR WALLS SUPPORTING WALLS WITH STONE OR MASONRY VENEER AND
USING 43-MIL COLD-FORMED STEEL FRAMING AND 6-INCH SCREW SPACING ON THE
PERIMETER OF EACH PANEL OF STRUCTURAL SHEATHING

SEISMIC DESIGN CATEGORY	STORY	BRACED WALL LINE LENGTH (FEET)						SINGLE- STORY HOLD- DOWN FORCE (pounds)	CUMMULATIVE HOLD-DOWN FORCE (pounds)
		10	20	30	40	50	60		
		MINIMUM TOTAL LENGTH (FEET) OF BRACED WALL PANELS REQUIRED ALONG EACH BRACED WALL LINE							
D ₀		<u>2.8</u>	<u>4.0</u>	<u>5.1</u>	<u>6.3</u>	<u>7.5</u>	<u>8.7</u>	<u>3,960</u>	--
		<u>4.5</u>	<u>7.4</u>	<u>10.2</u>	<u>13.1</u>	<u>16.0</u>	<u>18.8</u>	<u>3,960</u>	<u>7,920</u>
		<u>6.2</u>	<u>10.7</u>	<u>15.3</u>	<u>19.9</u>	<u>24.4</u>	<u>29.0</u>	<u>3,960</u>	<u>11,880</u>
D ₁		<u>3.5</u>	<u>4.9</u>	<u>6.4</u>	<u>7.8</u>	<u>9.3</u>	<u>10.7</u>	<u>3,960</u>	--
		<u>5.6</u>	<u>9.1</u>	<u>12.7</u>	<u>16.2</u>	<u>19.8</u>	<u>23.3</u>	<u>3,960</u>	<u>7,920</u>
		<u>7.7</u>	<u>13.3</u>	<u>19.0</u>	<u>24.6</u>	<u>30.3</u>	<u>35.9</u>	<u>3,960</u>	<u>11,880</u>
D ₂		<u>4.9</u>	<u>6.9</u>	<u>9.0</u>	<u>11.0</u>	<u>13.1</u>	<u>15.1</u>	<u>3,960</u>	--



		<u>7.8</u>	<u>12.9</u>	<u>17.9</u>	<u>22.9</u>	<u>27.9</u>	<u>32.9</u>	<u>3,960</u>	<u>7,920</u>
		<u>10.8</u>	<u>18.8</u>	<u>26.7</u>	<u>34.7</u>	<u>42.7</u>	<u>50.7</u>	<u>3,960</u>	<u>11,880</u>

TABLE R603.9.5(3)
REQUIRED LENGTH OF FULL HEIGHT SHEATHING AND ASSOCIATED OVERTURNING
ANCHORAGE FOR WALLS SUPPORTING WALLS WITH STONE OR MASONRY VENEER AND
USING 33-MIL COLD-FORMED STEEL FRAMING AND 4-INCH SCREW SPACING ON THE
PERIMETER OF EACH PANEL OF STRUCTURAL SHEATHING







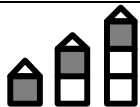


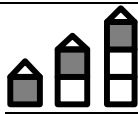


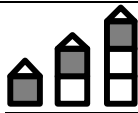


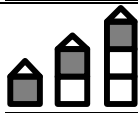


SEISMIC DESIGN CATEGORY	STORY	BRACED WALL LINE LENGTH (FEET)						SINGLE- STORY HOLD- DOWN FORCE (pounds)	CUMMULATIVE HOLD-DOWN FORCE (pounds)
		10	20	30	40	50	60		
		MINIMUM TOTAL LENGTH (FEET) OF BRACED WALL PANELS REQUIRED ALONG EACH BRACED WALL LINE							
D ₀		<u>2.5</u>	<u>3.6</u>	<u>4.6</u>	<u>5.7</u>	<u>6.8</u>	<u>7.8</u>	<u>4,392</u>	--
		<u>4.0</u>	<u>6.6</u>	<u>9.2</u>	<u>11.8</u>	<u>14.4</u>	<u>17.0</u>	<u>4,392</u>	<u>8,784</u>
		<u>5.6</u>	<u>9.7</u>	<u>13.8</u>	<u>17.9</u>	<u>22.0</u>	<u>26.2</u>	<u>4,392</u>	<u>13,176</u>
D ₁		<u>3.1</u>	<u>4.4</u>	<u>5.7</u>	<u>7.1</u>	<u>8.4</u>	<u>9.7</u>	<u>4,392</u>	--
		<u>5.0</u>	<u>8.2</u>	<u>11.4</u>	<u>14.6</u>	<u>17.8</u>	<u>21.0</u>	<u>4,392</u>	<u>8,784</u>
		<u>6.9</u>	<u>12.0</u>	<u>17.1</u>	<u>22.2</u>	<u>27.3</u>	<u>32.4</u>	<u>4,392</u>	<u>13,176</u>
D ₂		<u>4.4</u>	<u>6.2</u>	<u>8.1</u>	<u>10.0</u>	<u>11.8</u>	<u>13.7</u>	<u>4,392</u>	--
		<u>7.1</u>	<u>11.6</u>	<u>16.1</u>	<u>20.6</u>	<u>25.1</u>	<u>29.7</u>	<u>4,392</u>	<u>8,784</u>
		<u>9.7</u>	<u>16.9</u>	<u>24.1</u>	<u>31.3</u>	<u>38.5</u>	<u>45.7</u>	<u>4,392</u>	<u>13,176</u>

TABLE R603.9.5(4)
REQUIRED LENGTH OF FULL HEIGHT SHEATHING AND ASSOCIATED OVERTURNING
ANCHORAGE FOR WALLS SUPPORTING WALLS WITH STONE OR MASONRY VENEER AND
USING 43-MIL COLD-FORMED STEEL FRAMING AND 4-INCH SCREW SPACING ON THE
PERIMETER OF EACH PANEL OF STRUCTURAL SHEATHING

SEISMIC DESIGN CATEGORY	STORY	BRACED WALL LINE LENGTH (FEET)						SINGLE- STORY HOLD- DOWN FORCE (pounds)	CUMMULATIVE HOLD-DOWN FORCE (pounds)
		10	20	30	40	50	60		
		MINIMUM TOTAL LENGTH (FEET) OF BRACED WALL PANELS REQUIRED ALONG EACH BRACED WALL LINE							
D ₀		<u>1.9</u>	<u>2.7</u>	<u>3.4</u>	<u>4.2</u>	<u>5.0</u>	<u>5.8</u>	<u>5,928</u>	--
		<u>3.0</u>	<u>4.9</u>	<u>6.8</u>	<u>8.8</u>	<u>10.7</u>	<u>12.6</u>	<u>5,928</u>	<u>11,856</u>
		<u>4.1</u>	<u>7.2</u>	<u>10.2</u>	<u>13.3</u>	<u>16.3</u>	<u>19.4</u>	<u>5,928</u>	<u>17,784</u>
D ₁		<u>2.3</u>	<u>3.3</u>	<u>4.3</u>	<u>5.2</u>	<u>6.2</u>	<u>7.2</u>	<u>5,928</u>	--
		<u>3.7</u>	<u>6.1</u>	<u>8.5</u>	<u>10.8</u>	<u>13.2</u>	<u>15.6</u>	<u>5,928</u>	<u>11,856</u>
		<u>5.1</u>	<u>8.9</u>	<u>12.7</u>	<u>16.5</u>	<u>20.2</u>	<u>24.0</u>	<u>5,928</u>	<u>17,784</u>
D ₂		<u>3.3</u>	<u>4.6</u>	<u>6.0</u>	<u>7.4</u>	<u>8.7</u>	<u>10.1</u>	<u>5,928</u>	--
		<u>5.2</u>	<u>8.6</u>	<u>11.9</u>	<u>15.3</u>	<u>18.6</u>	<u>22.0</u>	<u>5,928</u>	<u>11,856</u>
		<u>7.2</u>	<u>12.5</u>	<u>17.9</u>	<u>23.2</u>	<u>28.5</u>	<u>33.8</u>	<u>5,928</u>	<u>17,784</u>

Reason: The original provisions for anchoring masonry chimneys to residential buildings were developed with the concept of anchoring to wood framing. Cold-formed steel framing can function equivalently in this respect to wood framing, except that the connections between the members, and possibly the size of the members, have to be adjusted for the different types of fasteners used and to prevent the failure mechanisms in steel from occurring.

Table R703.7(2): The table regulating the number of stories that masonry veneer can be used on in the three high seismic zones is changed from specifying wood only to allow cold-formed steel to be used in the same situations. The subsequent parts of the code change provide the required framing detailing changes (i.e. overturning connections) to support the forces generated by the masonry during an earthquake.

R603.9.2: An exception to the method for determining the length of full height sheathing is required to increase the length required to account for the increased lateral loads associated with the increase in mass of the masonry veneer. The exception is

simply a pointer to a revised section that provides the correct lengths for each of the Seismic Design Categories associated with high seismic regions.

R603.9.5: This part of the change is the real significant change required to insure that cold-formed steel framing can resist the higher lateral loads associated with the use of masonry in high seismic regions. The values in the four tables are based on the allowable design values provided in the AISI S213-07 wS1-09, *North American Standard for Cold-Formed Steel Framing -- Lateral Design*, in Table C2.1-3 for 33 mil and 43 mil stud thicknesses and 6-inch and 4-inch screw spacing around the perimeter. The assumption of uniform acceleration with respect to height as is allowed by ASCE 7-10 for the simplified method of seismic analysis was used. The maximum acceleration for each seismic zone was used for each seismic design category. It is assumed that the in-line framing concept of cold-formed steel light-frame construction provides the continuous load path required to transfer the overturning loads to the foundation.

Similar assumptions to those made for determining overturning anchorage requirements to those made for wood framing were made for these calculations. The assumptions concerning building configuration included 1) the walls have 20% of the area as door and window openings, 2) the masonry seismic weight that contributed to the lateral forces only included the wall veneer perpendicular to the direction of analysis (i.e., the masonry veneer would support its own seismic weight when loaded in plane.), 3) the story height for each floor was 10 ft., and 4) all of the masonry was 4-inch thick clay masonry for 40 psf dead load.

Cost Impact: This change will increase the cost of construction if stone masonry veneer is used in high seismic regions because it was not previously allowed. However, the increased cost is associated with allowing the option to use stone and masonry veneer in these regions where it is currently not allowed.

RB371-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

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RB372 – 13

R301.2.2.2.1, R301.2.2.2.2, R301.2.2.3.2, Table R301.7, Table R403.1, Table R403.4, R404.1.5.1, R404.1.5.2, R602.10.3, Table R602.10.3(4), Table R602.10.4, R602.10.6.5, Figure R602.10.6.5, R603.9.5, R703.7, Figure R703.7, Table R703.7(1), Table R703.7(2), R703.7.2, R703.7.2.1, Figure R703.7.2.1, R703.7.2.2, Figure R703.7.2.2, R703.7.3, Table R703.7.3.1, R703.7.3.2, Table R703.7.3.2, Figure R703.7.3.2, R703.7.4, R703.7.5

Proponent: Charles Clark, Brick Industry Association representing Masonry Alliance for Codes and Standards (cclark@bia.org)

Revise as follows:

R301.2.2.2.1 Weights of materials. Average dead loads shall not exceed 15 pounds per square foot (720 Pa) for the combined roof and ceiling assemblies (on a horizontal projection) or 10 pounds per square foot (480 Pa) for floor assemblies, except as further limited by Section R301.2.2. Dead loads for walls above *grade* shall not exceed:

1. Fifteen pounds per square foot (720 Pa) for exterior light-frame wood walls.
2. Fourteen pounds per square foot (670 Pa) for exterior light-frame cold-formed steel walls.
3. Ten pounds per square foot (480 Pa) for interior light-frame wood walls.
4. Five pounds per square foot (240 Pa) for interior light-frame cold-formed steel walls.
5. Eighty pounds per square foot (3830 Pa) for 8-inch-thick (203 mm) masonry walls.
6. Eighty-five pounds per square foot (4070 Pa) for 6-inch-thick (152 mm) concrete walls.
7. Ten pounds per square foot (480 Pa) for SIP walls.

Exceptions:

1. Roof and ceiling dead loads not exceeding 25 pounds per square foot (1190 Pa) shall be permitted provided the wall bracing amounts in Chapter 6 are increased in accordance with Table R301.2.2.2.1.
2. Light-frame walls with anchored stone or masonry veneer shall be permitted in accordance with the provisions of Sections R702.1 and R703.

R301.2.2.2.2 Anchored stone and masonry veneer. Anchored stone and masonry veneer shall comply with the requirements of Sections R702.1 and R703.

R301.2.2.3.2 Anchored stone and masonry veneer. Anchored stone and masonry veneer shall comply with the requirements of Sections R702.1 and R703.

TABLE R301.7
ALLOWABLE DEFLECTION OF STRUCTURAL MEMBERS^{b, c}

STRUCTURAL MEMBER	ALLOWABLE DEFLECTION
Rafters having slopes greater than 3:12 with no finished ceiling attached to rafters	$L/180$
Interior walls and partitions	$H/180$
Floors/ ceilings with plaster or stucco finish	$L/360$
All other structural members	$L/240$

Exterior walls—wind loads ^a with plaster or stucco finish	$H/360$
Exterior walls with other brittle finishes	$H/240$
Exterior walls with flexible finishes	$H/120^d$
Lintels supporting <u>anchored stone or masonry veneer walls</u> ^e	$L/600$

Note: L = span length, H = span height.

- The wind load shall be permitted to be taken as 0.7 times the Component and Cladding loads for the purpose of the determining deflection limits herein.
- For cantilever members, L shall be taken as twice the length of the cantilever.
- For aluminum structural members or panels used in roofs or walls of sunroom additions or patio covers, not supporting edge of glass or sandwich panels, the total load deflection shall not exceed $L/60$. For continuous aluminum structural members supporting edge of glass, the total load deflection shall not exceed $L/175$ for each glass lite or $L/60$ for the entire length of the member, whichever is more stringent. For sandwich panels used in roofs or walls of sunroom additions or patio covers, the total load deflection shall not exceed $L/120$.
- Deflection for exterior walls with interior gypsum board finish shall be limited to an allowable deflection of $H/180$.
- Refer to Section R703.7.2 R703.7.3.

**TABLE R403.1
MINIMUM WIDTH OF CONCRETE,
PRECAST OR MASONRY FOOTINGS (inches)^a**

	LOAD-BEARING VALUE OF SOIL (psf)			
	1,500	2,000	3,000	³ 4,000
Conventional light-frame construction				
1-story	12	12	12	12
2-story	15	12	12	12
3-story	23	17	12	12
4-inch brick anchored stone or masonry veneer over light frame or 8-inch hollow concrete masonry				
1-story	12	12	12	12
2-story	21	16	12	12
3-story	32	24	16	12
8-inch solid or fully grouted masonry				
1-story	16	12	12	12
2-story	29	21	14	12
3-story	42	32	21	16

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

- Where minimum footing width is 12 inches, use of a single wythe of solid or fully grouted 12-inch nominal concrete masonry units is permitted.

**TABLE R403.4
MINIMUM DEPTH OF CRUSHED STONE FOOTINGS (D), (inches)**

	LOAD-BEARING VALUE OF SOIL (psf)
--	----------------------------------

		1500				2000				3000				4000			
		MH, CH, CL, ML				SC, GC, SM, GM, SP, SW				GP, GW							
		Wall width (inches)				Wall width (inches)				Wall width (inches)				Wall width (inches)			
		6	8	10	12	6	8	10	12	6	8	10	12	6	8	10	12
Conventional light-frame construction																	
1-story	1100 plf	6	4	4	4	6	4	4	4	6	4	4	4	6	4	4	4
2-story	1800 plf	8	6	4	4	6	4	4	4	6	4	4	4	6	4	4	4
3-story	2900 plf	16	14	12	10	10	8	6	6	6	4	4	4	6	4	4	4
4-inch brick anchored stone or masonry veneer over light-frame or 8-inch hollow concrete masonry																	
1-story	1500 plf	6	4	4	4	6	4	4	4	6	4	4	4	6	4	4	4
2-story	2700 plf	14	12	10	8	10	8	6	4	6	4	4	4	6	4	4	4
3-story	4000 plf	22	22	20	18	16	14	12	10	10	8	6	4	6	4	4	4
8-inch solid or fully grouted masonry																	
1-story	2000 plf	10	8	6	4	6	4	4	4	6	4	4	4	6	4	4	4
2-story	3600 plf	20	18	16	16	14	12	10	8	8	6	4	4	6	4	4	4
3-story	5300 plf	32	30	28	26	22	22	20	18	14	12	10	8	10	8	6	4

For SI: 1 inch = 25.4 mm, 1 pound per square inch = 6.89 pounds per linear foot, 1 plf = 2.44 N/m, 1 pounds per square foot = 47.9 N/m².

R404.1.5.1 Masonry wall thickness. Masonry foundation walls shall not be less than the thickness of the wall supported, except that masonry foundation walls of at least 8-inch (203 mm) nominal thickness shall be permitted under ~~brick veneered light-frame walls~~ with an anchored stone or masonry veneer and under 10-inch-wide (254 mm) cavity walls where the total height of the wall supported, including gables, is not more than 20 feet (6096 mm), provided the requirements of Section R404.1.1 are met.

R404.1.5.2 Concrete wall thickness. The thickness of concrete foundation walls shall be equal to or greater than the thickness of the wall in the *story* above. Concrete foundation walls with corbels, brackets or other projections built into the wall for support of anchored stone or masonry veneer or other purposes are not within the scope of the tables in this section. Where a concrete foundation wall is reduced in thickness to provide a shelf for the support of anchored stone or masonry veneer, the reduced thickness shall be equal to or greater than the thickness of the wall in the *story* above. Vertical reinforcement for the foundation wall shall be based on Table R404.1.2(8) and located in the wall as required by Section R404.1.2.3.7.2 where that table is used. Vertical reinforcement shall be based on the thickness of the thinner portion of the wall.

Revise as follows:

R602.10.3 Required length of bracing. The required length of bracing along each *braced wall line* shall be determined as follows.


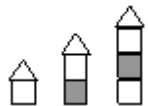

- 1 All buildings in Seismic Design Categories A and B shall use Table R602.10.3(1) and the applicable adjustment factors in Table R602.10.3(2).
- 2 Detached buildings in Seismic Design Category C shall use Table R602.10.3(1) and the applicable adjustment factors in Table R602.10.3(2).
- 3 Townhouses in Seismic Design Category C shall use the greater value determined from Table R602.10.3(1) or R602.10.3(3) and the applicable adjustment factors in Table R602.10.3(2) or R602.10.3(4) respectively.

4. All buildings in Seismic Design Categories D0, D1 and D2 shall use the greater value determined from Table R602.10.3(1) or R602.10.3(3) and the applicable adjustment factors in Table R602.10.3(2) or R602.10.3(4) respectively.

Only *braced wall panels* parallel to the *braced wall line* shall contribute toward the required length of bracing of that *braced wall line*. *Braced wall panels* along an angled wall meeting the minimum length requirements of Tables R602.10.5 and R602.10.5.2 shall be permitted to contribute its projected length toward the minimum required length of bracing for the *braced wall line* as shown in Figure R602.10.1.4. Any *braced wall panel* on an angled wall at the end of a *braced wall line* shall contribute its projected length for only one of the *braced wall lines* at the projected corner.

Exception: The length of wall bracing for dwellings in Seismic Design Categories D0, D1 and D2 with anchored stone or masonry veneer installed per Section R703.7 and exceeding the first-story height shall be in accordance with Section R602.10.6.5.

TABLE R602.10.3(4)
SEISMIC ADJUSTMENT FACTORS TO THE REQUIRED LENGTH OF WALL BRACING





ADJUSTMENT BASED ON:	STORY/SUPPORTING	CONDITION	ADJUSTMENT FACTOR ^{a, b} [Multiply length from Table R602.10.3(3) by this factor]	APPLICABLE METHODS
Story height (Section 301.3)	Any story	£ 10 feet > 10 feet and £ 12 feet	1.0 1.2	All methods
Braced wall line spacing, townhouses in SDC C	Any story	£ 35 feet > 35 feet and £ 50 feet	1.0 1.43	
Braced wall line spacing, in SDC D0, D1, D2 ^c	Any story	> 25 feet and £ 30 feet > 30 feet and £ 35 feet	1.2 1.4	
Wall dead load	Any story	> 8 psf and < 15 psf < 8 psf	1.0 0.85	
Roof/ceiling dead load for wall supporting	Roof only or roof plus one or two stories	£15 psf	1.0	
	Roof plus one or two stories	> 15 psf and £ 25 psf	1.1	
	Roof only	> 15 psf and £ 25 psf	1.2	
Walls with <u>anchored</u> stone or masonry veneer, townhouses in SDC C ^{d, e}		1.0		All intermittent and continuous methods
		1.5		
		1.5		



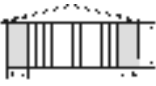
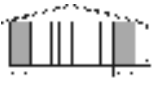


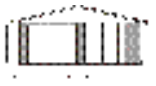




Walls with <u>anchored</u> stone or masonry veneer, detached one- and two-family dwellings in SDC D ₀ – D ₂ ^d	Any story	See Table R602.10.6.5	BV-WSP
Interior gypsum board finish (or equivalent)	Any story	Omitted from inside face of braced wall panels	1.5
			DWB, WSP, SFB, PBS, PCP, HPS, CS-WSP, CS-G, CS-SFB

For SI: 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

- Linear interpolation shall be permitted.
- The total length of bracing required for a given wall line is the product of all applicable adjustment factors.
- The length-to-width ratio for the floor/roof *diaphragm* shall not exceed 3:1. The top plate lap splice nailing shall be a minimum of 12-16d nails on each side of the splice.
- Applies to anchored stone or masonry veneer exceeding the first story height. See Section R602.10.6.5 for requirements when anchored stone or masonry veneer does not exceed the first story height.
- The adjustment factor for anchored stone or masonry veneer shall be applied to all exterior *braced wall lines* and all *braced wall lines* on the interior of the building, backing or perpendicular to and laterally supported veneered walls supporting anchored stoen or masonry veneer.

**TABLE R602.10.4
BRACING METHODS**

METHODS, MATERIAL		MINIMUM THICKNESS	FIGURE	CONNECTION CRITERIA ^a	
				Fasteners	Spacing
Intermittent Bracing Method	LIB Let-in-bracing	1 × 4 wood or approved metal straps at 45° to 60° angles for maximum 16 ² stud spacing		Wood: 2-8d common nails or 3-8d (2½" long x 0.113" dia.) nails	Wood: per stud and top and bottom plates
				Metal strap: per manufacturer	Metal: per manufacturer
	DWB Diagonal wood boards	¾"(1" nominal) for maximum 24" stud spacing		2-8d (2½" long x 0.113" dia.) nails or 2 - 1¾" long staples	Per stud
	WSP Wood structural panel (See Section R604)	¾"		Exterior sheathing per Table R602.3(3)	6" edges 12" field
				Interior sheathing per Table R602.3(1) or R602.3(2)	Varies by fastener
	BV-WSP^e Wood Structural Panels with <u>Anchored</u> Stone or Masonry Veneer (See Section R602.10.6.5)	7/16"	See Figure R602.10.6.5	8d common (2½" x 0.131) nails	4" at panel edges 12" at intermediate supports 4" at braced wall panel end posts
	SFB Structural fiberboard sheathing	½" or 25/32" for maximum 16" stud spacing		1½" long x 0.12" dia. (for ½" thick sheathing) 1¾" long x 0.12" dia. (for 25/32" thick sheathing) galvanized roofing nails or 8d common (2½" long x 0.131" dia.) nails	3" edges 6" field

	GB Gypsum board	$1/2"$		Nails or screws per Table R602.3(1) for exterior locations Nails or screws per Table R702.3.5 for interior locations	For all braced wall panel locations: 7" edges (including top and bottom plates) 7" field
	PBS Particleboard sheathing (See Section R605)	$3/8"$ or $1/2"$ for maximum 16" stud spacing		For $3/8"$, 6d common (2" long x 0.113" dia.) nails For $1/2"$, 8d common (2 1/2" long x 0.131" dia.) nails	3" edges 6" field
	PCP Portland cement plaster	See Section R703.6 for maximum 16" stud spacing		$1 1/2"$ long, 11 gage, $7/16"$ dia. head nails or $7/8"$ long, 16 gage staples	6" o.c. on all framing members
	HPS Hardboard panel siding	$7/16"$ for maximum 16" stud spacing		0.092" dia., 0.225" dia. head nails with length to accommodate $1 1/2"$ penetration into studs	4" edges 8" field
	ABW Alternate braced wall	$3/8"$		See Section R602.10.6.1	See Section R602.10.6.1
Intermittent Bracing Methods	PFH Portal frame with hold-downs	$3/8"$		See Section R602.10.6.2	See Section R602.10.6.2
	PFG Portal frame at garage	$7/16"$		See Section R602.10.6.3	See Section R602.10.6.3
Continuous Sheathing Methods	CS-WSP Continuously sheathed wood structural panel	$3/8"$		Exterior sheathing per Table R602.3(3) Interior sheathing per Table R602.3(1) or R602.3(2)	6" edges 12" field Varies by fastener
	CS-G^{b, c} Continuously sheathed wood structural panel adjacent to garage openings	$3/8"$		See Method CS-WSP	See Method CS-WSP
	CS-PF Continuously sheathed portal frame	$7/16"$		See Section R602.10.6.4	See Section R602.10.6.4
	CS-SFB^d Continuously sheathed structural fiberboard	$1/2"$ or $25/32"$ for maximum 16" stud spacing		$1 1/2"$ long x 0.12" dia. (for $1/2"$ thick sheathing) $1 3/4"$ long x 0.12" dia. (for $25/32"$ thick sheathing) galvanized roofing nails or 8d common (2 1/2" long x 0.131" dia.) nails	3" edges 6" field

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 degree = 0.0175 rad, 1 pound per square foot = 47.8 N/m², 1 mile per hour = 0.447 m/s.

- a. Adhesive attachment of wall sheathing, including Method GB, shall not be permitted in Seismic Design Categories C, D₀, D₁ and D₂.
- b. Applies to panels next to garage door opening when supporting gable end wall or roof load only. May only be used on one wall of the garage. In Seismic Design Categories D₀, D₁ and D₂, roof covering dead load may not exceed 3 psf.
- c. Garage openings adjacent to a Method CS-G panel shall be provided with a header in accordance with Table R502.5(1). A full height clear opening shall not be permitted adjacent to a Method CS-G panel.
- d. Method CS-SFB does not apply in Seismic Design Categories D₀, D₁ and D₂ and in areas where the wind speed exceeds 100 mph.
- e. Method applies to detached one- and two-family dwellings in Seismic Design Categories D₀ through D₂ only.

R602.10.6.5 Wall bracing for dwellings with anchored stone and masonry veneer in Seismic Design Categories D0, D1 and D2. Where anchored stone and masonry veneer are installed in accordance with Section R703.7, wall bracing on exterior *braced wall lines* and *braced wall lines* on the interior of the building, backing or perpendicular to and laterally supporting anchored stone or masonry veneer ~~veneered walls~~ shall comply with this section. Where dwellings in Seismic Design Categories D0, D1 and D2 have anchored stone or masonry veneer installed in accordance with Section R703.7, and the veneer does not exceed the first-story height, wall bracing shall be in accordance with Section R602.10.3. Where detached one- or two-family dwellings in Seismic Design Categories D0, D1 and D2 have anchored stone or masonry veneer installed in accordance with Section R703.7, and the veneer exceeds the first-story height, wall bracing at exterior *braced wall lines* and *braced wall lines* on the interior of the building shall be constructed using Method BV-WSP in accordance with this section and Figure R602.10.6.5. Cripple walls shall not be permitted, and required interior *braced wall lines* shall be supported on continuous foundations. Townhouses in Seismic Design Categories D0, D1 and D2 with anchored stone or masonry veneer exceeding the first-story height shall be designed in accordance with accepted engineering practice.

FIGURE R602.10.6.5
METHOD BV-WSP—WALL BRACING FOR DWELLINGS WITH ANCHORED STONE AND MASONRY VENEER IN SEISMIC DESIGN CATEGORIES D0, D1 and D2

(No change to figure)

R603.9.5 Structural sheathing for anchored stone and masonry veneer. In Seismic Design Category C, where anchored stone and masonry veneer is installed in accordance with Section R703.7, the length of structural sheathing for walls supporting one story, roof and ceiling shall be the greater of the amount required by Section R603.9.2 or 36 percent, modified by Section R603.9.2 except Section R603.9.2.2 shall not be permitted.

Revise as follows:

R703.7 Anchored stone and masonry veneer, general. Anchored stone and masonry veneer shall be installed in accordance with this chapter, Table R703.4 and Figure R703.7. These veneers installed over a backing of wood or cold-formed steel shall be limited to the first story above-grade plane and shall not exceed 5 inches (127 mm) in thickness. See Section R602.10 for wall bracing requirements for anchored masonry veneer for wood-framed construction and Section R603.9.5 for wall bracing requirements for anchored masonry veneer for cold-formed steel construction.

Exceptions:

1. For all buildings in Seismic Design Categories A, B and C, exterior anchored stone or masonry veneer, as specified in Table R703.7(1), with a backing of wood or steel framing shall be permitted to the height specified in Table R703.7(1) above a noncombustible foundation.
2. For detached one- or two-family dwellings in Seismic Design Categories D0, D1 and D2, exterior anchored stone or masonry veneer, as specified in Table R703.7(2), with a backing of wood framing shall be permitted to the height specified in Table R703.7(2) above a noncombustible foundation.

FIGURE R703.7
ANCHORED MASONRY VENEER WALL DETAILS

(No change to Figure)

TABLE R703.7(1)
**ANCHORED STONE OR MASONRY VENEER LIMITATIONS AND REQUIREMENTS,
WOOD OR STEEL FRAMING, SEISMIC DESIGN CATEGORIES A, B AND C**

(Portions of Table not shown remain unchanged)

TABLE R703.7(2)
**ANCHORED STONE OR MASONRY VENEER LIMITATIONS AND REQUIREMENTS,
ONE- AND TWO-FAMILY DETACHED DWELLINGS, WOOD FRAMING, SEISMIC DESIGN
CATEGORIES D0, D1 AND D2**

(Portions of Table not shown remain unchanged)

R703.7.2 Exterior veneer support. Except in Seismic Design Categories D0, D1 and D2, exterior anchored masonry veneers having an installed weight of 40 pounds per square foot (195 kg/m²) or less shall be permitted to be supported on wood or cold-formed steel construction. When anchored masonry veneer supported by wood or cold-formed steel construction adjoins anchored masonry veneer supported by the foundation, there shall be a movement joint between the veneer supported by the wood or cold-formed steel construction and the veneer supported by the foundation. The wood or cold-formed steel construction supporting the anchored masonry veneer shall be designed to limit the deflection to 1/600 of the span for the supporting members. The design of the wood or cold-formed steel construction shall consider the weight of the veneer and any other loads.

R703.7.2.1 Support by steel angle. A minimum 6 inches by 4 inches by 5/16 inch (152 mm by 102 mm by 8 mm) steel angle, with the long leg placed vertically, shall be anchored to double 2 inches by 4 inches (51 mm by 102 mm) wood studs at a maximum on-center spacing of 16 inches (406 mm). Anchorage of the steel angle at every double stud spacing shall be a minimum of two 7/16 inch (11 mm) diameter by 4 inch (102 mm) lag screws. The steel angle shall have a minimum clearance to underlying construction of 1/16 inch (2 mm). A minimum of two-thirds the width of the anchored masonry veneer thickness shall bear on the steel angle. Flashing and weep holes shall be located in the anchored masonry veneer wythe in accordance with Figure R703.7.2.1. The maximum height of anchored masonry veneer above the steel angle support shall be 12 feet, 8 inches (3861 mm). The air space separating the anchored masonry veneer from the wood backing shall be in accordance with Sections R703.7.4 and R703.7.4.2. The method of support for the anchored masonry veneer on wood construction shall be constructed in accordance with Figure R703.7.2.1.

The maximum slope of the roof construction without stops shall be 7:12. Roof construction with slopes greater than 7:12 but not more than 12:12 shall have stops of a minimum 3 inch by 3 inch by 1/4 inch (76 mm by 76 mm by 6 mm) steel plate welded to the angle at 24 inches (610 mm) on center along the angle or as *approved by the building official*.

FIGURE R703.7.2.1
EXTERIOR ANCHORED MASONRY VENEER SUPPORT BY STEEL ANGLES

(No change to Figure)

R703.7.2.2 Support by roof construction. A steel angle shall be placed directly on top of the roof construction. The roof supporting construction for the steel angle shall consist of a minimum of three 2 inch by 6 inch (51 mm by 152 mm) wood members. The wood member abutting the vertical wall stud construction shall be anchored with a minimum of three 5/8-inch (16 mm) diameter by 5-inch (127 mm) lag screws to every wood stud spacing. Each additional roof member shall be anchored by the use of two

10d nails at every wood stud spacing. A minimum of two-thirds the width of the anchored masonry veneer thickness shall bear on the steel angle. Flashing and weep holes shall be located in the anchored masonry veneer wythe in accordance with Figure R703.7.2.2. The maximum height of the masonry veneer above the steel angle support shall be 12 feet, 8 inches (3861 mm). The air space separating the anchored masonry veneer from the wood backing shall be in accordance with Sections R703.7.4 and R703.7.4.2. The support for the anchored masonry veneer on wood construction shall be constructed in accordance with Figure R703.7.2.2.

The maximum slope of the roof construction without stops shall be 7:12. Roof construction with slopes greater than 7:12 but not more than 12:12 shall have stops of a minimum 3 inch by 3 inch by 1/4 inch (76 mm by 76 mm by 6 mm) steel plate welded to the angle at 24 inches (610 mm) on center along the angle or as *approved by the building official*.

FIGURE R703.7.2.2
EXTERIOR ANCHORED MASONRY VENEER SUPPORT BY ROOF MEMBERS

(No change to Figure)

R703.7.3 Lintels. Anchored masonry veneer shall not support any vertical load other than the dead load of the veneer above. Veneer above openings shall be supported on lintels of noncombustible materials. The lintels shall have a length of bearing not less than 4 inches (102 mm). Steel lintels shall be shop coated with a rust-inhibitive paint, except for lintels made of corrosion-resistant steel or steel treated with coatings to provide corrosion resistance. Construction of openings shall comply with either Section R703.7.3.1 or 703.7.3.2.

TABLE R703.7.3.1
ALLOWABLE SPANS FOR LINTELS SUPPORTING ANCHORED MASONRY VENEER^{a, b, c, d}

(Portions of Table not shown remain unchanged)

R703.7.3.2 Maximum span. The allowable span shall not exceed 18 feet 3 inches (5562 mm) and shall be constructed to comply with Figure R703.7.3.2 and the following:

1. Provide a minimum length of 18 inches (457 mm) of anchored masonry veneer on each side of opening as shown in Figure R703.7.3.2.
2. Provide a minimum 5-inch by 3 1/2-inch by 5/16-inch (127 mm by 89 mm by 7.9 mm) steel angle above the opening and shore for a minimum of 7 days after installation.
3. Provide double-wire joint reinforcement extending 12 inches (305 mm) beyond each side of the opening. Lap splices of joint reinforcement a minimum of 12 inches (305 mm). Comply with one of the following:
 - 3.1. Double-wire joint reinforcement shall be 3/16-inch (4.8 mm) diameter and shall be placed in the first two bed joints above the opening.
 - 3.2. Double-wire joint reinforcement shall be 9 gauge (0.144 inch or 3.66 mm diameter) and shall be placed in the first three bed joints above the opening.
4. Provide the height of anchored masonry veneer above opening, in accordance with Table R703.7.3.2.

TABLE R703.7.3.2
HEIGHT OF ANCHORED MASONRY VENEER ABOVE OPENING

(Portions of Table not shown remain unchanged)

FIGURE R703.7.3.2
ANCHORED MASONRY VENEER OPENING

(No change to Figure)

R703.7.4 Anchorage. Anchored masonry veneer shall be anchored to the supporting wall studs with corrosion-resistant metal ties embedded in mortar or grout and extending into the veneer a minimum of 1 1/2 inches (38 mm), with not less than 5/8-inch (15.9 mm) mortar or grout cover to outside face. Anchored masonry veneer shall conform to Table R703.7.4.

R703.7.5 Flashing. Flashing shall be located beneath the first course of masonry above finished ground level above the foundation wall or slab and at other points of support, including structural floors, shelf angles and lintels when anchored masonry veneers are designed in accordance with Section R703.7. See Section R703.8 for additional requirements.

Reason: This code change clarifies existing masonry veneer provisions which were intended to address anchored stone or masonry veneer. Historically, the IRC has used the term "masonry veneer" for provisions which apply to anchored stone or masonry veneer. This was done prior to the use of the term "adhered masonry veneer." This code change addresses all uses of the term "masonry veneer" and changes it to "anchored masonry veneer" which is the appropriate term in the current code.

Cost Impact: This code change will not increase the cost of construction.

RB372-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

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RB373 – 13

R703.7, R703.7.3

Proponent: Randall Shackelford, P.E., Simpson Strong-Tie Co., Inc. (rshackelford@strongtie.com)

Revise as follows:

R703.7 Stone and masonry veneer, general. Stone and masonry veneer shall be installed in accordance with this chapter, Table R703.4 and Figure R703.7. These veneers installed over a backing of wood or cold-formed steel shall be limited to the first story above-grade plane and shall not exceed 5 inches (127 mm) in thickness. Masonry veneer shall not support any vertical load other than the dead load of the veneer above. See Section R602.10 for wall bracing requirements for masonry veneer for wood-framed construction and Section R603.9.5 for wall bracing requirements for masonry veneer for cold-formed steel construction.

Exceptions:

1. For all buildings in Seismic Design Categories A, B and C, exterior stone or masonry veneer, as specified in Table R703.7(1), with a backing of wood or steel framing shall be permitted to the height specified in Table R703.7(1) above a noncombustible foundation.
2. For detached one- or two-family *dwelling*s in Seismic Design Categories D₀, D₁ and D₂, exterior stone or masonry veneer, as specified in Table R703.7(2), with a backing of wood framing shall be permitted to the height specified in Table R703.7(2) above a noncombustible foundation.

R703.7.3 Lintels. ~~Masonry veneer shall not support any vertical load other than the dead load of the veneer above.~~ Veneer above openings shall be supported on lintels of noncombustible materials. The lintels shall have a length of bearing not less than 4 inches (102 mm). Steel lintels shall be shop coated with a rust-inhibitive paint, except for lintels made of corrosion-resistant steel or steel treated with coatings to provide corrosion resistance. Construction of openings shall comply with either Section R703.7.3.1 or 703.7.3.2.

Reason: It is proposed to relocate the requirement that masonry veneer can not support imposed vertical load from the Lintel section, where it could be missed, to the general section, where it is more likely to be noticed.

The main concern is that someone building or adding to a masonry wall who is not installing lintels will not look in that section for the important requirement that masonry veneer can carry no load other than its own weight. One example of this we get is when a deck builder calls and wants help choosing an anchor to fasten a new deck to an existing brick veneer wall. They do not know they should not do this.

As further justification, one can look at ACI-530/ASCE 5/TMS402, which defines *Veneer, masonry* as "A masonry wythe that provides the exterior finish of a wall system and transfers out-of-plane load directly to a backing, but is not considered to add load resisting capacity to the wall system." Load resisting capacity could be in-plane or vertical loads.

Cost Impact: The code change proposal will not increase the cost of construction. Just relocating an existing requirement where it is more likely to be seen.

RB373-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R703.7-RB-SHACKELFORD.doc

RB374 – 13

Table R703.4, R703.7, R703.12

Proponent: Jason Thompson, National Concrete Masonry Association representing Masonry Alliance for Codes and Standards (jthompson@ncma.org)

Revise as follows:

**TABLE R703.4
WEATHER-RESISTANT SIDING ATTACHMENT AND MINIMUM THICKNESS**

SIDING MATERIAL		NOMINAL THICKNESS ^a (inches)	JOINT TREATMENT	WATER-RESISTIVE BARRIER REQUIRED	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS ^{b, c, d}					
					Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud	Direct to studs	Number or spacing of fasteners
Horizontal aluminum ^e	Without insulation	0.019 ^f 0.024	Lap	Yes	0.120 nail 1½" long	0.120 nail 2" long	0.120 nail 2" long	0.120 nail ^y	Not allowed	Same as stud spacing
			Lap	Yes	0.120 nail 1½" long	0.120 nail 2" long	0.120 nail 2" long	0.120 nail ^y	Not allowed	
	With insulation	0.019	Lap	Yes	0.120 nail 1½" long	0.120 nail 2½" long	0.120 nail 2½" long	0.120 nail ^y	0.120 nail 1½" long	
Anchored veneer: brick, concrete, masonry or stone		2	Section R703	Yes	See Section R703 and Figure R703.7 ^g					
Adhered veneer: concrete, stone or masonry ^w		—	Section R703	Yes Note w	See Section R703.6.1 ^g or in accordance with the manufacturer's instructions. <u>See Section R7803.12.</u>					
Hardboard ^k Panel siding-vertical		7/16	—	Yes	Note m	Note m	Note m	Note m	Note m	6² panel edges 12² inter. sup. ⁿ
Hardboard ^k Lap-siding-horizontal		7/16	Note p	Yes	Note o	Note o	Note o	Note o	Note o	Same as stud spacing 2 per bearing
Steel ^h		29 ga.	Lap	Yes	0.113 nail ¾" Staple-1¾"	0.113 nail 2¾" Staple-2½"	0.113 nail 2½" Staple-2¼"	0.113 nail ^v Staple ^v	Not allowed	Same as stud spacing
Particleboard panels		3/8 - 1½	—	Yes	6d box nail (2" × 0.099")	6d box nail (2" × 0.099")	6d box nail (2" × 0.099")	box nail ^v	6d box nail (2" × 0.099"), 3/8 not allowed	6" panel edge, 12" inter. sup.
		5/8	—	Yes	6d box nail (2" × 0.099")	8d box nail (2½" × 0.113")	8d box nail (2½" × 0.113")	box nail ^v	6d box nail (2"" × 0.099")	
Wood structural panel ⁱ ANSI/APA-PRP 210 siding ^j (exterior grade)		3/8 - 1½	Note p	Yes	0.099 nail-2"	0.113 nail-2½"	0.113 nail-2½ sm	0.113 nail ^v	0.099 nail-2²	6" panel edges, 12" inter. sup.
Wood structural panel lapsiding		3/8 - 1½	Note p Note x	Yes	0.099 nail-2"	0.113 nail-2½"	0.113 nail-2½ sm	0.113 nail ^x	0.099 nail-2"	8" along bottom edge

Vinyl siding ^l	0.035	Lap	Yes	0.120 nail (shank) with a 0.313 head or 16-gage staple with $\frac{3}{8}$ to $\frac{1}{2}$ -inch crown ^{y, z}	0.120 nail (shank) with a 0.313 head or 16-gage staple with $\frac{3}{8}$ to $\frac{1}{2}$ -inch crown ^y	0.120 nail (shank) with a 0.313 head or 16-gage staple with $\frac{3}{8}$ to $\frac{1}{2}$ -inch crown ^y	0.120 nail (shank) with a 0.313 head per Section R703.11.2	Not allowed	16 inches on center or specified by the manufacturer instructions or test report
Wood ^d rustic, drop	$\frac{3}{8}$ Min	Lap	Yes	Fastener penetration into stud-1"				0.113 nail-2 $\frac{1}{2}$ " Staple-2"	Face nailing up to 6" widths, 1 nail per bearing; 8" widths and over, 2 nails per bearing
Shiplap	$\frac{19}{32}$ Average	Lap	Yes	Fastener penetration into stud-1"				0.113 nail-2 $\frac{1}{2}$ " Staple-2"	Face nailing up to 6" widths, 1 nail per bearing; 8" widths and over, 2 nails per bearing
Bevel	$\frac{7}{16}$								
Butt tip	$\frac{3}{16}$	Lap	Yes						
Fiber cement panel siding ^a	$\frac{5}{16}$	Note q	Yes Note u	6d common corrosion-resistant nail ^f	6d common corrosion-resistant nail ^f	6d common corrosion-resistant nail ^f	6d common corrosion-resistant nail ^{f, v}	4d common corrosion-resistant nail ^f	6" o.c. on edges, 12" o.c. on intermed. studs
Fiber cement lap siding ^a	$\frac{5}{16}$	Note s	Yes Note u	6d common corrosion-resistant nail ^f	6d common corrosion-resistant nail ^f	6d common corrosion-resistant nail ^f	6d common corrosion-resistant nail ^{f, v}	6d common corrosion-resistant nail or 11-gage roofing nail ^f	Note t

For SI: 1 inch = 25.4 mm.

- Based on stud spacing of 16 inches on center where studs are spaced 24 inches, siding shall be applied to sheathing approved for that spacing.
- Nail is a general description and shall be T-head, modified round head, or round head with smooth or deformed shanks.
- Staples shall have a minimum crown width of $\frac{7}{16}$ -inch outside diameter and be manufactured of minimum 16-gage wire.
- Nails or staples shall be aluminum, galvanized, or rust-preventative coated and shall be driven into the studs where fiberboard, gypsum, or foam plastic sheathing backing is used. Where wood or wood structural panel sheathing is used, fasteners shall be driven into studs unless otherwise permitted to be driven into sheathing in accordance with the siding manufacturer's installation instructions.
- Aluminum nails shall be used to attach aluminum siding.
- Aluminum (0.019 inch) shall be unbacked only when the maximum panel width is 10 inches and the maximum flat area is 8 inches. The tolerance for aluminum siding shall be +0.002 inch of the nominal dimension.
- All attachments shall be coated with a corrosion-resistant coating.
- Shall be of approved type.
- Three-eighths-inch plywood shall not be applied directly to studs spaced more than 16 inches on center when long dimension is parallel to studs. Plywood $\frac{1}{2}$ -inch or thinner shall not be applied directly to studs spaced more than 24 inches on center. The stud spacing shall not exceed the panel span rating provided by the manufacturer unless the panels are installed with the face grain perpendicular to the studs or over sheathing approved for that stud spacing.
- Wood board sidings applied vertically shall be nailed to horizontal nailing strips or blocking set 24 inches on center. Nails shall penetrate $1\frac{1}{2}$ inches into studs, studs and wood sheathing combined or blocking.
- Hardboard siding shall comply with CPA/ANSI A135.6.

- l. Vinyl siding shall comply with ASTM D 3679.
- m. Minimum shank diameter of 0.092 inch, minimum head diameter of 0.225 inch, and nail length must accommodate sheathing and penetrate framing 1 1/2 inches.
- n. When used to resist shear forces, the spacing must be 4 inches at panel edges and 8 inches on interior supports.
- o. Minimum shank diameter of 0.099 inch, minimum head diameter of 0.240 inch, and nail length must accommodate sheathing and penetrate framing 1 1/2 inches.
- p. Vertical end joints shall occur at studs and shall be covered with a joint cover or shall be caulked.
- q. See Section R703.10.1.
- r. Fasteners shall comply with the nominal dimensions in ASTM F 1667.
- s. See Section R703.10.2.
- t. Face nailing: one 6d common nail through the over lap pinging planks at each stud. Concealed nailing: one 11 gage 1 1/2 inch long galv. roofing nail through the top edge of each plank at each stud.
- u. See Section R703.2 exceptions.
- v. Minimum nail length must accommodate sheathing and penetrate framing 1 1/2 inches.
- w. ~~Adhered masonry veneer shall comply with the requirements of Section R703.6.3 and shall comply with the requirements in Sections 6.1 and 6.3 of TMS 402-ACI 530/ASCE 5.~~
- x ~~w.~~ Vertical joints, if staggered shall be permitted to be away from studs if applied over wood structural panel sheathing.
- y ~~v.~~ Minimum fastener length must accommodate sheathing and penetrate framing 0.75 inches or in accordance with the manufacturer's installation instructions.

R703.7 Anchored stone and masonry veneer, general. Anchored stone and masonry veneer shall be installed in accordance with this chapter, Table R703.4 and Figure R703.7. These veneers installed over a backing of wood or cold-formed steel shall be limited to the first story above-grade plane and shall not exceed 5 inches (127 mm) in thickness. See Section R602.10 for wall bracing requirements for masonry veneer for wood-framed construction and Section R603.9.5 for wall bracing requirements for masonry veneer for cold-formed steel construction.

Exceptions:

1. For all buildings in Seismic Design Categories A, B and C, exterior stone or masonry veneer, as specified in Table R703.7(1), with a backing of wood or steel framing shall be permitted to the height specified in Table R703.7(1) above a noncombustible foundation.
2. For detached one- or two-family *dwelling*s in Seismic Design Categories D₀, D₁ and D₂, exterior stone or masonry veneer, as specified in Table R703.7(2), with a backing of wood framing shall be permitted to the height specified in Table R703.7(2) above a noncombustible foundation.

R703.12 Adhered masonry veneer installation. ~~Adhered masonry veneer shall comply with the requirements of Section R703.6.3 and the requirements in Sections 6.1 and 6.3 of TMS 402/ACI 530/ASCE 5.~~ Adhered masonry veneer shall be installed in accordance with Section R703.6.1, Article 3.3 C of TMS 602/ACI 530.1/ASCE 6, or the manufacturer's instructions.

Reason: The changes proposed consolidate and clarify the requirements for adhered masonry veneer into Section R703.12.

Sections 6.1 and 6.3 of TMS 402 list prescriptive requirements for adhered veneers; such as weight limits and minimum adhesion strength between the adhered veneer and its backing. Section R703.6.3 defines minimum water-resistive barrier requirements.

The footnote w to Table R703.4 is proposed to be deleted and these requirements are incorporated into Section 703.12 where they are less likely to be overlooked. The method of installing adhered veneer varies depending upon the substrate to which it is bonded. For wood sheathing, metal lathe is used in accordance with R703.6.1. For concrete or masonry backing, Article 3.3 C of TMS 602 details prescriptive installation requirements.

The term 'anchored' is proposed to be added to the charging language of Section R703.7 to help clarify and differentiate these requirements from those for adhered veneer.

Cost Impact: This code change will not increase the cost of construction.

RB374-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

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RB375 – 13

Table R703.4, R703.7, R703.7.2, R703.7.2.1 (NEW), R703.7.2.2 (NEW), R703.12, R703.12.1, R703.12.2

Proponent: Suzanne Kusik, PE, CBO; Orange Empire Chapter Code Committee

Revise as follows:

**TABLE R703.4
WEATHER-RESISTANT SIDING ATTACHMENT AND MINIMUM THICKNESS**

SIDING MATERIAL		NOMINAL THICKNESS ^a (inches)	JOINT TREATMENT	WATER-RESISTIVE BARRIER REQUIRED	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS ^{b, c, d}					
					Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud	Direct to studs	Number or spacing of fasteners
Horizontal aluminum ^e	Without insulation	0.019 ^f 0.024	Lap	Yes	0.120 nail 1½" long	0.120 nail 2" long	0.120 nail 2" long	0.120 nail ^y	Not allowed	Same as stud spacing
			Lap	Yes	0.120 nail 1½" long	0.120 nail 2" long	0.120 nail 2" long	0.120 nail ^y	Not allowed	
	With insulation	0.019	Lap	Yes	0.120 nail 1½" long	0.120 nail 2½" long	0.120 nail 2½" long	0.120 nail ^y	0.120 nail 1½" long	
Anchored veneer: brick, concrete, masonry or stone		<u>-2 Section R703.7 and Tables R703.7(1) & R703.7(2)</u>	Section R703	Yes	See Section R703 <u>R703.7</u> and Figure R703.7 ^g					
Adhered veneer: concrete, stone or masonry ^w		<u>— Section R703.7</u>	Section R703	Yes Note w	See Section R703.6.4^g <u>R703.7^g</u> or in accordance with the manufacturer's instructions.					
Hardboard ^k Panel siding-vertical		7/16	—	Yes	Note m	Note m	Note m	Note m	Note m	6² panel edges 12² inter. sup. ⁿ
Hardboard ^k Lap-siding-horizontal		7/16	Note p	Yes	Note o	Note o	Note o	Note o	Note o	Same as stud spacing 2 per bearing
Steel ^h		29 ga.	Lap	Yes	0.113 nail 1¾" Staple-1¾"	0.113 nail 2¾" Staple-2½"	0.113 nail 2½" Staple-2¼"	0.113 nail ^v Staple ^v	Not allowed	Same as stud spacing
Particleboard panels		3/8 - 1½	—	Yes	6d box nail (2" × 0.099")	6d box nail (2" × 0.099")	6d box nail (2" × 0.099")	box nail ^v	6d box nail (2" × 0.099"), 3/8 not allowed	6" panel edge, 12" inter. sup.
		5/8	—	Yes	6d box nail (2" × 0.099")	8d box nail (2½" × 0.113")	8d box nail (2½" × 0.113")	box nail ^v	6d box nail (2" × 0.099")	
Wood structural panel ⁱ ANSI/APA-PRP 210 siding ^j (exterior grade)		3/8 - 1½	Note p	Yes	0.099 nail-2"	0.113 nail-2½"	0.113 nail-2 ½ ^m	0.113 nail ^v	0.099 nail-2²	6" panel edges, 12" inter. sup.

Wood structural panel lapsiding	$\frac{3}{8} - \frac{1}{2}$	Note p Note x	Yes	0.099 nail-2"	0.113 nail-2 $\frac{1}{2}$ "	0.113 nail-2 $\frac{1}{2}$ "	0.113 nail ^x	0.099 nail-2"	8" along bottom edge
Vinyl siding ^l	0.035	Lap	Yes	0.120 nail (shank) with a 0.313 head or 16-gage staple with $\frac{3}{8}$ to $\frac{1}{2}$ -inch crown ^{y, z}	0.120 nail (shank) with a 0.313 head or 16-gage staple with $\frac{3}{8}$ to $\frac{1}{2}$ -inch crown ^y	0.120 nail (shank) with a 0.313 head or 16-gage staple with $\frac{3}{8}$ to $\frac{1}{2}$ -inch crown ^y	0.120 nail (shank) with a 0.313 head per Section R703.11.2	Not allowed	16 inches on center or specified by the manufacturer instructions or test report
Wood ^l rustic, drop	$\frac{3}{8}$ Min	Lap	Yes	Fastener penetration into stud-1"				0.113 nail-2 $\frac{1}{2}$ " Staple-2"	Face nailing up to 6" widths, 1 nail per bearing; 8" widths and over, 2 nails per bearing
Shiplap	$\frac{19}{32}$ Average	Lap	Yes	Fastener penetration into stud-1"				0.113 nail-2 $\frac{1}{2}$ " Staple-2"	Face nailing up to 6" widths, 1 nail per bearing; 8" widths and over, 2 nails per bearing
Bevel	$\frac{7}{16}$								
Butt tip	$\frac{3}{16}$	Lap	Yes						
Fiber cement panel siding ^q	$\frac{5}{16}$	Note q	Yes Note u	6d common corrosion-resistant nail ^f	6d common corrosion-resistant nail ^f	6d common corrosion-resistant nail ^f	6d common corrosion-resistant nail ^{f, v}	4d common corrosion-resistant nail ^f	6" o.c. on edges, 12" o.c. on intermed. studs
Fiber cement lap siding ^s	$\frac{5}{16}$	Note s	Yes Note u	6d common corrosion-resistant nail ^f	6d common corrosion-resistant nail ^f	6d common corrosion-resistant nail ^f	6d common corrosion-resistant nail ^{f, v}	6d common corrosion-resistant nail or 11-gage roofing nail ^f	Note t

SIDING MATERIAL		NOMINAL THICKNESS ^a (inches)	JOINT TREATMENT	WATER-RESISTIVE BARRIER REQUIRED	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS ^{b, c, d}					
					Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud	Direct to studs	Number or spacing of fasteners
Horizontal aluminum ^e	Without insulation	0.019 ^f 0.024	Lap	Yes	0.120 nail 1 $\frac{1}{2}$ " long	0.120 nail 2" long	0.120 nail 2" long	0.120 nail ^y	Not allowed	Same as stud spacing
			Lap	Yes	0.120 nail 1 $\frac{1}{2}$ " long	0.120 nail 2" long	0.120 nail 2" long	0.120 nail ^y	Not allowed	
	With insulation	0.019	Lap	Yes	0.120 nail 1 $\frac{1}{2}$ " long	0.120 nail 2 $\frac{1}{2}$ " long	0.120 nail 2 $\frac{1}{2}$ " long	0.120 nail ^y	0.120 nail 1 $\frac{1}{2}$ " long	

Anchored veneer: brick, concrete, masonry or stone		2	Section R703	Yes	See Section R703 <u>703.7</u> and Figure R703.7 ⁹					
Adhered veneer: concrete, stone or masonry ^w		— <u>Section R703.7</u>	Section R703	Yes Note w	See Section R703.6.1 ⁹ <u>R703.7</u> or in accordance with the manufacturer's instructions.					
Hardboard ^k Panel siding-vertical		7/16	—	Yes	Note m	Note m	Note m	Note m	Note m	6 ² panel edges 12 ² inter. sup. ⁿ
Hardboard ^k Lap-siding-horizontal		7/16	Note p	Yes	Note o	Note o	Note o	Note o	Note o	Same as stud spacing 2 per bearing
Steel ^h		29 ga.	Lap	Yes	0.113 nail 1 ³ / ₄ ² Staple- 1 ³ / ₄ ²	0.113 nail 2 ³ / ₄ ² Staple- 2 ¹ / ₂ ²	0.113 nail 2 ¹ / ₂ ² Staple- 2 ¹ / ₄ ²	0.113 nail ^v Staple ^v	Not allowed	Same as stud spacing
Particleboard panels		3/8 - 1/2	—	Yes	6d box nail (2 ² × 0.099 ²)	6d box nail (2 ² × 0.099 ²)	6d box nail (2 ² × 0.099 ²)	box nail ^v	6d box nail (2 ² × 0.099 ²), 3/8 not allowed	6 ² panel edge, 12" inter. sup.
		5/8	—	Yes	6d box nail (2 ² × 0.099 ²)	8d box nail (2 ¹ / ₂ ² × 0.113 ²)	8d box nail (2 ¹ / ₂ ² × 0.113 ²)	box nail ^v	6d box nail (2 ² " × 0.099 ²)	
Wood structural panel ⁱ ANSI/APA-PRP 210 siding ⁱ (exterior grade)		3/8 - 1/2	Note p	Yes	0.099 nail-2 ²	0.113 nail- 2 ¹ / ₂ ²	0.113 nail-2 1/2 ²	0.113 nail ^v	0.099 nail-2 ²	6 ² panel edges, 12 ² inter. sup.
Wood structural panel lapsiding		3/8 - 1/2	Note p Note x	Yes	0.099 nail-2 ²	0.113 nail- 2 ¹ / ₂ ²	0.113 nail-2 1/2 ²	0.113 nail ^x	0.099 nail-2 ²	8 ² along bottom edge
Vinyl siding ^l		0.035	Lap	Yes	0.120 nail (shank) with a 0.313 head or 16-gage staple with 3/8 to 1 ¹ / ₂ -inch crown ^{y, z}	0.120 nail (shank) with a 0.313 head or 16-gage staple with 3/8 to 1 ¹ / ₂ -inch crown ^y	0.120 nail (shank) with a 0.313 head or 16-gage staple with 3/8 to 1 ¹ / ₂ - inch crown ^y	0.120 nail (shank) with a 0.313 head per Section R703.11.2	Not allowed	16 inches on center or specified by the manufacturer instructions or test report
Wood ^l rustic, drop	3/8 Min	Lap	Yes	Fastener penetration into stud-1 ²					0.113 nail-2 ¹ / ₂ ² Staple-2 ²	Face nailing up to 6 ² widths, 1 nail per bearing; 8 ² widths and over, 2 nails per bearing
Shiplap	19/32 Average	Lap	Yes	Fastener penetration into stud-1 ²					0.113 nail- 2 ¹ / ₂ ² Staple-2 ²	Face nailing up to 6 ² widths, 1 nail per bearing; 8 ² widths and over, 2 nails per bearing
Bevel	7/16									
Butt tip	3/16	Lap	Yes							

Fiber cement panel siding ^q	⁵ / ₁₆	Note q	Yes Note u	6d common corrosion-resistant nail ^f	6d common corrosion-resistant nail ^f	6d common corrosion-resistant nail ^f	6d common corrosion-resistant nail ^{f, v}	4d common corrosion-resistant nail ^f	6 ² o.c. on edges, 12 ² o.c. on intermed. studs
Fiber cement lap siding ^s	⁵ / ₁₆	Note s	Yes Note u	6d common corrosion-resistant nail ^f	6d common corrosion-resistant nail ^f	6d common corrosion-resistant nail ^f	6d common corrosion-resistant nail ^{f, v}	6d common corrosion-resistant nail or 11-gage roofing nail ^f	Note t

For SI: 1 inch = 25.4 mm.

- a. Based on stud spacing of 16 inches on center where studs are spaced 24 inches, siding shall be applied to sheathing approved for that spacing.
- b. Nail is a general description and shall be T-head, modified round head, or round head with smooth or deformed shanks.
- c. Staples shall have a minimum crown width of ⁷/₁₆-inch outside diameter and be manufactured of minimum 16-gage wire.
- d. Nails or staples shall be aluminum, galvanized, or rust-preventative coated and shall be driven into the studs where fiberboard, gypsum, or foam plastic sheathing backing is used. Where wood or wood structural panel sheathing is used, fasteners shall be driven into studs unless otherwise permitted to be driven into sheathing in accordance with the siding manufacturer's installation instructions.
- e. Aluminum nails shall be used to attach aluminum siding.
- f. Aluminum (0.019 inch) shall be unbacked only when the maximum panel width is 10 inches and the maximum flat area is 8 inches. The tolerance for aluminum siding shall be +0.002 inch of the nominal dimension.
- g. All attachments shall be coated with a corrosion-resistant coating.
- h. Shall be of approved type.
- i. Three-eighths-inch plywood shall not be applied directly to studs spaced more than 16 inches on center when long dimension is parallel to studs. Plywood ¹/₂-inch or thinner shall not be applied directly to studs spaced more than 24 inches on center. The stud spacing shall not exceed the panel span rating provided by the manufacturer unless the panels are installed with the face grain perpendicular to the studs or over sheathing approved for that stud spacing.
- j. Wood board sidings applied vertically shall be nailed to horizontal nailing strips or blocking set 24 inches on center. Nails shall penetrate ¹/₂ inches into studs, studs and wood sheathing combined or blocking.
- k. Hardboard siding shall comply with CPA/ANSI A135.6.
- l. Vinyl siding shall comply with ASTM D 3679.
- m. Minimum shank diameter of 0.092 inch, minimum head diameter of 0.225 inch, and nail length must accommodate sheathing and penetrate framing ¹/₂ inches.
- n. When used to resist shear forces, the spacing must be 4 inches at panel edges and 8 inches on interior supports.
- o. Minimum shank diameter of 0.099 inch, minimum head diameter of 0.240 inch, and nail length must accommodate sheathing and penetrate framing ¹/₂ inches.
- p. Vertical end joints shall occur at studs and shall be covered with a joint cover or shall be caulked.
- q. See Section R703.10.1.
- r. Fasteners shall comply with the nominal dimensions in ASTM F 1667.
- s. See Section R703.10.2.
- t. Face nailing: one 6d common nail through the over lap pining planks at each stud. Concealed nailing: one 11 gage ¹/₂ inch long galv. roofing nail through the top edge of each plank at each stud.
- u. See Section R703.2 exceptions.
- v. Minimum nail length must accommodate sheathing and penetrate framing ¹/₂ inches.
- w. Adhered masonry veneer shall comply with the requirements of Section R703.6.3 and shall comply with the requirements in Sections 6.1 and 6.3 of TMS-402 ACI 530/ASCE 5.
- x. Vertical joints, if staggered shall be permitted to be away from studs if applied over wood structural panel sheathing.
- y. Minimum fastener length must accommodate sheathing and penetrate framing 0.75 inches or in accordance with the manufacturer's installation instructions.
- z. Where approved by the manufacturer's instructions or test report siding shall be permitted to be installed with fasteners penetrating not less than 0.75 inches through wood or wood structural sheathing with or without penetration into the framing.

R703.7 Stone and masonry veneer, general. Stone and masonry anchored or adhered veneer shall be installed in accordance with this chapter, Table R703.4, Table R703.7(1), Table R703.7(2) and Figure R703.7. ~~These veneers installed over a backing of wood or cold formed steel shall be limited to the first story above grade plan and shall not exceed 5 inches in thickness. Wall bracing for stone and masonry veneer shall comply with~~ See Section R602.10 for wall bracing requirement for masonry veneer for wood framed construction and R603.9.5 for wall bracing requirement for masonry veneer for cold-formed steel construction.

Exceptions:

1. For all buildings in Seismic Design Categories A, B and C, exterior stone or masonry veneer, as specified in Table R703.7(1), with a backing of wood or steel framing shall be permitted to the height specified in Table R703.7(1) above a noncombustible foundation.
2. For detached one- or two-family dwellings in Seismic Design Categories D_0 , D_1 , and D_2 , exterior stone or masonry veneer, as specified in Table R703.7(2), with a backing of wood framing shall be permitted to the height specified in Table R703.7(2) above a noncombustible foundation.

R703.7.2 Anchored exterior veneer. Stone or masonry veneer greater than 2 $\frac{5}{8}$ inches nominal thickness or with an installed unit weight greater than 15 pounds per square feet shall be installed as anchored veneer in accordance with this chapter.

R703.7.2.1 Exterior anchored veneer supported by a noncombustible foundation. All buildings in Seismic Design Categories A, B and C, exterior stone or masonry veneer with backing of wood or steel framing shall be permitted to the height specified in Table R703.7(1) above a noncombustible foundation. Detached one- or two-family dwellings in Seismic Design Categories D_0 , D_1 , and D_2 , exterior stone or masonry veneer with a backing of wood framing shall be permitted to the height specified in Table R703.7(2) above a noncombustible foundation.

R703.7.2.2 Exterior anchored veneer supported by wood or cold-formed steel construction. Except in Seismic Design Categories D_0 , D_1 , and D_2 , exterior masonry veneers having an installed weight of 40 pounds per square foot or less shall be permitted to be supported on wood or cold-formed steel construction. When masonry veneer supported by wood or cold-formed steel construction adjoins masonry veneer supported by the foundation, there shall be a movement joint between the veneer supported by the wood or cold-formed steel construction and the veneer supported by the foundation. The wood or cold-formed steel construction supporting the masonry veneer shall be designed to limit the deflection to $\frac{1}{600}$ of the span for the supporting members. The design of the wood or cold-formed steel construction shall consider the weight of the veneer and any other loads.

Exception: In Seismic Design Categories D_0 , D_1 , and D_2 , exterior anchored veneer shall not be permitted to be supported on wood or cold-formed steel construction.

R703.7.3 Adhered masonry exterior veneer installation. Adhered stone and masonry veneer shall be installed in accordance with this chapter, Table 703.4 and the manufacturer's instructions. Adhered veneer shall not exceed 2 $\frac{5}{8}$ inches nominal thickness and 15 pounds per square feet maximum installed unit weight.

R703.7.3.1 Clearances. On exterior stud walls, adhered masonry veneer shall be installed:

1. Minimum of 4 inches (102 mm) above the earth;
2. Minimum of 2 inches (51 mm) above paved areas; or
3. Minimum of $\frac{1}{2}$ inch (12 mm) above exterior walking surfaces which are supported by the same foundation that supports the exterior wall.

R703.7.3.2 Flashing at foundation. A corrosion-resistant screed or flashing of a minimum 0.019-inch (0.48 mm) or 26-gage galvanized or plastic with a minimum vertical attachment flange of 3 $\frac{1}{2}$ inches (89 mm) shall be installed to extend a minimum of 1 inch (25 mm) below the foundation plate line on exterior stud walls in accordance with Section R703.8. The water-resistant barrier, as required by Table R703.4, Footnote w, shall comply with Section R703.6.3 and lap over the exterior of the attachment flange of the screed or flashing.

Reason: The overall propose of this change is to consolidate the anchored and adhered veneer installation requirements to one place, by following the siding material sequence established in Table 703.4. Currently the code requirements for adhered veneer are buried in table footnotes; other standards not typically utilized by one- and two-family builders and designers; or, are lost behind the vinyl siding requirements at the end of the Wall Coverings Chapter.

ITEM 1: Corrects the material thicknesses, and anchorage requirements to agree with the remaining code sections and details. The proposed reference to the appropriate tables takes into consideration the differing veneer thicknesses allowed in various Seismic Design Categories.

ITEM 2: This change provides more accurate and descriptive Section titles and relocates code requirements from existing Exceptions, to renumbered sections.

ITEM 3: Adds specific thickness and unit weight requirements for when veneer must be anchored. The code is currently silent on this requirement.

ITEM 4: This item relocates the adhered veneer requirements from the end of the chapter to after the anchored veneer requirements, in keeping with Table 703.4 order of materials, and consolidates requirements for similar exterior wall covering materials. The change also quantifies the maximum allowable veneer thickness and unit weight of adhered veneer.

ITEM 5: A missing cross reference was added to correlate with related code sections; and the sentence grammar was corrected.

Cost Impact: The code change proposal will not increase the cost of construction.

RB375-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R703.4T-RB-KUSIK.doc

RB376 – 13

Figure R703.7

Proponent: Gary J. Ehrlich, P.E., National Association of Home Builders (NAHB) (gehrlich@nahb.org)

Revise as follows:

FIGURE R703.7 **TYPICAL MASONRY VENEER WALL DETAILS**

For SI: 1 inch = 25.4 mm.

- a. See Sections R703.7.5, R703.7.6 and R703.8.
- b. See Sections R703.2 and R703.7.4.
- c. See Section R703.7.4.2 and Table R703.7.4.
- d. See Section R703.7.3.
- e. Figure R703.7 illustrates typical construction details for a masonry veneer wall. For the actual mandatory requirements of the code, see the indicated sections of text. Other details of masonry veneer wall construction shall be permitted provided the requirements of the indicated sections of text met.

(No change to Figure)

Reason: The purpose of this code change is to address potential misapplication of, and particularly improper enforcement of, the masonry veneer wall details. The existing details do not capture all of the possible window head, window sill, and foundation details which can occur in a masonry veneer wall assembly. For example, the current head and sill detail shows a wood window aligned within the wall studs, yet most windows installed today are vinyl, and in many cases the actual window sashes, panes, etc. are outboard of the stud wall. Similarly, most builders provide one course of CMU, or step back the top of a concrete wall, such that floor framing bears far enough above grade to avoid decay resistance requirements. As currently shown, not only the sill plate, but the floor joists, wall studs, and wall sheathing would all need to be preservative-treated or of naturally decay-resistant species because they would not meet the clearances of Section R317.

By retitling both portions of the detail as "typical" and adding the proposed footnote, the code will be clear that the veneer wall details are somewhat schematic, and that it is the code provisions (or, where applicable, manufacturer's instructions for windows, flashing and other elements) that provide the mandatory requirements. This is in keeping with similar titles and notes in other sections of the code, such as Figures R602.3(1), R613.8, and P2903.10 (for "typical") and Table R703.7.3.1 or Figures B-11 and B-12 for the note. The specific text of the note mirrors the note provided with Table R1001.1 for masonry fireplaces and chimneys.

Cost Impact: The code change proposal will not increase the cost of construction.

RB376-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R703.7F-RB-EHRLICH.doc

RB377 – 13

R703.8

Proponent: Jeff Inks, Window and Door Manufacturers Association, Theresa A. Weston, PhD., Dupont Building Innovations (theresa.a.weston@usa.dupont.com)

Revise as follows:

R703.8 Flashing. Approved corrosion-resistant flashing shall be applied shingle-fashion in a manner to prevent entry of water into the wall cavity or penetration of water to the building structural framing components. ~~Self-adhered membranes used as flashing shall comply with AAMA 711.~~ The flashing shall extend to the surface of the exterior wall finish. Approved corrosion-resistant flashings shall be installed at all of the following locations:

1. Exterior window and door openings. Flashing at exterior window and door openings shall extend to the surface of the exterior wall finish or to the water-resistive barrier for subsequent drainage. Self-adhered membranes used as flashing shall comply with AAMA 711. Flashing at exterior window and door openings shall be installed in accordance with one or more of the following:
 - 1.1. The fenestration manufacturer's installation and flashing instructions, or for applications not addressed in the fenestration manufacturer's instructions, in accordance with the flashing manufacturer's instructions. Where flashing instructions or details are not provided, pan flashing shall be installed at the sill of exterior window and door openings. Pan flashing shall be sealed or sloped in such a manner as to direct water to the surface of the exterior wall finish or to the water-resistive barrier for subsequent drainage. Openings using pan flashing shall also incorporate flashing or protection at the head and sides.
 - 1.2. In accordance with the flashing design or method of a registered design professional.
 - 1.3. In accordance with other approved methods.
2. At the intersection of chimneys or other masonry construction with frame or stucco walls, with projecting lips on both sides under stucco copings.
3. Under and at the ends of masonry, wood or metal copings and sills.
4. Continuously above all projecting wood trim.
5. Where exterior porches, decks or stairs attach to a wall or floor assembly of wood-frame construction.
6. At wall and roof intersections.
7. At built-in gutters.

Reason: (INKS) The charging paragraph of Section 703.8 is applicable to all seven locations listed below it. The provision requiring self-adhered membrane used as flashing to comply with AAMA 711 is applicable only to fenestration products (*Voluntary Specification for Self-adhering Flashing Used for Installation of Exterior Wall Fenestration Products*) and is therefore incorrectly located in the charging paragraph. This proposal simply moves the verbatim provision to the proper location in number 1 – Exterior window and door openings.

(WESTON) This proposal moves the reference standard for self-adhered flashing (AAMA 711) to the section specific to window and door openings from the more general flashing section. This would clarify the appropriate use of the referenced standard and provide consistency with the scope of AAMA 711: "*This voluntary specification establishes minimum performance requirements for self adhering flashing surrounding exterior wall fenestration products*".

Cost Impact: This code change proposal will not increase the cost of construction.

RB377-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R703.8-RB-INKS-WESTON.doc

RB378 – 13

R703.8, Chapter 44

Proponent: Theresa A. Weston, PhD., DuPont Building Innovations
(theresa.a.weston@usa.dupont.com)

Revise as follows:

R703.8 Flashing. *Approved* corrosion-resistant flashing shall be applied shingle-fashion in a manner to prevent entry of water into the wall cavity or penetration of water to the building structural framing components. Self-adhered membranes used as flashing shall comply with AAMA 711. The flashing shall extend to the surface of the exterior wall finish. *Approved* corrosion-resistant flashings shall be installed at all of the following locations:

1. Exterior window and door openings. Flashing at exterior window and door openings shall extend to the surface of the exterior wall finish or to the water-resistive barrier for subsequent drainage.
Mechanically attached flexible flashings shall comply with AAMA 712. Flashing at exterior window and door openings shall be installed in accordance with one or more of the following:
 - 1.1. The fenestration manufacturer's installation and flashing instructions, or for applications not addressed in the fenestration manufacturer's instructions, in accordance with the flashing manufacturer's instructions. Where flashing instructions or details are not provided, pan flashing shall be installed at the sill of exterior window and door openings. Pan flashing shall be sealed or sloped in such a manner as to direct water to the surface of the exterior wall finish or to the water-resistive barrier for subsequent drainage. Openings using pan flashing shall also incorporate flashing or protection at the head and sides.
 - 1.2. In accordance with the flashing design or method of a registered design professional.
 - 1.3. In accordance with other approved methods.
2. At the intersection of chimneys or other masonry construction with frame or stucco walls, with projecting lips on both sides under stucco copings.
3. Under and at the ends of masonry, wood or metal copings and sills.
4. Continuously above all projecting wood trim.
5. Where exterior porches, decks or stairs attach to a wall or floor assembly of wood-frame construction.
6. At wall and roof intersections.
7. At built-in gutters.

Add new standard to Chapter 44 as follows:

AAMA

AAMA 712-11 Voluntary Specification for Mechanically Attached Flexible Flashing

Reason: This proposal will add new requirements to the code for mechanically attached flexible flashing materials. Water entry at interfaces, including those around fenestration, has been a significant cause of construction defects. Setting minimum standards for the materials used at these interfaces is important to the durability of construction. Material property/performance requirements are currently included in the code only for self-adhered flashings, but should also be included for other types of systems. AAMA 712 was developed by industry to insure that mechanically attached flexible flashing materials meet minimum performance specifications. This proposal incorporates this industry standard by reference into the code. The properties and quality of flashing materials are crucial to successful implementation of the water management in wall systems.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, AAMA 712 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

RB378-13

Public Hearing: Committee: AS AM D

Assembly:

ASF

AMF

DF

R703.8 #3-RB-WESTON.doc

RB379 – 13

R703.8, Chapter 44

Proponent: Theresa A. Weston, PhD., DuPont Building Innovations
(theresa.a.weston@usa.dupont.com)

Revise as follows:

R703.8 Flashing. *Approved* corrosion-resistant flashing shall be applied shingle-fashion in a manner to prevent entry of water into the wall cavity or penetration of water to the building structural framing components. Self-adhered membranes used as flashing shall comply with AAMA 711. The flashing shall extend to the surface of the exterior wall finish. *Approved* corrosion-resistant flashings shall be installed at all of the following locations:

1. Exterior window and door openings. Flashing at exterior window and door openings shall extend to the surface of the exterior wall finish or to the water-resistive barrier for subsequent drainage. Fluid applied membranes used as flashing shall comply with AAMA 714. Flashing at exterior window and door openings shall be installed in accordance with one or more of the following:

- 1.1. The fenestration manufacturer's installation and flashing instructions, or for applications not addressed in the fenestration manufacturer's instructions, in accordance with the flashing manufacturer's instructions. Where flashing instructions or details are not provided, pan flashing shall be installed at the sill of exterior window and door openings. Pan flashing shall be sealed or sloped in such a manner as to direct water to the surface of the exterior wall finish or to the water-resistive barrier for subsequent drainage. Openings using pan flashing shall also incorporate flashing or protection at the head and sides.
- 1.2. In accordance with the flashing design or method of a registered design professional.
- 1.3. In accordance with other approved methods.
2. At the intersection of chimneys or other masonry construction with frame or stucco walls, with projecting lips on both sides under stucco copings.
3. Under and at the ends of masonry, wood or metal copings and sills.
4. Continuously above all projecting wood trim.
5. Where exterior porches, decks or stairs attach to a wall or floor assembly of wood-frame construction.
6. At wall and roof intersections.
7. At built-in gutters.

Add new standard to Chapter 44 as follows:

AAMA

AAMA 714-12 Voluntary Specification for Liquid Applied Flashing Used to Create a Water-Resistive Seal around Exterior Wall Openings in Buildings

Reason: This proposal will add new requirements to the code for fluid-applied membranes used as flashing materials. Water entry at interfaces, including those around fenestration, has been a significant cause of construction defects. Setting minimum standards for the materials used at these interfaces is important to the durability of construction. Material property/performance requirements are currently included in the code only for self-adhered flashings, but should also be included for other types of systems. AAMA 714, was developed by industry to insure that fluid-applied material meet minimum performance specifications. This proposal incorporates this industry standard by reference into the code. The properties and quality of flashing materials are crucial to successful implementation of the water management in wall systems.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, AAMA 714 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

RB379-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R703.8 #2-RB-WESTON.doc

RB380 – 13

R703.8

Proponent: James D. Katsaros, DuPont Building Innovations (james.d.katsaros@dupont.com)

Revise as follows:

R703.8 Flashing. *Approved* corrosion-resistant flashing shall be applied shingle-fashion in a manner to prevent entry of water into the wall cavity or penetration of water to the building structural framing components. Self-adhered membranes used as flashing shall comply with AAMA 711. The flashing shall extend to the surface of the exterior wall finish. *Approved* corrosion-resistant flashings shall be installed at all of the following locations:

1. Exterior window and door openings. Flashing at exterior window and door openings shall extend to the surface of the exterior wall finish or to the water-resistive barrier complying with Section 703.2 for subsequent drainage. Flashing at exterior window and door openings shall be installed in accordance with one or more of the following:
 - 1.1. The fenestration manufacturer's installation and flashing instructions, or for applications not addressed in the fenestration manufacturer's instructions, in accordance with the flashing manufacturer's instructions. Where flashing instructions or details are not provided, pan flashing shall be installed at the sill of exterior window and door openings. Pan flashing shall be sealed or sloped in such a manner as to direct water to the surface of the exterior wall finish or to the water-resistive barrier for subsequent drainage. Openings using pan flashing shall also incorporate flashing or protection at the head and sides.
 - 1.2. In accordance with the flashing design or method of a registered design professional.
 - 1.3. In accordance with other approved methods.
2. At the intersection of chimneys or other masonry construction with frame or stucco walls, with projecting lips on both sides under stucco copings.
3. Under and at the ends of masonry, wood or metal copings and sills.
4. Continuously above all projecting wood trim.
5. Where exterior porches, decks or stairs attach to a wall or floor assembly of wood-frame construction.
6. At wall and roof intersections.
7. At built-in gutters.

Reason: This proposal provides a pointer to the code section which specifies water-resistive barriers and their installation. Because the flashing integration with the water-resistive barrier is critical to the performance of the envelope system, it is critical that the water-resistive barrier is installed correctly. This pointer, while not changing the existing code requirements, will add emphasis to the criticality of integration and performance of the entire system.

Correct installation and integration of flashing and water-resistive barrier systems is a significant cause of moisture related construction defects. A recent study (K.R. Grosskopf, P. Oppenheim and T. Brennan, "Preventing Defect Claims In Hot, Humid Climates" ASHRAE Journal, July 2008) reported "*findings from participants who were involved in more than 17,000 combined total construction defect claims indicate that 84% of claims are associated with moisture-related defects in building envelope systems (69%) and building mechanical systems (15%). More than half (53%) of all defects are caused by faulty installation.*"

Cost Impact: The code change proposal will not increase the cost of construction.

RB380-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R703.8 #4-RB-WESTON.doc

RB381 – 13

R703.9, R703.9.1, R703.9.2, R703.9.2.1, R703.9.2.2, R703.9.3, R703.9.4, R703.9.4.1, R703.9.4.2

Proponent: Jesse J Beitel, Hughes Associates, Inc. representing EIFS Industry Members Association

Revise as follows:

R703.9 Exterior insulation and finish system (EIFS)/EIFS with drainage. Exterior Insulation and Finish Systems (EIFS) shall comply with this chapter and Sections R703.9.1, ~~and R703.9.3~~. EIFS with drainage shall comply with this chapter and Sections R703.9.2, ~~R703.9.3 and R703.9.4~~.

R703.9.1 Exterior insulation and finish systems (EIFS). EIFS shall comply with ~~ASTM E 2568~~. all of the following:

1. EIFS shall comply with ASTM E 2568.
2. EIFS shall be limited to applications over concrete or masonry wall assemblies (substrates).
3. Flashing of EIFS shall be provided in accordance with the requirements of Section R703.8.
4. EIFS shall be installed in accordance with the manufacturer's installation instructions.
5. The EIFS shall terminate not less than 6 inches (152 mm) above the finished ground level.
6. Decorative trim shall not be face nailed through the EIFS.

R703.9.2 Exterior insulation and finish system (EIFS) with drainage. EIFS with drainage shall comply with all of the following: ~~ASTM E 2568 and shall have an average minimum drainage efficiency of 90 percent when tested in accordance with ASTM E 2273.~~

1. EIFS with drainage shall comply with ASTM E 2568.
2. EIFS with drainage shall be required over all wall assemblies with the exception of concrete and masonry wall assemblies (substrates).
3. EIFS with drainage shall have an average minimum drainage efficiency of 90 percent when tested in accordance with ASTM E 2273.
4. The water-resistive barrier shall comply with Section R703.2 or ASTM E 2570.
5. The water-resistive barrier shall be applied between the EIFS and the wall sheathing.
6. Flashing of EIFS with drainage shall be provided in accordance with the requirements of Section R703.8.
7. EIFS with drainage shall be installed in accordance with the manufacturer's installation instructions.
8. The EIFS with drainage shall terminate not less than 6 inches (152 mm) above the finished ground level.
9. Decorative trim shall not be face nailed through the EIFS with drainage.

~~R703.9.2.1 Water-resistive barrier.~~ The water-resistive barrier shall comply with Section R703.2 or ASTM E 2570.

~~R703.9.2.2 Installation.~~ The water-resistive barrier shall be applied between the EIFS and the wall sheathing.

~~R703.9.3 Flashing, general.~~ Flashing of EIFS shall be provided in accordance with the requirements of Section R703.8.

~~R703.9.4 EIFS/EIFS with drainage installation.~~ All EIFS shall be installed in accordance with the manufacturer's installation instructions and the requirements of this section.

~~R703.9.4.1 Terminations.~~ The EIFS shall terminate not less than 6 inches (152 mm) above the finished ground level.

~~R703.9.4.2 Decorative trim.~~ Decorative trim shall not be face nailed through the EIFS.

Reason: When the EIFS section was added to the IRC in the 2009 edition, it was industry's position that EIFS (also known as "barrier" EIFS or EIFS without drainage) would be limited to applications over concrete or masonry substrates. It was also the industry's intent that EIFS with drainage shall be required on framed/sheathed walls constructed under the IRC. These applications were and still are consistent with the ICC Evaluation Service Reports for these products.

In examining the the existing Code text, it appears that the industry's intent may not be clear. For example, in Section 703.1.1, Exception 2 allows an "opt out" for the need for a means of drainage in the exterior wall envelope if it can meet the requirements of ASTM E331. Thus, while an EIFS "barrier" system could meet this requirement, the industry does not recommend this application on residential framed/sheathed construction. This restriction is consistent with the various EIFS manufacturer's ICC-ES Reports.

Thus, the proposed Code proposal provides clear language that addresses this potential issue. Additionally, upon review of the existing Code section, there appears to be several areas that were unclear as to the requirements for the EIFS and/or the EIFS with drainage. As such, the section has been reordered so as to provide clarity for the requirements of each type of EIFS.

Cost Impact: The code change proposal will not increase the cost of construction.

RB381-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R703.9-RB-BEITEL.doc

RB382 – 13

R703.10.1, Chapter 44

Proponent: John Mulder, Intertek Testing Services NA, Inc., representing International Standards Organization Technical Committee 77, *Products in Fibre-reinforced Cement* and self

Revise as follows:

R703.10.1 Panel siding. Fiber-cement panels shall comply with the requirements of ASTM C 1186, Type A, minimum Grade II or ISO 8336, Category A, minimum Class 2. Panels shall be installed with the long dimension either parallel or perpendicular to framing. Vertical and horizontal joints shall occur over framing members and shall be sealed with caulking, covered with battens or shall be designed to comply with Section R703.1. Panel siding shall be installed with fasteners according to Table R703.4 or *approved* manufacturer's installation instructions.

Add new standard to Chapter 44 as follows:

ISO

8336 – Fibre-Cement Flat Sheets – Product Specification and Test Methods

Reason: Performance requirements of ISO 8336, *Fibre-cement flat sheets – Product specification and test methods*, have been harmonized with the performance requirements of ASTM C1186, *Standard Specification for Flat Non-Asbestos Fiber-Cement Sheets*. Fiber-cement siding producers in Mexico, Central and South America, Europe, Asia, Australia and New Zealand currently manufacture and test their fiber-cement siding products for compliance with ISO 8336. The inclusion of this Standard reference in the IBC will permit manufacturers worldwide to demonstrate product compliance to IBC requirements. The addition of a reference to ISO 8336 in the Code removes a barrier to trade. Additional editorial changes are proposed to clarify the nature of the required vertical and/or horizontal joint protection to include reference to *approved* caulking and the recognition of both vertical or horizontal shiplap joints as a means of protecting the joints as is also common with wood panel siding.

IBC Section 1405.16.1 has, as a result of the IBC Group A Code Hearings, been revised to adopt this additional Standards reference (see attached Committee Action). This proposed revision brings the two building codes (IBC & IRC) and the applicable code sections and standards references into general alignment.

Cost Impact: The code change proposal will not increase the cost of construction because the product is already recognized for use in the Code. Reference to compliance with this alternative standard, an International Standard requiring the same performance as the ASTM Standard, will reduce barriers to trade by allowing foreign products complying with ISO 8336, Category A, minimum Class 2, market access to the United States without the need for additional product compliance documentation.

Analysis: A review of the standard proposed for inclusion in the code, ISO 8336 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

RB382-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R703.10.1-RB-MULDER.doc

RB383 – 13

R202 (NEW), Table R703.4, R703.11.1.1, R703.11.1.2 (NEW), R703.11.1.3 (NEW)

Proponent: Matt Dobson, Vinyl Siding Institute (mdobson@vinylsiding.org)

Revise as follows:

TABLE R703.4 WEATHER-RESISTANT SIDING ATTACHMENT AND MINIMUM THICKNESS

For SI: 1 inch = 25.4 mm.

- y. Minimum fastener length must accommodate be sufficient to penetrate sheathing other nailable substrate and penetrate framing 0.75 inches a total of a minimum of 1 ¼ inches or in accordance with the manufacturer's installation instructions.
- z. Where approved by the manufacturer's instructions or test report siding shall be permitted to be installed with fasteners penetrating not less than 0.75 inches through wood or wood structural sheathing with or without penetration into the framing. Where specified by the manufacturer's instructions and supported by a test report, fasteners are permitted to penetrate into or fully through nailable sheathing or other nailable substrate of minimum thickness specified by the instructions or test report, without penetrating into framing.

(Portions of Table not shown remain unchanged)

R703.11.1.1 Fasteners. Unless specified otherwise by the manufacturer's instructions, fasteners for vinyl siding shall be 0.120 shank diameter nail with a 0.313 head or 16 gauge staple with a 3/8 to 1/2-inch crown.

R703.11.1.2 Penetration Depth. Unless specified otherwise by the manufacturer's instructions, fasteners shall penetrate into building framing. The total penetration into sheathing, furring framing or other nailable substrate shall be 1-1/4 inches. Where specified by the manufacturer's instructions and supported by a test report, fasteners are permitted to penetrate into or fully through nailable sheathing or other nailable substrate of minimum thickness specified by the instructions or test report, without penetrating into framing. Where the fastener penetrates fully through the sheathing, the end of the fastener shall extend a minimum of ¼ inch beyond the opposite face of the sheathing or nailable substrate.

R703.11.1.3 Spacing. Unless specified otherwise by the manufacturer's instructions, the maximum spacing between fasteners for horizontal siding shall be 16 inches, and for vertical siding 12 inches both horizontally and vertically. Where specified by the manufacturer's instructions and supported by a test report, greater fastener spacing is permitted.

R703.11.1.4 Vinyl soffit panels. Soffit panels shall be individually fastened to a supporting component such as a nailing strip, fascia or subfascia component or as specified by the manufacturer's instructions.

Add new definition as follows:

NAILABLE SUBSTRATE. A product or material such as framing, sheathing, or furring, composed of wood or wood-based materials, or other materials and fasteners providing equivalent fastener withdrawal resistance under transverse load.

Reason: Currently information on vinyl siding fastener specifications, penetration, and spacing is found only in Table 703.4 and its footnotes. The first purpose of this proposal is to place those requirements into code text where they are more easily found and can be more clearly stated.

The second reason is to ensure that certain requirements, which have been implied but not explicitly stated in the codes, are included. Vinyl siding can be used in conjunction with a variety of sheathing types, some of which contribute to resisting fastener withdrawal, and some which don't. It is necessary to ensure that, regardless of the sheathing type, the total penetration into a material capable of holding fasteners is equivalent to what was used during testing of the siding. For typical siding installations, this is ¾ inch into framing plus approximately ½ inch through wood sheathing, for a total of 1-1/4 inch of penetration into "nailable"

material. This minimum penetration would be required unless a different penetration is specified in the manufacturer's instructions. A definition of "nailable substrate" is added to define what is considered to be "nailable".

Where the siding is used over a non-nailable material, then the total penetration must still be achieved, in this case by using a fastener long enough to accommodate the thickness of non-nailable material and penetrate the full 1-1/4 inches into framing or a combination of framing and other nailable material. By stating the requirement in terms of the total required penetration, rather than only in terms of framing penetration, it should be clear what penetration is needed for all installations.

This is not a new requirement, but needs to be more explicitly stated. The definition of nailable substrate and requirement for minimum total penetration into nailable substrate have already been added to several ICC-ES Evaluation Reports.

In addition to the above, the maximum fastener spacing for both horizontal and vertical siding has been added to the code text. The IRC previously had no provision for fastener spacing for vertical siding; the proposed requirement is the same as that currently in the IBC.

Cost Impact: The code change proposal will not increase the cost of construction.

RB383-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R703.11.1.1 (NEW)-RB-DOBSON.doc

RB384 – 13

R703.11.2, R703.11.2.1, R703.11.2.2

Proponent: Dennis Pitts, American Wood Council (dpitts@awc.org)

Revise as follows:

R703.11.2 Vinyl siding used with foam plastic sheathing. Vinyl siding used with foam plastic sheathing shall be installed in accordance with Section R703.11.2.1, R703.11.2.2, or R703.11.2.3.

R703.11.2.1 Exception: Where the foam plastic sheathing is applied directly over wood structural panels, fiberboard, gypsum sheathing or other *approved* backing capable of independently resisting the design wind pressure, the vinyl siding shall be installed in accordance with Section R703.11.1.

~~R703.11.2.1 Basic wind speed not exceeding 90 miles per hour and Exposure Category B.~~ Where the basic wind speed does not exceed 90 miles per hour (40 m/s), the Exposure Category is B and gypsum wall board or equivalent is installed on the side of the wall opposite the foam plastic sheathing, the minimum siding fastener penetration into wood framing shall be 1 1/4 inches (32 mm) using minimum 0.120-inch diameter nail (shank) with a minimum 0.313-inch diameter head, 16 inches on center. The foam plastic sheathing shall be minimum 1/2-inch-thick (12.7 mm) (nominal) extruded polystyrene per ASTM C 578, 1/2-inch-thick (12.7 mm) (nominal) polyisocyanurate per ASTM C 1289, or 1-inch-thick (25 mm) (nominal) expanded polystyrene per ASTM C 578.

~~R703.11.2.2 Basic wind speed exceeding 90 miles per hour or Exposure Categories C and D.~~ Where the basic wind speed exceeds 90 miles per hour (40 m/s) or the Exposure Category is C or D, or all conditions of Section R703.11.2.1 are not met, the adjusted design pressure rating for the assembly shall meet or exceed the loads listed in Tables R301.2(2) adjusted for height and exposure using Table R301.2(3). The design wind pressure rating of the vinyl siding for installation over solid sheathing as provided in the vinyl siding manufacturer's product specifications shall be adjusted for the following wall assembly conditions:

- ~~1. For wall assemblies with foam plastic sheathing on the exterior side and gypsum wall board or equivalent on the interior side of the wall, the vinyl siding's design wind pressure rating shall be multiplied by 0.39.~~
- ~~2. For wall assemblies with foam plastic sheathing on the exterior side and no gypsum wall board or equivalent on the interior side of wall, the vinyl siding's design wind pressure rating shall be multiplied by 0.27.~~

R703.11.2.2 Where the foam plastic sheathing is installed directly over studs and the foam plastic sheathing attachment is not designed to separately resist 100% of the wind load, the design wind pressure rating of the vinyl siding shall be multiplied by 0.27 and the result shall not be less than the design wind pressure load as determined in Section 703.1.2. The vinyl siding shall be installed in accordance with the manufacturer's instructions for the design wind pressure resistance rating.

Exception: For conditions where the design wind suction load as determined in Section 703.1.2 does not exceed 30 psf and the interior surface of the wall is sheathed with 1/2-in gypsum wallboard or equivalent, the design wind pressure rating of the vinyl siding shall be permitted to be multiplied by 0.30 rather than 0.27.

Reason: The proposed revisions intend to bring provisions for use of vinyl siding to secure foam plastic sheathing to resist wind suction loads more in line with requirements for sheathing products used structurally for wind resistance. Specifically, revisions are based on an assumption that the same wind suction loads applicable for securing exterior structural sheathing products to wall studs (i.e. either 100% or 90% of the wind suction loads) are also applicable for vinyl siding securing foam plastic sheathing to studs.

The following revisions are implemented: 1) removal of the 90 mph and less wind speed provisions of 703.11.2 due to inadequate wind resistance provided by the requirements when judged against standard requirements for wind design; and 2)

reduction of the 0.39 wind pressure rating adjustment factor to 0.30 based on an assumption that the vinyl siding used to secure exterior foam plastic sheathing to wall studs should resist the same loads as required for design of the foam plastic sheathing to resist wind loads (i.e. 90% of the wind loads versus 70% of the wind loads associated with the 0.39 factor). Two options for use of vinyl to secure foam plastic sheathing to studs are unchanged by this proposal: the 0.27 factor in R703.11.2.2 for cases where vinyl siding secures foam plastic sheathing to studs and interior gypsum is not present; and R703.11.2.3 which relies on availability and approval of vinyl siding manufacturer's instructions specifically for use over foam plastic sheathing for wind resistance.

Proposed revisions are summarized in Table 1. Additional details on revised wind pressure rating adjustment factors, wind load requirements for other structural sheathing products, and elimination of the 90 mph and less wind speed provisions are provided below.

Table 1. Summary of proposed change

Current Section Number	Proposed Section Number	Vinyl Siding Installed over:	2012 IRC Factors			Proposed Factors			Summary
			PEF	SF	WPR	PEF	SF	WPR	
R703.11.2 Exception	R703.11.2.1	Foam sheathing backed by materials designed to resist 100% of wind loads	0.36	1.5	1.00	0.36	1.5	1.00	(No Change)
R703.11.2.1	---	Foam sheathing with Interior GWB (90 mph, Exposure B)	0.36	1.5	1.00	-	-	-	(Deleted)
R703.11.2.2(1)	R703.11.2.2	Foam sheathing without interior GWB	1.00	2.0	0.27	1.00	2.0	0.27	(No Change)
R703.11.2.2(2)	R703.11.2.2 Exception	Foam sheathing with interior GWB (limited to design pressure not exceeding 30 psf)	0.70	2.0	0.39	0.90	2.0	0.30	(Revised)
R703.11.2.3	R703.11.2.3	Manufacturer specification for installation over foam sheathing approved to resist 100% of wind loads	Proprietary Systems						(No Change)
PEF - Pressure Equalization Factor SF - Safety Factor WPR - Wind Pressure Rating adjustment factor WPR = 0.36*1.5/PEF/SF									

Basis of vinyl siding wind rating adjustment factors

Vinyl siding wind pressure ratings are established using provisions in ASTM D 3679 Annex 1 and assume that the vinyl siding is installed over a backing material capable of resisting 100% of the wind suction loads (i.e. $PEF=1.0$). In those provisions, the test pressure of 15.73 psf is established as a minimum requirement based on an assumption that the vinyl siding resists only 36% of the wind suction loads (i.e. $PEF=0.36$) and a safety factor of 1.5. These assumptions, referred to herein as the reference case assumptions for vinyl siding wind pressure rating, are shown in Equation 1. Equation 1 can be found in ASTM D 3679 and relates test pressure, P_t , to design pressure, D_p :

$$P_t = D_p \times 0.36 \times 1.5 \quad \text{Eq. 1}$$

For a design suction pressure, D_p , of 29.12 lb/ft² associated with 110 mph wind speed, Exposure B and 30 ft mean roof height, the required test pressure, P_t , is 15.73 lb/ft².

In 2006, changes were brought forward to address how to use these ASTM D 3679 design wind pressure ratings when vinyl siding is installed over a backing material that can't independently resist 100% of the wind loads, such as when used over many of the foam plastic sheathing products which rely on vinyl siding and its fastening to studs to secure the foam plastic sheathing to the wall studs. At that time, a wind pressure rating adjustment factor of 0.39 was approved for applications where vinyl siding was used to secure foam plastic sheathing to wall studs based on the assumption that it was securing the foam plastic sheathing for 70% of the wind suction loads (i.e. $PEF = 0.70$) acting on the exterior foam plastic sheathing while the remaining 30% was assumed to be resisted by interior gypsum wallboard. In addition to accounting for increased wind loads resisted by the vinyl siding (from 36% to 70%), the 0.39 factor also accounted for an increase in safety factor from 1.5 to 2.0 in recognition of the increased importance of vinyl siding when used to structurally secure foam plastic sheathing to wall studs.

Rationale for use 0.30 adjustment factor in lieu of the 0.39 factor in R703.11.2.

Since the original code change that introduced wind pressure rating adjustment factors, progress has been made to standardize the wind resistance of foam plastic sheathing with the development of ANSI/SBCA FS 100-12 *Standard Requirements for Wind Pressure Resistance of Foam Plastic Insulating Sheathing Used in Exterior Wall Covering Assemblies*. Notably, for applications where gypsum wallboard or equivalent material is provided as an interior finish, design of the foam plastic sheathing layer for 90% of the wind suction loads (i.e. $PEF=0.90$) is permitted per SBCA FS 100-12 Section 6.4 as follows:

“6.4 Pressure Equalization Factor (PEF). A PEF of 1.0 shall be required for *exterior wall sheathing* applications.

Exceptions:

1. For conditions where the design negative wind pressure load determined in accordance with Section 4.0 does not exceed 30 psf, a PEF of 0.9 shall be permitted to determine negative wind pressure resistance only for *exterior wall sheathing* on wall assemblies having an interior finish of at least 0.5-inch-thick gypsum wall board (ASTM C1396) or any material of at least equivalent bending strength, rigidity and air permeability.”

Design using a PEF value of 0.9, or 90% of the wind suction loads, represents an approximate 29 percent increase in loads in the foam plastic sheathing layer relative to the 70% wind load assumption used in derivation of the 0.39 factor. Consistent with the original derivation, the vinyl siding used to secure the foam plastic sheathing to the wall studs must also be designed to resist the load for which the sheathing is designed. As a result, the 0.39 factor is reduced to 0.30 in recognition of the increase from 70% to 90% of wind loads on the foam plastic sheathing layer and resisted by the vinyl siding: $0.39 \times (0.7/0.9) = 0.30$. Additional information on the derivation of the 0.30 factor, consistent with assumptions in derivation of existing factors in the IRC, is provided below as additional background.

For the reference case where vinyl siding wind pressure resistance is based on installation over structural sheathing capable of resisting 100% of the wind loads, test pressure, P_t , and design pressure, D_p , are related as previously shown in Equation 1 and repeated in Equation 2 for ease of reference. In this case, vinyl siding is assumed to resist 36% of the wind loads and a safety factor of 1.5 is applicable.

$$P_t = D_p(\text{reference}) \times 0.36 \times 1.5 \quad \text{Eq. 2}$$

For the structural case where vinyl siding is used to secure foam plastic sheathing to wall studs for resistance to wind suction loads, test pressure, P_t , and design pressure, D_p , are related as shown in Equation 3. In this case, vinyl siding is assumed to resist 90% of the wind loads (the same loads as used for design of the foam plastic sheathing) and a safety factor of 2 is applicable.

$$P_t = D_p(\text{structural}) \times 0.90 \times 2.0 \quad \text{Eq. 3}$$

Equating P_t from Equation 2 and 3 and solving for $D_p(\text{structural})$ results in a factor of 0.30 as follows:

$$D_p(\text{structural}) = 0.30 D_p(\text{reference}) \quad \text{Eq. 4}$$

The PEF of 0.9 recognizes that gypsum wallboard on the interior face of the wall has been shown to resist a portion of the full wind load. It is important to note; however, that the amount resisted by the gypsum wallboard continues to be studied since the contribution is a function of the relative air permeability of the exterior wall sheathing and the interior gypsum wallboard and the relative strength and stiffness of the exterior wall sheathing and the interior gypsum wallboard to name a few variables, many of which are difficult to quantify and control at time of fabrication and over time. These are among some of the reasons why the PEF of 0.7 previously assumed for development of the 0.39 factor was increased to a PEF of 0.9 resulting in a 0.30 factor. Given the sensitivity of pressure equalization to level of pressure, relative porosity of the inside wall layer to the outside wall layer, pressures used in PEF testing, and in recognition of use of gypsum wallboard in much of the underlying PEF testing, the 0.30 adjustment is only applicable when the design wind suction load does not exceed 30 psf.

The adjustment factor of 0.27 in R703.11.2.2 remains unchanged by this proposal

Where vinyl siding is used to hold the foam plastic sheathing onto the wall studs and gypsum wallboard or equivalent interior finish is not present, the default condition in SBCA FS 100-12 applies and PEF of 1.0 is used (i.e. 100% of wind load resisted by exterior foam plastic sheathing). In this case, the vinyl siding used to secure the foam plastic sheathing to the wall studs must also be designed to resist 100% of the load, equal to the load for which the sheathing is designed. The resulting wind pressure rating factor is 0.27 and remains unchanged in the proposed revisions.

Basis for removal of the 90 mph and less wind speed provisions of current R703.11.2.1

The current provisions of R703.11.2.1 have been proposed for deletion. These provisions exempt the user from checking the wind resistance of the vinyl siding if the building is located in an area where the wind speed is 90 mph or less, Wind Exposure B, and the interior finish is gypsum wallboard. These provisions result in significantly lower wind resistance than required by section R703.1.2. For example, the wind loads associated with 90 mph Exposure B is a maximum suction (negative) pressure of 19.5 psf for a 30' mean roof height (see Table 2). The minimum required test pressure for vinyl siding in accordance with ASTM D 3679 is only 15.73 psf. In this example, the minimum required test pressure is only 80% of the design pressure. It is important to note that the minimum test pressure should substantially exceed the design pressure to provide a margin of safety.

Table 2. Design wind pressure for wall claddings and cladding attachments (psf)

Wind exposure category	Mean roof height (ft)	BASIC WIND SPEED, V_{ASD} (mph-3-second gust)							
		85		90		100		110	
		max +	max -	max +	max -	max +	max -	max +	max -
B	0-15	13.0	-17.4	14.6	-19.5	18.0	-24.1	21.8	-29.1
	20	13.0	-17.4	14.6	-19.5	18.0	-24.1	21.8	-29.1
	25	13.0	-17.4	14.6	-19.5	18.0	-24.1	21.8	-29.1
	30	13.0	-17.4	14.6	-19.5	18.0	-24.1	21.8	-29.1
	35	13.6	-18.2	15.2	-20.4	18.8	-25.2	22.7	-30.5
C	0-15	15.7	-21.1	17.7	-23.6	21.8	-29.2	26.4	-35.3
	20	16.7	-22.4	18.8	-25.1	23.2	-31.0	28.0	-37.5
	25	17.5	-23.5	19.7	-26.3	24.3	-32.5	29.4	-39.3
	30	18.2	-24.4	20.4	-27.4	25.2	-33.8	30.5	-40.9
	35	18.8	-25.2	21.1	-28.3	26.1	-34.9	31.5	-42.2

Note: Design wind pressures calculated by combining wall cladding loads (for effective wind area of 10 ft²) in Table R301.2(2) and height and exposure coefficients in Table R301.2(3). Negative (-) wind pressures represent wind suction pressures.

The extent of under-design of the vinyl siding is exacerbated when considering that 15.73 psf represents an average of 3-4 test results and does not reflect minimum values. Application of the wind pressure resistance rating described above demonstrates the extent of under-design. For the case where interior gypsum finish is present, the adjusted wind pressure resistance for the minimum vinyl siding per ASTM D 3679 becomes $0.30 \times 29.1 = 8.7$ psf. The value of 8.7 psf is less than half of the 19.5 psf value required for 90 mph wind speeds, Exposure B at a 30' mean roof height.

In summary, this proposal deletes the current R703.11.2.1 provisions that exempt the user from checking the wind resistance of the vinyl siding in a 90 mph Exposure B area. Both the revised section R703.11.2.2 and existing section R703.11.2.3 still remain and allow the proper installation of vinyl siding installed over foam sheathing in accordance with the vinyl siding manufacturer's installation instructions.

Cost Impact: The code change proposal will increase the cost of construction.

RB384-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R703.11.2-RB-PITTS.doc

RB385 – 13

Table R703.4, R703.11.2

Proponent: Matt Dobson, Vinyl Siding Institute (mdobson@vinylsiding.org)

Revise as follows:

**TABLE R703.4
WEATHER-RESISTANT SIDING ATTACHMENT AND MINIMUM THICKNESS**

SIDING MATERIAL	NOMINAL THICKNESS ^a (inches)	JOINT TREATMENT	WATER-RESISTIVE BARRIER REQUIRED	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS ^{b, c, d}					
				Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud	Direct to studs	Number or spacing of fasteners
<u>Insulated Vinyl Siding^{aa}</u>	<u>0.035 (vinyl siding layer only)</u>	<u>Lap</u>	<u>Yes</u>	<u>0.120 nail (shank) with a 0.313 head or 16 gauge crown^{z,c}</u>	<u>0.120 nail (shank) with a 0.313 head or 16 gauge crown^x</u>	<u>0.120 nail (shank) with a 0.313 head or 16 gauge crown^x</u>	<u>0.120 nail (shank) with a 0.313 head per Section R703.11.2</u>	<u>Not Allowed</u>	<u>16 inches on center or specified by manufacturer instructions, test report or other sections of this code.</u>

(Portions of Table not shown remain unchanged)

For SI: 1 inch = 25.4 mm.

- a. Based on stud spacing of 16 inches on center where studs are spaced 24 inches, siding shall be applied to sheathing approved for that spacing.
- b. Nail is a general description and shall be T-head, modified round head, or round head with smooth or deformed shanks.
- c. Staples shall have a minimum crown width of $7/16$ -inch outside diameter and be manufactured of minimum 16-gage wire.
- d. Nails or staples shall be aluminum, galvanized, or rust-preventative coated and shall be driven into the studs where fiberboard, gypsum, or foam plastic sheathing backing is used. Where wood or wood structural panel sheathing is used, fasteners shall be driven into studs unless otherwise permitted to be driven into sheathing in accordance with the siding manufacturer's installation instructions.
- e. Aluminum nails shall be used to attach aluminum siding.
- f. Aluminum (0.019 inch) shall be unbacked only when the maximum panel width is 10 inches and the maximum flat area is 8 inches. The tolerance for aluminum siding shall be +0.002 inch of the nominal dimension.
- g. All attachments shall be coated with a corrosion-resistant coating.
- h. Shall be of approved type.
- i. Three-eighths-inch plywood shall not be applied directly to studs spaced more than 16 inches on center when long dimension is parallel to studs. Plywood $1/2$ -inch or thinner shall not be applied directly to studs spaced more than 24 inches on center. The stud spacing shall not exceed the panel span rating provided by the manufacturer unless the panels are installed with the face grain perpendicular to the studs or over sheathing approved for that stud spacing.
- j. Wood board sidings applied vertically shall be nailed to horizontal nailing strips or blocking set 24 inches on center. Nails shall penetrate $1\frac{1}{2}$ inches into studs, studs and wood sheathing combined or blocking.
- k. Hardboard siding shall comply with CPA/ANSI A135.6.
- l. Vinyl siding shall comply with ASTM D 3679.
- m. Minimum shank diameter of 0.092 inch, minimum head diameter of 0.225 inch, and nail length must accommodate sheathing and penetrate framing $1\frac{1}{2}$ inches.
- n. When used to resist shear forces, the spacing must be 4 inches at panel edges and 8 inches on interior supports.
- o. Minimum shank diameter of 0.099 inch, minimum head diameter of 0.240 inch, and nail length must accommodate sheathing and penetrate framing $1\frac{1}{2}$ inches.
- p. Vertical end joints shall occur at studs and shall be covered with a joint cover or shall be caulked.
- Q. See Section R703.10.1.
- r. Fasteners shall comply with the nominal dimensions in ASTM F 1667.
- s. See Section R703.10.2.
- t. Face nailing: one 6d common nail through the over lap pining planks at each stud. Concealed nailing: one 11 gage $1\frac{1}{2}$ inch long galv. roofing nail through the top edge of each plank at each stud.
- u. See Section R703.2 exceptions.
- v. Minimum nail length must accommodate sheathing and penetrate framing $1\frac{1}{2}$ inches.
- w. Adhered masonry veneer shall comply with the requirements of Section R703.6.3 and shall comply with the requirements in Sections 6.1 and 6.3 of TMS-402 ACI 530/ASCE 5.

- x. Vertical joints, if staggered shall be permitted to be away from studs if applied over wood structural panel sheathing.
- y. Minimum fastener length must accommodate sheathing and penetrate framing 0.75 inches or in accordance with the manufacturer's installation instructions.
- z. Where approved by the manufacturer's instructions or test report siding shall be permitted to be installed with fasteners.
- aa. Insulated vinyl siding shall comply with ASTM D 7793.

R703.11.2 Foam plastic sheathing. Vinyl siding and insulated vinyl siding used with foam plastic sheathing shall be installed in accordance with Section R703.11.2.1, R703.11.2.2, or R703.11.2.3.

Reason: There is general consensus among manufacturers on the installation practices for insulated vinyl siding, including several requirements that can be integrated into the installation requirements in Table R703.4. Installation specifications are very similar to vinyl siding.

These include:

- Minimum thickness requirement from ASTM D7793
- That the siding must be installed over a water-resistive Barrier
- Size of nail and/or staple and penetration depth into the stud
- Provision for how it should be installed over foam sheathing
- Fastener spacing
- Installation over foam sheathing should be treated the same as vinyl siding, the principals of section R703.11.2 will apply

Additional footnotes "aa", "y" and "z" refer to the ASTM standard for insulated vinyl siding, ASTM D7793, and fastening prescriptions similar to vinyl siding involving penetration into the stud 0.75 inches and an allowance for variation to this requirement when approved by the manufacturer.

An additional reference was added to the use of vinyl siding with foam plastic sheathing to include insulated vinyl siding. The application of insulated vinyl siding with foam sheathing is the same as vinyl siding, therefore the provision can simply apply.

For more information, go to www.insulatedsiding.info.

Cost Impact: The code change proposal will not increase the cost of construction.

RB385-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R703.4T-RB-DOBSON.doc

RB386 – 13

R202 (NEW), R703.13 (NEW), R703.13.1 (NEW), Chapter 44

Proponent: Matt Dobson, Vinyl Siding Institute (mdobson@vinylsiding.org)

Add new text as follows:

703.13 Insulated vinyl siding. Insulated vinyl siding shall be certified and labeled as conforming to the requirements of ASTM D7793 by an approved quality control agency.

703.13.1 Insulated vinyl siding and accessories. Insulated vinyl siding and accessories shall be installed in accordance with manufacturer's installation instructions.

Add new definition as follows:

INSULATED VINYL SIDING. A vinyl cladding product with manufacturer-installed foam plastic insulating material as an integral part of the cladding product, having a minimum thermal resistance of R-2.

Add new standard to Chapter 44 as follows:

ASTM

D 7793 – 12 Standard Specification for Insulated Vinyl Siding

Reason: This definition is based on the current ASTM standard for insulated vinyl siding, ASTM D7793. Insulated vinyl siding has been available for over ten years and is now certified to an ASTM standard by an approved quality control agency. Therefore, it makes sense to introduce the standard and third party certification into the code as insulated vinyl siding grows and is embraced as a form of a cladding and home insulation. Performance requirements are specified by ASTM, ensuring that insulated vinyl siding can meet the necessary demands as a cladding and home insulation.

This change also provides a method for building officials to verify that insulated vinyl siding is code compliant, since there are separate standards for vinyl siding and insulated vinyl siding.

- Insulated vinyl siding is vinyl siding with rigid foam insulation laminated or permanently attached to the panel.
- In energy codes and energy efficiency programs, insulated siding is recognized as a form of "continuous insulation," or insulation installed on the exterior of the building that helps reduce energy loss through framing or other building material.
- Insulated siding products that bear the Certified Insulated Siding Label and are found on VSI's *Official List of Certified Products and Colors* have been independently certified by a third-party, accredited quality control agency to meet or exceed ASTM D7793.

Certified insulated vinyl siding:

- Meets or exceeds the industry standard for quality and performance (ASTM D7793), as verified by an independent, accredited quality control agency through twice yearly, unannounced plant inspections, product testing and quality review.
- Has demonstrated a minimum thermal resistance, or R-value, of at least R-2.0, as verified by an independent quality control agency.
- Withstands the impacts of recommended installation procedures.
- Lies straight on a flat wall and does not buckle under normal conditions.
- Weathers the effects of sunshine, rain and heavy winds of at least 110 mph.
- Meets manufacturer's advertised specifications for length, width, thickness and gloss.
- Can be identified by a variety of program logos and/or labels.
- Meets or exceeds the industry standard for performance (ASTM D7793), as verified by an independent, accredited quality control agency through twice yearly, unannounced plant inspections, product testing and quality review.

Fire Performance

Due to vinyl's chlorine base, the siding portion of insulated siding does not readily ignite and burn and resists flame spread. Vinyl siding routinely demonstrates a Class A flame spread rating (that is, a flame spread index of 25 or less when tested under ASTM E84). Rigid vinyl will not sustain combustion without an external source of heat and will tend to self-extinguish if that heat is removed. Foam plastics used in the insulation portion contain a flame retardant designed to limit rapid flame spread. Foam plastic insulation products are tested and classified for flame spread and smoke-development under ASTM E84/UL 723 by Underwriters Laboratories and other certified agencies.

Moisture Performance

Insulated siding provides a supplemental rain screen that reduces the amount of water that reaches the underlying water-resistive barrier. With a properly applied water-resistive barrier, insulated siding minimizes moisture penetration from the exterior into the wall assembly and provides a way for moisture to readily drain and dry. The presence of a layer of thermal insulation filling the space between the insulated siding and the wall sheathing also aids in the moisture management system.

For more information, go to www.insulatedsiding.info.

Cost Impact: The code change proposal will increase the cost of construction. This change will have minimal cost impact as there are products on the market certified.

Analysis: A review of the standard proposed for inclusion in the code, ASTM D 7793 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

RB386-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R703.13 (NEW) #2-RB-DOBSON.doc

RB387 – 13

R202 (NEW), Table R703.4, R703.13 (NEW), R703.13.1 (NEW), R703.13.1.1 (NEW), R703.13.1.2 (NEW), R703.13.2 (NEW), R703.13.2.1 (NEW), Chapter 44

Proponent: Matt Dobson, Vinyl Siding Institute (mdobson@vinylsiding.org)

Revise as follows:

**TABLE R703.4
WEATHER-RESISTANT SIDING ATTACHMENT AND MINIMUM THICKNESS**

SIDING MATERIAL	NOMINAL THICKNESS ^a (inches)	JOINT TREATMENT	WATER-RESISTIVE BARRIER REQUIRED	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS ^{b, c, d}					
				Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud	Direct to studs	Number or spacing of fasteners
<u>Polypropylene Siding^{aa}</u>	<u>Not applicable.</u>	<u>Lap</u>	<u>Yes</u>	<u>Section 703.13.1</u>	<u>Not Allowed</u>	<u>As specified by the manufacturer instructions, test report or other sections of this code.</u>	<u>Polypropylene Siding^{aa}</u>	<u>Not applicable.</u>	<u>Lap</u>

(Portions of Table not shown remain unchanged)

For SI: 1 inch = 25.4 mm.

- Based on stud spacing of 16 inches on center where studs are spaced 24 inches, siding shall be applied to sheathing approved for that spacing.
- Nail is a general description and shall be T-head, modified round head, or round head with smooth or deformed shanks.
- Staples shall have a minimum crown width of $7/16$ -inch outside diameter and be manufactured of minimum 16-gage wire.
- Nails or staples shall be aluminum, galvanized, or rust-preventative coated and shall be driven into the studs where fiberboard, gypsum, or foam plastic sheathing backing is used. Where wood or wood structural panel sheathing is used, fasteners shall be driven into studs unless otherwise permitted to be driven into sheathing in accordance with the siding manufacturer's installation instructions.
- Aluminum nails shall be used to attach aluminum siding.
- Aluminum (0.019 inch) shall be unbacked only when the maximum panel width is 10 inches and the maximum flat area is 8 inches. The tolerance for aluminum siding shall be +0.002 inch of the nominal dimension.
- All attachments shall be coated with a corrosion-resistant coating.
- Shall be of approved type.
- Three-eighths-inch plywood shall not be applied directly to studs spaced more than 16 inches on center when long dimension is parallel to studs. Plywood $1/2$ -inch or thinner shall not be applied directly to studs spaced more than 24 inches on center. The stud spacing shall not exceed the panel span rating provided by the manufacturer unless the panels are installed with the face grain perpendicular to the studs or over sheathing approved for that stud spacing.
- Wood board sidings applied vertically shall be nailed to horizontal nailing strips or blocking set 24 inches on center. Nails shall penetrate $1\frac{1}{2}$ inches into studs, studs and wood sheathing combined or blocking.
- Hardboard siding shall comply with CPA/ANSI A135.6.
- Vinyl siding shall comply with ASTM D 3679.
- Minimum shank diameter of 0.092 inch, minimum head diameter of 0.225 inch, and nail length must accommodate sheathing and penetrate framing $1\frac{1}{2}$ inches.
- When used to resist shear forces, the spacing must be 4 inches at panel edges and 8 inches on interior supports.
- Minimum shank diameter of 0.099 inch, minimum head diameter of 0.240 inch, and nail length must accommodate sheathing and penetrate framing $1\frac{1}{2}$ inches.
- Vertical end joints shall occur at studs and shall be covered with a joint cover or shall be caulked.
- See Section R703.10.1.
- Fasteners shall comply with the nominal dimensions in ASTM F 1667.
- See Section R703.10.2.
- Face nailing: one 6d common nail through the over lap ping planks at each stud. Concealed nailing: one 11 gage $1\frac{1}{2}$ inch long galv. roofing nail through the top edge of each plank at each stud.
- See Section R703.2 exceptions.
- Minimum nail length must accommodate sheathing and penetrate framing $1\frac{1}{2}$ inches.

- w. Adhered masonry veneer shall comply with the requirements of Section R703.6.3 and shall comply with the requirements in Sections 6.1 and 6.3 of TMS-402 ACI 530/ASCE 5.
- x. Vertical joints, if staggered shall be permitted to be away from studs if applied over wood structural panel sheathing.
- y. Minimum fastener length must accommodate sheathing and penetrate framing 0.75 inches or in accordance with the manufacturer's installation instructions.
- z. Where approved by the manufacturer's instructions or test report siding shall be permitted to be installed with fasteners penetrating not less than 0.75 inches through wood or wood structural sheathing with or without penetration into the framing.
- aa. Polypropylene siding shall comply with ASTM D7254.

703.13 Polypropylene siding. Polypropylene siding shall be certified and labeled as conforming to the requirements of ASTM D7254 by an approved quality control agency.

703.13.1 Polypropylene siding and accessories shall be installed in accordance with manufacturer's installation instructions.

703.13.1.1 Polypropylene siding shall be installed over and attached to sheathing or other substrate, composed of wood or wood-based material with minimum thickness of 7/16 -inch, or other materials and fasteners having equivalent withdrawal resistance.

703.13.1.2 Fastener requirements. Unless otherwise specified in the approved manufacturer's instructions, nails shall be corrosion resistant, with a minimum 0.120 shank and minimum 0.313 head diameter and fully penetrate sheathing or penetrate the substrate a minimum 3/4 inch. The end of the fastener shall extend a minimum of ¼ inch beyond the opposite face of the sheathing or nailable sheathing. Staples are not permitted.

703.13.2 Polypropylene siding shall comply with section 703.13.2.1

703.13.2.1 Polypropylene siding shall not be installed on walls with a fire separation distance of less than 5 feet (1524 mm) and walls not closer than 10 feet to a building on another lot.

Exception: Walls perpendicular to the line used to determine the *fire separation distance*.

Add new definition as follow:

POLYPROPYLENE SIDING. A shaped material, made principally from polypropylene homopolymer, or copolymer, which in some cases contains fillers or reinforcements, that is used to clad *exterior walls* or buildings.

Add new standard to Chapter 44 as follows:

ASTM

D 7254 Standard Specification for Polypropylene (PP) Siding

Reason: This change mirrors requirements for polypropylene siding in the 2012/2015 International Building Code (IBC), by adding them to the International Residential Code.

This provision sets minimum performance requirements for polypropylene siding and requires a third party quality control agency to verify compliance to an internationally accepted ASTM standard. Additionally, confusion in the marketplace and by building officials on use of polypropylene siding vs. vinyl siding is removed, as appropriate installation and use of polypropylene siding are detailed. The proposed definition conforms to the definition in the IBC and ASTM D7254 standard. Use of polypropylene siding is also limited on walls that face each other in high density settings, similar to the intent of the requirement in the IBC.

Not all polypropylene siding products on the market today are third party certified to internationally accepted standards which set minimum performance; our industry believes there should be minimum performance requirements for compliance with the building code.



The *VSI Product Certification Program* added certification of polypropylene siding in 2010. Additionally, several manufacturers have code compliant evaluation reports for their products. The *VSI Product Certification Program* allows manufacturers to certify, with independent third-party verification by an approved quality control agency, that certain polypropylene siding meets or exceeds the ASTM D7254 Standard Specification for Polypropylene (PP) Siding. The program is not exclusive to VSI members and any manufacturer can participate. It has been in place since 1998 when vinyl siding certification began.

Polypropylene siding certified through the program is verified by a third-party, approved quality control agency to meet or exceed the ASTM D7254 Standard Specification for Polypropylene (PP) Siding. Certified polypropylene siding is tested to:

- Weather the elements over time without cracking, chipping, flaking, pitting, or peeling.
- Meet impact resistance requirements.
- Withstand wind pressures equivalent to 110 mph or more.
- Demonstrate flame spread performance equivalent to or better than wood materials commonly used in building construction.

Although polypropylene siding panels are specific to each manufacturer, there is general consensus among manufacturers on several installation requirements. These include:

- Use of a water-resistive barrier
- Substrate installed with polypropylene siding panels, typically OSB or plywood, must have a minimum fastener withdrawal resistance because fastener spacing varies from 5 inches to 12 inches. The fasteners must have a substrate to penetrate because they will not penetrate studs in most cases because of the typical 16 inch on center spacing.
- No attachment directly over studs
- Fastener size and length are specified; staples are not allowed
- Manufacturer specified fastener spacing

Specifications for installation, including underlayment and fasteners, are necessary for polypropylene siding, so building officials and specifiers recognize the differences between installation of vinyl siding and polypropylene siding.

For more information on polypropylene siding, go to <http://www.polypropylenesiding.org/>.

Cost Impact: This change will have minimal cost impact as many products on the market are already certified.

Analysis: A review of the standard proposed for inclusion in the code, ASTM D 7254 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

RB387-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R703.13 (NEW) #1-RB-DOBSON.doc

RB388 – 13

R202 (NEW), Table R703.4, R703.13 (NEW), R703.13.1 (NEW), R703.13.2 (NEW), R703.13.2.1 (NEW), R703.13.2.2 (NEW), R703.13.3 (NEW), R703.13.4 (NEW), Chapter 44

Proponent: Marcelo M. Hirschler, GBH International (gbhint@aol.com)

Revise as follows:

**TABLE R703.4
WEATHER-RESISTANT SIDING ATTACHMENT AND MINIMUM THICKNESS**

SIDING MATERIAL	NOMINAL THICKNESS ^a (inches)	JOINT TREATMENT	WATER-RESISTIVE BARRIER REQUIRED	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS ^{b, c, d}					
				Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud	Direct to studs	Number or spacing of fasteners
<u>Polypropylene siding^{aa}</u>	<u>Not applicable</u>	<u>Lap</u>	<u>Yes</u>	<u>See Section 703.13.3 and Section 703.13.4</u>	<u>Not allowed</u>	<u>As specified by the manufacturer instructions or test report</u>	<u>Polypropylene siding^{aa}</u>	<u>Not applicable</u>	<u>Lap</u>

(Portions of Table not shown remain unchanged)

For SI: 1 inch = 25.4 mm.

- Based on stud spacing of 16 inches on center where studs are spaced 24 inches, siding shall be applied to sheathing approved for that spacing.
- Nail is a general description and shall be T-head, modified round head, or round head with smooth or deformed shanks.
- Staples shall have a minimum crown width of $\frac{7}{16}$ -inch outside diameter and be manufactured of minimum 16-gage wire.
- Nails or staples shall be aluminum, galvanized, or rust-preventative coated and shall be driven into the studs where fiberboard, gypsum, or foam plastic sheathing backing is used. Where wood or wood structural panel sheathing is used, fasteners shall be driven into studs unless otherwise permitted to be driven into sheathing in accordance with the siding manufacturer's installation instructions.
- Aluminum nails shall be used to attach aluminum siding.
- Aluminum (0.019 inch) shall be unbacked only when the maximum panel width is 10 inches and the maximum flat area is 8 inches. The tolerance for aluminum siding shall be +0.002 inch of the nominal dimension.
- All attachments shall be coated with a corrosion-resistant coating.
- Shall be of approved type.
- Three-eighths-inch plywood shall not be applied directly to studs spaced more than 16 inches on center when long dimension is parallel to studs. Plywood $\frac{1}{2}$ -inch or thinner shall not be applied directly to studs spaced more than 24 inches on center. The stud spacing shall not exceed the panel span rating provided by the manufacturer unless the panels are installed with the face grain perpendicular to the studs or over sheathing approved for that stud spacing.
- Wood board sidings applied vertically shall be nailed to horizontal nailing strips or blocking set 24 inches on center. Nails shall penetrate $1\frac{1}{2}$ inches into studs, studs and wood sheathing combined or blocking.
- Hardboard siding shall comply with CPA/ANSI A135.6.
- Vinyl siding shall comply with ASTM D 3679.
- Minimum shank diameter of 0.092 inch, minimum head diameter of 0.225 inch, and nail length must accommodate sheathing and penetrate framing $1\frac{1}{2}$ inches.
- When used to resist shear forces, the spacing must be 4 inches at panel edges and 8 inches on interior supports.
- Minimum shank diameter of 0.099 inch, minimum head diameter of 0.240 inch, and nail length must accommodate sheathing and penetrate framing $1\frac{1}{2}$ inches.
- Vertical end joints shall occur at studs and shall be covered with a joint cover or shall be caulked.
- See Section R703.10.1.
- Fasteners shall comply with the nominal dimensions in ASTM F 1667.
- See Section R703.10.2.
- Face nailing: one 6d common nail through the over lap ping planks at each stud. Concealed nailing: one 11 gage $1\frac{1}{2}$ inch long galv. roofing nail through the top edge of each plank at each stud.
- See Section R703.2 exceptions.

- v. Minimum nail length must accommodate sheathing and penetrate framing $1\frac{1}{2}$ inches.
- w. Adhered masonry veneer shall comply with the requirements of Section R703.6.3 and shall comply with the requirements in Sections 6.1 and 6.3 of TMS-402 ACI 530/ASCE 5.
- x. Vertical joints, if staggered shall be permitted to be away from studs if applied over wood structural panel sheathing.
- y. Minimum fastener length must accommodate sheathing and penetrate framing 0.75 inches or in accordance with the manufacturer's installation instructions.
- z. Where approved by the manufacturer's instructions or test report siding shall be permitted to be installed with fasteners penetrating not less than 0.75 inches through wood or wood structural sheathing with or without penetration into the framing.
- aa. Polypropylene siding shall comply with ASTM D7254 and Section R703.13.

R703.13 Polypropylene siding. Polypropylene siding shall be certified and *labeled* as conforming to the requirements of ASTM D7254 by an *approved* quality control agency.

R703.13.1 Polypropylene siding and accessories shall be installed in accordance with the manufacturer's installation instructions.

R703.13.2 Flame Spread Index. Polypropylene siding shall exhibit a flame spread index not exceeding 200 when tested in accordance with ASTM E84 or UL 723 and shall comply either with the requirements of Section R703.13.2.1 or with those of section R703.13.2.2.

R703.13.2.1 Polypropylene siding shall not be installed on walls with a fire separation distance of less than 5 feet (1524 mm) and walls not closer than 10 feet to a building on another lot.

Exception: Walls perpendicular to the line used to determine the *fire separation distance*.

R703.13.2.2 The certification of the flame spread index shall be accompanied by a test report stating that all portions of the test specimen ahead of the flame front remained in position during the test in accordance with ASTM E84 or UL 723.

R703.13.3 Polypropylene siding shall be installed over and attached to sheathing or other substrate, composed of wood or wood-based material with minimum thickness of 7/16 -inch, or other materials and fasteners having equivalent withdrawal resistance.

R703.13.4 Fastener requirements. Unless otherwise specified in the approved manufacturer's instructions, nails shall be corrosion resistant, with a minimum 0.120 shank and minimum 0.313 head diameter, minimum length of 1.50 inches and penetrate sheathing or substrate a minimum 7/16 inch. Staples shall not be used for fastening polypropylene siding.

Add new definition as follows:

POLYPROPYLENE SIDING. A shaped material, made principally from polypropylene homopolymer, or copolymer, which in some cases contains fillers or reinforcements, that is used to clad *exterior walls* of buildings.

Add new standard to Chapter 44 as follows:

ASTM

D 7254 - 07 Standard Specification for polypropylene (PP) siding

Reason: This proposal recommends incorporating into the IRC language permitting the use of polypropylene siding in a manner fully consistent with the language contained in the IBC, except that it allows also an exception for walls perpendicular to the line for the fire separation distance. This ensures the use of the product with adequate fire safety. Further details are shown in the subsequent paragraphs.

Polypropylene (PP) siding is being used in residential construction based on AC308 and is also used in other construction in accordance with the requirements in the building code, as shown below. These requirements are not consistent primarily because the fire safety requirements in the IBC do not permit the siding test specimen to fall on the floor during the ASTM E84 fire test unless there is a 10 foot separation between buildings while those in AC 308 are silent and rely on ASTM D7254 which does not have this safety. This proposal incorporates the same separation (with the same concept of the permission if the materials stays in place during the test) but it also offers an exception for walls perpendicular to the line used to determine the fire separation distance.

The flame spread index in accordance with ASTM E84 must be assessed with a test specimen that remains in position during the test ahead of the flame front because of the well-known tendency for polypropylene to melt and drip. This tendency of polypropylene to melt and drip has been recognized by the IBC when it incorporated the requirements in section 1404.12.1 (for polypropylene siding) and in section 803.12 (for polypropylene used as interior finish). In the case of polypropylene siding the IBC has language consistent with the proposed to the IRC for the siding. In the case of polypropylene as interior finish, the IBC does not allow it to be tested to ASTM E84 but requires the use of the room-corner test (NFPA 286). The proposal does not recommend using the room-corner test for siding in the IRC: that is unnecessary. With the proposed provisions, enough safety is provided that polypropylene siding can be incorporated into the IRC.

It is easy for the consumer to confuse PP siding with vinyl siding, especially since most retailers carry them together. However, PP siding is very different in fire performance than either vinyl siding or wood (cedar) siding. The table below shows recent fire tests on two different PP siding materials and on a wood (cedar) siding using the cone calorimeter, ASTM E1354, at an incident heat flux of 25 kW/m², as well as some material tests on vinyl (PVC) and on a fire retarded polypropylene.

Cone Calorimeter (ASTM E1354) Tests at 25 kW/m² incident heat flux		
	Peak Heat Release Rate (in kW/m²)	Effective Heat of Combustion (in MJ/kg)
Siding Tests		
Cedar siding	309	13
PP siding	546	25
PP siding 2	878	32
Material Tests		
Vinyl (PVC)	190	9
FR Polypropylene	200	25

The table below shows that polypropylene can be made so that it meets the requirements indicated above, in the ASTM E84 test without melting, and perform just like PVC (vinyl) or wood products.

ASTM E84 (Steiner tunnel) tests on some exemplar materials		
Material	Flame Spread Index	Flaming on Floor Ahead of Flame Front
PVC (vinyl)	10	None
FR Polypropylene	50	None
Western red cedar	70	None
Douglas fir	70-100	None
Western white pine	75	None

The revisions for Table R703.4 are consistent with actual usage. For example, since polypropylene siding is significantly heavier (and often thicker) than vinyl siding, no manufacturers have approved the use of staples for fastening and some manufacturers even prohibit the use of staples in their instructions. Polypropylene siding requires more frequent fasteners than vinyl siding.

The relevant sections of the IBC, AC366 and ASTM D7254 are shown here.

AC366

3.0 TEST METHODS AND PERFORMANCE REQUIREMENTS

3.1 General: Polypropylene siding shall conform to the requirements of ASTM D7254.

3.2 Wind Load Resistance: Wind load resistance testing shall be conducted in accordance with ASTM D7254 and ASTM D5206.

The test assembly shall be constructed in a manner consistent with the construction methods and materials that are to be recognized in the evaluation report.

Allowable wind pressures shall be determined in accordance with Annex A1 of ASTM D7254. Design wind pressures shall be determined in accordance with Chapter 16 of the IBC, and shall not exceed the allowable negative wind loads.

Positive wind loading is not considered, since the siding shall be applied over solid sheathing capable of resisting design wind pressures. In areas enforcing the IBC, where construction is located in areas where the basic wind speed (3-second gust) does not exceed 100 miles per hour (161 km/h) and the building heights do not exceed 40 feet (12 192 mm), solid sheathing as noted in Section 1405.14.1 of the 2009 IBC and Section 1405.13.1 of the 2006 IBC, is acceptable. Where construction is located in areas where the basic wind speed (3-second gust) exceeds 100 miles per hour (161 km/h) or the building heights are in excess of 40 feet (12 192 mm), negative wind load resistance tests shall be conducted in accordance with ASTM D5206 and with Section 5.4 of ASTM D7254. The test assembly shall be constructed in a manner consistent with the construction methods and materials that are to be recognized in the evaluation report. Allowable wind pressures shall be determined in accordance with Annex A1 of ASTM D7254.

In areas enforcing the IRC, where construction is located in areas where the basic wind speed does not exceed 110 miles per hour (177 km/h), solid sheathing as noted in Table R703.4 of the IRC, is acceptable. For basic wind speeds equal to or greater than 110 mph (177 km/h), design shall be in accordance with Section R301.2.1.1 of the IRC, and wind load resistance tests shall be conducted in accordance with ASTM D5206. The test assembly shall be constructed in a manner consistent with the construction methods and materials that are to be recognized in the evaluation report. Allowable negative wind pressures shall be determined in accordance with Annex A1 of ASTM D7254.

3.3 Ignition Resistance:

3.3.1 Test Method: For recognition under the IBC, for construction other than Type VB, the siding shall be tested in accordance with NFPA 268 and IBC Section 1406.2. Ignition resistance testing is not required under the IRC.

3.3.2 Conditions of Acceptance: The minimum allowable fire separation distance for siding installed on the exterior of buildings of other than Type VB construction shall be as set forth in IBC Table 1406.2.1.2, based on the results of testing.

ASTM D7254:

6.4 Windload Resistance—Conduct the test on windload resistance of the finished siding in accordance with Test Method D5206.

6.5 Surface Flame Spread—Conduct the test on surface flame spread characteristics in accordance with Test Method E84. The test specimen shall either be self-supporting by its own structural characteristics or held in place by added supports along the test specimen surface.

IBC 202 includes:

POLYPROPYLENE SIDING. A shaped material, made principally from polypropylene homopolymer, or copolymer, which in some cases contains fillers or reinforcements, that is used to clad exterior walls of buildings.

IBC 1404.12 Polypropylene siding. Polypropylene siding shall be certified and labeled as conforming to the requirements of ASTM D7254 and those of Section 1404.12.1 or 1404.12.2 by an approved quality control agency. Polypropylene siding shall be installed in accordance with the requirements of Section 1405.18 and in accordance with the manufacturer's installation instructions.

Polypropylene siding shall be secured to the building so as to provide weather protection for the exterior walls of the building.

IBC 1404.12.1 Flame spread index. The certification of the flame spread index shall be accompanied by a test report stating that all portions of the test specimen ahead of the flame front remained in position during the test in accordance with ASTM E84 or UL 723.

IBC 1404.12.2 Fire separation distance. The fire separation distance between a building with polypropylene siding and the adjacent building shall be no less than 10 feet (3048 mm).

IBC 1405.18 Polypropylene siding. Polypropylene siding conforming to the requirements of this section and complying with Section 1404.12 shall be limited to exterior walls of Type VB construction located in areas where the wind speed specified in Chapter 16 does not exceed 100 miles per hour (45 m/s) and the building height is less than or equal to 40 feet (12 192 mm) in Exposure C. Where construction is located in areas where the basic wind speed exceeds 100 miles per hour (45 m/s), or building heights are in excess of 40 feet (12 192 mm), tests or calculations indicating compliance with Chapter 16 shall be submitted.

Polypropylene siding shall be installed in accordance with the manufacturer's installation instructions. Polypropylene siding shall be secured to the building so as to provide weather protection for the exterior walls of the building.

IBC 803.12 High-density Polyethylene (HDPE) and Polypropylene (PP). Where high-density polyethylene or polypropylene is used as an interior finish it shall comply with Section 803.1.2.

IBC 803.1.2 Room corner test for interior wall or ceiling finish materials. Interior wall or ceiling finish materials shall be permitted to be tested in accordance with NFPA 286. Interior wall or ceiling finish materials tested in accordance with NFPA 286 shall comply with Section 803.1.2.1.

IBC 803.1.2.1 Acceptance criteria for NFPA 286. The interior finish shall comply with the following:

1. During the 40 kW exposure, flames shall not spread to the ceiling.
2. The flame shall not spread to the outer extremity of the sample on any wall or ceiling.
3. Flashover, as defined in NFPA 286, shall not occur.
4. The peak heat release rate throughout the test shall not exceed 800 kW.
5. The total smoke released throughout the test shall not exceed 1,000 m².

Cost Impact: The code change proposal will minimally increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, ASTM D 7254 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

RB388-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

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RB389 – 13

R703.4, Table R703.4, R703.13 (NEW), R703.13.1 (NEW), Table R703.13.1 (NEW), R703.13.2 (NEW), Table R703.13.2 (NEW),

Proponent: Jay Crandell, P.E., ARES Consulting, representing Foam Sheathing Committee and American Chemistry Council (jcrandell@aresconsulting.biz)

Revise as follows:

R703.4 Attachments. Unless specified otherwise, all wall coverings shall be securely fastened in accordance with Table R703.4 or with other *approved* aluminum, stainless steel, zinc-coated or other *approved* corrosion-resistive fasteners. Where the basic wind speed in accordance with Figure R301.2(4)A is 110 miles per hour (49 m/s) or higher, the attachment of wall coverings shall be designed to resist the component and cladding loads specified in Table R301.2(2), adjusted for height and exposure in accordance with Table R301.2(3). Cladding attachment over foam sheathing shall comply with the additional requirements and limitations of Section R703.13.

**TABLE R703.4
WEATHER-RESISTANT SIDING ATTACHMENT AND MINIMUM THICKNESS**

SIDING MATERIAL	NOMINAL THICKNESS ^a (inches)	JOINT TREATMENT	WATER-RESISTIVE BARRIER REQUIRED	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS ^{b, c, d}					
				Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud ^{aa}	Direct to studs	Number or spacing of fasteners

For SI: 1 inch = 25.4 mm.

- Based on stud spacing of 16 inches on center where studs are spaced 24 inches, siding shall be applied to sheathing approved for that spacing.
- Nail is a general description and shall be T-head, modified round head, or round head with smooth or deformed shanks.
- Staples shall have a minimum crown width of $7/16$ -inch outside diameter and be manufactured of minimum 16-gage wire.
- Nails or staples shall be aluminum, galvanized, or rust-preventative coated and shall be driven into the studs where fiberboard, gypsum, or foam plastic sheathing backing is used. Where wood or wood structural panel sheathing is used, fasteners shall be driven into studs unless otherwise permitted to be driven into sheathing in accordance with the siding manufacturer's installation instructions.
- Aluminum nails shall be used to attach aluminum siding.
- Aluminum (0.019 inch) shall be unbacked only when the maximum panel width is 10 inches and the maximum flat area is 8 inches. The tolerance for aluminum siding shall be +0.002 inch of the nominal dimension.
- All attachments shall be coated with a corrosion-resistant coating.
- Shall be of approved type.
- Three-eighths-inch plywood shall not be applied directly to studs spaced more than 16 inches on center when long dimension is parallel to studs. Plywood $1/2$ -inch or thinner shall not be applied directly to studs spaced more than 24 inches on center. The stud spacing shall not exceed the panel span rating provided by the manufacturer unless the panels are installed with the face grain perpendicular to the studs or over sheathing approved for that stud spacing.
- Wood board sidings applied vertically shall be nailed to horizontal nailing strips or blocking set 24 inches on center. Nails shall penetrate $1 1/2$ inches into studs, studs and wood sheathing combined or blocking.
- Hardboard siding shall comply with CPA/ANSI A135.6.
- Vinyl siding shall comply with ASTM D 3679.
- Minimum shank diameter of 0.092 inch, minimum head diameter of 0.225 inch, and nail length must accommodate sheathing and penetrate framing $1 1/2$ inches.
- When used to resist shear forces, the spacing must be 4 inches at panel edges and 8 inches on interior supports.
- Minimum shank diameter of 0.099 inch, minimum head diameter of 0.240 inch, and nail length must accommodate sheathing and penetrate framing $1 1/2$ inches.
- Vertical end joints shall occur at studs and shall be covered with a joint cover or shall be caulked.
- See Section R703.10.1.
- Fasteners shall comply with the nominal dimensions in ASTM F 1667.
- See Section R703.10.2.
- Face nailing: one 6d common nail through the over lap ping planks at each stud. Concealed nailing: one 11 gage $1 1/2$ inch long galv. roofing nail through the top edge of each plank at each stud.
- See Section R703.2 exceptions.

- v. Minimum nail length must accommodate sheathing and penetrate framing 1½ inches.
- w. Adhered masonry veneer shall comply with the requirements of Section R703.6.3 and shall comply with the requirements in Sections 6.1 and 6.3 of TMS-402 ACI 530/ASCE 5.
- x. Vertical joints, if staggered shall be permitted to be away from studs if applied over wood structural panel sheathing.
- y. Minimum fastener length must accommodate sheathing and penetrate framing 0.75 inches or in accordance with the manufacturer's installation instructions.
- z. Where approved by the manufacturer's instructions or test report siding shall be permitted to be installed with fasteners penetrating not less than 0.75 inches through wood or wood structural sheathing with or without penetration into the framing.
- aa. Cladding attachment over foam sheathing shall comply with the additional requirements and limitations of Section R703.13.

R703.13 Cladding attachment over foam sheathing to wood framing. Cladding shall be specified and installed in accordance with Section R703, the cladding manufacturer's approved installation instructions, including any limitations for use over foam plastic sheathing, or an approved design. In addition, the cladding or furring attachments through foam sheathing to framing shall meet or exceed the minimum fastening requirements of Section R703.13.1, Section R703.13.2, or an approved design for support of cladding weight.

Exceptions:

1. Where the cladding manufacturer has provided approved installation instructions for application over foam sheathing, those requirements shall apply.
2. For exterior insulation and finish systems, refer to Section R703.9.
3. For anchored masonry or stone veneer installed over foam sheathing; refer to Section R703.7.

R703.13.1 Direct attachment. Where cladding is installed directly over foam sheathing without the use of furring, cladding minimum fastening requirements to support the cladding weight shall be as specified in Table R703.13.1.

TABLE R703.13.1
CLADDING MINIMUM FASTENING REQUIREMENTS
FOR DIRECT ATTACHMENT OVER FOAM PLASTIC SHEATHING
TO SUPPORT CLADDING WEIGHT^a

Cladding Fastener Through Foam Sheathing into:	Cladding Fastener Type and Minimum Size ^b	Cladding Fastener Vertical Spacing (inches)	Maximum Thickness of Foam Sheathing ^c (inches)					
			16" o.c. Fastener Horizontal Spacing			24" o.c. Fastener Horizontal Spacing		
			Cladding Weight:			Cladding Weight:		
			3 psf	11 psf	25 psf	3 psf	11 psf	25 psf
Wood Framing (minimum 1-1/4 inch penetration)	0.113" diameter nail	6	2	1	DR	2	0.75	DR
		8	2	1	DR	2	0.5	DR
		12	2	0.5	DR	2	DR	DR
	0.120" diameter nail	6	3	1.5	0.5	3	0.75	DR
		8	3	1	DR	3	0.5	DR
		12	3	0.5	DR	2	DR	DR
	0.131" diameter nail	6	4	2	0.75	4	1	DR
		8	4	1.5	0.5	4	0.75	DR
		12	4	0.75	DR	2	0.5	DR
	0.162" diameter nail	6	4	4	1.5	4	2	1
		8	4	3	1	4	1.5	0.75
		12	4	2	0.75	4	1	DR

For SI: 1 inch = 25.4 mm; 1 pound per square foot (psf) = 0.0479 kPa

DR = design required

o.c. = on center

- a. Wood framing shall be Spruce-Pine-Fir or any wood species with a specific gravity of 0.42 or greater in accordance with AFPA/NDS.
- b. Nail fasteners shall comply with ASTM F1667, except nail length shall be permitted to exceed ASTM F1667 standard lengths.
- c. Foam sheathing shall have a minimum compressive strength of 15 psi in accordance with ASTM C 578 or ASTM C 1289.

R703.13.2 Furred cladding attachment. Where wood furring is used to attach cladding over foam sheathing, furring minimum fastening requirements to support the cladding weight shall be as specified in Table R703.13.2. Where placed horizontally, wood furring shall be preservative treated wood in accordance with Section R317.1 or naturally durable wood and fasteners shall be corrosion resistant in accordance Section R317.3.

TABLE R703.13.2 FURRING MINIMUM FASTENING REQUIREMENTS FOR APPLICATION OVER FOAM PLASTIC SHEATHING TO SUPPORT CLADDING WEIGHT^{a,b}

Furring Material	Framing Member	Fastener Type and Minimum Size	Minimum Penetration into Wall Framing (inches)	Fastener Spacing in Furring (inches)	Maximum Thickness of Foam Sheathing ^d (inches)						Allowable Design Wind Pressure for Furring (psf)	
					16"oc Furring ^e			24"oc Furring ^e				
					Siding Weight:			Siding Weight:				
					3 psf	11 psf	25 psf	3 psf	11 psf	25 psf	16"oc Furring	24"oc Furring
Minimum 1x Wood Furring ^e	Minimum 2x Wood Stud	0.131" diameter nail	1-1/4	8	4	2	1	4	1.5	DR	46.5	31.0
				12	4	1.5	DR	3	1	DR	31.0	20.7
				16	4	1	DR	3	0.5	DR	23.3	15.5
		0.162" diameter nail	1-1/4	8	4	4	1.5	4	2	0.75	57.5	38.3
				12	4	2	0.75	4	1.5	DR	38.3	25.6
				16	4	1.5	DR	4	1	DR	28.8	19.2
		#10 wood screw	1	12	4	2	0.75	4	1.5	DR	107.3	71.6
				16	4	1.5	DR	4	1	DR	79.0	52.7
				24	4	1	DR	3	DR	DR	35.1	23.4
		¼" lag screw	1-1/2	12	4	3	1	4	2	0.5	140.4	93.6
				16	4	1.5	DR	4	1.5	DR	79.0	52.7
				24	4	1.5	DR	4	0.75	DR	35.1	23.4

For SI: 1" = 25.4 mm; 1 pound per square foot (psf) = 0.0479 kPa.

DR = design required

o.c. = on center

- Wood framing and furring shall be Spruce-Pine-Fir or any wood species with a specific gravity of 0.42 or greater in accordance with AFPA/NDS.
- Nail fasteners shall comply with ASTM F1667, except nail length shall be permitted to exceed ASTM F1667 standard lengths.
- Where the required cladding fastener penetration into wood material exceeds 3/4 inch (19.1 mm) and is not more than 1-1/2 inches (38.1 mm), a minimum 2x wood furring shall be used or an approved design.
- Foam sheathing shall have a minimum compressive strength of 15 psi in accordance with ASTM C 578 or ASTM C 1289.
- Furring shall be spaced a maximum of 24 inches (610 mm) on center, in a vertical or horizontal orientation. In a vertical orientation, furring shall be located over wall studs and attached with the required fastener spacing. In a horizontal orientation, the indicated 8 inch (203.2 mm) and 12 inch (304.8 mm) fastener spacing in furring shall be achieved by use of two fasteners into studs at 16 inches (406.4 mm) and 24 inches (610 mm) on center, respectively.

Reason: The proposed cladding connection requirements were proposed for the IBC 2015 (FS 195-11/12) but were withdrawn at the final action hearing to address more recent research to improve connection performance. An earlier version of these siding connection requirements already exist in the New York State Energy Code which is based on the 2009 IECC. Similar requirements for the IECC 2012 were denied last year mainly because it was felt that they belonged in the building code, not the energy code. These requirements fill an information gap in the IRC provisions for exterior wall covering assemblies that include foam plastic insulation. Separate proposals address connection to other wall framing materials and were approved for the 2015 IBC.

The proposed requirements are based on a project sponsored by the New York State Energy Research and Development Agency (NYSERDA). The project report is available for download at [www.nyserda.ny.gov/-/media/Files/Publications/Research/Other Technical Reports/fastening-systems-for-continuous-insulation.pdf](http://www.nyserda.ny.gov/-/media/Files/Publications/Research/Other_Technical_Reports/fastening-systems-for-continuous-insulation.pdf). The report explains the technical basis for the proposed requirements which, for purposes of this proposal, have been modified to increase the reduction factor to control deflection from 1.5 to 3 (fastener strength halved) to better ensure long-term deflection control. For comparison, the reduction factor used in the NDS provisions for fastener shear resistance calculation is 2.2.

The purpose of the NYSERDA project was to develop prescriptive fastening requirements for cladding materials installed over foam sheathing to ensure adequate performance. The project included testing of cladding attachments through various thicknesses of foam sheathing using various fastener types on steel frame wall assemblies (see separate proposal for attachment to steel framing). Supplemental testing also was sponsored by the Foam Sheathing Coalition (lab report available at <http://fsc.americanchemistry.com/Building-Code/Installation-of-Cladding>) to address attachments to wood framing and the resulting data is included in the data set analyzed and presented in the NYSERDA project report. The proposed cladding attachment requirements and foam sheathing thickness limits are based on rational analysis verified by the extensive test data to control cladding connection movement to no more than 0.015" slip under cladding weight or dead load. This deflection controlled approach resulted in safety factors commonly in the range of 5 to 8 relative to average shear capacity. Similar tests by other independent parties, such as Wiss, Janey, & Elstner (unpublished data) and also Building Science Corporation for DOE's Building America program (report pending) have

shown similar results and have contributed to the verification of this proposal.

Finally, the proposal provides prescriptive requirements for attachment of furring to resist wind loading – something that is currently not addressed in the IRC. Furring is a common means of attaching cladding over foam sheathing and provides for improved siding durability. The allowable wind pressure limits are based on the lesser of fastener withdrawal and furring bending strength.

Three separate proposals for wood, steel, and concrete/masonry wall applications have been prepared to ensure that these different applications are considered independently. If one or more these proposals are approved, the proponent will work with ICC staff to resolve duplicative formatting/numbering of the proposed new code sections.

Cost Impact:

RB389-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

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RB390 – 13

R703.4, Table R703.4, R703.13 (NEW), R703.13.1 (NEW), Table R703.13.1 (NEW), R703.13.2 (NEW), Table R703.13.2 (NEW)

Proponent: Jay Crandell, P.E., ARES Consulting, representing Foam Sheathing Committee and American Chemistry Council (jcrandell@aresconsulting.biz); Mark Nowak, M Nowak Consulting LLC, representing Steel Framing Alliance

Revise as follows:

R703.4 Attachments. Unless specified otherwise, all wall coverings shall be securely fastened in accordance with Table R703.4 or with other *approved* aluminum, stainless steel, zinc-coated or other *approved* corrosion-resistive fasteners. Where the basic wind speed in accordance with Figure R301.2(4)A is 110 miles per hour (49 m/s) or higher, the attachment of wall coverings shall be designed to resist the component and cladding loads specified in Table R301.2(2), adjusted for height and exposure in accordance with Table R301.2(3). Cladding attachment over foam sheathing shall comply with the additional requirements and limitations of Section R703.13.

**TABLE R703.4
WEATHER-RESISTANT SIDING ATTACHMENT AND MINIMUM THICKNESS**

SIDING MATERIAL	NOMINAL THICKNESS ^a (inches)	JOINT TREATMENT	WATER-RESISTIVE BARRIER REQUIRED	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS ^{b, c, d}					
				Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud ^{aa}	Direct to studs	Number or spacing of fasteners

(Portions of Table not shown remain unchanged)

For SI: 1 inch = 25.4 mm.

- Based on stud spacing of 16 inches on center where studs are spaced 24 inches, siding shall be applied to sheathing approved for that spacing.
- Nail is a general description and shall be T-head, modified round head, or round head with smooth or deformed shanks.
- Staples shall have a minimum crown width of $7/16$ -inch outside diameter and be manufactured of minimum 16-gage wire.
- Nails or staples shall be aluminum, galvanized, or rust-preventative coated and shall be driven into the studs where fiberboard, gypsum, or foam plastic sheathing backing is used. Where wood or wood structural panel sheathing is used, fasteners shall be driven into studs unless otherwise permitted to be driven into sheathing in accordance with the siding manufacturer's installation instructions.
- Aluminum nails shall be used to attach aluminum siding.
- Aluminum (0.019 inch) shall be unbacked only when the maximum panel width is 10 inches and the maximum flat area is 8 l nches. The tolerance for aluminum siding shall be +0.002 inch of the nominal dimension.
- All attachments shall be coated with a corrosion-resistant coating.
- Shall be of approved type.
- Three-eighths-inch plywood shall not be applied directly to studs spaced more than 16 inches on center when long dimension is parallel to studs. Plywood $1/2$ -inch or thinner shall not be applied directly to studs spaced more than 24 inches on center. The stud spacing shall not exceed the panel span rating provided by the manufacturer unless the panels are installed with the face grain perpendicular to the studs or over sheathing approved for that stud spacing.
- Wood board sidings applied vertically shall be nailed to horizontal nailing strips or blocking set 24 inches on center. Nails shall penetrate $1 1/2$ inches into studs, studs and wood sheathing combined or blocking.
- Hardboard siding shall comply with CPA/ANSI A135.6.
- Vinyl siding shall comply with ASTM D 3679.
- Minimum shank diameter of 0.092 inch, minimum head diameter of 0.225 inch, and nail length must accommodate sheathing and penetrate framing $1 1/2$ inches.
- When used to resist shear forces, the spacing must be 4 inches at panel edges and 8 inches on interior supports.
- Minimum shank diameter of 0.099 inch, minimum head diameter of 0.240 inch, and nail length must accommodate sheathing and penetrate framing $1 1/2$ inches.
- Vertical end joints shall occur at studs and shall be covered with a joint cover or shall be caulked.
- See Section R703.10.1.
- Fasteners shall comply with the nominal dimensions in ASTM F 1667.

- s. See Section R703.10.2.
- t. Face nailing: one 6d common nail through the over lap ping planks at each stud. Concealed nailing: one 11 gage 1½ inch long galv. roofing nail through the top edge of each plank at each stud.
- u. See Section R703.2 exceptions.
- v. Minimum nail length must accommodate sheathing and penetrate framing 1½ inches.
- w. Adhered masonry veneer shall comply with the requirements of Section R703.6.3 and shall comply with the requirements in Sections 6.1 and 6.3 of TMS-402 ACI 530/ASCE 5.
- x. Vertical joints, if staggered shall be permitted to be away from studs if applied over wood structural panel sheathing.
- y. Minimum fastener length must accommodate sheathing and penetrate framing 0.75 inches or in accordance with the manufacturer's installation instructions.
- z. Where approved by the manufacturer's instructions or test report siding shall be permitted to be installed with fasteners penetrating not less than 0.75 inches through wood or wood structural sheathing with or without penetration into the framing.
- a.a. Cladding attachment over foam sheathing shall comply with the additional requirements and limitations of Section R703.13.

R703.13 Cladding attachment over foam sheathing to cold-formed steel framing. Cladding shall be specified and installed in accordance with Section R703, the cladding manufacturer's approved installation instructions, including any limitations for use over foam plastic sheathing, or an approved design. In addition, the cladding or furring attachments through foam sheathing to framing shall meet or exceed the minimum fastening requirements of Section R703.13.1, Section R703.13.2, or an approved design for support of cladding weight.

Exceptions:

- 1. Where the cladding manufacturer has provided approved installation instructions for application over foam sheathing, those requirements shall apply.
- 2. For exterior insulation and finish systems, refer to Section R703.9.
- 3. For anchored masonry or stone veneer installed over foam sheathing; refer to Section R703.7.

R703.13.1 Direct attachment. Where cladding is installed directly over foam sheathing without the use of furring, cladding minimum fastening requirements to support the cladding weight shall be as specified in Table R703.13.1.

TABLE R703.13.1
CLADDING MINIMUM FASTENING REQUIREMENTS
FOR DIRECT ATTACHMENT OVER FOAM PLASTIC SHEATHING
TO SUPPORT CLADDING WEIGHT¹

<u>Cladding Fastener Through Foam Sheathing into:</u>	<u>Cladding Fastener Type and Minimum Size²</u>	<u>Cladding Fastener Vertical Spacing (inches)</u>	<u>Maximum Thickness of Foam Sheathing³ (inches)</u>					
			<u>16"oc Fastener Horizontal Spacing</u>			<u>24"oc Fastener Horizontal Spacing</u>		
			<u>Cladding Weight:</u>			<u>Cladding Weight:</u>		
			<u>3 psf</u>	<u>11 psf</u>	<u>25 psf</u>	<u>3 psf</u>	<u>11 psf</u>	<u>25 psf</u>
<u>Steel Framing (minimum penetration of steel thickness + 3 threads)</u>	<u>#8 screw into 33 mil steel or thicker</u>	<u>6</u>	<u>3</u>	<u>3</u>	<u>1.5</u>	<u>3</u>	<u>2</u>	<u>DR</u>
		<u>8</u>	<u>3</u>	<u>2</u>	<u>0.5</u>	<u>3</u>	<u>1.5</u>	<u>DR</u>
		<u>12</u>	<u>3</u>	<u>1.5</u>	<u>DR</u>	<u>3</u>	<u>0.75</u>	<u>DR</u>
	<u>#10 screw into 33 mil steel</u>	<u>6</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>4</u>	<u>3</u>	<u>0.5</u>
		<u>8</u>	<u>4</u>	<u>3</u>	<u>1</u>	<u>4</u>	<u>2</u>	<u>DR</u>
		<u>12</u>	<u>4</u>	<u>2</u>	<u>DR</u>	<u>3</u>	<u>1</u>	<u>DR</u>
	<u>#10 screw into 43 mil steel or thicker</u>	<u>6</u>	<u>4</u>	<u>4</u>	<u>3</u>	<u>4</u>	<u>4</u>	<u>2</u>
		<u>8</u>	<u>4</u>	<u>4</u>	<u>2</u>	<u>4</u>	<u>3</u>	<u>1.5</u>
		<u>12</u>	<u>4</u>	<u>3</u>	<u>1.5</u>	<u>4</u>	<u>3</u>	<u>DR</u>

For SI: 1 inch = 25.4 mm; 1 pound per square foot (psf) = 0.0479 kPa

DR = design required

o.c. = on center

1. Steel framing shall be minimum 33 ksi steel for 33 mil and 43 mil steel and 50 ksi steel for 54 mil steel or thicker.
2. Screws shall comply with the requirements of ASTM C1513.
3. Foam sheathing shall have a minimum compressive strength of 15 psi in accordance with ASTM C 578 or ASTM C 1289.

R703.13.2 Furred cladding attachment. Where steel or wood furring is used to attach cladding over foam sheathing, furring minimum fastening requirements to support the cladding weight shall be as specified in Table R703.13.2. Where placed horizontally, wood furring shall be preservative treated wood in accordance with Section R317.1 or naturally durable wood and fasteners shall be corrosion resistant in accordance Section R317.3. Steel furring shall have a minimum G60 galvanized coating.

**TABLE R703.13.2
FURRING MINIMUM FASTENING REQUIREMENTS FOR APPLICATION
OVER FOAM PLASTIC SHEATHING TO SUPPORT CLADDING WEIGHT¹**

Furring Material	Framing Member	Fastener Type and Minimum Size ²	Minimum Penetration into Wall Framing (inches)	Fastener Spacing in Furring (inches)	Maximum Thickness of Foam Sheathing ⁴ (inches)						Allowable Design Wind Pressure for Furring (psf)	
					16"oc FURRING ⁵			24"oc FURRING ⁵			16"oc Furring	24"oc Furring
					Cladding Weight:			Cladding Weight:				
					3 psf	11 psf	25 psf	3 psf	11 psf	25 psf		
Minimum 33mil Steel Furring or Minimum 1x Wood Furring ³	33 mil Steel Stud	#8 screw	Steel thickness + 3 threads	12	3	1.5	DR	3	0.5	DR	52.9	35.3
				16	3	1	DR	2	DR	DR	39.7	26.5
				24	2	DR	DR	2	DR	DR	26.5	17.6
		#10 screw	Steel thickness + 3 threads	12	4	2	DR	4	1	DR	62.9	41.9
				16	4	1.5	DR	3	DR	DR	47.1	31.4
				24	3	DR	DR	2	DR	DR	31.4	21.0
	43 mil or thicker Steel Stud	#8 Screw	Steel thickness + 3 threads	12	3	1.5	DR	3	0.5	DR	69.0	46.0
				16	3	1	DR	2	DR	DR	51.8	34.5
				24	2	DR	DR	2	DR	DR	34.5	23.0
		#10 screw	Steel thickness + 3 threads	12	4	3	1.5	4	3	DR	81.9	54.6
				16	4	3	0.5	4	2	DR	61.5	41.0
				24	4	2	DR	4	0.5	DR	35.1	23.4

For SI: 1" = 25.4 mm; 1 pound per square foot (psf) = 0.0479 kPa.

DR = design required

o.c. = on center

1. Wood furring shall be Spruce-Pine-Fir or any softwood species with a specific gravity of 0.42 or greater. Steel furring shall be minimum 33 ksi steel. Steel studs shall be minimum 33 ksi steel for 33mil and 43 mil thickness and 50 ksi steel for 54 mil steel or thicker.
2. Screws shall comply with the requirements of ASTM C1513.
3. Where the required cladding fastener penetration into wood material exceeds ¾ inch (19.1 mm) and is not more than 1-1/2 inches (38.1 mm), a minimum 2 inch (51 mm) nominal wood furring shall be used or an approved design.
4. Foam sheathing shall have a minimum compressive strength of 15 psi in accordance with ASTM C 578 or ASTM C 1289.
5. Furring shall be spaced a maximum of 24 inches (610 mm) on center, in a vertical or horizontal orientation. In a vertical orientation, furring shall be located over wall studs and attached with the required fastener spacing. In a horizontal orientation, the indicated 8 inch (203.2 mm) and 12 inch (304.8 mm) fastener spacing in furring shall be achieved by use of two fasteners into studs at 16 inches (406.4 mm) and 24 inches (610 mm) on center, respectively.

Reason: The proposed cladding connection requirements have been approved for the 2015 IBC (FS 194-11/12) and already exist in the New York State Energy Code which is based on the 2009 IECC. Similar requirements for the IECC 2012 were considered last code cycle, but it was clearly expressed that these provision are a better fit for the building code. These requirements fill an important need in the IRC provisions for exterior wall covering assemblies that include foam plastic insulation.

The proposed requirements are based on a project sponsored by the New York State Energy Research and Development Agency (NYSERDA) and the Steel Framing Alliance. The project report is available for download at [http://data.memberclicks.com/site/sfa/NYSERDA_TASK_3_REPORT%20-%20FINAL_\(3-22-10\).pdf](http://data.memberclicks.com/site/sfa/NYSERDA_TASK_3_REPORT%20-%20FINAL_(3-22-10).pdf). The report explains the technical basis for the proposed requirements.

The purpose of the NYSEDA project was to develop prescriptive fastening requirements for cladding materials installed over foam sheathing to ensure adequate performance. The project included testing of cladding attachments through various thicknesses of foam sheathing using various fastener types on steel frame wall assemblies. Supplemental testing also was sponsored by the Foam Sheathing Coalition (lab report available at

www.foamsheathing.org) to address attachments to wood framing and the resulting data is included in the data set analyzed and presented in the NYSERDA project report. The proposed cladding attachment requirements and foam sheathing thickness limits are based on rational analysis verified by the extensive test data to control cladding connection movement to no more than 0.015" slip under cladding weight or dead load. This deflection controlled approach resulted in safety factors commonly in the range of 5 to 8 relative to average shear capacity.

Cost Impact: The code change proposal will not increase the cost of construction.

RB390-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

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RB391 – 13

R703.4, Table R703.4, R703.13 (NEW)

Proponent: Jay Crandell, P.E., ARES Consulting, representing Foam Sheathing Committee / American Chemistry Council (jcrandell@aresconsulting.biz)

Revise as follows:

R703.4 Attachments. Unless specified otherwise, all wall coverings shall be securely fastened in accordance with Table R703.4 or with other *approved* aluminum, stainless steel, zinc-coated or other *approved* corrosion-resistive fasteners. Where the basic wind speed in accordance with Figure R301.2(4)A is 110 miles per hour (49 m/s) or higher, the attachment of wall coverings shall be designed to resist the component and cladding loads specified in Table R301.2(2), adjusted for height and exposure in accordance with Table R301.2(3). Cladding attachment over foam sheathing shall comply with the additional requirements and limitations of Section R703.13.

TABLE R703.4
WEATHER-RESISTANT SIDING ATTACHMENT AND MINIMUM THICKNESS

SIDING MATERIAL	NOMINAL THICKNESS ^a (inches)	JOINT TREATMENT	WATER-RESISTIVE BARRIER REQUIRED	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS ^{b, c, d}					
				Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud ^{aa}	Direct to studs	Number or spacing of fasteners

(Portions of Table not shown remain unchanged)

For SI: 1 inch = 25.4 mm.

- a. Based on stud spacing of 16 inches on center where studs are spaced 24 inches, siding shall be applied to sheathing approved for that spacing.
- b. Nail is a general description and shall be T-head, modified round head, or round head with smooth or deformed shanks.
- c. Staples shall have a minimum crown width of ⁷/₁₆-inch outside diameter and be manufactured of minimum 16-gage wire.
- d. Nails or staples shall be aluminum, galvanized, or rust-preventative coated and shall be driven into the studs where fiberboard, gypsum, or foam plastic sheathing backing is used. Where wood or wood structural panel sheathing is used, fasteners shall be driven into studs unless otherwise permitted to be driven into sheathing in accordance with the siding manufacturer's installation instructions.
- e. Aluminum nails shall be used to attach aluminum siding.
- f. Aluminum (0.019 inch) shall be unbacked only when the maximum panel width is 10 inches and the maximum flat area is 8 inches. The tolerance for aluminum siding shall be +0.002 inch of the nominal dimension.
- g. All attachments shall be coated with a corrosion-resistant coating.
- h. Shall be of approved type.
- i. Three-eighths-inch plywood shall not be applied directly to studs spaced more than 16 inches on center when long dimension is parallel to studs. Plywood ¹/₂-inch or thinner shall not be applied directly to studs spaced more than 24 inches on center. The stud spacing shall not exceed the panel span rating provided by the manufacturer unless the panels are installed with the face grain perpendicular to the studs or over sheathing approved for that stud spacing.
- j. Wood board sidings applied vertically shall be nailed to horizontal nailing strips or blocking set 24 inches on center. Nails shall penetrate ¹/₂ inches into studs, studs and wood sheathing combined or blocking.
- k. Hardboard siding shall comply with CPA/ANSI A135.6.
- l. Vinyl siding shall comply with ASTM D 3679.
- m. Minimum shank diameter of 0.092 inch, minimum head diameter of 0.225 inch, and nail length must accommodate sheathing and penetrate framing ¹/₂ inches.
- n. When used to resist shear forces, the spacing must be 4 inches at panel edges and 8 inches on interior supports.
- o. Minimum shank diameter of 0.099 inch, minimum head diameter of 0.240 inch, and nail length must accommodate sheathing and penetrate framing ¹/₂ inches.
- p. Vertical end joints shall occur at studs and shall be covered with a joint cover or shall be caulked.
- q. See Section R703.10.1.
- r. Fasteners shall comply with the nominal dimensions in ASTM F 1667.
- s. See Section R703.10.2.
- t. Face nailing: one 6d common nail through the over lap ping planks at each stud. Concealed nailing: one 11 gage ¹/₂ inch long galv. roofing nail through the top edge of each plank at each stud.

- u. See Section R703.2 exceptions.
- v. Minimum nail length must accommodate sheathing and penetrate framing 1^{1/2} inches.
- w. Adhered masonry veneer shall comply with the requirements of Section R703.6.3 and shall comply with the requirements in Sections 6.1 and 6.3 of TMS-402 ACI 530/ASCE 5.
- x. Vertical joints, if staggered shall be permitted to be away from studs if applied over wood structural panel sheathing.
- y. Minimum fastener length must accommodate sheathing and penetrate framing 0.75 inches or in accordance with the manufacturer's installation instructions.
- z. Where approved by the manufacturer's instructions or test report siding shall be permitted to be installed with fasteners penetrating not less than 0.75 inches through wood or wood structural sheathing with or without penetration into the framing.
- aa. Cladding attachment over foam sheathing shall comply with the additional requirements and limitations of Section R703.13.

R703.13 Cladding attachment over foam sheathing to masonry or concrete wall construction.

Cladding shall be specified and installed in accordance with Section 703.4 and the cladding manufacturer's installation instructions or an approved design. Foam sheathing shall be attached to masonry or concrete construction in accordance with the insulation manufacturer's installation instructions or an approved design. Furring and furring attachments through foam sheathing into concrete or masonry substrate shall be designed to resist design loads determined in accordance with Section R301, including support of cladding weight as applicable. Fasteners used to attach cladding or furring through foam sheathing to masonry or concrete substrates shall be approved for application into masonry or concrete material and shall be installed in accordance with the fastener manufacturer's installation instructions.

Exceptions:

1. Where the cladding manufacturer has provided approved installation instructions for application over foam sheathing and connection to a masonry or concrete substrate, those requirements shall apply.
2. For exterior insulation and finish systems, refer to Section R703.9.
3. For anchored masonry or stone veneer installed over foam sheathing, refer to Section R703.7.

Reason: Two other proposals submitted on the topic of attachment of cladding through foam sheathing address wood and steel framing applications based on experimental data and rational analysis addressed in the reason statements for those proposals. Similar solutions and guidance for attachment of cladding to masonry/concrete walls through foam sheathing is needed. Research is not yet available to justify prescriptive "off-the-shelf" solutions with standardized types of concrete/masonry fasteners. Also, many fasteners best suited for this application are proprietary and approved data and design is the best approach. Therefore, this proposal requires engineered design of cladding connections through foam sheathing to masonry/concrete. The exceptions recognize cases where appropriate attachment solutions may already exist. An identical provision was approved for the 2015 IBC.

Cost Impact: The code change proposal will not increase the cost of construction.

RB391-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

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RB392 – 13

R703.2, R703.3, Table R703.3 (New), R703.3.1, R703.3.2, R703.4, Table R703.4, R703.3.1, R703.3.2, R703.3.3 (NEW), R703.5.1 (NEW), R703.8, R703.12, R703.12.3 (NEW),

Proponent: Gary J. Ehrlich, P.E., National Association of Home Builders (NAHB) (gehrlich@nahb.org)

Revise as follows:

R703.2 Water-resistive barrier. One layer of No. 15 asphalt felt, free from holes and breaks, complying with ASTM D 226 for Type 1 felt or other approved water-resistive barrier shall be applied over studs or sheathing of all exterior walls. Such felt or material shall be applied horizontally, with the upper layer lapped over the lower layer not less than 2 inches (51 mm). Where joints occur, felt shall be lapped not less than 6 inches (152 mm). The felt or other approved material shall be continuous to the top of walls and terminated at penetrations and building appendages in a manner to meet the requirements of the exterior wall envelope as described in Section R703.1.

Exception: Omission of the water-resistive barrier is permitted in the following situations:

1. In detached accessory buildings.
- ~~2. Under exterior wall finish materials as permitted in Table R703.4.~~
- ~~3~~ 2. Under paperbacked stucco lath when the paper backing is an approved water-resistive barrier.

R703.4 R703.3 Nominal thickness and attachments. ~~Unless specified otherwise, all~~ The nominal thickness and attachment of exterior wall coverings shall be ~~securely fastened~~ in accordance with Table ~~R703.4~~ R703.3, the wall covering material requirements of this section, and the wall covering manufacturer's installation instructions ~~or with other approved aluminum, stainless steel, zinc-coated or other approved corrosion-resistant fasteners.~~ Nominal material thicknesses in Table R703.3 are based on a maximum stud spacing of 16 inches on center. Where specified by the siding manufacturer's instructions and supported by a test report or other documentation, attachment to studs with greater spacing is permitted. Fasteners for exterior wall coverings shall be in accordance with Section R703.3.2

R703.3.1 Wind limitations. Where the basic wind speed in accordance with Figure R301.2(4)A is 110 miles per hour (49 m/s) or higher, the attachment of wall coverings shall be designed to resist the component and cladding loads specified in Table R301.2(2), adjusted for height and exposure in accordance with Table R301.2(3).

R703.3.2 Fasteners. Exterior wall coverings shall be securely fastened with aluminum, galvanized, stainless steel or rust-preventative coated nails or staples in accordance with Table R703.3 or with other approved corrosion-resistant fasteners in accordance with the wall covering manufacturer's installation instructions. Nails and staples shall comply with ASTM F 1667. Nails shall be T-head, modified round head, or round head with smooth or deformed shanks. Staples shall have a minimum crown width of 7/16-inch outside diameter and be manufactured of minimum 16 gage wire. Where fiberboard, gypsum, or foam plastic sheathing backing is used, nails or staples shall be driven into the studs. Where wood or wood structural panel sheathing is used, fasteners shall be driven into studs unless otherwise permitted to be driven into sheathing in accordance with the siding manufacturer's installation instructions.

R703.3.3 Minimum fastener length and penetration. Fasteners shall have the greater of the minimum length specified in Table R703.3 or as required to provide a minimum penetration into framing as follows:

1. Fasteners for horizontal aluminum siding, steel siding, particleboard panel siding, wood structural panel siding per ANSI/APA-PRP 210, fiber-cement panel siding, and fiber-cement lap siding

installed over foam plastic sheathing shall penetrate a minimum of 1-1/2 inches into framing or shall be in accordance with the manufacturer's installation instructions.

2. Fasteners for hardboard panel and lap siding shall penetrate a minimum of 1-1/2 inches into framing.
3. Fasteners for vinyl siding installed over wood or wood structural panel sheathing shall penetrate a minimum of 1-1/4 inches into sheathing and framing combined. Where approved by the manufacturer's instructions or test report, vinyl siding shall be permitted to be installed with fasteners penetrating not less than .75 inches through wood or wood structural sheathing with or without penetration into the framing. Fasteners for vinyl siding installed over foam plastic sheathing shall be in accordance with Section R703.11.2. Fasteners for vinyl siding installed over fiberboard or gypsum sheathing or direct to studs shall penetrate a minimum of 1-1/4 inches into framing.
4. Fasteners for vertical or horizontal wood siding shall penetrate a minimum of 1-1/2 inches into studs, studs and wood sheathing combined, or blocking.
5. Fasteners for siding material installed over foam plastic sheathing shall have sufficient length to accommodate foam plastic sheathing thickness and to penetrate framing or sheathing and framing combined as specified above.

R703.8 R703.4 Flashing. *Approved* corrosion-resistant flashing shall be applied shingle-fashion in a manner to prevent entry of water into the wall cavity or penetration of water to the building structural framing components. Self-adhered membranes used as flashing shall comply with AAMA 711. The flashing shall extend to the surface of the exterior wall finish. *Approved* corrosion-resistant flashings shall be installed at all of the following locations:

1. Exterior window and door openings. Flashing at exterior window and door openings shall extend to the surface of the exterior wall finish or to the water-resistive barrier for subsequent drainage. Flashing at exterior window and door openings shall be installed in accordance with one or more of the following:
 - 1.1. The fenestration manufacturer's installation and flashing instructions, or for applications not addressed in the fenestration manufacturer's instructions, in accordance with the flashing manufacturer's instructions. Where flashing instructions or details are not provided, pan flashing shall be installed at the sill of exterior window and door openings. Pan flashing shall be sealed or sloped in such a manner as to direct water to the surface of the exterior wall finish or to the water-resistive barrier for subsequent drainage. Openings using pan flashing shall also incorporate flashing or protection at the head and sides.
 - 1.2. In accordance with the flashing design or method of a registered design professional.
 - 1.3. In accordance with other approved methods.
2. At the intersection of chimneys or other masonry construction with frame or stucco walls, with projecting lips on both sides under stucco copings.
3. Under and at the ends of masonry, wood or metal copings and sills.
4. Continuously above all projecting wood trim.
5. Where exterior porches, decks or stairs attach to a wall or floor assembly of wood-frame construction.
6. At wall and roof intersections.
7. At built-in gutters.

R703.3 R703.5 Wood, hardboard and wood structural panel siding. Wood, hardboard, and wood structural panel siding shall be installed in accordance with this section and Table R703.3. Hardboard siding shall comply with CPA/ANSI A135.6.

R703.5.1 Vertical wood siding. Wood siding applied vertically shall be nailed to horizontal nailing strips or blocking set no more than 24 inches on center.

R703.3.4 R703.5.2 Panel siding. 3/8" wood structural panel siding shall not be applied directly to studs spaced more than 16 inches on center when long dimension is parallel to studs. 7/16" wood structural panel siding or thinner shall not be applied directly to studs spaced more than 24 inches on center. The

stud spacing shall not exceed the panel span rating provided by the manufacturer unless the panels are installed with the face grain perpendicular to the studs or over sheathing approved for that stud spacing.

Joints in wood, hardboard or wood structural panel siding shall be made as follows unless otherwise approved. Vertical joints in panel siding shall occur over framing members, unless wood or wood structural panel sheathing is used, and shall be shiplapped or covered with a batten. Horizontal joints in panel siding shall be lapped a minimum of 1 inch (25 mm) or shall be shiplapped or shall be flashed with Z-flashing and occur over solid blocking, wood or wood structural panel sheathing.

R703.3.2 R703.5.3 Horizontal wood siding. Horizontal lap siding shall be installed in accordance with the manufacturer's recommendations. Where there are no recommendations the siding shall be lapped a minimum of 1 inch (25 mm), or 1/2 inch (13 mm) if rabbeted, and shall have the ends caulked, covered with a batten or sealed and installed over a strip of flashing.

R703.12 Adhered masonry veneer installation. Adhered masonry veneer shall comply with the requirements of Section R703.6.3. Adhered masonry veneer shall be attached in accordance with Section R703.6.1 or the manufacturer's instructions. Adhered masonry veneer shall be installed in accordance with Sections 6.1 and 6.3 of TMS 402/ACI 530/ASCE 5 or the manufacturer's instructions.

R703.12.3 Water-resistive barrier. ~~The~~ A water-resistive barrier shall be installed, as required by Section R703.2 and shall comply with the requirements of Section R703.6.3. The water-resistive barrier Table R703.4, Footnote w, shall lap over the exterior of the attachment flange of the screed or flashing provided in accordance with Section R703.12.2.

TABLE R703.3
SIDING MINIMUM ATTACHMENT AND MINIMUM THICKNESS

SIDING MATERIAL		NOMINAL THICKNESS (inches)	JOINT TREATMENT	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS					
				Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud	Direct to studs	Number or spacing of fasteners
Anchored veneer: brick, concrete, masonry or stone (See Section R703.7)		2	Per Section R703.7	Per Section R703.7					
Adhered veneer: concrete, stone or masonry (See Section R703.12)		=	Per Section R703.12	Per Section R703.12					
Fiber-cement siding	Panel siding (See Section R703.10.1)	5/16	(Per Section R703.10.1)	6d common (2" x 0.113")	6d common (2" x 0.113")	6d common (2" x 0.113")	6d common (2" x 0.113")	4d common (1½" x 0.099")	6" panel edges 12" inter. sup.
	Lap siding (See Section R703.10.2)	5/16	(Per Section R703.10.2)	6d common (2" x 0.113")	6d common (2" x 0.113")	6d common (2" x 0.113")	6d common (2" x 0.113")	6d common (2" x 0.113") or 11 gage roofing nail	Note f
Hardboard panel siding (See Section R703.3)		7/16	=	0.120" nail (shank) with 0.225" head	0.120" nail (shank) with 0.225" head	0.120" nail (shank) with 0.225" head	0.120" nail (shank) with 0.225" head	0.120" nail (shank) with 0.225" head	6" panel edges 12" inter. sup. ^d
Hardboard lap siding (See Section R703.3)		7/16	Note e	0.099" nail (shank) with 0.240" head	0.099" nail (shank) with 0.240" head	0.099" nail (shank) with 0.240" head	0.099" nail (shank) with 0.240" head	0.099" nail (shank) with 0.240" head	Same as stud spacing 2 per bearing
Horizontal aluminum ^a	Without insulation	0.019 ^b	Lap	Siding nail 1½" x 0.120"	Siding nail 2" x 0.120"	Siding nail 2" x 0.120"	Siding nail 1½" x 0.120"	Not allowed	Same as stud

SIDING MATERIAL		NOMINAL THICKNESS (inches)	JOINT TREATMENT	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS					Number or spacing of fasteners
				Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud	Direct to studs	
		0.024	Lap	Siding nail 1½" x 0.120"	Siding nail 2" x 0.120"	Siding nail 2" x 0.120"	Siding nail 1½" x 0.120"	Not Allowed	spacing
	With insulation	0.019	Lap	Siding nail 1½" x 0.120"	Siding nail 2½" x 0.120"	Siding nail 2½" x 0.120"	Siding nail 1½" x 0.120"	Siding nail 1½" x 0.120"	
Particleboard panels		3/8	—	6d box nail (2" x 0.099")	6d box nail (2" x 0.099")	6d box nail (2" x 0.099")	6d box nail (2" x 0.099")	Not allowed	6" panel edges 12" inter. sup.
		1/2	—	6d box nail (2" x 0.099")	6d box nail (2" x 0.099")	6d box nail (2" x 0.099")	6d box nail (2" x 0.099")	6d box nail (2" x 0.099")	
		5/8	—	6d box nail (2" x 0.099")	8d box nail (2½" x 0.113")	8d box nail (2½" x 0.113")	6d box nail (2" x 0.099")	6d box nail (2" x 0.099")	
Steel ^c		29 ga.	Lap	Siding nail (1¾" x 0.113") Staple-1¾"	Siding nail (2¾" x 0.113") Staple-2½"	Siding nail (2½" x 0.113") Staple-2¼"	Siding nail (1¾" x 0.113") Staple-1¾"	Not allowed	Same as stud spacing
Vinyl siding (See Section R703.11)		0.035	Lap	0.120" nail (shank) with a 0.313" head or 16 gauge staple with 3/8 to ½-inch crown	0.120" nail (shank) with a 0.313" head or 16 gauge staple with 3/8 to ½-inch crown	0.120" nail (shank) with a 0.313" head or 16 gauge staple with 3/8 to ½-inch crown	0.120 nail (shank) with a 0.313 head per Section R703.11.2	Not allowed	16 inches on center or specified by the manufacturer instructions or test report
Wood siding (See Section R703.3)	Wood rustic, drop	3/8 Min	Lap	6d box or siding nail (2" x 0.099")	6d box or siding nail (2" x 0.099")	6d box or siding nail (2" x 0.099")	6d box or siding nail (2" x 0.099")	8d box or siding nail (2½" x 0.113") Staple-2"	Face nailing up to 6" widths, 1 nail per bearing; 8" widths and over, 2 nails per bearing
	Shiplap	19/32 Average	Lap						
	Bevel	7/16	Lap						
	Butt tip	3/16	Lap						
Wood structural panel ANSI/APA PRP-210 siding (exterior grade) (See Section R703.3)		3/8 – 1/2	Note e	2" x 0.099" siding nail	2½" x 0.113" siding nail	2½" x 0.113" siding nail	2½" x 0.113" siding nail	2" x 0.099" siding nail	6" panel edges 12" inter. sup.
Wood structural panel lapsiding (See Section R703.3)		3/8 – 1/2	Note e Note g	2" x 0.099" siding nail	2½" x 0.113" siding nail	2½" x 0.113" siding nail	2½" x 0.113" siding nail	2" x 0.099" siding nail	8" along bottom edge

For SI: 1 inch = 25.4 mm.

a. Aluminum nails shall be used to attach aluminum siding.

b. Aluminum (0.019 inch) shall be unbacked only when the maximum panel width is 10 inches and the maximum flat area is 8 inches. The tolerance for aluminum siding shall be +0.002 inch of the nominal dimension.

c. Shall be of approved type.

d. When used to resist shear forces, the spacing must be 4 inches at panel edges and 8 inches on interior supports.

e. Vertical end joints shall occur at studs and shall be covered with a joint cover or shall be caulked.

f. Face nailing: one 6d common nail through the overlapping planks at each stud. Concealed nailing: one 11 gage 1½ inch long galv. roofing nail through the top edge of each plank at each stud in accordance with the manufacturer's installation instruction.

g. Vertical joints, if staggered shall be permitted to be away from studs if applied over wood structural panel sheathing.

TABLE R703.4
WEATHER-RESISTANT SIDING ATTACHMENT AND MINIMUM THICKNESS

SIDING MATERIAL		NOMINAL THICKNESS ^a (inches)	JOINT TREATMEN T	WATER-RESISTIVE BARRIER REQUIRED	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS ^{b, c, d}					
					Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud	Direct to studs	Number or spacing of fasteners
Horizontal aluminum ^e	Without insulation	0.019 ^f 0.024	Lap	Yes	0.120 nail 1 ¹ / ₂ " long	0.120 nail 2" long	0.120 nail 2" long	0.120 nail ^y	Not allowed	Same as stud spacing
			Lap	Yes	0.120 nail 1 ¹ / ₂ " long	0.120 nail 2" long	0.120 nail 2" long	0.120 nail ^y	Not allowed	
	With insulation	0.019	Lap	Yes	0.120 nail 1 ¹ / ₂ " long	0.120 nail 2 ¹ / ₂ " long	0.120 nail 2 ¹ / ₂ " long	0.120 nail ^y	0.120 nail 1 ¹ / ₂ " long	
Anchored veneer: brick, concrete, masonry or stone		2	Section R703	Yes	See Section R703 and Figure R703.7 ^g					
Adhered veneer: concrete, stone or masonry ^w		—	Section R703	Yes Note w	See Section R703.6.1 ^g or in accordance with the manufacturer's instructions.					
Hardboard ^k —Panel siding vertical		7/16	—	Yes	Note m	Note m	Note m	Note m	Note m	6" panel edges 12" inter. sup. ⁿ
Hardboard ^k —Lap siding horizontal		7/16	Note p	Yes	Note o	Note o	Note o	Note o	Note o	Same as stud spacing 2 per bearing
Steel ^h		29 ga.	Lap	Yes	0.113 nail 1 ³ / ₄ " Staple- 1 ³ / ₄ "	0.113 nail 2 ³ / ₄ " Staple- 2 ¹ / ₂ "	0.113 nail 2 ¹ / ₂ " Staple- 2 ¹ / ₄ "	0.113 nail ^v Staple ^v	Not allowed	Same as stud spacing
Particleboard panels		3/8—1/2	—	Yes	6d box nail (2" × 0.099")	6d box nail (2" × 0.099")	6d box nail (2" × 0.099")	box nail ^x	6d box nail (2" × 0.099"), 3/8" not allowed	6" panel edge, 12" inter. sup.
		5/8	—	Yes	6d box nail (2" × 0.099")	8d box nail (2 ¹ / ₂ " × 0.113")	8d box nail (2 ¹ / ₂ " × 0.113")	box nail ^x	6d box nail (2" × 0.099")	
Wood structural panel ⁱ ANSI/APA PRP 210 siding ⁱ (exterior grade)		3/8—1/2	Note p	Yes	0.099 nail 2"	0.113 nail- 2 ¹ / ₂ "	0.113 nail- 2 ¹ / ₂ "	0.113 nail ^v	0.099 nail 2"	6" panel edges, 12" inter. sup.
Wood structural panel lapsiding		3/8—1/2	Note p Note x	Yes	0.099 nail 2"	0.113 nail- 2 ¹ / ₂ "	0.113 nail- 2 ¹ / ₂ "	0.113 nail ^x	0.099 nail 2"	8" along bottom edge
Vinyl siding [†]		0.035	Lap	Yes	0.120 nail (shank) with a 0.313 head or 16-gage staple with 3/8-to 1/2-inch crown ^{y, z}	0.120 nail (shank) with a 0.313 head or 16-gage staple with 3/8-to 1/2-inch crown ^y	0.120 nail (shank) with a 0.313 head or 16-gage staple with 3/8-to 1/2-inch crown ^y	0.120 nail (shank) with a 0.313 head per Section R703.11, 2	Not allowed	16 inches on center or specified by the manufacturer instructions or test report

SIDING MATERIAL		NOMINAL THICKNESS ^a (inches)	JOINT TREATMEN [†]	WATER-RESISTIVE BARRIER REQUIRED	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS ^{b, c, d}					
					Wood or wood structural panel sheathing into stud	Fiberboard sheathing into stud	Gypsum sheathing into stud	Foam plastic sheathing into stud	Direct to studs	Number or spacing of fasteners
Wood ^j rustic, drop	$\frac{3}{8}$ " Min	Lap	Yes	Fastener penetration into stud 1"				0.113 nail $2\frac{1}{2}$ " Staple 2"	Face nailing up to 6" widths, 1 nail per bearing; 8" widths and over, 2 nails per bearing	
Shiplap	$\frac{19}{32}$ " Average	Lap	Yes	Fastener penetration into stud 1"				0.113 nail $2\frac{1}{2}$ " Staple 2"	Face nailing up to 6" widths, 1 nail per bearing; 8" widths and over, 2 nails per bearing	
Bevel	$\frac{7}{16}$ "									
Butt tip	$\frac{3}{16}$ "	Lap	Yes							
Fiber cement panel siding ^q	$\frac{5}{16}$ "	Note q	Yes Note u	6d common corrosion-resistant nail ^f	6d common corrosion-resistant nail ^f	6d common corrosion-resistant nail ^f	6d common corrosion-resistant nail ^{f, v}	4d common corrosion-resistant nail ^f	6" o.c. on edges, 12" o.c. on intermediate studs	
Fiber cement lap siding [*]	$\frac{5}{16}$ "	Note s	Yes Note u	6d common corrosion-resistant nail ^f	6d common corrosion-resistant nail ^f	6d common corrosion-resistant nail ^f	6d common corrosion-resistant nail ^{f, v}	6d common corrosion-resistant nail or 11-gage roofing nail ^f	Note t	

For SI: 1 inch = 25.4 mm.

- a. Based on stud spacing of 16 inches on center where studs are spaced 24 inches, siding shall be applied to sheathing approved for that spacing.
- b. Nail is a general description and shall be T-head, modified round head, or round head with smooth or deformed shanks.
- c. Staples shall have a minimum crown width of $\frac{7}{16}$ -inch outside diameter and be manufactured of minimum 16-gage wire.
- d. Nails or staples shall be aluminum, galvanized, or rust-preventative coated and shall be driven into the studs where fiberboard, gypsum, or foam plastic sheathing backing is used. Where wood or wood structural panel sheathing is used, fasteners shall be driven into studs unless otherwise permitted to be driven into sheathing in accordance with the siding manufacturer's installation instructions.
- e. Aluminum nails shall be used to attach aluminum siding.
- f. Aluminum (0.019 inch) shall be unbacked only when the maximum panel width is 10 inches and the maximum flat area is 8 inches. The tolerance for aluminum siding shall be +0.002 inch of the nominal dimension.
- g. All attachments shall be coated with a corrosion-resistant coating.
- h. Shall be of approved type.
- i. Three-eighths-inch plywood shall not be applied directly to studs spaced more than 16 inches on center when long dimension is parallel to studs. Plywood $\frac{1}{2}$ -inch or thinner shall not be applied directly to studs spaced more than 24 inches on center. The stud spacing shall not exceed the panel span rating provided by the manufacturer unless the panels are installed with the face grain perpendicular to the studs or over sheathing approved for that stud spacing.
- j. Wood board sidings applied vertically shall be nailed to horizontal nailing strips or blocking set 24 inches on center. Nails shall penetrate $1\frac{1}{2}$ inches into studs, studs and wood sheathing combined or blocking.
- k. Hardboard siding shall comply with CPA/ANSI A135.6.
- l. Vinyl siding shall comply with ASTM D 3679.
- m. Minimum shank diameter of 0.092 inch, minimum head diameter of 0.225 inch, and nail length must accommodate sheathing and penetrate framing $1\frac{1}{2}$ inches.

- ~~n. When used to resist shear forces, the spacing must be 4 inches at panel edges and 8 inches on interior supports.~~
- ~~o. Minimum shank diameter of 0.099 inch, minimum head diameter of 0.240 inch, and nail length must accommodate sheathing and penetrate framing $1\frac{1}{2}$ inches.~~
- ~~p. Vertical end joints shall occur at studs and shall be covered with a joint cover or shall be caulked.~~
- ~~q. See Section R703.10.1.~~
- ~~r. Fasteners shall comply with the nominal dimensions in ASTM F 1667.~~
- ~~s. See Section R703.10.2.~~
- ~~t. Face nailing: one 6d common nail through the over lap ping planks at each stud. Concealed nailing: one 11 gage $1\frac{1}{2}$ inch long galv. roofing nail through the top edge of each plank at each stud.~~
- ~~u. See Section R703.2 exceptions.~~
- ~~v. Minimum nail length must accommodate sheathing and penetrate framing $1\frac{1}{2}$ inches.~~
- ~~w. Adhered masonry veneer shall comply with the requirements of Section R703.6.3 and shall comply with the requirements in Sections 6.1 and 6.3 of TMS 402 ACI 530/ASCE 5.~~
- ~~x. Vertical joints, if staggered shall be permitted to be away from studs if applied over wood structural panel sheathing.~~
- ~~y. Minimum fastener length must accommodate sheathing and penetrate framing 0.75 inches or in accordance with the manufacturer's installation instructions.~~

Reason: The purpose of this code change is to replace the existing Table R703.4 with a revised and simplified version and improve the code text relating to siding attachment. While reviewing several code change proposals last cycle dealing with siding attachment, we identified a number of conflicts between the table and code text, as well as discovering several errata. Additionally, we found the 2009 IRC version of the table hard to work with because of the small font and the extensive footnotes. The 2012 version of the table was printed in a larger font in an effort to improve readability, but this has not fixed all of the issues and we have identified new errata. This code change replaces the table with a new version and introduces new charging language and additional code revisions to move material from footnotes to the main body of the code where they can be more easily located. The key changes are as follows:

- (1) Existing Section R703.4 is clarified and revised. The nail requirement is relocated to a new subsection. Footnote (a) is moved to the section. The entire section is moved to become R703.3, placing it immediately following the WRB section ahead of the wood siding section.
- (2) To the extent possible, nail specifications are formatted to match the standard used in Table R602.3(1) and elsewhere, where the nail type is specified, followed by the length x shank diameter.
- (3) A new Section R703.3.2 on fasteners combines existing footnotes (b), (c), (d), (g) and (r). It is noted all nails and staples need to comply with ASTM F 1667, not just those for fiber-cement siding.
- (4) Footnotes (i) and (j) are moved to the existing section on wood, hardboard and wood structural panel siding. Separate subsections are created for the requirements relevant to horizontal wood siding, vertical wood siding, and panel siding products. Minimum fastener size and minimum penetration requirements, along with other installation details, are coordinated with current installation guides such as those available from WRCLA or WWPA.
- (5) The existing footnote (k) reference to the hardboard siding standard is moved to Section R703.5 (formerly Section R703.3).
- (6) The existing footnote (l) reference to the vinyl siding standard is not needed as the standard is called out in Section R703.11. A pointer is added under the material listing.
- (7) A new Section R703.3.3 is created dealing with fastener length and penetration. The penetration requirements from footnotes (m) and (o) for hardboard siding and footnotes (v), (y), and (z) are moved to items under this new section.
- (8) The shank and head diameters in footnotes (m) and (o) for hardboard siding are moved into Table R703.3.
- (9) The fiber-cement section references from existing footnotes (q) and (s) are provided under the respective material listings. The shank diameter and length for the 6d common nail is provided. The "corrosion-resistant nail" language is removed since it is already required by the charging language for Table R703.3 (formerly Table R703.4).
- (10) The "water-resistive barrier required" column is deleted. As of the 2012 IRC, all the products in Table R703.4 required a WRB unless covered by the exceptions under Section R703.2 for detached accessory buildings and for certain paper-backed stucco lath products. Since Section R703.2 always applies, existing footnote (u) is redundant.
- (11) The existing footnote (w) reference to TMS 402 is relocated to the adhered veneer section.

Cost Impact: The code change proposal will not increase the cost of construction.

RB392-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

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RB393 – 13

R802.1, R802.1.1, R802.1.2, R802.1.3, R802.1.3.1, R802.1.3.2, R802.1.3.3, R802.1.3.4, R802.1.3.5, R802.1.3.5.1, R802.1.3.5.2, R802.1.3.6, R802.1.3.7, R802.1.3.8, R802.1.4, R802.1.5, R802.1.6,

Proponent: Dennis Pitts, American Wood Council (dpitts@awc.org)

Revise as follows:

R802.1 General. Wood and wood-based products used for load-supporting purposes shall conform to the applicable provisions of this section.

R802.1.1 Identification Sawn Lumber. ~~Load-bearing dimension lumber for rafters, trusses and ceiling joists~~ Sawn lumber shall be identified by a grade mark of an accredited lumber grading or inspection agency and have design values certified by that has been approved by an accreditation body that complies with DOC PS 20. In lieu of a grade mark, a certificate of inspection issued by a lumber grading or inspection agency meeting the requirements of this section shall be accepted.

R802.1 Blocking. ~~Blocking shall be a minimum of utility grade lumber.~~

R802.1.2 R802.1.1.1 End-jointed lumber. *Approved* end-jointed lumber identified by a grade mark conforming to Section R802.1.1 may be used interchangeably with solid-sawn members of the same species and grade. End-jointed lumber used in an assembly required elsewhere in this code to have a fire-resistance rating shall have the designation “Heat-Resistant Adhesive” or “HRA” included in its grade mark.

R802.1.4 R802.1.2 Structural glued laminated timbers. Glued laminated timbers shall be manufactured and identified as required in ANSI/AITC A190.1 and ASTM D 3737.

R802.1.5 R802.1.3 Structural log members. Stress grading of structural log members of nonrectangular shape, as typically used in log buildings, shall be in accordance with ASTM D 3957. Such structural log members shall be identified by the grade mark of an *approved* lumber grading or inspection agency. In lieu of a grade mark on the material, a certificate of inspection as to species and grade issued by a lumber-grading or inspection agency meeting the requirements of this section shall be permitted to be accepted.

R802.1.6 R802.1.4 Structural composite lumber. Structural capacities for structural composite lumber shall be established and monitored in accordance with ASTM D 5456.

R802.1.3 R802.1.5 Fire-retardant-treated wood. Fire-retardant treated wood (FRTW) is any wood product which, when impregnated with chemicals by a pressure process or other means during manufacture, shall have, when tested in accordance with ASTM E 84 or UL 723, a listed flame spread index of 25 or less and shows no evidence of significant progressive combustion when the test is continued for an additional 20-minute period. In addition, the flame front shall not progress more than 10.5 feet (3200 mm) beyond the center line of the burners at any time during the test.

R802.1.3.4 R802.1.5.1 Pressure process. For wood products impregnated with chemicals by a pressure process, the process shall be performed in closed vessels under pressures not less than 50 pounds per square inch gauge (psig) (344.7 kPa).

R802.1.3.2 R802.1.5.2 Other means during manufacture. For wood products produced by other means during manufacture the treatment shall be an integral part of the manufacturing process of the wood product. The treatment shall provide permanent protection to all surfaces of the wood product.

~~R802.1.3.3~~ R802.1.5.3 Testing. For wood products produced by other means during manufacture, other than a pressure process, all sides of the wood product shall be tested in accordance with and produce the results required in Section R802.1.3. Testing of only the front and back faces of wood structural panels shall be permitted.

~~R802.1.3.4~~ R802.1.5.4 Labeling. Fire-retardant-treated lumber and wood structural panels shall be *labeled*. The *label* shall contain:

1. The identification *mark* of an *approved* agency in accordance with Section 1703.5 of the *International Building Code*.
2. Identification of the treating manufacturer.
3. The name of the fire-retardant treatment.
4. The species of wood treated.
5. Flame spread index and smoke-developed index.
6. Method of drying after treatment.
7. Conformance to applicable standards in accordance with Sections ~~R802.1.3.5~~ R802.1.5.5 through ~~R802.1.3.8~~ R802.1.5.10.
8. For FRTW exposed to weather, or a damp or wet location, the words "No increase in the listed classification when subjected to the Standard Rain Test" (ASTM D 2898).

~~R802.1.3.5~~ R802.1.5.5 Strength adjustments. Design values for untreated lumber and wood structural panels as specified in Section R802.1 shall be adjusted for fire-retardant- treated wood. Adjustments to design values shall be based upon an *approved* method of investigation which takes into consideration the effects of the anticipated temperature and humidity to which the fire-retardant- treated wood will be subjected, the type of treatment and redrying procedures.

~~R802.1.3.5.4~~ R802.1.5.6 Wood structural panels. The effect of treatment and the method of redrying after treatment, and exposure to high temperatures and high humidities on the flexure properties of fire-retardant- treated softwood plywood shall be determined in accordance with ASTM D 5516. The test data developed by ASTM D 5516 shall be used to develop adjustment factors, maximum loads and spans, or both for untreated plywood design values in accordance with ASTM D 6305. Each manufacturer shall publish the allowable maximum loads and spans for service as floor and roof sheathing for their treatment.

~~R802.1.3.5.2~~ R802.1.5.7 Lumber. For each species of wood treated, the effect of the treatment and the method of redrying after treatment and exposure to high temperatures and high humidities on the allowable design properties of fire-retardant-treated lumber shall be determined in accordance with ASTM D 5664. The test data developed by ASTM D 5664 shall be used to develop modification factors for use at or near room temperature and at elevated temperatures and humidity in accordance with ASTM D 6841. Each manufacturer shall publish the modification factors for service at temperatures of not less than 80°F (27°C) and for roof framing. The roof framing modification factors shall take into consideration the climatological location.

~~R802.1.3.6~~ R802.1.5.8 Exposure to weather. Where fire-retardant- treated wood is exposed to weather or damp or wet locations, it shall be identified as "Exterior" to indicate there is no increase in the listed flame spread index as defined in Section ~~R802.1.3~~ R802.1.5 when subjected to ASTM D 2898.

~~R802.1.3.7~~ R802.1.5.9 Interior applications. Interior fire-retardant- treated wood shall have a moisture content of not over 28 percent when tested in accordance with ASTM D 3201 procedures at 92 percent relative humidity. Interior fire-retardant-treated wood shall be tested in accordance with Section ~~R802.1.3.5.4~~ R802.1.3.5.6 or ~~R802.1.3.5.2~~ R802.1.3.5.7. Interior fire-retardant-treated wood designated as Type A shall be tested in accordance with the provisions of this section.

~~R802.1.3.8~~ R802.1.5.10 Moisture content. Fire-retardant-treated wood shall be dried to a moisture content of 19 percent or less for lumber and 15 percent or less for wood structural panels before use. For wood kiln dried after treatment (KDAT) the kiln temperatures shall not exceed those used in kiln drying

the lumber and plywood submitted for the tests described in Section ~~R802.1.3.5.1~~ R802.1.5.6 for plywood and ~~R802.1.3.5.2~~ R802.1.5.7 for lumber.

~~R802.1~~ R802.3.3 Blocking. Blocking shall be a minimum of utility grade lumber.

Reason: The change is intended to clarify the process by which lumber design values are certified and recognized in the code. The current process, which has been used since 1970, relies on the internationally recognized U.S.Department of Commerce Voluntary Product Standard PS20. Because the current format of the section can be incorrectly interpreted to place a number of wood products under the identification requirements of PS20, a new format is proposed that clearly states this standard is only for sawn lumber. The format proposed is nearly identical to what is used in Section 2302 of the International Building Code. Wood products other than sawn lumber have unique manufacturing standards, design value development, and quality control criteria. This new format clarifies that these other wood products must comply with specific product standards.

Cost Impact: The code change proposal will not increase the cost of construction.

RB393-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R802.1 (NEW)-RB-PITTS.doc

RB394 – 13

R802.3

Proponent: Tim Swanson, City of Greeley, representing Colorado Chapter of the International Code Council (tim.swanson@greeleygov.com)

Revise as follows:

R802.3 Framing details. Rafters shall be framed directly opposite each other to ridge board or directly opposite ~~or to~~ each other with a gusset plate as a tie. Ridge board shall be at least 1-inch (25 mm) nominal thickness and not less in depth than the cut end of the rafter. At all valleys and hips there shall be a valley or hip rafter not less than 2-inch (51 mm) nominal thickness and not less in depth than the cut end of the rafter. Hip and valley rafters shall be supported at the ridge by a brace to a bearing partition or be designed to carry and distribute the specific load at that point. Where the roof pitch is less than three units vertical in 12 units horizontal (25-percent slope), structural members that support rafters and ceiling joists, such as ridge beams, hips and valleys, shall be designed as beams.

Reason: The language in the current IRC would allow rafters to be staggered at the ridge board, does that maintain structural integrity? It also does not give any guidance as to how the rafters are configured when joined with a gusset plate. Are they stacked? Side by side? We can assume that the code intends for them to be opposed with the gusset plate, but that requirement is not given. This code change reflects the intent and language currently in the IBC with minimal changes to the text of the IRC.

Cost Impact: The code change proposal will not increase the cost of construction.

RB394-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R802.3-RB-SWANSON.doc

RB395 – 13

Table R602.3(1), R802.3.1, Figure 802.5.1

Proponent: Rick Davidson, City of Maple Grove, MN, representing Association of Minnesota Building Officials (rdavidson@maplegrovern.gov)

Revise as follows:

TABLE R602.3(1)
FASTENER SCHEDULE FOR STRUCTURAL MEMBERS

ITEM	DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENER ^{a,b,c}	SPACING OF FASTENERS
Roof			
4	Collar tie to rafter, face nail or 1 1/4" x 20 gage ridge strap	3-10d (3" x 0.128")	-

(Portions of Table not shown remain unchanged)

Revise as follows:

R802.3.1 Ceiling joist and rafter connections. Ceiling joists and rafters shall be nailed to each other in accordance with Table R802.5.1(9); to provide a continuous tie across the building, and the rafter Rafters and ceiling joists shall be nailed to the top wall plate in accordance with Table R602.3(1). Ceiling joists shall be continuous or ~~securely~~ joined in accordance with Table R802.5.1(9). ~~where they meet over interior partitions and are nailed to adjacent rafters to provide a continuous tie across the building when such joists are parallel to the rafters.~~ Laps or butts of ceiling joists shall be in accordance with Section R802.3.2.

~~Where ceiling joists are not connected to the rafters at the top wall plate, joists connected higher in the attic shall be installed as rafter ties, or rafter ties shall be installed to provide a continuous tie. Where ceiling joists are not parallel to rafters, rafter ties shall be installed. Rafter ties shall be a minimum of 2 inches by 4 inches (51 mm by 102 mm) (nominal), installed in accordance with the connection requirements in Table R802.5.1(9), or connections of equivalent capacities shall be provided. Where ceiling joists or rafter ties are not provided, the ridge formed by these rafters shall be supported by a wall or girder designed in accordance with accepted engineering practice.~~

~~Collar ties or ridge straps to resist wind uplift shall be connected in the upper third of the attic space in accordance with Table R602.3(1).~~

~~Collar ties shall be a minimum of 1 inch by 4 inches (25 mm by 102 mm) (nominal), spaced not more than 4 feet (1219 mm) on center.~~

Where ceiling joists are connected to rafters above the top wall plate, they shall also meet the requirements for rafter ties. Where ceiling joists run perpendicular to rafters, rafter ties shall be installed. Rafter ties shall be a minimum of 2 inches by 4 inches (51 mm by 102 mm) (nominal) and be installed in accordance with Figure R802.5.1 and the connection requirements in Table R802.5.1(9).

Where ceiling joists or rafter ties are not provided, the ridge formed by these rafters shall be supported by a wall or girder designed in accordance with accepted engineering practice.

Delete without substitution:

Delete references to "collar tie" in Figure R802.5.1

Reason: The current language is confusing to read. It contains unnecessary repetition.

In the first paragraph, the first and last sentences are combined. Language is inserted to address the connection of ceiling joists to the top plate. The word "securely" is being deleted as ceiling joists joined per the code are presumed to be secure. Laps or butts are already regulated in R802.3.2.

Specific direction on rafter ties has been editorially revised so it is more easily understood.

References to "collar ties" are being deleted because there is no place in the IRC that makes collar ties a requirement. The sentence says "Collar ties or ridge straps to resist wind uplift shall be connected in the upper third of the attic space in accordance with Table R602.3(1)." The code says where they are to be connected, not when they are required. Something is missing. This text first appeared in the 2006 IRC but there isn't a valid explanation in ICC guides or manuals. Collar ties were not part of any previous I-Code. Why have rules for components that are not required? Such rules are unenforceable.

Cost Impact: The code change proposal will not increase the cost of construction.

RB395-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R802.3.1-RB-DAVIDSON.doc

RB396 – 13

R802.10.2.1, R802.11.1, Table R802.11

Proponent: Gary J. Ehrlich, P.E., National Association of Home Builders (NAHB) (gehrlich@nahb.org)

Revise as follows:

R802.10.2.1 Applicability limits. The provisions of this section shall control the design of truss roof framing when snow controls for buildings not greater than 60 feet (18 288 mm) in length perpendicular to the joist, rafter or truss span, not greater than 36 feet (10 973 mm) in width parallel to the joist, rafter or truss span, not more than three stories above grade plane in height, and roof slopes not smaller than 3:12 (25 percent slope) or greater than 12:12 (100 percent slope). Truss roof framing constructed in accordance with the provisions of this section shall be limited to sites subjected to a maximum design wind speed of 140~~140~~ miles per hour (63~~49~~ m/s), Exposure A, B or C, and a maximum ground snow load of 70 psf (3352 Pa). For consistent loading of all truss types, roof snow load is to be computed as: 0.7 p_g .

R802.11.1 Uplift resistance. Roof assemblies shall have uplift resistance in accordance with Sections R802.11.1.2 and R802.11.1.3.

Where the uplift force does not exceed 200 pounds, rafters and trusses spaced not more than 24 inches (610 mm) on center shall be permitted to be attached to their supporting wall assemblies in accordance with Table R602.3(1).

Where the basic wind speed does not exceed 115 mph~~90 mph~~, the wind exposure category is B, the roof pitch is 5:12 or greater, and the roof span is 32 feet (9754 mm) or less, rafters and trusses spaced not more than 24 inches (610 mm) on center shall be permitted to be attached to their supporting wall assemblies in accordance with Table R602.3(1).

TABLE R802.11
RAFTER OR TRUSS UPLIFT CONNECTION FORCES FROM WIND (POUNDS PER CONNECTION)^{a, b, c, d, e, f, g, h}

RAFTER OR TRUSS SPACING	ROOF SPAN (feet)	EXPOSURE B							
		Basic Wind Speed (mph)							
		85		90		100		110	
		Roof Pitch		Roof Pitch		Roof Pitch		Roof Pitch	
		< 5:12	≥ 5:12	< 5:12	≥ 5:12	< 5:12	≥ 5:12	< 5:12	≥ 5:12
12" o.c.	12	47	41	62	54	93	81	127	110
	18	59	51	78	68	119	104	165	144
	24	70	61	93	81	145	126	202	176
	28	77	67	104	90	163	142	227	197
	32	85	74	115	100	180	157	252	219
	36	93	81	126	110	198	172	277	241
	42	105	91	143	124	225	196	315	274
	48	116	101	159	138	251	218	353	307
16" o.c.	12	63	55	83	72	124	108	169	147
	18	78	68	103	90	159	138	219	191

	24	93	81	124	108	193	168	269	234
	28	102	89	138	120	217	189	302	263
	32	113	98	153	133	239	208	335	291
	36	124	108	168	146	264	230	369	321
	42	139	121	190	165	299	260	420	365
	48	155	135	212	184	335	291	471	410
24" o.e.	12	94	82	124	108	186	162	254	221
	18	117	102	155	135	238	207	329	286
	24	140	122	186	162	290	252	404	351
	28	154	134	208	181	326	284	454	395
	32	170	148	230	200	360	313	504	438
	36	186	162	252	219	396	345	554	482
	42	209	182	285	248	449	391	630	548
	48	232	202	318	277	502	437	706	614
RAFTER-OR TRUSS SPACING	ROOF SPAN (feet)	EXPOSURE C							
		Basic Wind Speed (mph)							
		85		90		100		110	
		Roof Pitch		Roof Pitch		Roof Pitch		Roof Pitch	
		< 5:12	≥ 5:12	< 5:12	≥ 5:12	< 5:12	≥ 5:12	< 5:12	≥ 5:12
12" o.e.	12	94	82	114	99	157	137	206	179
	18	120	104	146	127	204	177	268	233
	24	146	127	179	156	251	218	330	287
	28	164	143	201	175	283	246	372	324
	32	182	158	224	195	314	273	414	360
	36	200	174	246	214	346	301	456	397
	42	227	197	279	243	394	343	520	452
	48	254	221	313	272	441	384	583	507
RAFTER-OR TRUSS SPACING	ROOF SPAN (feet)	EXPOSURE C							
		Basic Wind Speed (mph)							
		85		90		100		110	
		Roof Pitch		Roof Pitch		Roof Pitch		Roof Pitch	
		< 5:12	≥ 5:12	< 5:12	≥ 5:12	< 5:12	≥ 5:12	< 5:12	≥ 5:12
16" o.e.	12	125	109	152	132	209	182	274	238
	18	160	139	194	169	271	236	356	310

24" o.c.	24	194	169	238	207	334	291	439	382
	28	218	190	267	232	376	327	495	431
	32	242	211	298	259	418	364	551	479
	36	266	231	327	284	460	400	606	527
	42	302	263	372	324	524	456	691	601
	48	338	294	416	362	587	511	775	674
	12	188	164	228	198	314	273	412	358
	18	240	209	292	254	408	355	536	466
24" o.c.	24	292	254	358	311	502	437	660	574
	28	328	285	402	350	566	492	744	647
	32	364	317	448	390	628	546	828	720
	36	400	348	492	428	692	602	912	793
	42	454	395	558	485	786	684	1040	905
	48	508	442	626	545	882	767	1166	1014

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 0.447 m/s, 1 pound = 0.454 kg, 1 pound per linear foot = 14.5 N/m.

- The uplift connection forces are based on a maximum 33-foot mean roof height and Wind Exposure Category B or C. For Exposure D, the uplift connection force shall be selected from the Exposure C portion of the table using the next highest tabulated basic wind speed. The Adjustment Coefficients in Table R301.2(3) shall not be used to multiply the above forces for Exposures C and D or for other mean roof heights.
- The uplift connection forces include an allowance for roof and ceiling assembly dead load of 15 psf.
- The tabulated uplift connection forces are limited to a maximum roof overhang of 24 inches.
- The tabulated uplift connection forces shall be permitted to be multiplied by 0.75 for connections not located within 8 feet of building corners.
- For buildings with hip roofs with 5:12 and greater pitch, the tabulated uplift connection forces shall be permitted to be multiplied by 0.70. This reduction shall not be combined with any other reduction in tabulated forces.
- For wall-to-wall and wall-to-foundation connections, the uplift connection force shall be permitted to be reduced by 60 plf for each full wall above.
- Linear interpolation between tabulated roof spans and wind speeds shall be permitted.
- The tabulated forces for a 12-inch on-center spacing shall be permitted to be used to determine the uplift load in pounds per linear foot.

TABLE R802.11
RAFTER OR TRUSS UPLIFT CONNECTION FORCES FROM WIND (ASD)(POUNDS PER CONNECTION) ^{a, b, c, d, e, f, g, h}

RAFTER OR TRUSS SPACING	ROOF SPAN (feet)	EXPOSURE B									
		Ultimate Design Wind Speed, V_{ULT} (mph)									
		110		115		120		130		140	
		Roof Pitch		Roof Pitch		Roof Pitch		Roof Pitch		Roof Pitch	
		<5:12	≥5:12	<5:12	≥5:12	<5:12	≥5:12	<5:12	≥5:12	<5:12	≥5:12
12" o.c.	12	48	32	59	42	70	52	95	73	122	97
	18	59	42	74	55	89	69	122	98	157	129
	24	71	52	89	69	108	86	149	123	192	162
	28	79	59	99	78	121	97	167	139	216	184
	32	86	66	109	87	134	109	185	156	240	206
	36	94	72	120	96	146	120	203	172	264	229
	42	106	83	135	109	166	138	230	197	300	262
	48	118	93	151	123	185	155	258	222	336	295

16" o.c.	12	64	43	78	56	93	69	126	97	162	129
	18	78	56	98	73	118	92	162	130	209	172
	24	94	69	118	92	144	114	198	164	255	215
	28	105	78	132	104	161	129	222	185	287	245
	32	114	88	145	116	178	145	246	207	319	274
	36	125	96	160	128	194	160	270	229	351	305
	42	141	110	180	145	221	184	306	262	399	348
	48	157	124	201	164	246	206	343	295	447	392
24" o.c.	12	96	64	118	84	140	104	190	146	244	194
	18	118	84	148	110	178	138	244	196	314	258
	24	142	104	178	138	216	172	298	246	384	324
	28	158	118	198	156	242	194	334	278	432	368
	32	172	132	218	174	268	218	370	312	480	412
	36	188	144	240	192	292	240	406	344	528	458
	42	212	166	270	218	332	276	460	394	600	524
	48	236	186	302	246	370	310	516	444	672	590
RAFTER OR TRUSS SPACING	ROOF SPAN (feet)	EXPOSURE C									
		Ultimate Design Wind Speed, V_{ULT} (mph)									
		110		115		120		130		140	
		Roof Pitch		Roof Pitch		Roof Pitch		Roof Pitch		Roof Pitch	
		<5:12	≥5:12	<5:12	<5:12	<5:12	≥5:12	<5:12	≥5:12	<5:12	≥5:12
12" o.c.	12	95	73	110	86	126	100	161	130	198	163
	18	121	97	141	115	163	135	208	175	257	219
	24	148	122	173	145	200	169	256	220	317	275
	28	166	138	195	164	225	192	289	250	358	313
	32	184	155	216	184	249	215	321	280	398	351
	36	202	171	237	204	274	238	353	310	438	389
	42	229	196	269	233	312	273	402	356	499	446
	48	256	221	302	263	349	307	450	401	560	503
16" o.c.	12	126	97	146	114	168	133	214	173	263	217
	18	161	129	188	153	217	180	277	233	342	291
	24	197	162	230	193	266	225	340	293	422	366
	28	221	184	259	218	299	255	384	333	476	416
	32	245	206	287	245	331	286	427	372	529	467
	36	269	227	315	271	364	317	469	412	583	517
	42	305	261	358	310	415	363	535	473	664	593
	48	340	294	402	350	464	408	599	533	745	669
24" o.c.	12	190	146	220	172	252	200	322	260	396	326
	18	242	194	282	230	326	270	416	350	514	438
	24	296	244	346	290	400	338	512	440	634	550
	28	332	276	390	328	450	384	578	500	716	626
	32	368	310	432	368	498	430	642	560	796	702
	36	404	342	474	408	548	476	706	620	876	778
	42	458	392	538	466	624	546	804	712	998	892
	48	512	442	604	526	698	614	900	802	1120	1006

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mph = 0.447 m/s, 1 pound = 0.454 kg.

a. The uplift connection forces are based on a maximum 33 foot mean roof height and Wind Exposure Category B or C. For Exposure D, the uplift connection force shall be selected from the Exposure C portion of the table using the next highest tabulated ultimate design wind speed. The Adjustment Coefficients in Table R301.2(3) shall not be used to multiply the above forces for Exposures C and D or for other mean roof heights.

- b. The uplift connection forces include an allowance for roof and ceiling assembly dead load of 15 psf.
- c. The tabulated uplift connection forces are limited to a maximum roof overhang of 24 inches.
- d. The tabulated uplift connection forces shall be permitted to be multiplied by 0.75 for connections not located within 8 feet of building corners.
- e. For buildings with hip roofs with 5:12 and greater pitch, the tabulated uplift connection forces shall be permitted to be multiplied by 0.70. This reduction shall not be combined with any other reduction in tabulated forces.
- f. For wall-to-wall and wall-to-foundation connections, the uplift connection force shall be permitted to be reduced by 60 plf for each full wall above.
- g. Linear interpolation between tabulated roof spans and wind speeds shall be permitted.
- h. The tabulated forces for a 12" on center spacing shall be permitted to be used to determine the uplift load in pounds per linear foot.

Reason: The purpose of this code change is to bring the wind provisions of the IRC in line with the 2012 IBC and ASCE 7-10. As a result of the schedule changes implemented during the 2009-2010 ICC code development cycle, there was not sufficient time to revise the IRC to fully implement the new ultimate wind speed basis of ASCE 7-10 and the 2012 IBC, due to the extent of prescriptive IRC provisions and tables which are directly related to basic wind speed.. New maps based on the ASCE 7-10 ultimate wind speed data but converted back down to nominal (ASD) basis were provided in the IRC. This has led to a fair amount of confusion among those stakeholders who work with both codes.

A working group of stakeholders including NAHB, the major material associations, ASCE, and the Insurance Institute for Business and Home Safety developed a series of IRC proposals to implement the new ultimate wind speed basis. This proposal updates Chapter 8, including wood truss applicability limits and roof uplift connection provisions. It is noted that the changes necessary to update the appropriate Section R804 cold-formed steel provisions are contained in a separate AISI proposal which comprehensively revises the cold-formed steel provisions.

Cost Impact: The code change proposal will not increase the cost of construction.

RB396-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R802.10.2.1-RB-EHRLICH.doc

RB397 – 13

R802.11.1.2

Proponent: Gary J. Ehrlich, P.E., National Association of Home Builders (NAHB) (gehrlich@nahb.org)

Revise as follows:

R802.11.1.2 Truss uplift resistance. Trusses shall be attached to supporting wall assemblies by connections capable of resisting uplift forces as specified on the Truss Design Drawings for the basic wind speed as determined by Figure R301.2(4)A and listed in Table R301.2(1). Uplift forces shall be permitted to be determined as specified by Table R802.11, if applicable, or as determined by accepted engineering practice.

Reason: The purpose of this code change is to clarify the requirements for determining uplift loads for trusses. The proposal adds a pointer to the Climatic and Geographic Design Criteria table and the Basic Wind Speed figure. This emphasizes the need for the Truss Designer to correctly select the proper wind speed and other criteria for the site and building in the truss design software and not just pick the highest wind speed applicable in a state or the highest mean roof height permitted. It is critical the Truss Design Drawings reflect the correct uplift reactions for the site and building in question and not a more conservative reaction. Otherwise, the builder (and homeowner) would be required to install extra (or larger) uplift connectors than would normally be necessary for the loads anticipated at the site.

Cost Impact: The code change proposal will not increase the cost of construction.

RB397-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R802.11.1.2-RB-EHRLICH.doc

RB398 – 13

R602.3.5, R802.11.1

Proponent: Andrew Herseth, US Dept of Homeland Security, representing Federal Emergency Management Agency (FEMA) and Glenn Overcash, URS Corporation representing FEMA

Revise as follows:

R602.3.5 Braced wall panel uplift load path. Braced wall panels located at exterior walls that support roof rafters or trusses (including stories below top story) shall have the framing members connected in accordance with one of the following:

1. Fastening in accordance with Table R602.3(1) where:
 - 1.1. The basic wind speed does not exceed 90 mph (40 m/s), the wind exposure category is B, the roof pitch is 5:12 or greater, and the roof span is ~~32~~ 20 feet (~~9754~~ 6096 mm) or less, or
 - 1.2. The net uplift value at the top of a wall does not exceed ~~400~~ 70 plf (102 N/mm). (The net uplift value shall be determined in accordance with Section R802.11 and shall be permitted to be reduced by 60 plf (86 N/mm) for each full wall above.
2. Where the net uplift value at the top of a wall exceeds ~~400~~ 70 plf (446 102 N/mm), installing approved uplift framing connectors to provide a continuous load path from the top of the wall to the foundation or to a point where the uplift force is ~~400~~ 70 plf (446 102 N/mm) or less. The net uplift value shall be as determined in Item 1.2 above.
3. Wall sheathing and fasteners designed in accordance with accepted engineering practice to resist combined uplift and shear forces.

Revise as follows:

R802.11 Roof tie-down.

R802.11.1 Uplift resistance. Roof assemblies shall have uplift resistance in accordance with Sections R802.11.1.2 and R802.11.1.3.

Where the uplift force does not exceed ~~200~~ 140 pounds, rafters and trusses spaced not more than 24 inches (610 mm) on center shall be permitted to be attached to their supporting wall assemblies in accordance with Table R602.3(1).

Where the basic wind speed does not exceed 90 mph, the wind exposure category is B, the roof pitch is 5:12 or greater, and the roof span is ~~32~~ 20 feet (~~9754~~ 6096 mm) or less, rafters and trusses spaced not more than 24 inches (610 mm) on center shall be permitted to be attached to their supporting wall assemblies in accordance with Table R602.3(1).

Exception: When the roof framing and top plates are of Douglas Fir-Larch or Southern Pine lumber, and the uplift force does not exceed 200 pounds, rafters and trusses are permitted to be attached to their supporting wall assemblies in accordance with Table R602.3(1).

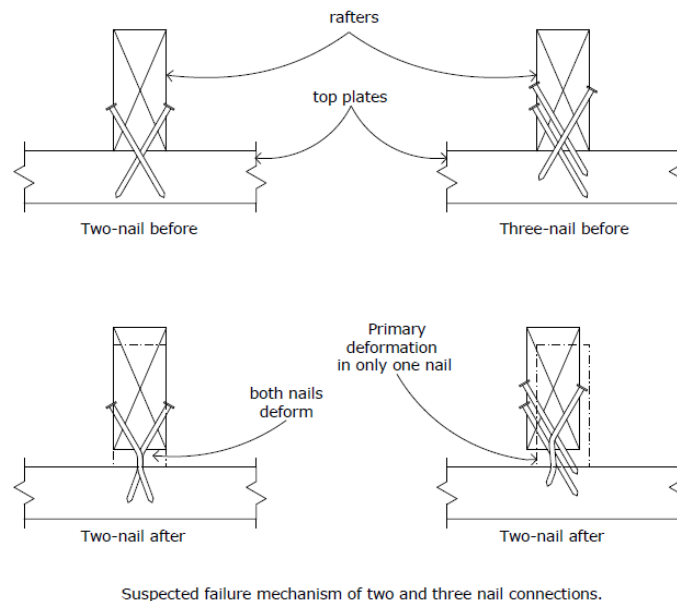
Reason: The purpose of this proposal is to modify IRC roof tie-down provisions to reflect research that affect assumptions supporting the existing roof tie-down provisions.

As background, wood frame roof to wall load path failure has been observed on numerous post-disaster observations. The MAT Report from Hurricane Ivan (2004) – which was not considered to be a design wind event when evaluating wind speeds and wind pressures from the 2001 FBC or the 2000/2003 IBC and IRC – notes “the most prevalent construction type experiencing structural damage was residential wood roof framing. Inadequate nailing of roof sheathing panels, gable end wall failures, and lack of properly installed wood framing connectors were the major factors in these structural failures.” The Spring 2011 Tornadoes MAT Report observed instances of residential roof to wall connection failure for EF 1 rated tornadoes where wind speeds were estimated between 86 and 110 miles per hour. That report notes that “metal connectors designed to transfer uplift forces from the rafter or truss to the wall below greatly enhance connectivity and were observed to outperform toe nail-only connections”. It further concluded

that “The weak link most often identified as responsible for loss of roof structure was the roof-to-wall connection (Figures 4-18 through 4-22)”.

The calculations included in this reason statement show that the trigger in the IRC for enhanced connections is lower than can be justified by calculations or testing. Table R602.3(1), Item 5 requires that the rafter or roof truss be toenailed to the top plate with either 3-16d box nails or 3-10d common nails. Using the most common wood species for wall framing, Spruce-Pine-Fir, calculations show that the capacity of the roof to wall connection is 139 pounds for the 10d nails or 149 pounds for the 16d sinker nails. Yet the IRC is written so that an additional connection is not required unless the uplift exceeds 200 pounds, assuming that the prescriptive toenails can provide 200 pounds of uplift resistance. But a trigger of 200 pounds cannot be justified by the calculated capacity of the connection.

Further, new test data shows that the assumption used in developing the wind uplift trigger for the 2012 IRC is flawed. That assumption was that adding an additional toenail to the traditional minimum of two toenails would increase the uplift capacity by 50 percent. Recent testing of 100 four-rafter assemblies taken from actual houses showed that there is only a 30% increase in uplift capacity for three toenails versus two toenails. The investigators wrote in their journal article that when one toenail is driven from each side of the roof framing member, “both must yield for the nails to withdraw. However, in the three nail connection, two nails angle in from one side while the third nail is driven at an opposing angle from the other side. This imbalance in the resistance causes the single nail to yield before the double nails. A small lateral shift occurs in the connection as one nail yields and the other two primarily avoid yielding while only experiencing direct withdrawal.” See the following drawing for an illustration of this.



Taken together, the calculations and testing argue for a lower limit for the assumed capacity of three toenails in the IRC. As a companion to the roof framing anchorage, the wall anchorage trigger should similarly be adjusted to reflect the capacity of the minimum required sheathing and fastening.

Specific justification is provided for each part of this code change proposal.

Calculation of Withdrawal Capacity of IRC Rafter/Truss to Top Plate Nailing

IRC Table R602.3(1), Item 5 specifies a toenail connection of the rafter or truss to the top plate using either 3 - 16d box nails (3-1/2" x 0.135") or 3 - 10d common nails (3" x 0.148")

Calculate the withdrawal capacity of the three fasteners above for a Spruce-Pine-Fir top plate

Use DA-2 Design Aid for Toenail Connections, published by the American Wood Council

<http://www.awc.org/pdf/DA2-Toenails.pdf>

- 1 **3 - 16d box nails (3-1/2" x 0.135")**
 From DA-2, Wp = 31 pounds per nail
 Adjust using 1.6 load duration factor for wind
 Connection Capacity: $3 \times 31 \times 1.6 = 148.8$ pounds

- 2 **3 - 10d common nails (3" x 0.148")**
 From DA-2, Wp = 29 pounds per nail
 Adjust using 1.6 load duration factor for wind
 Connection Capacity: $3 \times 29 \times 1.6 = 139.2$ pounds

Reference Withdrawal Design Values (Wp) for Toe-Nailed Connections ^{1,2}														
in Sawn Lumber or SCL														
Nail Type	Nail Diameter D in.	Nail Length L in.	L _e in.	L _m in.	G=0.67 Red Oak	G=0.55 Mixed Maple Southern Pine	G=0.5 Douglas Fir-Larch	G=0.49 Douglas Fir-Larch (N)	G=0.46 Douglas Fir(S) Hem-Fir(N)	G=0.43 Hem-Fir	G=0.42 Spruce-Pine-Fir	G=0.37 Redwood (open grain)	G=0.36 Eastern Softwoods Spruce-Pine-Fir (S) Western Cedars Western Woods	G=0.35 Northern Species
					lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	
Box	0.099	2	0.67	1.07	41	25	20	19	16	14	13	9	9	8
	0.113	2.5	0.83	1.33	59	36	28	27	23	19	18	13	12	12
	0.128	3	1.00	1.60	80	49	39	37	31	26	25	18	17	16
	0.135	3.5	1.17	1.86	99	60	48	45	39	33	31	22	21	19
	0.148	4	1.33	2.13	124	76	60	57	48	41	38	28	26	24
Common	0.162	5	1.67	2.66	169	103	81	77	66	56	53	38	36	33
	0.113	2	0.67	1.07	47	29	23	22	18	16	15	11	10	9
	0.131	2.5	0.83	1.33	68	42	33	31	27	23	21	16	14	14
	0.148	3	1.00	1.60	93	57	45	42	36	31	29	21	20	18
	0.162	3.5	1.17	1.86	119	72	57	54	46	39	37	27	25	23
Sinker	0.099	2.125	0.71	1.13	44	27	21	20	17	15	14	10	9	9
	0.113	2.375	0.79	1.27	56	34	27	26	22	19	17	13	12	11
	0.120	2.875	0.96	1.53	72	44	35	33	28	24	22	16	15	14
	0.135	3.125	1.04	1.67	88	54	42	40	34	29	27	20	19	17
	0.148	3.250	1.08	1.73	101	61	48	46	39	33	31	23	21	20

1. Tabulated withdrawal design values (Wp) shall be multiplied by all applicable adjustment factors (see NDS Table 10.3.1). Tabulated withdrawal design values (Wp) have been multiplied by the toe-nail factor, C_{tn} = 0.67 as specified in NDS 11.5.4.1.

2. Tabulated withdrawal design values (Wp) are for toe-nailed connections with common wire, box and sinker nails (see NDS Appendix L) with side and main member thickness sufficient to provide complete embedment of the nail in the wood members.

It is proposed to adjust the assumed uplift capacity of a prescriptive wall to be consistent with the value used in Section R802.11. The proposed 70 plf uplift trigger can be justified by calculating the uplift capacity of the minimum braced wall panel method, Method GB. Table R602.10.4 specifies fastening for Method GB with nails or screws spaced at 7" o.c. The AF and PA *Special Design Provisions for Wind and Seismic* lists an allowable shear capacity of a nailed shearwall of 1/2" gypsum wallboard of 75 pounds per foot. Assuming that the same fasteners can resist the same amount of uniform uplift force as they could in a uniform shear force, and adjusting by dividing by the 1.1 diaphragm factor, that gives a uniform uplift of 68.2 pounds per foot, which agrees with the proposed limit of 70 pounds per foot.

Bibliography:

DA 2 - Toenail Connections, American Wood Council

ANSI / AF&PA SDPWS-2008 - Special Design Provisions for Wind and Seismic, American Wood Council

Statistical and analytical models for roof components in existing light-framed wood structures, B. Shanmugam, B. Nielson, and D. Prevatt, as published in Engineering Structures

Cost Impact: The code change proposal will increase the cost of construction. Cost of construction will increase for some roof assemblies (dependent on spacing, span, wind speed, and exposure) where construction includes Spruce-Pine Fir top plates. For smaller roof spans or where Douglas Fir-Larch or Southern Pine top plates are installed (or substituted), there will be no cost impact.

RB398-13

Public Hearing: Committee:
Assembly:

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RB399 – 13

R802.11, R802.11.1, R802.11.1.4 (NEW)

Proponent: Jay Crandell, P.E., ARES Consulting, representing Foam Sheathing Committee and American Chemistry Council (jcrandell@aresconsulting.biz)

Revise as follows:

R802.11 Roof uplift load path ~~tie-down~~.

R802.11.1 Uplift resistance. A continuous uplift load path shall be provided to transfer uplift forces from the roof assembly to the foundation. Roof assemblies shall have uplift resistance in accordance with Sections R802.11.1.2 and R802.11.1.3. Where required for roof or wall assemblies, uplift connection methods shall comply with Section R802.11.1.4.

Exceptions:

1. Where the uplift force does not exceed 200 pounds, rafters and trusses spaced not more than 24 inches (610 mm) on center shall be permitted to be attached to their supporting wall assemblies in accordance with Table R602.3(1).
2. Where the basic wind speed does not exceed 90 mph, the wind exposure category is B, the roof pitch is 5:12 or greater, and the roof span is 32 feet (9754 mm) or less, rafters and trusses spaced not more than 24 inches (610 mm) on center shall be permitted to be attached to their supporting wall assemblies in accordance with Table R602.3(1).

R802.11.1.4 Uplift load path connection methods. One of the following methods shall be used to provide an continuous uplift load path:

1. Fastening in accordance with Table R602.3(1) subject to the limitations of Section R602.3.5, Item 1, and Section R802.11.1, Exceptions 1 and 2.
2. Connectors, fasteners, or devices installed in accordance with the manufacturer's approved data and installation instructions and sized with a minimum safety factor of 2 to resist uplift loads determined in accordance with Table R802.11 or accepted engineering practice.

Reason: This proposal clarifies that a continuous uplift load path is needed. It also clarifies and provides direction for acceptable methods of providing uplift resistance.

Cost Impact: The code change proposal will not increase the cost of construction.

RB399-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R802.11-RB-CRANDELL.doc

RB400 – 13

R804

Proponent: Bonnie Manley, P.E., American Iron and Steel Institute (bmanley@steel.org)

Revise as follows:

SECTION R804 COLD-FORMED STEEL ROOF FRAMING

R804.1 General. Elements shall be straight and free of any defects that would significantly affect their structural performance. Cold-formed steel roof framing members shall be in accordance ~~comply~~ with the requirements of this section.

R804.1.1 Applicability limits. The provisions of this section shall control the construction of cold-formed steel roof framing for buildings not greater than 60 feet (18 288 mm) perpendicular to the joist, rafter or truss span, not greater than 40 feet (12 192 mm) in width parallel to the joist span or truss, less than or equal to three stories above *grade* plane and with roof slopes not less than 3:12 (25-percent slope) or greater than 12:12 (100-percent slope). Cold-formed steel roof framing constructed in accordance with the provisions of this section shall be limited to sites ~~subjected to a maximum~~ where the ultimate design wind speed of 140 is less than 139 miles per hour (6249 m/s), Exposure Category B or C, and a ~~maximum the ground snow load is less than or equal to~~ 70 pounds per square foot (3350 Pa).

R804.2 Structural framing. Load-bearing, cold-formed steel roof framing members shall be in accordance ~~comply~~ with this section, Figure R804.2(1) and with the dimensional and minimum thickness requirements specified in Tables R804.2(1) and R804.2(2). Tracks shall ~~comply with Figure R804.2(2)~~ and shall have a minimum flange width of $1\frac{1}{4}$ inches (32 mm).

R804.2.1 Material. Load-bearing, cold-formed steel framing members shall be cold-formed to shape from structural quality sheet steel complying with the requirements of ~~one of the following:~~

- ~~1. ASTM A 653: Grades 33 and 50 (Class 1 and 3).~~
- ~~2. ASTM A 792: Grades 33 and 50A.~~
- ~~3. ASTM A 1003: Structural Grades 33 Type H and 50 Type H.~~

R804.2.2 Corrosion protection. Load-bearing, cold-formed steel framing shall have a metallic coating complying with ASTM A 1003 and one of the following:

1. A minimum of G 60 in accordance with ASTM A 653.
2. A minimum of AZ 50 in accordance with ASTM A 792.

R804.2.3 Dimension, thickness and material grade. Load-bearing, cold-formed steel roof framing members shall comply with Figure R804.2.3(1) and with the dimensional and thickness requirements specified in Table R804.2.3. Additionally, all c-shaped sections shall have a minimum flange width of 1.625 inches (41 mm) and a maximum flange width of 2 inches (51 mm). The minimum lip size for c-shaped sections shall be 0.5 inches (13 mm). Tracks shall comply with Figure R804.2.3(2) and shall have a minimum flange width of $1\frac{1}{4}$ inches (32 mm). Minimum Grade 33 ksi steel shall be used wherever 33 mil and 43 mil thicknesses are specified. Minimum Grade 50 ksi steel shall be used wherever 54 and 68 mil thicknesses are specified.

R804.2.4 Identification. Load-bearing, cold-formed steel framing members shall have a legible *label*, stencil, stamp or embossment with the following information as a minimum:

1. Manufacturer's identification.
2. Minimum base steel thickness in inches (mm).
3. Minimum coating designation.

4. Minimum yield strength, in kips per square inch (ksi) (MPa).

R804.2.3 Corrosion protection. Load-bearing, cold-formed steel framing shall have a metallic coating complying with ASTM A 1003 and one of the following:

1. A minimum of G 60 in accordance with ASTM A 653.
2. A minimum of AZ 50 in accordance with ASTM A 792.

FIGURE R804.2.3(1) C-SHAPED SECTION

(No change to Figure)

FIGURE R804.2.3(2) TRACK SECTION

(No change to Figure)

TABLE R804.2(1)
LOAD-BEARING COLD-FORMED STEEL MEMBER SIZES

NOMINAL MEMBER SIZE MEMBER DESIGNATION ^a	WEB DEPTH (inches)	MINIMUM FLANGE WIDTH (inches)	MAXIMUM FLANGE WIDTH (inches)	MINIMUM LIP SIZE (inches)
350S162-t	3.5	1.625	2	0.5
550S162-t	5.5	1.625	2	0.5
800S162-t	8	1.625	2	0.5
1000S162-t	10	1.625	2	0.5
1200S162-t	12	1.625	2	0.5

For SI: 1 inch = 25.4 mm

a. — The member designation is defined by the first number representing the member depth in hundredths of an inch, the letter "s" representing a stud or joist member, the second number representing the flange width in hundredths of an inch, and the letter "t" shall be a number representing the minimum base metal thickness in mils [see Table R804.2(2)].

TABLE R804.2(2)
MINIMUM THICKNESS OF COLD-FORMED STEEL MEMBERS

DESIGNATION THICKNESS (mils)	MINIMUM BASE STEEL THICKNESS (inch)
33	0.0329
43	0.0428
54	0.0538
68	0.0677
97	0.0966

For SI: 1 inch = 25.4 mm, 1 mil = 0.0254 mm.

TABLE R804.2.3 LOAD-BEARING COLD-FORMED STEEL ROOF FRAMING MEMBER SIZES AND THICKNESSES

MEMBER DESIGNATION ^a	WEB DEPTH (inches)	MINIMUM BASE STEEL THICKNESS mil (inches)
350S162-t	3.5	33 (0.0329), 43 (0.0428), 54 (0.0538)
550S162-t	5.5	33 (0.0329), 43 (0.0428), 54 (0.0538), 68 (0.0677)

<u>800S162-t</u>	<u>8</u>	<u>33 (0.0329), 43 (0.0428), 54 (0.0538), 68 (0.0677)</u>
<u>1000S162-t</u>	<u>10</u>	<u>43 (0.0428), 54 (0.0538), 68 (0.0677)</u>
<u>1200S162-t</u>	<u>12</u>	<u>43 (0.0428), 54 (0.0538), 68 (0.0677)</u>

For SI: 1 inch = 25.4 mm

- a. The member designation is defined by the first number representing the member depth in hundredths of an inch, the letter "s" representing a stud or joist member, the second number representing the flange width in hundredths of an inch, and the letter "t" shall be a number representing the minimum base metal thickness in mils.

R804.2.4 R804.2.5 Fastening requirements. Screws for steel-to-steel connections shall be installed with a minimum edge distance and center-to-center spacing of $\frac{1}{2}$ inch (13 mm), shall be self-drilling tapping, and shall conform to ASTM C 1513. Structural sheathing shall be attached to cold-formed steel roof rafters with minimum No. 8 self-drilling tapping screws that conform to ASTM C 1513. Screws for attaching structural sheathing to cold-formed steel roof framing shall have a minimum head diameter of 0.292 inch (7.4 mm) with countersunk heads and shall be installed with a minimum edge distance of $\frac{3}{8}$ inch (10 mm). Gypsum board ceilings shall be attached to cold-formed steel joists with minimum No. 6 screws conforming to ASTM C 954 or ASTM C 1513 with a bugle-head style and shall be installed in accordance with Section R805. For all connections, screws shall extend through the steel a minimum of three exposed threads. All fasteners shall have rust-inhibitive coating suitable for the installation in which they are being used, or be manufactured from material not susceptible to corrosion.

~~Where No. 8 screws are specified in a steel-to-steel connection, reduction of the required number of screws in the connection is permitted in accordance with the reduction factors in Table R804.2.4 when larger screws are used or when one of the sheets of steel being connected is thicker than 33 mils (0.84 mm). When applying the reduction factor, the resulting number of screws shall be rounded up.~~

**TABLE R804.2.4
SCREW SUBSTITUTION FACTOR**

SCREW SIZE	THINNEST CONNECTED STEEL SHEET (mils)	
	33	43
#8	1.0	0.67
#10	0.93	0.62
#12	0.86	0.56

For SI: 1 mil = 0.0254 mm.

R804.2.5 R804.2.6 Web holes, web hole reinforcing and web hole patching. Web holes, web hole reinforcing, and web hole patching shall be in accordance with this section.

R804.2.5.1 R804.2.6.1 Web holes. Web holes in roof framing members shall comply with all of the following conditions:

1. Holes shall conform to Figure ~~R804.2.5.1~~ R804.2.6.1;
2. Holes shall be permitted only along the centerline of the web of the framing member;
3. Center-to-center spacing of holes shall not be less than 24 inches (610 mm);
4. The web hole width shall not be greater than one-half the member depth, or $2\frac{1}{2}$ inches (64.5 mm);
5. Holes shall have a web hole length not exceeding $4\frac{1}{2}$ inches (114 mm); and
6. The minimum distance between the edge of the bearing surface and the edge of the web hole shall not be less than 10 inches (254 mm).

Framing members with web holes not conforming to the above requirements shall be reinforced in accordance with Section ~~R804.2.5.2~~ R804.2.6.2, patched in accordance with Section ~~R804.2.5.3~~ R804.2.6.3 or designed in accordance with accepted engineering practices.

FIGURE ~~R804.2.5.4~~ R804.2.6.1 ROOF FRAMING MEMBER WEB HOLES

(No change to Figure)

~~R804.2.5.2~~ R804.2.6.2 Web hole reinforcing. Reinforcement of web holes in ceiling joists not conforming to the requirements of Section ~~R804.2.5.4~~ R804.2.6.1 shall be permitted if the hole is located fully within the center 40 percent of the span and the depth and length of the hole does not exceed 65 percent of the flat width of the web. The reinforcing shall be a steel plate or C-shape section with a hole that does not exceed the web hole size limitations of Section ~~R804.2.5.4~~ R804.2.6.1 for the member being reinforced. The steel reinforcing shall be the same thickness as the receiving member and shall extend at least 1 inch (25.4 mm) beyond all edges of the hole. The steel reinforcing shall be fastened to the web of the receiving member with No. 8 screws spaced no greater than 1 inch (25.4 mm) center-to-center along the edges of the patch with minimum edge distance of $\frac{1}{2}$ inch (13 mm).

~~R804.2.5.3~~ R804.2.6.3 Hole patching. Patching of web holes in roof framing members not conforming to the requirements in Section ~~R804.2.5.4~~ R804.2.6.1 shall be permitted in accordance with either of the following methods:

1. Framing members shall be replaced or designed in accordance with accepted engineering practices where web holes exceed the following size limits:
 - 1.1. The depth of the hole, measured across the web, exceeds 70 percent of the flat width of the web; or
 - 1.2. The length of the hole measured along the web, exceeds 10 inches (254 mm) or the depth of the web, whichever is greater.
2. Web holes not exceeding the dimensional requirements in Section ~~R804.2.5.3~~ R804.2.6.3, Item 1, shall be patched with a solid steel plate, stud section or track section in accordance with Figure ~~R804.2.5.3~~ R804.2.6.3. The steel patch shall, as a minimum, be of the same thickness as the receiving member and shall extend at least 1 inch (25 mm) beyond all edges of the hole. The steel patch shall be fastened to the web of the receiving member with No. 8 screws spaced no greater than 1 inch (25 mm) center-to-center along the edges of the patch with minimum edge distance of $\frac{1}{2}$ inch (13 mm).

FIGURE ~~R804.2.5.3~~ R804.2.6.3 ROOF FRAMING MEMBER WEB HOLE PATCH

(No change to Figure)

R804.3 Roof construction. Cold-formed steel roof systems constructed in accordance with the provisions of this section shall consist of both ceiling joists and rafters in accordance with Figure R804.3 and fastened in accordance with Table R804.3, and hip framing in accordance with Section R804.3.3.

R804.3.1 Ceiling joists. Cold-formed steel ceiling joists shall be in accordance with this section.

R804.3.1.1 Minimum ceiling joist size. Ceiling joist size and thickness shall be determined in accordance with the limits set forth in Tables R804.3.1.1(1) through and ~~R804.3.1.1(8)~~ R804.3.1.1(2). When determining the size of ceiling joists, the lateral support of the top flange shall be classified as unbraced, braced at mid-span or braced at third points in accordance with Section R804.3.1.4. Where sheathing material is attached to the top flange of ceiling joists or where the bracing is spaced closer than third point of the joists, the "third point" values from Tables R804.3.1.1(1) through and ~~R804.3.1.1(8)~~ R804.3.1.1(2) shall be used.

Ceiling joists shall have a bearing support length of not less than $1\frac{1}{2}$ inches (38 mm) and shall be connected to roof rafters (heel joint) with No. 10 screws in accordance with Figures ~~R804.3.1.1(1) and R804.3.1.1(2)~~ and Table ~~804.3.1.1(9)~~ 804.3.1.1(3).

When continuous joists are framed across interior bearing supports, the interior bearing supports shall be located within 24 inches (610 mm) of midspan of the ceiling joist, and the individual spans shall not

exceed the applicable spans in Tables R804.3.1.1(2), R804.3.1.1(4), R804.3.1.1(6) and R804.3.1.1(8). R804.3.1.1(1) and R804.3.1.1(2)

When the *attic* is to be used as an *occupied space*, the ceiling joists shall be designed in accordance with Section R505.

FIGURE R804.3 COLD-FORMED STEEL ROOF CONSTRUCTION

(No change to Figure)

TABLE R804.3
ROOF FRAMING FASTENING SCHEDULE^{a,b}

DESCRIPTION OF BUILDING ELEMENTS			NUMBER AND SIZE OF FASTENERS ^a				SPACING OF FASTENERS
Ceiling joist to top track of load-bearing wall			2 No. 10 screws				Each joist
Roof sheathing (oriented strand board or plywood) to rafter			No. 8 screws				6" o.c. on edges and 12" o.c. at interior supports. 6" o.c. at gable end truss
Truss to bearing wall ^a			2 No. 10 screws				Each truss
Gable end truss to end wall top track			No. 10 screws				12" o.c.
Rafter to ceiling joist			Minimum No. 10 screws, per Table R804.3.1.1(39)				Evenly spaced, not less than 1/2" from all edges.
Ceiling joist or roof truss to top track of bearing wall ^b	Ceiling Joist Spacing (in.)	Roof Span (ft)	Ultimate Design Wind Speed (mph) and Exposure Category				Each ceiling joist or roof truss
			126 B 110 C	<139 B 115 C	126 C	<139 C	
	16	24	2	2	2	3	
		28	2	2	3	3	
		32	2	2	3	4	
		36	2	2	3	4	
		40	2	2	3	4	
	24	24	2	2	3	4	
		28	2	2	4	5	
		32	2	3	4	5	
		36	2	3	4	6	
		40	2	3	5	6	

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 mil = 0.0254 mm.

a. Screws are a minimum No. 10 unless noted otherwise.

b. Indicated number of screws shall be applied through the flanges of the truss or ceiling joist or through each leg of a 54 mil clip angle shall be used with two No. 10 screws in each leg. See Section R804.3.89 for additional requirements to resist uplift forces.

b. Spacing of fasteners on roof sheathing panel edges applies to panel edges supported by framing members and at all roof plane perimeters. Blocking of roof sheathing panel edges perpendicular to the framing members shall not be required except at the intersection of adjacent roof planes. Roof perimeter shall be supported by framing members or cold-formed blocking of the same depth and gage as the floor members.

TABLE R804.3.1.1(1)
CEILING JOIST SPANS
SINGLE SPANS WITH BEARING STIFFENERS
-10 lb per sq ft LIVE LOAD (NO ATTIC STORAGE)^{a, b, c} 33 ksi STEEL

MEMBER DESIGNATION	ALLOWABLE SPAN (feet-inches)					
	Lateral Support of Top (Compression) Flange					
	Unbraced		Mid-Span Bracing		Third-Point Bracing	
	Ceiling Joist Spacing (inches)					
	16	24	16	24	16	24
350S162-33	9'-5"	8'-6"	12'-2"	10'-4"	12'-2"	10'-7"
350S162-43	10'-3"	9'-2"	12'-10"	11'-2"	12'-10"	11'-2"
350S162-54	11'-1"	9'-11"	13'-9"	12'-0"	13'-9"	12'-0"
350S162-68	12'-1"	10'-9"	14'-8"	12'-10"	14'-8"	12'-10"
350S162-97	14'-4"	12'-7"	16'-4"	14'-3"	16'-4"	14'-3"
550S162-33	10'-7"	9'-6"	14'-10"	12'-10"	15'-11"	13'-4"
550S162-43	11'-8"	10'-6"	16'-4"	14'-3"	17'-10"	15'-3"
550S162-54	12'-6"	11'-2"	17'-7"	15'-7"	19'-5"	16'-10"
550S162-68	13'-6"	12'-1"	19'-2"	17'-1"	21'-0"	18'-4"
550S162-97	15'-9"	13'-11"	21'-8"	19'-3"	23'-5"	20'-5"
800S162-33	12'-2"	10'-11"	17'-8"	15'-10"	19'-10"	17'-1"
800S162-43	13'-0"	11'-9"	18'-10"	17'-0"	21'-6"	19'-1"
800S162-54	13'-10"	12'-5"	20'-0"	18'-0"	22'-9"	20'-4"
800S162-68	14'-11"	13'-4"	21'-3"	19'-1"	24'-1"	21'-8"
800S162-97	17'-1"	15'-2"	23'-10"	21'-3"	26'-7"	23'-10"
1000S162-43	13'-11"	12'-6"	20'-2"	18'-3"	23'-1"	20'-9"
1000S162-54	14'-9"	13'-3"	21'-4"	19'-3"	24'-4"	22'-0"
1000S162-68	15'-10"	14'-2"	22'-8"	20'-5"	25'-9"	23'-2"
1000S162-97	18'-0"	16'-0"	25'-3"	22'-7"	28'-3"	25'-4"
1200S162-43	14'-8"	13'-3"	21'-4"	19'-3"	24'-5"	21'-8"
1200S162-54	15'-7"	14'-0"	22'-6"	20'-4"	25'-9"	23'-2"
1200S162-68	16'-8"	14'-11"	23'-11"	21'-6"	27'-2"	24'-6"
1000S162-97	18'-9"	16'-9"	26'-6"	23'-8"	29'-9"	26'-9"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

- a. — Deflection criterion: $L/240$ for total loads.
- b. — Ceiling dead load = 5 psf.
- c. — Bearing stiffeners are required at all bearing points and concentrated load locations.

TABLE R804.3.1.1(2)
CEILING JOIST SPANS
TWO EQUAL SPANS WITH BEARING STIFFENERS
10 lb per sq ft LIVE LOAD (NO ATTIC STORAGE)^{a, b, c} 33 ksi STEEL

MEMBER DESIGNATION	ALLOWABLE SPAN (feet-inches)					
	Lateral Support of Top (Compression) Flange					
	Unbraced		Mid-Span Bracing		Third-Point Bracing	
	Ceiling Joist Spacing (inches)					
	16	24	16	24	16	24
350S162-33	12'-11"	10'-11"	13'-5"	10'-11"	13'-5"	10'-11"
350S162-43	14'-2"	12'-8"	15'-10"	12'-11"	15'-10"	12'-11"
350S162-54	15'-6"	13'-10"	17'-1"	14'-6"	17'-9"	14'-6"
350S162-68	17'-3"	15'-3"	18'-6"	16'-1"	19'-8"	16'-1"
350S162-97	20'-10"	18'-4"	21'-5"	18'-10"	21'-11"	18'-10"
550S162-33	14'-4"	12'-11"	16'-7"	14'-1"	17'-3"	14'-1"
550S162-43	16'-0"	14'-1"	17'-11"	16'-1"	20'-7"	16'-10"
550S162-54	17'-4"	15'-6"	19'-5"	17'-6"	23'-2"	19'-0"
550S162-68	19'-1"	16'-11"	20'-10"	18'-8"	25'-2"	21'-5"
550S162-97	22'-8"	19'-9"	23'-6"	20'-11"	27'-11"	25'-1"
800S162-33	16'-5"	14'-10"	19'-2"	17'-3"	23'-1"	18'-3"
800S162-43	17'-9"	15'-11"	20'-6"	18'-5"	25'-0"	22'-6"
800S162-54	19'-1"	17'-1"	21'-8"	19'-6"	26'-4"	23'-9"
800S162-68	20'-9"	18'-6"	23'-1"	20'-9"	28'-0"	25'-2"
800S162-97	24'-5"	21'-6"	26'-0"	23'-2"	31'-1"	27'-9"
1000S162-43	18'-11"	17'-0"	21'-11"	19'-9"	26'-8"	24'-1"
1000S162-54	20'-3"	18'-2"	23'-2"	20'-10"	28'-2"	25'-5"
1000S162-68	21'-11"	19'-7"	24'-7"	22'-2"	29'-10"	26'-11"
1000S162-97	25'-7"	22'-7"	27'-6"	24'-6"	33'-0"	29'-7"
1200S162-43	19'-11"	17'-11"	23'-1"	20'-10"	28'-3"	25'-6"
1200S162-54	21'-3"	19'-1"	24'-5"	22'-0"	29'-9"	26'-10"
1200S162-68	23'-0"	20'-7"	25'-11"	23'-4"	31'-6"	28'-4"
1000S162-97	26'-7"	23'-6"	28'-9"	25'-10"	34'-8"	31'-1"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

- a. — Deflection criterion: $L/240$ for total loads.
- b. — Ceiling dead load = 5 psf.
- c. — Bearing stiffeners are required at all bearing points and concentrated load locations.

TABLE R804.3.1.1(3)
CEILING JOIST SPANS
SINGLE SPANS WITH BEARING STIFFENERS
20 lb per sq ft LIVE LOAD (LIMITED ATTIC STORAGE)^{a, b, c} 33 ksi STEEL

MEMBER DESIGNATION	ALLOWABLE SPAN (feet-inches)					
	Lateral Support of Top (Compression) Flange					
	Unbraced		Mid-Span Bracing		Third-Point Bracing	
	Ceiling Joist Spacing (inches)					
	16	24	16	24	16	24
350S162-33	8'-2"	7'-2"	9'-9"	8'-1"	9'-11"	8'-1"
350S162-43	8'-10"	7'-10"	11'-0"	9'-5"	11'-0"	9'-7"
350S162-54	9'-6"	8'-6"	11'-9"	10'-3"	11'-9"	10'-3"
350S162-68	10'-4"	9'-2"	12'-7"	11'-0"	12'-7"	11'-0"
350S162-97	12'-1"	10'-8"	14'-0"	12'-0"	14'-0"	12'-0"
550S162-33	9'-2"	8'-3"	12'-2"	10'-2"	12'-6"	10'-5"
550S162-43	10'-1"	9'-1"	13'-7"	11'-7"	14'-5"	12'-2"
550S162-54	10'-9"	9'-8"	14'-10"	12'-10"	15'-11"	13'-6"
550S162-68	11'-7"	10'-4"	16'-4"	14'-0"	17'-5"	14'-11"
550S162-97	13'-4"	11'-10"	18'-5"	16'-2"	20'-1"	17'-1"
800S162-33	10'-7"	9'-6"	15'-1"	13'-0"	16'-2"	13'-7"
800S162-43	11'-4"	10'-2"	16'-5"	14'-6"	18'-2"	15'-9"
800S162-54	12'-0"	10'-9"	17'-4"	15'-6"	19'-6"	17'-0"
800S162-68	12'-10"	11'-6"	18'-5"	16'-6"	20'-10"	18'-3"
800S162-97	14'-7"	12'-11"	20'-5"	18'-3"	22'-11"	20'-5"
1000S162-43	12'-1"	10'-11"	17'-7"	15'-10"	19'-11"	17'-3"
1000S162-54	12'-10"	11'-6"	18'-7"	16'-9"	21'-2"	18'-10"
1000S162-68	13'-8"	12'-3"	19'-8"	17'-8"	22'-4"	20'-1"
1000S162-97	15'-4"	13'-8"	21'-8"	19'-5"	24'-5"	21'-11"
1200S162-43	12'-9"	11'-6"	18'-7"	16'-6"	20'-9"	18'-2"
1200S162-54	13'-6"	12'-2"	19'-7"	17'-8"	22'-5"	20'-2"
1200S162-68	14'-4"	12'-11"	20'-9"	18'-8"	23'-7"	21'-3"
1000S162-97	16'-1"	14'-4"	22'-10"	20'-6"	25'-9"	23'-2"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. — Deflection criterion: $L/240$ for total loads.

b. — Ceiling dead load = 5 psf.

c. — Bearing stiffeners are required at all bearing points and concentrated load locations.

TABLE R804.3.1.1(4)
CEILING JOIST SPANS
TWO EQUAL SPANS WITH BEARING STIFFENERS
20 lb per sq ft LIVE LOAD (LIMITED ATTIC STORAGE)^{a, b, c} 33 ksi STEEL

MEMBER DESIGNATION	ALLOWABLE SPAN (feet-inches)					
	Lateral Support of Top (Compression) Flange					
	Unbraced		Mid-Span Bracing		Third-Point Bracing	
	Ceiling Joist Spacing (inches)					
	16	24	16	24	16	24
350S162-33	10'-2"	8'-4"	10'-2"	8'-4"	10'-2"	8'-4"
350S162-43	12'-1"	9'-10"	12'-1"	9'-10"	12'-1"	9'-10"
350S162-54	13'-3"	11'-0"	13'-6"	11'-0"	13'-6"	11'-0"
350S162-68	14'-7"	12'-3"	15'-0"	12'-3"	15'-0"	12'-3"
350S162-97	17'-6"	14'-3"	17'-6"	14'-3"	17'-6"	14'-3"
550S162-33	12'-5"	10'-9"	13'-2"	10'-9"	13'-2"	10'-9"
550S162-43	13'-7"	12'-1"	15'-6"	12'-9"	15'-8"	12'-9"
550S162-54	14'-11"	13'-4"	16'-10"	14'-5"	17'-9"	14'-5"
550S162-68	16'-3"	14'-5"	18'-0"	16'-1"	20'-0"	16'-4"
550S162-97	19'-1"	16'-10"	20'-3"	18'-0"	23'-10"	19'-5"
800S162-33	14'-3"	12'-4"	16'-7"	12'-4"	16'-7"	12'-4"
800S162-43	15'-4"	13'-10"	17'-9"	16'-0"	21'-8"	17'-9"
800S162-54	16'-5"	14'-9"	18'-10"	16'-11"	22'-11"	20'-6"
800S162-68	17'-9"	15'-11"	20'-0"	18'-0"	24'-3"	21'-10"
800S162-97	20'-8"	18'-3"	22'-3"	19'-11"	26'-9"	24'-0"
1000S162-43	16'-5"	14'-9"	19'-0"	17'-2"	23'-3"	18'-11"
1000S162-54	17'-6"	15'-8"	20'-1"	18'-1"	24'-6"	22'-1"
1000S162-68	18'-10"	16'-10"	21'-4"	19'-2"	25'-11"	23'-4"
1000S162-97	21'-8"	19'-3"	23'-7"	21'-2"	28'-5"	25'-6"
1200S162-43	17'-3"	15'-7"	20'-1"	18'-2"	24'-6"	18'-3"
1200S162-54	18'-5"	16'-6"	21'-3"	19'-2"	25'-11"	23'-5"
1200S162-68	19'-9"	17'-8"	22'-6"	20'-3"	27'-4"	24'-8"
1000S162-97	22'-7"	20'-1"	24'-10"	22'-3"	29'-11"	26'-11"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

- a. — Deflection criterion: $L/240$ for total loads.
- b. — Ceiling dead load = 5 psf.
- c. — Bearing stiffeners are required at all bearing points and concentrated load locations.

TABLE ~~R804.3.1.1(5)~~ R804.3.1.1(1)
CEILING JOIST SPANS
SINGLE SPANS WITHOUT BEARING STIFFENERS
10 lb per sq ft LIVE LOAD (NO ATTIC STORAGE)^{a, b, c}
33-ksi STEEL

MEMBER DESIGNATION	ALLOWABLE SPAN (feet-inches)					
	Lateral Support of Top (Compression) Flange					
	Unbraced		Mid-Span Bracing		Third-Point Bracing	
	Ceiling Joist Spacing (inches)					
	16	24	16	24	16	24
350S162-33	9'-5"	8'-6"	12'-2"	10'-4"	12'-2"	10'-7"
350S162-43	10'-3"	9'-12"	13'-2"	11'-6"	13'-2"	11'-6"
350S162-54	11'-1"	9'-11"	13'-9"	12'-0"	13'-9"	12'-0"
350S162-68	12'-1"	10'-9"	14'-8"	12'-10"	14'-8"	12'-10"
350S162-97	14'-4"	12'-7"	16'-10"	14'-3"	16'-4"	14'-3"
550S162-33	10'-7"	9'-6"	14'-10"	12'-10"	15'-11"	13'-4"
550S162-43	11'-8"	10'-6"	16'-4"	14'-3"	17'-10"	15'-3"
550S162-54	12'-6"	11'-2"	17'-7"	15'-7"	19'-5"	16'-10"
550S162-68	13'-6"	12'-1"	19'-2"	17'-0"	21'-0"	18'-4"
550S162-97	15'-9"	13'-11"	21'-8"	19'-3"	23'-5"	20'-5"
800S162-33	—	—	—	—	—	—
800S162-43	13'-0"	11'-9"	18'-10"	17'-0"	21'-6"	19'-0"
800S162-54	13'-10"	12'-5"	20'-0"	18'-0"	22'-9"	20'-4"
800S162-68	14'-11"	13'-4"	21'-3"	19'-1"	24'-1"	21'-8"
800S162-97	17'-1"	15'-2"	23'-10"	21'-3"	26'-7"	23'-10"
1000S162-43	—	—	—	—	—	—
1000S162-54	14'-9"	13'-3"	21'-4"	19'-3"	24'-4"	22'-0"
1000S162-68	15'-10"	14'-2"	22'-8"	20'-5"	25'-9"	23'-2"
1000S162-97	18'-0"	16'-0"	25'-3"	22'-7"	28'-3"	25'-4"
1200S162-43	—	—	—	—	—	—
1200S162-54	—	—	—	—	—	—
1200S162-68	16'-8"	14'-11"	23'-11"	21'-6"	27'-2"	24'-6"
1000S162-97	18'-9"	16'-9"	26'-6"	23'-8"	29'-9"	26'-9"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. Deflection criterion: $L/240$ for total loads.

b. Ceiling dead load = 5 psf.

c. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

TABLE R804.3.1.1(6)
CEILING JOIST SPANS
TWO EQUAL SPANS WITHOUT BEARING STIFFENERS
10 lb per sq ft LIVE LOAD (NO ATTIC STORAGE)^{a,b} 33 ksi STEEL

MEMBER DESIGNATION	ALLOWABLE SPAN (feet-inches)					
	Lateral Support of Top (Compression) Flange					
	Unbraced		Mid-Span Bracing		Third-Point Bracing	
	Ceiling Joist Spacing (inches)					
	16	24	16	24	16	24
350S162-33	11'-9"	8'-11"	11'-9"	8'-11"	11'-9"	8'-11"
350S162-43	14'-2"	11'-7"	14'-11"	11'-7"	14'-11"	11'-7"
350S162-54	15'-6"	13'-10"	17'-1"	13'-10"	17'-7"	13'-10"
350S162-68	17'-3"	15'-3"	18'-6"	16'-1"	19'-8"	16'-1"
350S162-97	20'-10"	18'-4"	21'-5"	18'-9"	21'-11"	18'-9"
550S162-33	13'-4"	9'-11"	13'-4"	9'-11"	13'-4"	9'-11"
550S162-43	16'-0"	13'-6"	17'-9"	13'-6"	17'-9"	13'-6"
550S162-54	17'-4"	15'-6"	19'-5"	16'-10"	21'-9"	16'-10"
550S162-68	19'-1"	16'-11"	20'-10"	18'-8"	24'-11"	20'-6"
550S162-97	22'-8"	20'-0"	23'-9"	21'-1"	28'-2"	25'-1"
800S162-33	—	—	—	—	—	—
800S162-43	17'-9"	15'-7"	20'-6"	15'-7"	21'-0"	15'-7"
800S162-54	19'-1"	17'-1"	21'-8"	19'-6"	26'-4"	23'-10"
800S162-68	20'-9"	18'-6"	23'-1"	20'-9"	28'-0"	25'-2"
800S162-97	24'-5"	21'-6"	26'-0"	23'-2"	31'-1"	27'-9"
1000S162-43	—	—	—	—	—	—
1000S162-54	20'-3"	18'-2"	23'-2"	20'-10"	28'-2"	21'-2"
1000S162-68	21'-11"	19'-7"	24'-7"	22'-2"	29'-10"	26'-11"
1000S162-97	25'-7"	22'-7"	27'-6"	24'-6"	33'-0"	29'-7"
1200S162-43	—	—	—	—	—	—
1200S162-54	—	—	—	—	—	—
1200S162-68	23'-0"	20'-7"	25'-11"	23'-4"	31'-6"	28'-4"
1000S162-97	26'-7"	23'-6"	28'-9"	25'-10"	34'-8"	31'-1"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. — Deflection criterion: $L/240$ for total loads.

b. — Ceiling dead load = 5 psf.

TABLE ~~R804.3.1.1(7)~~ R804.3.1.1(2)
CEILING JOIST SPANS
~~SINGLE SPANS WITHOUT BEARING STIFFENERS~~
20 lb per sq ft LIVE LOAD (LIMITED ATTIC STORAGE)^{a, b, c}
33 ksi STEEL

MEMBER DESIGNATION	ALLOWABLE SPAN (feet-inches)					
	Lateral Support of Top (Compression) Flange					
	Unbraced		Mid-Span Bracing		Third-Point Bracing	
	Ceiling Joist Spacing (inches)					
	16	24	16	24	16	24
350S162-33	8'-2"	6'-10"	9'-9"	6'-10"	9'-11"	6'-10"
350S162-43	8'-10"	7'-10"	11'-0"	9'-5"	11'-0"	9'-7"
350S162-54	9'-6"	8'-6"	11'-9"	10'-3"	11'-9"	10'-3"
350S162-68	10'-4"	9'-2"	12'-7"	11'-0"	12'-7"	11'-0"
350S162-97	12'-10"	10'-8"	13'-9"	12'-0"	13'-9"	12'-0"
550S162-33	9'-2"	8'-3"	12'-2"	8'-5"	12'-6"	8'-5"
550S162-43	10'-1"	9'-1"	13'-7"	11'-8"	14'-5"	12'-2"
550S162-54	10'-9"	9'-8"	14'-10"	12'-10"	15'-11"	13'-6"
550S162-68	11'-7"	10'-4"	16'-4"	14'-0"	17'-5"	14'-11"
550S162-97	13'-4"	11'-10"	18'-5"	16'-2"	20'-1"	17'-4"
800S162-33	—	—	—	—	—	—
800S162-43	11'-4"	10'-1"	16'-5"	13'-6"	18'-1"	13'-6"
800S162-54	20'-0"	10'-9"	17'-4"	15'-6"	19'-6"	27'-0"
800S162-68	12'-10"	11'-6"	18'-5"	16'-6"	20'-10"	18'-3"
800S162-97	14'-7"	12'-11"	20'-5"	18'-3"	22'-11"	20'-5"
1000S162-43	—	—	—	—	—	—
1000S162-54	12'-10"	11'-6"	18'-7"	16'-9"	21'-2"	15'-5"
1000S162-68	13'-8"	12'-3"	19'-8"	17'-8"	22'-4"	20'-1"
1000S162-97	15'-4"	13'-8"	21'-8"	19'-5"	24'-5"	21'-11"
1200S162-43	—	—	—	—	—	—
1200S162-54	—	—	—	—	—	—
1200S162-68	14'-4"	12'-11"	20'-9"	18'-8"	23'-7"	21'-3"
1000S162-97	16'-1"	14'-4"	22'-10"	20'-6"	25'-9"	23'-2"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. Deflection criterion: $L/240$ for total loads.

b. Ceiling dead load = 5 psf.

c. Minimum Grade 33 ksi steel shall be used for 33 mil and 43 mil thicknesses. Minimum Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

TABLE R804.3.1.1(8)
CEILING JOIST SPANS
TWO EQUAL SPANS WITHOUT BEARING STIFFENERS
20 lb per sq ft LIVE LOAD (LIMITED ATTIC STORAGE)^{a, b} 33 ksi STEEL

MEMBER DESIGNATION	ALLOWABLE SPAN (feet-inches)					
	Lateral Support of Top (Compression) Flange					
	Unbraced		Mid-Span Bracing		Third-Point Bracing	
	Ceiling Joist Spacing (inches)					
	16	24	16	24	16	24
350S162-33	8'-1"	6'-1"	8'-1"	6'-1"	8'-1"	6'-1"
350S162-43	10'-7"	8'-1"	10'-7"	8'-1"	10'-7"	8'-1"
350S162-54	12'-8"	9'-10"	12'-8"	9'-10"	12'-8"	9'-10"
350S162-68	14'-7"	11'-10"	14'-11"	11'-10"	14'-11"	11'-10"
350S162-97	17'-6"	14'-3"	17'-6"	14'-3"	17'-6"	14'-3"
550S162-33	8'-11"	6'-8"	8'-11"	6'-8"	8'-11"	6'-8"
550S162-43	12'-3"	9'-2"	12'-3"	9'-2"	12'-3"	9'-2"
550S162-54	14'-11"	11'-8"	15'-4"	11'-8"	15'-4"	11'-8"
550S162-68	16'-3"	14'-5"	18'-0"	15'-8"	18'-10"	14'-7"
550S162-97	19'-1"	16'-10"	20'-3"	18'-0"	23'-9"	19'-5"
800S162-33	—	—	—	—	—	—
800S162-43	13'-11"	9'-10"	13'-11"	9'-10"	13'-11"	9'-10"
800S162-54	16'-5"	13'-9"	18'-8"	13'-9"	18'-8"	13'-9"
800S162-68	17'-9"	15'-11"	20'-0"	18'-0"	24'-1"	18'-3"
800S162-97	20'-8"	18'-3"	22'-3"	19'-11"	26'-9"	24'-0"
1000S162-43	—	—	—	—	—	—
1000S162-54	17'-6"	13'-11"	19'-1"	13'-11"	19'-1"	13'-11"
1000S162-68	18'-10"	16'-10"	21'-4"	19'-2"	25'-11"	19'-7"
1000S162-97	21'-8"	19'-3"	23'-7"	21'-2"	28'-5"	25'-6"
1200S162-43	—	—	—	—	—	—
1200S162-54	—	—	—	—	—	—
1200S162-68	19'-9"	17'-8"	22'-6"	19'-8"	26'-8"	19'-8"
1000S162-97	22'-7"	20'-1"	24'-10"	22'-3"	29'-11"	26'-11"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. — Deflection criterion: $L/240$ for total loads.

b. — Ceiling dead load = 5 psf.

TABLE R804.3.1.1(9) R804.3.1.1(3)
NUMBER OF SCREWS REQUIRED FOR CEILING JOIST TO ROOF RAFTER CONNECTION^a

ROOF SLOPE	NUMBER OF SCREWS																			
	Building width (feet)																			
	24				28				32				36				40			
	Ground snow load (psf)																			
	20	30	50	70	20	30	50	70	20	30	50	70	20	30	50	70	20	30	50	70
3/12	5	6	9	11	5	7	10	13	6	8	11	15	7	8	13	17	8	9	14	19
4/12	4	5	7	9	4	5	8	10	5	6	9	12	5	7	10	13	6	7	11	14
5/12	3	4	6	7	4	4	6	8	4	5	7	10	5	5	8	11	5	6	9	12
6/12	3	3	5	6	3	4	6	7	4	4	6	8	4	5	7	9	4	5	8	10
7/12	3	3	4	6	3	3	5	7	3	4	6	7	4	4	6	8	4	5	7	9
8/12	2	3	4	5	3	3	5	6	3	4	5	7	3	4	6	8	4	4	6	8
9/12	2	3	4	5	3	3	4	6	3	3	5	6	3	4	5	7	3	4	6	8
10/12	2	2	4	5	2	3	4	5	3	3	5	6	3	3	5	7	3	4	6	7
11/12	2	2	3	4	2	3	4	5	3	3	4	6	3	3	5	6	3	4	5	7
12/12	2	2	3	4	2	3	4	5	2	3	4	5	3	3	5	6	3	4	5	7

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479kPa.

a. Screws shall be No. 10.

FIGURE R804.3.1.1(4) JOIST TO RAFTER CONNECTION

(No change to Figure)

R804.3.1.2 Ceiling joist bearing stiffeners. Where required in Tables R804.3.1.1(1) through R804.3.1.1(8), bearing stiffeners shall be installed at each bearing support in accordance with Figure R804.3.1.1(2). Bearing stiffeners shall be fabricated from a C-shaped or track member in accordance with the one of following:

1. C shaped bearing stiffeners shall be a minimum 33 mils (0.84 mm) thick.
2. Track bearing stiffener shall be a minimum 43 mils (1.09 mm) thick.

The minimum length of a bearing stiffener shall be the depth of member being stiffened minus $\frac{3}{8}$ inch (9.5 mm). Each stiffener shall be fastened to the web of the ceiling joist with a minimum of four No. 8 screws equally spaced as shown in Figure R804.3.1.1(2). Installation of stiffeners shall be permitted on either side of the web.

FIGURE R804.3.1.1(2) BEARING STIFFENER

R804.3.1.3 R804.3.1.2 Ceiling joist bottom flange bracing. The bottom flanges of ceiling joists shall be laterally braced by the application of gypsum board or continuous steel straps installed perpendicular to the joist run in accordance with one of the following:

1. Gypsum board shall be fastened with No. 6 screws in accordance with Section R702.
2. Steel straps with a minimum size of 1½ inches by 33 mils (38 mm by 0.84 mm) shall be installed at a maximum spacing of 4 feet (1219 mm). Straps shall be fastened to the bottom flange at each joist with one No. 8 screw and shall be fastened to blocking with two No. 8 screws. Blocking shall be installed between joists at a maximum spacing of 12 feet (3658 mm)

measured along a line of continuous strapping (perpendicular to the joist run). Blocking shall also be located at the termination of all straps.

~~R804.3.1.4~~ R804.3.1.3 Ceiling joist top flange bracing. The top flanges of ceiling joists shall be laterally braced as required by Tables ~~R804.3.1.1(1) through and R804.3.1.1(8)~~, R804.3.1.1(2) in accordance with one of the following:

1. Minimum 33-mil (0.84 mm) C-shaped member in accordance with Figure ~~R804.3.1.4(1)~~, R804.3.1.3(1).
2. Minimum 33-mil (0.84 mm) track section in accordance with Figure ~~R804.3.1.4(1)~~, R804.3.1.3(1).
3. Minimum 33-mil (0.84 mm) hat section in accordance with Figure ~~R804.3.1.4(1)~~, R804.3.1.3(1).
4. Minimum 54-mil (1.37 mm) 1¹/₂-inch cold-rolled channel section in accordance with Figure ~~R804.3.1.4(1)~~, R804.3.1.3(1).
5. Minimum 1¹/₂-inch by 33-mil (38 mm by 0.84 mm) continuous steel strap in accordance with Figure ~~R804.3.1.4(2)~~, R804.3.1.3(2).

Lateral bracing shall be installed perpendicular to the ceiling joists and shall be fastened to the top flange of each joist with one No. 8 screw. Blocking shall be installed between joists in line with bracing at a maximum spacing of 12 feet (3658 mm) measured perpendicular to the joists. Ends of lateral bracing shall be attached to blocking or anchored to a stable building component with two No. 8 screws.

~~R804.3.1.5~~ R804.3.1.4 Ceiling joist splicing. Splices in ceiling joists shall be permitted, if ceiling joist splices are supported at interior bearing points and are constructed in accordance with Figure ~~R804.3.1.5~~ R804.3.1.4. The number of screws on each side of the splice shall be the same as required for the heel joint connection in Table ~~R804.3.1.1(9)~~, R804.3.1.1(3).

FIGURE ~~R804.3.1.4(1)~~ R804.3.1.3(1) CEILING JOIST TOP FLANGE BRACING WITH C-SHAPE, TRACK OR COLD-ROLLED CHANNEL

(No change to Figure)

FIGURE ~~R804.3.1.4(2)~~ R804.3.1.3(2) CEILING JOIST TOP FLANGE BRACING WITH CONTINUOUS STEEL STRAP AND BLOCKING

(No change to Figure)

FIGURE ~~R804.3.1.5~~ R804.3.1.4 SPLICED CEILING JOISTS

(No change to Figure)

R804.3.2 Roof rafters. Cold-formed steel roof rafters shall be in accordance with this section.

R804.3.2.1 Minimum roof rafter sizes. Roof rafter size and thickness shall be determined in accordance with the limits set forth in Tables ~~R804.3.2.1(1) and R804.3.2.1(2)~~ based on the horizontal projection of the roof rafter span. For determination of roof rafter sizes, reduction of roof spans shall be permitted when a roof rafter support brace is installed in accordance with Section R804.3.2.2. The reduced roof rafter span shall be taken as the larger of the distance from the roof rafter support brace to the ridge or to the heel measured horizontally.

For the purpose of determining roof rafter sizes in Tables ~~R804.3.2.1(1) and R804.3.2.1(2)~~, ultimate design wind speeds shall be converted to equivalent ground snow loads in accordance with Table ~~R804.3.2.1(3)~~, R804.3.2.1(2). Roof rafter sizes shall be based on the higher of the ground snow load or the equivalent snow load converted from the ultimate design wind speed.

R804.3.2.1.1 Eave overhang. Eave overhangs shall not exceed 24 inches (610 mm) measured horizontally.

R804.3.2.1.2 Rake overhangs. Rake overhangs shall not exceed 12 inches (305 mm) measured horizontally. Outlookers at gable endwalls shall be installed in accordance with Figure R804.3.2.1.2.

R804.3.2.2 Roof rafter support brace. When used to reduce roof rafter spans in determining roof rafter sizes, a roof rafter support brace shall meet all of the following conditions:

1. Minimum 350S162-33 C-shaped brace member with maximum length of 8 feet (2438 mm).
2. Minimum brace member slope of 45 degrees (0.785 rad) to the horizontal.
3. Minimum connection of brace to a roof rafter and ceiling joist with four No.10 screws at each end.
4. Maximum 6 inches (152 mm) between brace/ceiling joist connection and load-bearing wall below.
5. Each roof rafter support brace greater than 4 feet (1219 mm) in length, shall be braced with a supplemental brace having a minimum size of 350S162-33 or 350T162-33 such that the maximum unsupported length of the roof rafter support brace is 4 feet (1219 mm). The supplemental brace shall be continuous and shall be connected to each roof rafter support brace using two No.8 screws.

TABLE R804.3.2.1(1)
ROOF RAFTER SPANS^{a, b, c}
33-ksi STEEL

MEMBER DESIGNATION	ALLOWABLE SPAN MEASURED HORIZONTALLY (feet-inches)							
	Ground snow load (psf)							
	20		30		50		70	
	Rafter spacing (inches)							
	16	24	16	24	16	24	16	24
550S162-33	14'-0"	11'-6"	11'-11"	9'-7"	9'-6"	7'-9"	8'-2"	6'-8"
550S162-43	16'-8"	13'-11"	14'-5"	11'-9"	11'-6"	9'-5"	9'-10"	8'-0"
550S162-54	17'-11"	15'-7"	15'-7"	13'-3"	12'-11"	10'-7"	11'-1"	9'-1"
550S162-68	19'-2"	16'-9"	16'-9"	14'-7"	14'-1"	11'-10"	12'-6"	10'-2"
550S162-97	21'-3"	18'-6"	18'-6"	16'-2"	15'-8"	13'-8"	14'-0"	12'-2"
800S162-33	16'-5"	13'-5"	13'-11"	11'-4"	11'-4"	8'-2"	9'-0"	6'-0"
800S162-43	19'-9"	16'-1"	16'-8"	13'-7"	13'-4"	10'-10"	11'-5"	9'-4"
800S162-54	22'-8"	18'-6"	19'-2"	15'-8"	15'-4"	12'-6"	13'-1"	10'-8"
800S162-68	25'-10"	21'-2"	21'-11"	17'-10"	17'-6"	14'-4"	15'-0"	12'-3"
800S162-97	21'-3"	18'-6"	18'-6"	16'-2"	15'-8"	13'-8"	14'-0"	12'-2"
1000S162-43	22'-3"	18'-2"	18'-9"	15'-8"	15'-0"	12'-3"	12'-10"	10'-6"
1000S162-54	25'-8"	20'-11"	21'-8"	17'-9"	17'-4"	14'-2"	14'-10"	12'-1"
1000S162-68	29'-7"	24'-2"	25'-0"	20'-5"	20'-0"	16'-4"	17'-2"	14'-0"
1000S162-97	34'-8"	30'-4"	30'-4"	25'-10"	25'-3"	20'-8"	21'-8"	17'-8"
1200S162-54	28'-3"	23'-1"	23'-11"	19'-7"	19'-2"	15'-7"	16'-5"	13'-5"
1200S162-68	32'-10"	26'-10"	27'-9"	22'-8"	22'-2"	18'-1"	19'-0"	15'-6"
1200S162-97	40'-6"	33'-5"	34'-6"	28'-3"	27'-7"	22'-7"	23'-8"	19'-4"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

- a. Table provides maximum horizontal rafter spans in feet and inches for slopes between 3:12 and 12:12.
- b. Deflection criterion: $L/240$ for live loads and $L/180$ for total loads.
- c. Roof dead load = 12 psf.

TABLE R804.3.2.1(1)
ROOF RAFTER SPANS^{a, b, c, d}

MEMBER DESIGNATION	ALLOWABLE SPAN MEASURED HORIZONTALLY (feet-inches)							
	Equivalent ground snow load (psf)							
	20		30		50		70	
	Rafter spacing (inches)							
	16	24	16	24	16	24	16	24
550S162-33	14'-0"	11'-6"	11'-11"	9'-7"	9'-6"	7'-9"	8'-2"	6'-8"
550S162-43	16'-8"	13'-11"	14'-5"	11'-9"	11'-6"	9'-5"	9'-10"	8'-0"
550S162-54	17'-11"	15'-7"	15'-7"	13'-8"	13'-2"	11'-6"	11'-9"	10'-3"
550S162-68	19'-2"	16'-9"	16'-9"	14'-7"	14'-1"	12'-4"	12'-7"	11'-0"
800S162-33	16'-5"	13'-5"	13'-11"	11'-4"	11'-1"	8'-2"	9'-0"	6'-0"
800S162-43	19'-9"	16'-1"	16'-8"	13'-7"	13'-4"	10'-10"	11'-5"	9'-4"
800S162-54	24'-2"	21'-2"	21'-1"	18'-5"	17'-10"	14'-8"	15'-5"	12'-7"
800S162-68	25'-11"	22'-8"	22'-8"	19'-9"	19'-1"	16'-8"	17'-1"	14'-9"
1000S162-43	22'-3"	18'-2"	18'-9"	15'-8"	15'-0"	12'-3"	12'-10"	10'-6"
1000S162-54	29'-0"	24'-6"	25'-4"	20'-9"	20'-3"	16'-7"	17'-5"	14'-2"
1000S162-68	31'-2"	27'-3"	27'-3"	23'-9"	20'-0"	19'-6"	20'-6"	16'-8"
1200S162-54	33'-2"	27'-1"	28'-1"	22'-11"	22'-5"	18'-4"	19'-3"	15'-8"
1200S162-68	36'-4"	31'-9"	31'-9"	27'-0"	26'-5"	21'-6"	22'-6"	18'-6"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

- a. Table provides maximum horizontal rafter spans in feet and inches for slopes between 3:12 and 12:12.
- b. Deflection criterion: $L/240$ for live loads and $L/180$ for total loads.
- c. Roof dead load = 12 psf.
- d. Grade 33 ksi steel is permitted to be used for 33 mil and 43 mil thicknesses. Grade 50 ksi steel shall be used for 54 and 68 mil thicknesses.

TABLE R804.3.2.1(2)
ROOF RAFTER SPANS^{a, b, c}
50 ksi STEEL

MEMBER DESIGNATION	ALLOWABLE SPAN MEASURED HORIZONTALLY (feet-inches)							
	Equivalent ground snow load (psf)							
	20		30		50		70	
	Rafter spacing (inches)							
	16	24	16	24	16	24	16	24
550S162-33	15'-4"	12'-11"	13'-4"	10'-11"	10'-9"	8'-9"	9'-2"	7'-6"
550S162-43	16'-8"	14'-7"	14'-7"	12'-9"	12'-3"	10'-6"	11'-0"	9'-0"
550S162-54	17'-11"	15'-7"	15'-7"	13'-8"	13'-2"	11'-6"	11'-9"	10'-3"
550S162-68	19'-2"	16'-9"	16'-9"	14'-7"	14'-1"	12'-4"	12'-7"	11'-0"
550S162-97	21'-3"	18'-6"	18'-6"	16'-2"	15'-8"	13'-8"	14'-0"	12'-3"

800S162-33	18'-10"	15'-5"	15'-11"	12'-9"	12'-3"	8'-2"	9'-0"	6'-0"
800S162-43	22'-3"	18'-2"	18'-10"	15'-5"	15'-1"	12'-3"	12'-11"	10'-6"
800S162-54	24'-2"	21'-2"	21'-1"	18'-5"	17'-10"	14'-8"	15'-5"	12'-7"
800S162-68	25'-11"	22'-8"	22'-8"	19'-9"	19'-1"	16'-8"	17'-1"	14'-9"
800S162-97	28'-10"	25'-2"	25'-2"	22'-0"	21'-2"	18'-6"	19'-0"	16'-7"
1000S162-43	25'-2"	20'-7"	21'-4"	17'-5"	17'-0"	13'-11"	14'-7"	10'-7"
1000S162-54	29'-0"	24'-6"	25'-4"	20'-9"	20'-3"	16'-7"	17'-5"	14'-2"
1000S162-68	31'-2"	27'-3"	27'-3"	23'-9"	20'-0"	19'-6"	20'-6"	16'-8"
1000S162-97	34'-8"	30'-4"	30'-4"	26'-5"	25'-7"	22'-4"	22'-10"	20'-0"
1200S162-54	33'-2"	27'-1"	28'-1"	22'-11"	22'-5"	18'-4"	19'-3"	15'-8"
1200S162-68	36'-4"	31'-9"	31'-9"	27'-0"	26'-5"	21'-6"	22'-6"	18'-6"
1200S162-97	40'-6"	35'-4"	35'-4"	30'-11"	29'-10"	26'-1"	26'-8"	23'-1"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. Table provides maximum horizontal rafter spans in feet and inches for slopes between 3:12 and 12:12.

b. Deflection criterion: $L/240$ for live loads and $L/180$ for total loads.

c. Roof dead load = 12 psf.

TABLE R804.3.2.1(3) R804.3.2.1(2)
BASIC ULTIMATE DESIGN WIND SPEED TO EQUIVALENT SNOW LOAD CONVERSION

BASIC ULTIMATE DESIGN WIND SPEED (mph) AND EXPOSURE CATEGORY		EQUIVALENT GROUND SNOW LOAD (psf)									
		Roof slope									
Exp. B	Exp. C	3:12	4:12	5:12	6:12	7:12	8:12	9:12	10:12	11:12	12:12
85 mph	—	20	20	20	20	20	20	30	30	30	30
100-126 mph	85-110 mph	20	20	20	20	30	30	30	30	50	50
110-139 mph	100-126 mph	20	20	20	20	30	50	50	50	50	50
—	110-139 mph	30	30	30	50	50	50	70	70	70	—

For SI: 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

R804.3.2.3 Roof rafter splice. Roof rafters shall not be spliced.

R804.3.2.4 Roof rafter to ceiling joist and ridge member connection. Roof rafters shall be connected to a parallel ceiling joist to form a continuous tie between exterior walls in accordance with Figure R804.3.1.1(4) or R804.3.1.1(2) and Table R804.3.1.1(9). R804.3.1.1(3). Ceiling joists shall be connected to the top track of the load-bearing wall in accordance with Table R804.3, either with ~~two~~ the required number of No. 10 screws applied through the flange of the ceiling joist or by using a 54-mil (1.37 mm) clip angle with ~~two~~ the required number of No. 10 screws in each leg. Roof rafters shall be connected to a ridge member with a minimum 2-inch by 2-inch (51 mm by 51 mm) clip angle fastened with No. 10 screws to the ridge member in accordance with Figure R804.3.2.4 and Table R804.3.2.4. The clip angle shall have a steel thickness equivalent to or greater than the roof rafter thickness and shall extend the depth of the roof rafter member to the extent possible. The ridge member shall be fabricated from a C-shaped member and a track section, which shall have a minimum size and steel thickness equivalent to or greater than that of adjacent roof rafters and shall be installed in accordance with Figure R804.3.2.4. The ridge member shall extend the full depth of the sloped roof rafter cut.

R804.3.2.5 Roof rafter bottom flange bracing. The bottom flanges of roof rafters shall be continuously braced, at a maximum spacing of 8 feet (2440 mm) as measured parallel to the roof rafters, with one of the following members:

1. Minimum 33-mil (0.84 mm) C-shaped member.
2. Minimum 33-mil (0.84 mm) track section.
3. Minimum 1¹/₂-inch by 33-mil (38 mm by 0.84 mm) steel strap.

The bracing element shall be fastened to the bottom flange of each roof rafter with one No. 8 screw and shall be fastened to blocking with two No. 8 screws. Blocking shall be installed between roof rafters in-line with the continuous bracing at a maximum spacing of 12 feet (3658 mm) measured perpendicular to the roof rafters. The ends of continuous bracing shall be fastened to blocking or anchored to a stable building component with two No. 8 screws.

FIGURE R804.3.2.4 HIP MEMBER OR RIDGE MEMBER CONNECTION

(No change to Figure)

TABLE R804.3.2.4
SCREWS REQUIRED AT EACH LEG OF CLIP ANGLE FOR HIP RAFTER TO HIP MEMBER OR
ROOF RAFTER TO RIDGE MEMBER CONNECTION^a

BUILDING WIDTH (feet)	NUMBER OF SCREWS			
	Ground snow load (psf)			
	0 to 20	21 to 30	31 to 50	51 to 70
24	2	2	3	4
28	2	3	4	5
32	2	3	4	5
36	3	3	5	6
40	3	4	5	7

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. Screws shall be No. 10 minimum.

R804.3.3 Hip framing. Hip framing shall consist of jack-rafters, hip members, hip support columns and connections in accordance with this section, or shall be in accordance with an *approved* design. The provisions of this section for hip members and hip support columns shall apply only where the jack rafter slope is greater than or equal to the roof slope. For the purposes of determining member sizes in this section, wind speeds shall be converted to equivalent ground snow load in accordance with Table R804.3.2.1(3).

R804.3.3.1 Jack rafters. Jack rafters shall meet the requirements for roof rafters in accordance with Section R804.3.2, except that the requirements in Section R804.3.2.4 shall not apply.

R804.3.3.2 Hip members. Hip members shall be fabricated from C-shape members and track section, which shall have minimum sizes determined in accordance with Table R804.3.3.2. The C-shape member and track section shall be connected at a maximum spacing of 24 inches (610 mm) using No. 10 screws through top and bottom flanges in accordance with Figure R804.3.2.4. The depth of the hip member shall match that of the roof rafters and jack rafters, or shall be based on an *approved* design for a beam pocket at the corner of the supporting wall.

TABLE R804.3.3.2 HIP MEMBER SIZES, 33 ksi STEEL

BUILDING WIDTH (feet)	HIP MEMBER DESIGNATION ^a			
	Equivalent ground snow load (psf)			
	0 to 20	21 to 30	31 to 50	51 to 70

24	800S162-68 800T150-68	800S162-68 800T150-68	800S162-97 800T150-97	1000S162-97 1000T150-97
28	1000S162-68 1000T150-68	1000S162-68 1000T150-68	1000S162-97 1000T150-97	1200S162-97 1200T150-97
32	1000S162-97 1000T150-97	1000S162-97 1000T150-97	1200S162-97 1200T150-97	—
36	1200S162-97 1200T150-97	—	—	—
40	—	—	—	—

For SI: 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. The web depth of the roof rafters and jack rafters is to match at the hip or they shall be installed in accordance with an approved design.

R804.3.3.3 Hip support columns. Hip support columns shall be used to support hip members at the ridge. A hip support column shall consist of a pair of C-shape members, with a minimum size determined in accordance with Table R804.3.3.3. The C-shape members shall be connected at a maximum spacing of 24 inches (610 mm) on center to form a box using minimum 3-inch by 33-mil (76 mm by 0.84 mm) strap connected to each of the flanges of the C-shape members with three No. 10 screws. Hip support columns shall have a continuous load path to the foundation and shall be supported at the ceiling line by an interior wall or by an approved design for a supporting element.

TABLE R804.3.3.3 HIP SUPPORT COLUMN SIZES

BUILDING WIDTH (feet)	HIP SUPPORT COLUMN DESIGNATION ^{a, b}			
	Equivalent ground snow load (psf)			
	0 to 20	21 to 30	31 to 50	51 to 70
24	2-350S162-33	2-350S162-33	2-350S162-43	2-350S162-54
28	2-350S162-54	2-550S162-54	2-550S162-68	2-550S162-68
32	2-550S162-68	2-550S162-68	2-550S162-97	—
36	2-550S162-97	—	—	—
40	—	—	—	—

For SI: 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. V-Box shape column only in accordance with Figure R804.3.3.4(2).

b. 33 ksi steel for 33 and 43 mil material; 50 ksi steel for thicker material.

R804.3.3.4 Hip framing connections. Hip rafter framing connections shall be installed in accordance with the following:

1. Jack rafters shall be connected at the eave to a parallel C-shape blocking member in accordance with Figure R804.3.3.4(1). The C-shape blocking member shall be attached to the supporting wall track with minimum two No. 10 screws.
2. Jack rafters shall be connected to a hip member with a minimum 2-inch by 2-inch (51 mm by 51 mm) clip angle fastened with No.10 screws to the hip member in accordance with Figure R804.3.2.4 and Table R804.3.2.4. The clip angle shall have a steel thickness equivalent to or greater than the jack rafter thickness and shall extend the depth of the jack rafter member to the extent possible.
3. The connection of the hip support columns at the ceiling line shall be in accordance with Figure R804.3.3.4(2), with an uplift strap sized in accordance with Table R804.3.3.4(1).
4. The connection of hip support members, ridge members and hip support columns at the ridge shall be in accordance with Figures R804.3.3.4(3) and R804.3.3.4(4) and Table R804.3.3.4(2).
5. The connection of hip members to the wall corner shall be in accordance with Figure R804.3.3.4(5) and Table R804.3.3.4(3).

TABLE R804.3.3.4(1) UPLIFT STRAP CONNECTION REQUIREMENTS HIP SUPPORT COLUMN AT CEILING LINE

BUILDING WIDTH (feet)	BASIC WIND SPEED (mph) EXPOSURE B				
	85	100	110	—	—
	BASIC WIND SPEED (mph) EXPOSURE C				
	—	85	—	100	110
	Number of No. 10 screws in each end of each 3 inch by 54-mil steel strap ^{a, b, c}				
24	3	4	4	6	7
28	4	6	6	8	10
32	5	8	8	11	13
36	7	10	11	14	17
40	—	—	—	—	—

For SI: 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 mil = 0.0254 mm.

- a. Two straps are required, one each side of the column.
- b. Space screws at ¾ inch on-center and provide ¾ inch end distance.
- c. 50 ksi steel strap.

FIGURE R804.3.3.4(1) JACK RAFTER CONNECTION AT EAVE

TABLE R804.3.3.4(2) CONNECTION REQUIREMENTS HIP MEMBER TO HIP SUPPORT COLUMN

BUILDING WIDTH (feet)	NUMBER OF NO. 10 SCREWS IN EACH FRAMING ANGLE ^{a, b, c}			
	Equivalent ground snow load (psf)			
	0 to 20	21 to 30	31 to 50	51 to 70
24	10	10	10	12
28	10	10	14	18
32	10	12	—	—
36	14	—	—	—
—	—	—	—	—

For SI: 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 mil = 0.0254 mm.

- a. Screws to be divided equally between the connection to the hip member and the column. Refer to Figures R804.3.3.4(3) and R804.3.3.4(4).
- b. The number of screws required in each framing angle is not to be less than shown in Table R804.3.3.4(1).
- c. 50 ksi steel from the framing angle.

FIGURE 804.3.3.4(2) HIP SUPPORT COLUMN

TABLE R804.3.3.4(3) UPLIFT STRAP CONNECTION REQUIREMENTS HIP MEMBER TO WALL

BUILDING WIDTH (feet)	BASIC WIND SPEED (mph) EXPOSURE B				
	85	100	110	—	—
	BASIC WIND SPEED (mph) EXPOSURE C				
	—	85	—	100	110
	Number of No. 10 screws in each end of each 3 inch by 54-mil Steel strap ^{a, b, c}				
24	2	2	3	3	4
28	2	3	3	4	5
32	3	4	4	6	7
36	3	5	5	7	8

40	—	—	—	—	—
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For SI: 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

- a. Two straps are required, one each side of the column.
- b. Space screws at $\frac{3}{4}$ inches on-center and provide $\frac{3}{4}$ inch end distance.
- c. 50-ksi steel strap.

FIGURE R804.3.3.4(3) HIP CONNECTIONS AT RIDGE

FIGURE R804.3.3.4(4) HIP CONNECTIONS AT RIDGE AND BOX COLUMN

FIGURE R804.3.3.4(5) HIP MEMBER CONNECTION AT WALL CORNER

R804.3.4 R804.3.4 Cutting and notching. Flanges and lips of load-bearing, cold-formed steel roof framing members shall not be cut or notched.

R804.3.5 R804.3.4 Headers. Roof-ceiling framing above wall openings shall be supported on headers. The allowable spans for headers in load-bearing walls shall not exceed the values set forth in Section R603.6 and Tables R603.6(1) through ~~R603.6(24)~~ R603.6(6).

R804.3.6 R804.3.5 Framing of openings in roofs and ceilings. Openings in roofs and ceilings shall be framed with header and trimmer joists. Header joist spans shall not exceed 4 feet (1219 mm) in length. Header and trimmer joists shall be fabricated from joist and track members having a minimum size and thickness at least equivalent to the adjacent ceiling joists or roof rafters and shall be installed in accordance with Figures ~~R804.3.6(4)~~ R804.3.5(1) and ~~R804.3.6(2)~~ R804.3.5(2). Each header joist shall be connected to trimmer joists with a minimum of four 2-inch by 2-inch (51 by 51 mm) clip angles. Each clip angle shall be fastened to both the header and trimmer joists with four No. 8 screws, evenly spaced, through each leg of the clip angle. The steel thickness of the clip angles shall be not less than that of the ceiling joist or roof rafter. Each track section for a built-up header or trimmer joist shall extend the full length of the joist (continuous).

R804.3.7 R804.3.6 Roof trusses. Cold-formed steel trusses shall be designed and installed in accordance with AISI S100, Section D4. In the absence of specific bracing requirements, trusses shall be braced in accordance with accepted industry practices, such as the SBCA *Cold-Formed Steel Building Component Safety Information (CFSBCSI) Guide to Good Practice for Handling, Installing & Bracing of Cold-Formed Steel Trusses*. Trusses shall be connected to the top track of the load-bearing wall in accordance with Table R804.3, either with two No. 10 screws applied through the flange of the truss or by using a 54-mil (1.37 mm) clip angle with two No. 10 screws in each leg.

FIGURE ~~R804.3.6(4)~~ R804.3.5(1) ROOF OR CEILING OPENING

(No change to Figure)

FIGURE ~~R804.3.6(2)~~ R804.3.5(2) HEADER TO TRIMMER CONNECTION

(No change to Figure)

R804.3.8 R804.3.7 Ceiling and roof diaphragms. Ceiling and roof diaphragms shall be in accordance with this section.

R804.3.8.1 R804.3.7.1 Ceiling diaphragms. At gable endwalls a ceiling *diaphragm* shall be provided by attaching a minimum $\frac{1}{2}$ -inch (12.7 mm) gypsum board ~~in accordance with Tables R804.3.8(1) and R804.3.8(2)~~ or a minimum $\frac{3}{8}$ -inch (9.5 mm) wood structural panel sheathing, which complies with Section R803, ~~in accordance with Table R804.3.8(3)~~ to the bottom of ceiling joists or roof trusses and connected to wall framing in accordance with Figures ~~R804.3.8(1)~~ R804.3.7.1(1) and ~~R804.3.8(2)~~ R804.3.7.1(2), unless studs are designed as full height without bracing at the ceiling. Flat blocking shall consist of C-shape or track section with a minimum thickness of 33 mils (0.84 mm).

For a gypsum board sheathed ceiling, the diaphragm length shall be in accordance with Table R804.3.7.1. For a wood structural panel sheathed ceiling, the diaphragm length shall be a minimum of 12 ft (3658 mm) for building widths less than 36 feet (10,973 mm), or be a minimum of 14 ft (4267 mm) for building widths greater than or equal to 36 feet.

The ceiling *diaphragm* shall be secured with screws spaced at a maximum 6 inches (152 mm) o.c. at panel edges and a maximum 12 inches (305 mm) o.c. in the field. Multiplying the required lengths in Tables R804.3.8(1) and R804.3.8(2) R804.3.7.1 for gypsum board sheathed ceiling diaphragms shall be permitted to be multiplied by 0.35 shall be permitted if all panel edges are blocked. Multiplying the required lengths in Tables R804.3.8(1) and R804.3.8(2) R804.3.7.1 for gypsum board sheathed ceiling diaphragms by 0.9 shall be permitted if all panel edges are secured with screws spaced at 4 inches (102 mm) o.c.

R804.3.8.2 R804.3.7.2 Roof diaphragm. A roof *diaphragm* shall be provided by attaching a minimum of $\frac{3}{8}$ -inch (9.5 mm) wood structural panel which complies with Section R803 to roof rafters or truss top chords in accordance with Table R804.3. Buildings with 3:1 or larger plan *aspect ratio* and with roof rafter slope (pitch) of 9:12 or larger shall have the roof rafters and ceiling joists blocked in accordance with Figure R804.3.8(3). R804.3.7.2

R804.3.9 R804.3.8 Roof tie-down. Roof assemblies subject to wind uplift pressures of 20 pounds per square foot (0.96 kPa) or greater, as established in Table R301.2(2), shall have rafter to bearing be connected to walls below ties provided in accordance with Table R802.14 R804.3. A continuous load path shall be provided to transfer uplift loads to the foundation.

TABLE R804.3.8(1) R804.3.7.1 REQUIRED LENGTHS FOR CEILING DIAPHRAGMS AT GABLE ENDWALLS GYPSUM BOARD SHEATHED, CEILING HEIGHT = 8 FT^{a,b,c,d,e,f,g}

Exposure Category B		BASIC ULTIMATE DESIGN WIND SPEED (mph)				
		85	100-126	140-139	—	—
Exposure Category C		—	85-110	—	100-126	140-139
Roof pitch	Building endwall width (feet)	Minimum diaphragm length (feet)				
3:12 to 6:12	24 - 28	44	20	22	28	32
	28 - 32	46	22	28	32	38
	32 - 36	20	26	32	38	44
	36 - 40	22	30	36	44	50
6:12 to 9:12	24 - 28	46	22	26	32	36
	28 - 32	20	26	32	38	44
	32 - 36	22	32	38	44	52
	36 - 40	26	36	44	52	60
9:12 to 12:12	24 - 28	48	26	30	36	42
	28 - 32	22	30	36	42	50
	32 - 36	26	36	42	50	60
	36 - 40	30	42	50	60	70

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa, 1 mile per hour = 0.447 m/s, 1 foot = 304.8 mm, 1 mil = 0.0254 mm.

- Ceiling diaphragm is composed of $\frac{1}{2}$ inch gypsum board (min. thickness) secured with screws spaced at 6 inches o.c. at panel edges and 12 inches o.c. in field. Use No. 8 screws (min.) when framing members have a designation thickness of 54 mils or less and No. 10 screws (min.) when framing members have a designation thickness of greater than 54 mils.
- Maximum aspect ratio (length/width) of diaphragms is 2:1.
- Building width is in the direction of horizontal framing members supported by the all studs.
- Required diaphragm lengths are to be provided at each end of the structure.
- Multiplying required diaphragm lengths by 0.35 is permitted if all panel edges are blocked.
- Multiplying required diaphragm lengths by 0.9 is permitted if all panel edges are secured with screws spaced at 4 inches o.c.

- g. To determine the minimum diaphragm length for buildings with ceiling heights of 9 ft (2743mm) or 10 ft (3048mm), values in the table above shall be multiplied by 1.15.

FIGURE R804.3.8(1) R804.3.7.1(1) CEILING DIAPHRAGM TO GABLE ENDWALL DETAIL

(No change to Figure)

TABLE R804.3.8(2)
REQUIRED LENGTHS FOR CEILING DIAPHRAGMS AT GABLE ENDWALLS GYPSUM BOARD
SHEATHED CEILING HEIGHT = 9 OR 10 FT^{a,b,c,d,e,f}

Exposure B		BASIC WIND SPEED (mph)				
		85	100	110	—	—
Exposure C		—	85	—	100	110
Roof pitch	Building endwall width (feet)	Minimum diaphragm length (feet)				
3:12 to 6:12	24–28	16	22	26	32	38
	28–32	20	26	32	38	44
	32–36	22	30	36	44	50
	36–40	26	36	42	50	58
6:12 to 9:12	24–28	18	26	30	36	42
	28–32	22	30	36	42	50
	32–36	26	36	42	50	58
	36–40	30	42	48	58	68
9:12 to 12:12	24–28	20	28	34	40	46
	28–32	24	34	40	48	56
	32–36	28	40	48	56	66
	36–40	34	46	56	66	78

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa, 1 mile per hour = 0.447 m/s, 1 foot = 304.8 mm, 1 mil = 0.0254 mm.

a. Ceiling diaphragm is composed of ½ inch gypsum board (min. thickness) secured with screws spaced at 6 inches o.c. at panel edges and 12 inches o.c. infield. Use No. 8 screws (min.) when framing members have a designation thickness of 54 mils or less and No. 10 screws (min.) when framing members have a designation thickness of greater than 54 mils.

b. Maximum aspect ratio (length/width) of diaphragms is 2:1.

c. Building width is in the direction of horizontal framing members supported by the all studs.

d. Required diaphragm lengths are to be provided at each end of the structure.

e. Multiplying required diaphragm lengths by 0.35 is permitted if all panel edges are blocked.

f. Multiplying required diaphragm lengths by 0.9 is permitted if all panel edges are secured with screws spaced at 4 inches o.c.

FIGURE R804.3.8(2) R804.3.7.1(2) CEILING DIAPHRAGM TO SIDEWALL DETAIL

(No change to Figure)

TABLE R804.3.8(3) REQUIRED LENGTHS FOR CEILING DIAPHRAGMS AT GABLE ENDWALLS
WOOD STRUCTURAL PANEL SHEATHED CEILING HEIGHT = 8, 9 OR 10 FT^{a,b,c,d}

Exposure B		BASIC WIND SPEED (mph)				
		85	100	110	—	—
Exposure C		—	85	—	100	110
Roof pitch	Building endwall width (feet)	Minimum diaphragm length (feet)				
3:12 to	24–28	10	10	10	10	10

6:12	28–32	12	12	12	12	12
	32–36	12	12	12	12	12
	36–40	14	14	14	14	14
6:12 to 9:12	24–28	10	10	10	10	10
	28–32	12	12	12	12	12
	32–36	12	12	12	12	12
	36–40	14	14	14	14	14
9:12 to 12:12	24–28	10	10	10	10	10
	28–32	12	12	12	12	12
	32–36	12	12	12	12	12
	36–40	14	14	14	14	14

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa, 1 mile per hour = 0.447 m/s, 1 foot = 304.8 mm, 1 mil = 0.0254 mm.

- Ceiling diaphragm is composed of ½ inch gypsum board (min. thickness) secured with screws spaced at 6 inches O.C. at panel edges and 12 inches O.C. in field. Use No. 8 screws (min.) when framing members have a designation thickness of 54 mils or less and No. 10 screws (min.) when framing members have a designation thickness of greater than 54 mils.
- Maximum aspect ratio (length/width) of diaphragms is 2:1.
- Building width is in the direction of horizontal framing members supported by the all studs.
- Required diaphragm lengths are to be provided at each end of the structure.

FIGURE R804.8(3) R804.7.2 ROOF BLOCKING DETAIL

(No change to Figure)

Revise as follows:

M1308.1 Drilling and notching. Wood-framed structural members shall be drilled, notched or altered in accordance with the provisions of Sections R502.8, R602.6, R602.6.1 and R802.7. Holes in load-bearing members of cold-formed steel light-frame construction shall be permitted only in accordance with Sections R505.2.5, R603.2.5 and R804.2.65. In accordance with the provisions of Sections R505.3.5, R603.3.4 and R804.3.34, cutting and notching of flanges and lips of load-bearing members of cold-formed steel light frame construction shall not be permitted. Structural insulated panels (SIPs) shall be drilled and notched or altered in accordance with the provisions of Section R613.7.

Revise as follows:

M2101.6 Drilling and notching. Wood-framed structural members shall be drilled, notched or altered in accordance with the provisions of Sections R502.8, R602.6, R602.6.1 and R802.7. Holes in load bearing members of cold-formed steel light-frame construction shall be permitted only in accordance with Sections R505.2.5, R603.2.5 and R804.2.65. In accordance with the provisions of Sections R505.3.5, R603.3.4 and R804.3.34, cutting and notching of flanges and lips of load-bearing members of cold-formed steel light frame construction shall not be permitted. Structural insulated panels (SIPs) shall be drilled and notched or altered in accordance with the provisions of Section R613.

Revise as follows:

P2603.2 Drilling and notching. Wood-framed structural members shall not be drilled, notched or altered in any manner except as provided in Sections R502.8, R602.6, R802.7 and R802.7.1. Holes in load-

bearing members of cold-formed steel light-frame construction shall be permitted only in accordance with Sections R505.2.5, R603.2.5 and R804.2.65. In accordance with the provisions in Sections R505.3.5, R603.3.4 and R804.3.34, cutting and notching of flanges and lips of load-bearing members of cold-formed steel light frame construction shall not be permitted. Structural insulated panels (SIPs) shall be drilled and notched or altered in accordance with the provisions of Section R613.7.

Reason: This proposal is one in a series intended to both update and streamline the cold-formed steel (CFS) light frame construction provisions of the IRC. The revisions are based upon recommendations made by the AISI Committee on Framing Standards (COFS) Prescriptive Methods Subcommittee, which is responsible for the requirements' base document -- AISI S230, *Standard for Cold-Formed Steel Framing – Prescriptive Method for One and Two Family Dwellings*. For the most part, the changes are editorial in nature and work to focus the cold-formed steel solutions presented in the IRC on the most popular and readily available options. The changes also align the cold-formed steel provisions with the latest reference standards, including AISI S230-07 w/S3-12, *Standard for Cold-Formed Steel Framing – Prescriptive Method for One and Two Family Dwellings*, 2007, with Supplement 3, 2012.

Changes specific to Section R804 include the following:

- **R804:** Title correction.
- **R804.1:** The wind speeds are updated to reflect “ultimate” design wind speeds from ASCE 7-10 and editorial adjustments are made to the language. The design wind speeds are changed based upon the following direct conversion table, which was incorporated into AISI S230-07 w/S3-12:

ASCE 7-10 Wind Speed (mph)	110	115	126	139	152	164	177	190
AISI S230 Wind Speed (mph)	85	90	100	110	120	130	140	150

- **R804.2:** Requirements are relocated to new Section R804.2.3, which is specific to dimension, thickness and material grade.
- **R804.2.1:** The references to ASTM A653 and ASTM A792 are deleted. Since these materials are included under ASTM A1003, they do not need to be repeated in this section.
- **R804.2.2:** The corrosion protection requirements are relocated from Section R804.2.3 for better flow in section.
- **R804.2.3:** Requirements from Section R804.2 are relocated into new section on dimension, thickness and material grade and Table R804.2(1) and Table R804.2(2) are combined into new Table R804.2.3. The minimum flange width, maximum flange width, and minimum lip size are moved into the charging language for the table, since these properties do not vary based upon the member designation. Also, to further streamline the provisions, the most popular and readily available grade-thickness combinations are being retained and the less popular and readily available grade-thickness combinations are being removed. For Grade 33 ksi steel, 33 and 43 mil thicknesses are specified; while, for Grade 50 ksi steel, 54 mil and 68 mil thicknesses are specified. This language is added to Section R804.2.3. Finally, the reference to 97 mil product is deleted. It is very uncommon in residential construction, and, if need be, the user can still use AISI S230, where solutions include 97 mil product.
- **R804.2.5:** The title is fixed to match others in section and the screw substitution factor is eliminated. This is seldom used in prescriptive design and adds complexity to the provisions.
- **Figures R804.2.6.1, R804.2.6.3, and R804.3:** Title correction.
- **R804.3:** Since Section R804.3.3, on hip roof framing, is recommended for deletion, coordinating text is also recommended for deletion. In Table R804.3, the wind speeds are updated to reflect “ultimate” design wind speeds from ASCE 7-10 and editorial modifications are made to the column headings to clarify the applicability of the CFSF provisions. Finally, entries on ceiling joist or roof truss to top track of bearing wall are brought into agreement with AISI S230-07 w/S3-12, which includes modifications to the table notes.
- **R804.3.1.1:** The tables for continuous ceiling joists and ceiling joists with bearing stiffeners are deleted. These add volume and complexity, but do not provide significant improvement over the single span tables and tables without bearing stiffeners. If need be, users can conservatively use the single span ceiling joist tables without bearing stiffeners – now Tables R804.3.1.1(1) and R804.3.1.1(2) – in all situations or they can also go back to AISI S230. To be consistent with changes in other sections, Tables R804.3.1.1(1) and R804.3.1.1(2) now each address both Grade 33 ksi and Grade 50 ksi. For Grade 33 ksi steel, 33 and 43 mil thicknesses are specified; while, for Grade 50 ksi steel, 54 mil and 68 mil thicknesses are specified. This language is added in new table notes. Please note that, while Grade 50 ksi steel is now required for 54 mil and 68 mil product, no changes are made to the allowable spans, thus resulting in additional conservatism. Finally, the reference to 97 mil product is deleted.
- **R804.3.1.2:** The tables for ceiling joists with bearing stiffeners are deleted in Section R804.3.1.1, so this section on ceiling joist bearing stiffeners is not needed.
- **R804.3.2:** The language in the section associated with wind speeds is updated to reflect “ultimate” design wind speeds from ASCE 7-10. A new Table R804.3.2.1(1) is created by combining the Grade 33ksi and 50 ksi tables. For Grade 33

ksi steel, 33 and 43 mil thicknesses are specified; while, for Grade 50 ksi steel, 54 mil and 68 mil thicknesses are specified. This language is added in a new table note. Also, the 97 mil product is eliminated from the table. Additionally, the newly renumbered Table R804.3.2.1(2), updates the wind speeds to reflect the “ultimate” design wind speeds from ASCE 7-10 and editorial modifications are made to the row headings to clarify the applicability of the CFSF provisions. Finally, an unnecessary wind speed – 110 mph (old 85 mph) Exposure Category B – is eliminated. Provisions at this lower wind speed are not substantively different than at the next higher wind speed.

- **R804.3.2.4:** The number of required screws is brought into agreement with AISI S230-07 w/S3-12, which may now require more than two screws in accordance with Table R804.3.
- **Figure R804.3.2.4 and Table R804.3.2.4:** Since Section R804.3.3 is recommended for deletion, coordinating text is also recommended for deletion.
- **R804.3.3:** The CFS hip roof framing provisions are deleted in the IRC. This section adds volume and complexity, but does not provide significant improvement. If need be, users can go back to AISI S230 for hip roof framing design options.
- **R804.3.7:** Existing Table R804.3.8(2) for gypsum ceiling diaphragms where ceiling height is 9 or 10 feet is replaced with a table note in Table R804.7(1) (renumbered Table R804.3.8(1)). Existing Table R804.3.8(3) for wood structural panel ceiling diaphragms is replaced in the section with text. Both changes eliminate extraneous tables, providing a more streamlined solution. In Table R804.7(1), the wind speeds are updated to reflect “ultimate” design wind speeds from ASCE 7-10 and editorial modifications are made to the column headings to clarify the applicability of the CFSF provisions. Also, an unnecessary wind speed – 110 mph (old 85 mph) Exposure Category B – is eliminated. Provisions at this lower wind speed are not substantively different than at the next higher wind speed.
- **R804.3.8:** The language on roof tie-down is brought into agreement with AISI S230-07 w/S3-12 through a reference to the newly modified Table R804.3.
- **M1308.1, M2101.6, and P2603.2:** Cross-references are updated in each of these sections.

Cost Impact: The code change proposal will not increase the cost of construction.

RB400-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R804-RB-MANLEY.doc

RB401 – 13

R806.1

Proponent: Michael D. Fischer, Kellen Company, representing the Asphalt Roofing Manufacturers Association (mfischer@kellencompany.com)

Revise as follows:

R806.1 Ventilation required. Enclosed *attics* and enclosed rafter spaces formed where ceilings are applied directly to the underside of roof rafters shall have cross ventilation for each separate space by ventilating openings protected against the entrance of rain or snow. Ventilation openings shall have a least dimension of 1/16 inch (1.6 mm) minimum and 1/4 inch (6.4 mm) maximum. Ventilation openings having a least dimension larger than 1/4 inch (6.4 mm) shall be provided with corrosion-resistant wire cloth screening, hardware cloth, or similar material with openings having a least dimension of 1/16 inch (1.6 mm) minimum and 1/4 inch (6.4 mm) maximum.

Openings in roof framing members shall conform to the requirements of Section R802.7. Required ventilation openings shall open directly to the outside air.

~~**Exception:** Attic ventilation shall not be required when determined not necessary by the code official due to atmospheric or climatic conditions.~~

Reason: With recent revisions to the IRC roof ventilation requirements, and an IBC change approved last year, both codes now contain specific details on both vented and unvented attics with detailed requirements related to the use of vapor retarders and climate specific instructions on the use of air-impermeable insulation. Now that the IRC contains these provisions, the current exception creates a conflict and an unnecessary alternative. Additionally, since the exception is based on climatic conditions, with no direction to the code official on matters related to construction methods or details, it cannot be applied on a project-by-project basis.

Cost Impact: The code change proposal will not increase the cost of construction.

RB401-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R806.1-RB-FISCHER.doc

RB402 – 13

R806.1, R806.2, R806.3, R806.4, R806.5

Proponent: Charles S. Bajnai, Chesterfield County, VA., representing ICC Building Code Action Committee and Virginia Building and Code Officials Association (bajnaic@chesterfield.gov), Joseph Lstiburek, Building Science Corporation

Revise as follows:

SECTION R806 ROOF VENTILATION

~~R806.1 Ventilation required.~~ Enclosed attics and enclosed rafter spaces formed where ceilings are applied directly to the underside of roof rafters shall have cross ventilation for each separate space by ventilating openings protected against the entrance of rain or snow. Ventilation openings shall have a least dimension of 1/16 inch (1.6 mm) minimum and 1/4 inch (6.4 mm) maximum. Ventilation openings having a least dimension larger than 1/4 inch (6.4 mm) shall be provided with corrosion-resistant wire cloth screening, hardware cloth, or similar material with openings having a least dimension of 1/16 inch (1.6 mm) minimum and 1/4 inch (6.4 mm) maximum. Openings in roof framing members shall conform to the requirements of Section R802.7. Required ventilation openings shall open directly to the outside air.

~~Exception:~~ Attic ventilation shall not be required when determined not necessary by the code official due to atmospheric or climatic conditions.

~~R806.2 Minimum vent area.~~ The minimum net free ventilating area shall be 1/150 of the area of the vented space.

~~Exception:~~ The minimum net free ventilation area shall be 1/300 of the vented space provided one or more of the following conditions are met:

- ~~1. In Climate Zones 6, 7 and 8, a Class I or II vapor retarder is installed on the warm-in-winter side of the ceiling.~~
- ~~2. At least 40 percent and not more than 50 percent of the required ventilating area is provided by ventilators located in the upper portion of the attic or rafter space. Upper ventilators shall be located no more than 3 feet (914 mm) below the ridge or highest point of the space, measured vertically, with the balance of the required ventilation provided by eave or cornice vents. Where the location of wall or roof framing members conflicts with the installation of upper ventilators, installation more than 3 feet (914 mm) below the ridge or highest point of the space shall be permitted.~~

R806.1 Ventilation. The requirements for vented and unvented attic space and enclosed rafter space shall be in accordance with this section.

R806.2 Vented attics. Vented attics shall have a minimum net free ventilation area at least 1/300 of the area of the vented space. Between half and two thirds of the provided ventilation shall be installed at the eaves. The ventilation openings shall have a least dimension of 1/16 inch (1.6 mm) minimum and 1/4 inch (6.4 mm) maximum. Ventilation openings having a least dimension larger than 1/4 inch (6.4 mm) shall be provided with corrosion-resistant wire cloth screening, hardware cloth, or similar material with openings having a least dimension of 1/16 inch (1.6 mm) minimum and 1/4 inch (6.4 mm) maximum. Openings in roof framing members shall conform to the requirements of Section R802.7. Required ventilation openings shall open directly to the outside air.

R806.3 Vent and insulation clearance. Where eave or cornice vents are installed, insulation shall not block the free flow of air. A minimum of a 1-inch (25 mm) space shall be provided between the insulation and the roof sheathing and at the location of the vent.

R806.4 R806.2.1 Installation and weather protection. Ventilators shall be installed in accordance with manufacturer's installation instructions. Installation of ventilators in roof systems shall be in accordance with the requirements of Section R903. Installation of ventilators in wall systems shall be in accordance with the requirements of Section R703.1.

R806.5 R806.3 Unvented attic and unvented enclosed rafter assemblies. Unvented *attic* assemblies (spaces between the ceiling joists of the top *story* and the roof rafters) and unvented enclosed rafter assemblies (spaces between ceilings that are applied directly to the underside of roof framing members/rafters and the structural roof sheathing at the top of the roof framing members/rafters) shall be permitted if all the following conditions are met:

1. The unvented *attic* space is completely contained within the *building thermal envelope*.
2. No interior Class I vapor retarders are installed on the ceiling side (*attic* floor) of the unvented *attic* assembly or on the ceiling side of the unvented enclosed rafter assembly.
3. Where wood shingles or shakes are used, a minimum ¹/₄-inch (6 mm) vented air space separates the shingles or shakes and the roofing underlayment above the structural sheathing.
4. In Climate Zones 5, 6, 7 and 8, any *air-impermeable insulation* shall be a Class II vapor retarder, or shall have a Class III vapor retarder coating or covering in direct contact with the underside of the insulation.
5. Either Items 5.1, 5.2 or 5.3 shall be met, depending on the air permeability of the insulation directly under the structural roof sheathing.
 - 5.1. *Air-impermeable insulation* only. Insulation shall be applied in direct contact with the underside of the structural roof sheathing.
 - 5.2. Air-permeable insulation only. In addition to the air-permeable insulation installed directly below the structural sheathing, rigid board or sheet insulation shall be installed directly above the structural roof sheathing as specified in Table R806.5 for condensation control.
 - 5.3. Air-impermeable and air-permeable insulation. The *air-impermeable insulation* shall be applied in direct contact with the underside of the structural roof sheathing as specified in Table R806.5 for condensation control. The air-permeable insulation shall be installed directly under the *air-impermeable insulation*.
 - 5.4. Where preformed insulation board is used as the air-impermeable insulation layer, it shall be sealed at the perimeter of each individual sheet interior surface to form a continuous layer.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

1. This section was rewritten to clarify vented and unvented attics. The current charging language in the first sentence of Section R806.1 says that all attics shall have cross ventilation, and yet Section R806.5 acknowledges unvented attics. The new Section R806.1 offers charging language for both conditions.
2. More importantly however, Section 806.2 now incorporates the concepts that were passed in Portland for the IBC, namely that more than half of the incoming ventilation for attics should come from low sources (eaves) and exit up high (roof vent, mechanical vents, gable end vents, etc.). A range is provided: $\frac{1}{2}$ to $\frac{2}{3}$ should be low at the eaves for proper chimney effect. Currently the code would allow 100% of the attic ventilation to be from ridge vents...where would the cross ventilation come from?

Cost Impact: The code change proposal will not increase the cost of construction.

RB402-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R806.1-RB-BAJNAI-BCAC.doc

RB403 – 13

R806.5

Proponent: Rick Davidson, City of Maple Grove, MN, representing Association of Minnesota Building Officials (rdavidson@maplegrovern.gov)

Revise as follows:

R806.5 Unvented attic and unvented enclosed rafter assemblies. Unvented ~~attic assemblies (spaces between the ceiling joists of the top story and the roof rafters)~~ attics and unvented enclosed rafter assemblies (spaces between ceilings that are applied directly to the underside of roof framing members/rafters and the structural roof sheathing at the top of the roof framing members/rafters) shall be permitted if all the following conditions are met:

1. The unvented *attic* space is completely contained within the *building thermal envelope*.
2. No interior Class I vapor retarders are installed on the ceiling side (*attic* floor) of the unvented *attic* assembly or on the ceiling side of the unvented enclosed rafter assembly.
3. Where wood shingles or shakes are used, a minimum 1/4-inch (6 mm) vented air space separates the shingles or shakes and the roofing underlayment above the structural sheathing.
4. In Climate Zones 5, 6, 7 and 8, any *air-impermeable insulation* shall be a Class II vapor retarder, or shall have a Class III vapor retarder coating or covering in direct contact with the underside of the insulation.
5. Either Items 5.1, 5.2 or 5.3 shall be met, depending on the air permeability of the insulation directly under the structural roof sheathing.
 - 5.1. *Air-impermeable insulation* only. Insulation shall be applied in direct contact with the underside of the structural roof sheathing.
 - 5.2. Air-permeable insulation only. In addition to the air-permeable insulation installed directly below the structural sheathing, rigid board or sheet insulation shall be installed directly above the structural roof sheathing as specified in Table R806.5 for condensation control.
 - 5.3. Air-impermeable and air-permeable insulation. The *air-impermeable insulation* shall be applied in direct contact with the underside of the structural roof sheathing as specified in Table R806.5 for condensation control. The air-permeable insulation shall be installed directly under the *air-impermeable insulation*.
- 5.4. Where preformed insulation board is used as the air-impermeable insulation layer, it shall be sealed at the perimeter of each individual sheet interior surface to form a continuous layer.

Reason: The term "attic" is already defined and the additional commentary not only adds confusion but is misleading because attics occur at locations other than the top story. The revision makes the first sentence consistent with the title of the section.

From the IRC: "**ATTIC.** The unfinished space between the ceiling assembly of the top story and the roof assembly."

Cost Impact: The code change proposal will not increase the cost of construction.

RB403-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R806.5-RB-DAVIDSON.doc

RB404 – 13

R806.5

Proponent: Joseph Lstiburek, Building Science Corporation, representing self (joe@buildingscience.com), Steven R Winkel, FAIA, PE, The Preview Group, Inc., representing The American Institute of Architects (swinkel@preview-group.com)

Delete and substitute as follows:

~~R806.5 Unvented attic and unvented enclosed rafter assemblies.~~ ~~Unvented attic assemblies (spaces between the ceiling joists of the top story and the roof rafters) and unvented enclosed rafter assemblies (spaces between ceilings that are applied directly to the underside of roof framing members/rafters and the structural roof sheathing at the top of the roof framing members/rafters) shall be permitted if all the following conditions are met:~~

- ~~1. The unvented attic space is completely contained within the building thermal envelope.~~
- ~~2. No interior Class I vapor retarders are installed on the ceiling side (attic floor) of the unvented attic assembly or on the ceiling side of the unvented enclosed rafter assembly.~~
- ~~3. Where wood shingles or shakes are used, a minimum 1/4 inch (6 mm) vented air space separates the shingles or shakes and the roofing underlayment above the structural sheathing.~~
- ~~4. In Climate Zones 5, 6, 7 and 8, any air-impermeable insulation shall be a Class II vapor retarder, or shall have a Class III vapor retarder coating or covering in direct contact with the underside of the insulation.~~
- ~~5. Either Items 5.1, 5.2 or 5.3 shall be met, depending on the air permeability of the insulation directly under the structural roof sheathing.~~
 - ~~5.1. Air-impermeable insulation only. Insulation shall be applied in direct contact with the underside of the structural roof sheathing.~~
 - ~~5.2. Air-permeable insulation only. In addition to the air-permeable insulation installed directly below the structural sheathing, rigid board or sheet insulation shall be installed directly above the structural roof sheathing as specified in Table R806.5 for condensation control.~~
 - ~~5.3. Air-impermeable and air-permeable insulation. The air-impermeable insulation shall be applied in direct contact with the underside of the structural roof sheathing as specified in Table R806.5 for condensation control. The air-permeable insulation shall be installed directly under the air-impermeable insulation.~~
 - ~~5.4. Where preformed insulation board is used as the air-impermeable insulation layer, it shall be sealed at the perimeter of each individual sheet interior surface to form a continuous layer.~~

R806.5 Unvented attic and unvented enclosed rafter assemblies. Unvented attics and unvented enclosed roof framing assemblies created by ceilings that are applied directly to the underside of the roof framing members and structural roof sheathing applied directly to the top of the roof framing members /rafters, shall be permitted where all the following conditions are met:

1. The unvented attic space is completely within the building thermal envelope.
2. No interior Class I vapor retarders are installed on the ceiling side (attic floor) of the unvented attic assembly or on the ceiling side of the unvented enclosed roof framing assembly.
3. Where wood shingles or shakes are used, a minimum 1/4 inch (6 mm) vented air space separates the shingles or shakes and the roofing underlayment above the structural sheathing.
4. In climate zones 5, 6, 7 and 8, any air-impermeable insulation shall be a Class II vapor retarder, or shall have a Class II vapor retarder coating or covering in direct contact with the underside of the insulation.
5. Insulation shall be located in accordance with the following:

5.1 Items 5.1.1, 5.1.2, 5.1.3, or 5.1.4 shall be met, depending on the air permeability of the insulation directly under the structural roof sheathing.

5.1.1 Where only *air-impermeable insulation* is provided, the *air-impermeable insulation* shall be applied in direct contact with the underside of the structural roof sheathing.

5.1.2. Where air-permeable insulation is provided inside the building thermal envelope, it shall be installed per Section 5.1. In addition to the air-permeable insulation installed directly below the structural sheathing, rigid board or sheet insulation shall be installed directly above the structural roof sheathing in accordance with the R values in in Table R806.5 for condensation control.

5.1.3. Where both *air-impermeable* and air-permeable *insulation* are provided the *air-impermeable insulation* shall be applied in direct contact with the underside of the structural roof sheathing in accordance with Item 5.1.1 and shall be in accordance with the R values in Table R806.5 for condensation control. The air-permeable insulation shall be installed directly under the *air-impermeable insulation*.

5.1.4 Alternatively, sufficient rigid board or sheet insulation shall be installed directly above the structural roof sheathing to maintain the monthly average temperature of the underside of the structural roof sheathing above 45 degrees F (7 degrees C). For calculation purposes, an interior air temperature of 68 degrees F (20 degrees C) is assumed and the exterior air temperature is assumed to be the monthly average outside air temperature of the three coldest months.

5.2 Where preformed insulation board is used as the *air-impermeable insulation* layer, it shall be sealed at the perimeter of each individual sheet interior surface to form a continuous layer.

Reason: The changes to R806.5 are based on the Track A Final Action Hearing revisions to IBC Section 1203.3. These changes were made to coordinate insulation requirements for unvented attics between the IBC and the IRC. The original proposed changes to the IBC were based on the language from the 2012 IRC. In the course of the committee action and the Final Action Hearing the IBC language was cleaned up and now reads more clearly than the current 2012 IRC language. This proposed change is meant to align IRC and IBC provisions for similar conditions and to make use of the clearer new IBC language in the IRC.

Cost Impact: The code change proposal will not increase the cost of construction. Primarily editorial changes.

RB404-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R806.5-RB-LSTIBUREK-WINKEL.doc

RB405 – 13

Table R806.5

Proponent: Joseph Lstiburek, Building Science Corporation, representing self
(joe@buildingscience.com)

Revise as follows:

**TABLE R806.5
INSULATION FOR CONDENSATION CONTROL**

CLIMATE ZONE	MINIMUM RIGID BOARD ON AIR- IMPERMEABLE INSULATION R- VALUE ^{a,b}
2B and 3B tile roof only	0 (none required)
1, 2A, 2B, 3A, 3B, 3C	R-5
4C	R-10
4A, 4B	R-15
5	R-20
6	R-25
7	R-30
8	R-35

a. Contributes to but does not supersede the requirements in Section N1102.

b. Alternatively, sufficient rigid board or sheet insulation shall be installed directly above the structural roof sheathing to maintain the monthly average temperature of the underside of the structural roof sheathing above 45 degrees F (7 degrees C). For calculation purposes, an interior air temperature of 68 degrees F (20 degrees C) is assumed and the exterior air temperature is assumed to be the monthly average outside air temperature of the three coldest months.

Reason: The R-values in the table are based on R-49 ceiling insulation in Climate Zones 4, 5, 6, 7 and 8 and R-38 insulation in Climate Zones 2 and 3. Not all roof assemblies have these ceiling insulation R-values. The footnote provides a calculation procedure to determine rigid board or air impermeable insulation R-values for roof assemblies that have different ceiling insulation R-values. Additionally, this footnote is consistent with similar language in the IBC Section 1203.3 providing alignment between the IRC and the IBC.

Cost Impact: The code change proposal will not increase the cost of construction.

RB405-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R806.5-RB-LSTIBUREK.doc

RB406 – 13

R807.1

Proponent: Rick Davidson, City of Maple Grove, MN, representing Association of Minnesota Building Officials (rdavidson@maplegrovern.gov)

Revise as follows:

R807.1 Attic Access. ~~Buildings Dwellings with concealed combustible ceilings or roof construction~~ attics shall have an attic access opening to attic areas that ~~exceed 30 square feet and~~ have a vertical height of 30 inches or more. The vertical height shall be measured from the top of the ceiling framing members to the underside of the roof framing members.

The rough-framed opening shall not be less than 22 inches by 30 inches (559 mm by 762 mm) ~~and shall be located in a hallway or other readily accessible location.~~ When located in a wall, the opening shall be a minimum of 22 inches wide by 30 inches high (559 mm wide by 762 mm high). When the access is located in a ceiling, minimum unobstructed headroom in the *attic* space shall be 30 inches (762 mm) at some point above the access measured vertically from the bottom of ceiling framing members. See Section M1305.1.3 for access requirements where mechanical *equipment* is located in *attics*.

Exception: An attic access is not required:

1. for attics above unconditioned space or
2. where the area of the attic is less than 300 square feet

Reason: The ICC Commentary for the IRC states: *The requirement for an attic access is predicated on the likelihood that during the life of the structure, access to an attic space for repair of piping, electrical and mechanical systems will be required.*

If this is true, then language in the section that states *"Buildings with combustible ceilings or roof construction shall have...."* is misleading because attics of non-combustible construction are just as likely to have piping, electrical and mechanical systems. The **IBC** makes no mention of combustibility in its attic access requirements. And, the mechanical code (M1305.1.3) already requires access for equipment in an attic. It is less obvious why access is need for piping or electrical systems that would never need service. So the purpose of the access is universally poorly understood.

If it is believed that access should be provided regardless of equipment, a more realistic approach would be to require access to any attic that contains concealed spaces and without regard to construction materials used. Furthermore, direction on the location of the access needs to be more useful. Currently the code says the access must be "in a hallway or other readily accessible location". There are a number of problems with this language. It leads one to believe that the access must be interior to the dwelling. Why couldn't the access be via a gable end hatch, through a knee wall, or via a garage attic? Eliminating the access within the dwelling solves a problem involving heat loss and air infiltration.

Another confusing component is that the term "readily accessible" is somewhat defined in the code as follows:

Ready Access (to). That which enables a device, appliance or equipment to be directly reached, without requiring the removal or movement of any panel, door, or similar obstruction, and without requiring the use of portable access equipment.

This poses another dilemma. It states that "ready access" may not require removal of a panel or movement of a door and must be accessed by means other than a portable device such as a ladder. So interpreted literally would mean that the access could not be in a room accessed by a door, swinging or sliding, and it must be accessed by means of a stair or fixed ladder. This is not the norm practiced in the industry.

Then there is the issue of providing access to spaces as small as 30 square feet which means even some small porch attics would require access. 30 square feet is just too small an area to regulate.

The IBC provides no direction on where the access must be. It only requires that there be one and stipulates the size. To alleviate these issues, this proposal would require an access for all attics in dwellings that have concealed spaces, would not dictate where the access must be consistent with the IBC, and provides two exceptions where access would typically serve no useful purpose such as a garage attic or areas with very small attics.

It should also be remembered that an access can be provided even if the code does not require one and that creating an opening in a ceiling or wall that does not contain an opening is a very simple operation.

Cost Impact: The code change proposal will not increase the cost of construction.

RB406-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R807.1-RB-DAVIDSON.doc

RB407 – 13

R807.1

Proponent: Charles S. Bajnai, Chesterfield County, VA, representing ICC Building Code Action Committee and Virginia Building and Code Officials Association (bajnaic@chesterfield.gov)

Revise as follows:

R807.1 Attic access. Buildings with combustible ceiling or roof construction shall have an *attic* access opening to *attic* areas ~~that exceed 30 square feet (2.8 m²) and that~~ have a vertical height of 30 inches (762 mm) or greater ~~over an area of not less than 30 square feet.~~ The vertical height shall be measured from the top of the ceiling framing members to the underside of the roof framing members.

The rough-framed opening shall not be less than 22 inches by 30 inches (559 mm by 762 mm) and shall be located in a hallway or other readily accessible location. When located in a wall, the opening shall be a minimum of 22 inches wide by 30 inches high (559 mm wide by 762 mm high). When the access is located in a ceiling, minimum unobstructed headroom in the *attic* space shall be 30 inches (762 mm) at some point above the access measured vertically from the bottom of ceiling framing members. See Section M1305.1.3 for access requirements where mechanical *equipment* is located in *attics*.

Reason: This proposal is submitted by the ICC Building Code Action Committee (BCAC). The BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the BCAC has held 6 open meetings and numerous workgroup calls which included members of the BCAC as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: <http://www.iccsafe.org/cs/BCAC/Pages/default.aspx>.

The primary reason for this change is to clarify that the volume of space required for an attic access should be measured as the actual usable space. The clearance should be measured to collar ties, insulation curbs, or other permanent obstructions, not always to the ceiling or roof framing members. The revision of the text describing the 30 square feet is an editorial revision and is not intended to change the requirement, but make it more understandable.

Cost Impact: The code change proposal will not increase the cost of construction. It may decrease the cost.

RB407-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R807.1-RB-BAJNAI-BCAC.doc

RB408 – 13

R902.1

Proponent: Mark S. Graham, National Roofing Contractors Association (mgramham@nrca.net)

Revise as follows:

R902.1 Roofing covering materials. Roofs shall be covered with materials as set forth in Sections R904 and R905. Class A, B or C roofing shall be installed in areas designated by law as requiring their use or when the edge of the roof is less than 3 feet (914 mm) from a lot line. Classes A, B and C roofing required by this section to be listed shall be tested in accordance with UL 790 or ASTM E 108.

Exceptions:

1. Class A roof assemblies include those with coverings of brick, masonry and exposed concrete roof deck.
2. Class A roof assemblies also include ferrous or copper shingles or sheets, metal sheets and shingles, clay or concrete roof tile, or slate installed on noncombustible decks.
3. Class A roof assemblies include minimum 16 oz/ft² copper sheets installed over combustible decks.
4. Class A roof assemblies include slate installed over underlayment over combustible decks.

Reason: In IRC 2009 (and similarly in IBC 2009), the historic exemptions from fire testing for certain roof covering types, including copper sheets and slate, over combustible roof decks were amended to require ASTM E 108 or UL 790 fire testing. At the time, a lack of adequate fire test data was cited as the reason for this change.

In IRC 2012, Exception 3 was added based upon fire testing conducted by the Copper Development Association.

The National Roofing Contractors Association and the National Slate Association have conducted fire tests at Underwriters Laboratories, Inc. (UL) that documents slate installed over an underlayment over a combustible deck meets the requirements of UL 790 Class A. This testing substantiates the addition of Exception 4 as a Class A roof assembly.

This same code change proposal was submitted for the International Building Code as S20-12 in Group A and was Approved as Submitted.

A copy of this test report has been submitted with this code change proposal; additional copies are available by contacting the proponent.

Cost Impact: This code change proposal will not increase the cost of construction.

RB408-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R902.1-RB-GRAHAM.doc

RB409 – 13

R903.5 (NEW)

Proponent: Mark S. Graham, National Roofing Contractors Association (mgraham@nrca.net)

Add new text as follows:

R903.5 Attic ventilation. Intake and exhaust vents shall be provided in accordance with Section R806 and the roof covering manufacturer's installation instruction.

Reason: This code change proposal is intended to coordinate the requirements for attic ventilation in Section R806 with roof covering manufacturer's requirements. In many cases, roof covering manufacturers' installation instructions specifically require attic ventilation.

Cost Impact: This code change proposal will not increase the cost of construction.

RB409-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R903.5 (NEW)-RB-GRAHAM.doc

RB410 – 13

R904.2

Proponent: Mark S. Graham, National Roofing Contractors Association (mgraham@nrca.net)

Delete without substitution as follows:

~~**R904.2 Compatibility of materials.** Roof assemblies shall be of materials that are compatible with each other and with the building or structure to which the materials are applied.~~

Reason: This code change proposal is intended to better facilitate compliance and ease enforcement of the Code relating to roof assemblies.

Specific criteria are not provided in the Code for determining roofing materials' compatibility or incompatibility. Material compatibility is best determined by material manufacturers and should be explained or restricted in manufacturers' installation instructions, which are already provided for in Section R904.

Deleting this section relieves the building official from needing to make determinations of materials' compatibility or incompatibility without specific criteria.

Cost Impact: This code change proposal will not increase the cost of construction.

RB410-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R904.2-RB-GRAHAM.doc

RB411 – 13

R904.3, R904.3.1 (NEW)

Proponent: Michael D. Fischer, Kellen Company, representing the Asphalt Roofing Manufacturers Association (mfischer@kellencompany.com)

Revise as follows:

R904.3 Material specifications and physical characteristics. Roof covering materials shall conform to the applicable standards listed in this chapter. In the absence of applicable standards ~~or where materials are of questionable suitability,~~ testing by an *approved* testing agency shall be required by the *building official* ~~to determine the character, quality and limitations of application of the materials demonstrate compliance with the intent of this code.~~

R904.3.1 Underlayment. Underlayment materials shall conform to the applicable standards listed in this chapter. Underlayment materials required to comply with ASTM D 226, D 1970, D4869 and D 6757 shall bear a label indicating compliance to the standard and indicating the appropriate performance grade.

Reason: The roofing requirements include vague language regarding an additional testing requirement for roof coverings that might be required by the building official. This existing text provides a standard inconsistent with the Chapter 1 option for alternate means and methods. This proposal clarifies that should the code official require such testing, it must demonstrate compliance with the intent of the code. The section also fails to provide similar guidance for underlayment materials; the proposal adds that reference and institutes a provision requiring labeling to the appropriate ASTM standards for underlayment- including the required product performance grade. With the increased reliance on underlayment materials to provide additional weather protection when the roof covering is damaged by wind storms or other events, the labeling requirement provides assurance that the product will perform as intended and will comply with the referenced standards.

Cost Impact: The code change proposal will increase the cost of construction.

RB411-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R904.3-RB-FISCHER.doc

RB412 – 13

R904.3

Proponent: Mark S. Graham, National Roofing Contractors Association (mgramham@nrca.net)

Revise as follows:

R904.3 Material specifications and physical characteristics. Roof covering materials shall conform to the applicable standards listed in this chapter. ~~In the absence of applicable standards or where materials are of questionable suitability, testing by an approved testing agency shall be required by the building official to determine the character, quality and limitations of application of the materials.~~

Reason: This code change is intended to clarify the code's intent relating to the use of roofing materials that do not specifically conform to the requirements of this Chapter.

It can be interpreted as currently written the second sentence of Section R904.3 may conflict somewhat with Section R104.11-Alternative Materials, Design and Methods of Construction and Equipment. Deleting this sentence avoids this possible conflict and allows Section R104.11 to apply.

This same code change proposal was submitted for the International Building Code as S27-12 in Group A and was Approved as Modified. This code change proposal reflects the modification.

Cost Impact: This code change proposal will not increase the cost of construction.

RB412-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R904.3-RB-GRAHAM.doc

RB413 – 13

R905.1

Proponent: W. Harvey Cappel, P.E., Racelectric Engineering F-1525, representing self
(hcappel@aol.com)

Revise as follows:

R905.1 Roof covering application. Roof coverings shall be applied in accordance with the applicable provisions of this section and the manufacturer's installation instructions. Unless ~~otherwise specified in this section, specifically waived by a listed exception in the appropriate code section,~~ roof coverings shall be installed to resist the component and cladding loads specified in Table R301.2(2), adjusted for height and exposure in accordance with Table R301.2(3).

Reason: The term "otherwise specified" without a definition basically means "anything specified" which makes this Section R905.1 meaningless and basically void. The original intent here is to require roof coverings to be installed to resist specific wind loads. With this undefined "otherwise specified" loophole the intent of R905.1 is cancelled. We want roof coverings to be installed to resist the wind loads so let's be clear about what we want.

Note: I will submit other changes to related sections of this code to completely correct this problem.

Cost Impact: The code change proposal will not increase the cost of construction.

RB413-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R905.1-RB-CAPPEL.doc

RB414 – 13

R905.2.3, R905.4.3, R905.5.3, R905.6.3, R905.7.3, R905.8.3

Proponent: Michael D. Fischer, Kellen Company, representing the Asphalt Roofing Manufacturers Association (mfischer@kellencompany.com)

Revise as follows:

R905.2.3 Underlayment. Unless otherwise noted, required underlayment shall conform to ASTM D 226 Type I or II, ASTM D 4869 Type I, II, III or IV, or ASTM D 6757.

R905.4.3 Underlayment. Underlayment shall comply with ASTM D 226, Type I or II, ASTM D 4869, Type I, or II, III or IV, or ASTM D 1970. Underlayment shall be installed in accordance with the manufacturer's installation instructions.

R905.5.3 Underlayment. Underlayment shall comply with ASTM D 226, Type I or II, or ASTM D 4869, Type I, or II, III or IV.

R905.6.3 Underlayment. Underlayment shall comply with ASTM D 226, Type I or II, or ASTM D 4869, Type I, or II, III or IV. Underlayment shall be installed in accordance with the manufacturer's installation instructions.

R905.7.3 Underlayment. Underlayment shall comply with ASTM D 226, Type I or II, or ASTM D 4869, Type I, or II, III or IV.

R905.8.3 Underlayment. Underlayment shall comply with ASTM D 226, Type I or II, or ASTM D 4869, Type I, or II, III or IV.

Reason: The current code requirements for certain underlayments do not accurately capture all available material grades. As an example, asphalt shingles in high-wind areas are required to have an ASTM D226 Type II underlayment, but the code does not allow that material to be used outside of the high wind areas. This proposal broadens the available and applicable performance grades for underlayment materials, and is largely editorial.

Cost Impact: The code change proposal will not increase the cost of construction.

RB414-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R905.2.3-RB-FISCHER.doc

RB415 – 13

R905.2.3, R905.4.3, R905.5.3, R905.6.3, R905.7.3, R905.8.3, R905.10.5

Proponent: Mark Zehnal, Florida Roofing, Sheet Metal and Air Conditioning Contractors Association Inc. (FRSA)

Revise as follows:

R905.2.3 Underlayment. Unless otherwise noted, required underlayment shall ~~conform to~~ comply with ASTM D 226 Type I or Type II, ASTM D 4869, Type-I II or Type IV, or ASTM D 6757. Self-adhering polymer modified bitumen sheet shall comply with ASTM D 1970.

R905.4.3 Underlayment. Underlayment shall comply with ASTM D 226, Type I or Type II or ASTM D 4869, Type-I II or Type II IV or ASTM D 1970 or ASTM D 6757. Underlayment shall be installed in accordance with the manufacturer's installation instructions.

R905.5.3 Underlayment. Underlayment shall comply with ASTM D 226, Type I or Type II or ASTM D 4869, Type-I II or Type II IV or ASTM D 1970 or ASTM D 6757.

R905.6.3 Underlayment. Underlayment shall comply with ASTM D 226, Type I or Type II or ASTM D 4869, Type-I II or Type II IV or ASTM D 1970 or ASTM D 6757. Underlayment shall be installed in accordance with the manufacturer's installation instructions.

R905.7.3 Underlayment. Underlayment shall comply with ASTM D 226, Type I or Type II or ASTM D 4869, Type-I II or Type II IV.

R905.8.3 Underlayment. Underlayment shall comply with ASTM D 226, Type I or Type II or ASTM D 4869, Type-I II or Type II IV.

R905.10.5 Underlayment. Underlayment shall comply with ASTM D 226, Type I or Type II or ASTM D 4869, Type II or Type IV or ASTM D 1970 or ASTM D 6757. Underlayment shall be installed in accordance with the manufacturer's installation instructions.

Reason: Strengthen and unify the code by including manufacturer approved options for minimum types of underlayment.

Cost Impact: The code change proposal may increase the cost of construction.

RB415-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R905.2.3-RB-ZEHNAL.doc

RB416 – 13

R905.6.3

Proponent: Mark S. Graham, National Roofing Contractors Association (mgraham@nrca.net)

Revise as follows:

R905.6.3 Underlayment. Underlayment shall comply with ASTM D 226, Type I–II, or ASTM D4869, Type I–II, III or IV. ~~Underlayment shall be installed in accordance with the manufacturer's installation instructions.~~

Reason: This code change proposal is intended to update the Code's minimum requirement for underlayment used with slate roof systems.

Both *The NRCA Roofing Manual* and the National Slate Association's *Slate Roofs Design and Installation Manual* recommend a minimum No. 30 underlayment be used with slate roofs. A No. 30 designation is consistent with underlayment products designated as ASTM D226, Type II or ASTM D 4869, Type III or Type IV. Use of these type classes in the Code is necessary to differentiate products from lighter-weight No. 15 underlayment products.

This same code change proposal was submitted for the International Building Code as S40-12 in Group A and was Approved as Submitted.

Removal of the second sentence (i.e., "Underlayment shall be installed...") is intended to remove redundant requirements. Compliance with the manufacturer's installation instruction is already required in Section R904.1.

Cost Impact: The code change proposal will not increase the cost of construction.

RB416-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R905.6.3-RB-GRAHAM.doc

RB417 – 13

R905.2.4

Proponent: Mark S. Graham, National Roofing Contractors Association (mgraham@nrca.net)

Revise as follows:

R905.2.4 Asphalt shingles. Asphalt shingles shall comply with ~~ASTM D 225 or~~ ASTM D 3462.

Reason: This code change proposal is intended to remove ASTM D 225 (organic felt-reinforced asphalt shingles) as an acceptable product standard in the Code.

Organic felt-reinforced asphalt shingles are no longer manufactured in North America and ASTM International has withdrawn ASTM D 225.

Cost Impact: This code change proposal will not increase the cost of construction.

RB417-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R905.2.4-RB-GRAHAM.doc

RB418 – 13

R905.2.4.1, Table R905.2.4.1, Table R905.2.4.1(1), Table R905.2.4.1(2), R905.2.7.2, R905.3.3.3, R905.3.7, R905.4.3.2, R905.5.3.2, R905.6.3.2, R905.7.3.2, R905.8.3.2, R905.10.5.1

Proponent: Gary J. Ehrlich, P.E., National Association of Home Builders (NAHB) (gehrlich@nahb.org)

Revise as follows:

R905.2.4.1 Wind resistance of asphalt shingles. Asphalt shingles shall be tested in accordance with ASTM D 7158. Asphalt shingles shall meet the classification requirements of Table R905.2.4.1(1) for the appropriate maximum basic wind speed. Asphalt shingle packaging shall bear a label to indicate compliance with ASTM D 7158 and the required classification in Table R905.2.4.1(1).

Exception: Asphalt shingles not included in the scope of ASTM D 7158 shall be tested and labeled to indicate compliance with ASTM D 3161 and the required classification in Table R905.2.4.1(2).

TABLE R905.2.4.1(1)
CLASSIFICATION OF ASPHALT ROOF SHINGLES PER ASTM D 7158

MAXIMUM BASIC WIND SPEED FROM FIGURE 301.2(4)A (mph)	CLASSIFICATION REQUIREMENT
85	D, G or H
90	D, G or H
100	G or H
110	G or H
120	G or H
130	H
140	H
150	H

For SI: 1 mile per hour = 0.447 m/s.

TABLE R905.2.4.1(2)
CLASSIFICATION OF ASPHALT SHINGLES PER ASTM D 3161

MAXIMUM BASIC WIND SPEED FROM FIGURE 301.2(4)A (mph)	CLASSIFICATION REQUIREMENT
85	A, D or F
90	A, D or F
100	A, D or F
110	F
120	F
130	F
140	F

150	F
-----	---

For SI: 1 mile per hour = 0.447 m/s.

TABLE R905.2.4.1
CLASSIFICATION OF ASPHALT ROOF SHINGLES

<u>MAXIMUM ULTIMATE DESIGN WIND SPEED, V_{ULT} FROM FIGURE R301.2(4)A</u>	<u>MAXIMUM BASIC WIND SPEED, V_{ASD} FROM TABLE R301.2.1.3</u>	<u>ASTM D 7158^A SHINGLE CLASSIFICATION</u>	<u>ASTM D 3161 SHINGLE CLASSIFICATION</u>
110	85	D, G or H	A, D or F
116	90	D, G or H	A, D or F
129	100	G or H	A, D or F
142	110	G or H	F
155	120	G or H	F
168	130	H	F
181	140	H	F
194	150	H	F

For SI: 1 foot = 304.8 mm; 1 mph = 0.447 m/s.

a. The standard calculations contained in ASTM D 7158 assume exposure category B or C and building height of 60 feet or less. Additional calculations are required for conditions outside of these assumptions.

R905.2.7.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above ~~140~~ 140 mph (~~49~~ 63 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds ~~120~~ 150 mph (~~54~~ 67 m/s) shall comply with ASTM D 226 Type II, ASTM D 4869 Type IV, or ASTM D 6757. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

R905.3.3.3 Underlayment and high winds. Underlayment applied in areas subject to high wind [above ~~140~~ 140 mph (~~49~~ 63 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds ~~120~~ 150 mph (~~54~~ 67 m/s) shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4-inch (19 mm) into the roof sheathing.

R905.3.7 Application. Tile shall be applied in accordance with this chapter and the manufacturer's installation instructions, based on the following:

1. Climatic conditions.
2. Roof slope.
3. Underlayment system.

4. Type of tile being installed.

Clay and concrete roof tiles shall be fastened in accordance with this section and the manufacturer's installation instructions. Perimeter tiles shall be fastened with a minimum of one fastener per tile. Tiles with installed weight less than 9 pounds per square foot (0.4 kg/m²) require a minimum of one fastener per tile regardless of roof slope. Clay and concrete roof tile attachment shall be in accordance with the manufacturer's installation instructions where applied in areas where the wind speed exceeds ~~400~~ 130 miles per hour (~~45~~ 58 m/s) and on buildings where the roof is located more than 40 feet (12 192 mm) above grade. In areas subject to snow, a minimum of two fasteners per tile is required. In all other areas, clay and concrete roof tiles shall be attached in accordance with Table R905.3.7.

R905.4.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above ~~440~~ 140 mph (~~49~~ 63 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds ~~420~~ 150 mph (~~54~~ 67 m/s) shall comply with ASTM D 226 Type II, ASTM D 4869 Type IV, or ASTM D 1970. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32 gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

R905.5.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above ~~440~~ 140 mph (~~49~~ 63 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds ~~420~~ 150 mph (~~54~~ 67 m/s) shall comply with ASTM D 226 Type II or ASTM D 4869 Type IV. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

R905.6.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above ~~440~~ 140 mph (~~49~~ 63 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds ~~420~~ 150 mph (~~54~~ 67 m/s) shall comply with ASTM D 226 Type II or ASTM D 4869 Type IV. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

R905.7.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above ~~440~~ 140 mph (~~49~~ 63 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant

fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914mm) on center.

Underlayment installed where the basic wind speed equals or exceeds ~~420~~ 150 mph (~~54~~ 67 m/s) shall comply with ASTM D 226 Type II or ASTM D 4869 Type IV. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all Head laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

R905.8.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds ~~440~~ 140 mph (~~49~~ 63 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds ~~420~~ 150 mph (~~54~~ 67 m/s) shall comply with ASTM D 226 Type II or ASTM D 4869 Type IV. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

R905.10.5.1 Underlayment and high winds. Underlayment applied in areas subject to high winds ~~440~~ 140 mph (~~49~~ 63 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds ~~420~~ 150 mph (~~54~~ 67 m/s) shall comply with ASTM D 226 Type II. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

Reason: The purpose of this code change is to bring the wind provisions of the IRC in line with the 2012 IBC and ASCE 7-10. As a result of the schedule changes implemented during the 2009-2010 ICC code development cycle, there was not sufficient time to revise the IRC to fully implement the new ultimate wind speed basis of ASCE 7-10 and the 2012 IBC, due to the extent of prescriptive IRC provisions and tables which are directly related to basic wind speed.. New maps based on the ASCE 7-10 ultimate wind speed data but converted back down to nominal (ASD) basis were provided in the IRC. This has led to a fair amount of confusion among those stakeholders who work with both codes.

A working group of stakeholders including NAHB, the major material associations, ASCE, and the Insurance Institute for Business and Home Safety developed a series of IRC proposals to implement the new ultimate wind speed basis. This proposal updates the Chapter 9 provisions for roof coverings, including asphalt shingle classifications and triggers for high-wind roof covering and underlayment installation requirements. A similar table to new table R905.2.4.1 was proposed by ARMA and approved for the 2015 IBC.

Cost Impact: The code change proposal will not increase the cost of construction.

RB418-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R905.2.4.1-RB-EHRLICH.doc

RB419 – 13

R905.2.4.1, Table R905.2.4.1 (NEW), Table R905.2.4.1(1), Table R905.2.4.1(2)

Proponent: Michael D. Fischer, Kellen Company, representing the Asphalt Roofing Manufacturers Association (mfischer@kellencompany.com)

Revise as follows:

R905.2.4.1 Wind resistance of asphalt shingles. Asphalt shingles shall be tested in accordance with ASTM D 7158. Asphalt shingles shall meet the classification requirements of Table R905.2.4.1(1) for the appropriate maximum basic wind speed. Asphalt shingle packaging shall bear a *label* to indicate compliance with ASTM D 7158 and the required classification in Table R905.2.4.1(1).

Exception: Asphalt shingles not included in the scope of ASTM D 7158 shall be tested and *labeled* to indicate compliance with ASTM D 3161 and the required classification in Table R905.2.4.1(2).

TABLE R905.2.4.1(1)
CLASSIFICATION OF ASPHALT ROOF SHINGLES PER ASTM D 7158

MAXIMUM BASIC WIND SPEED FROM FIGURE 301.2(4)A (mph)	CLASSIFICATION REQUIREMENT
85	D, G or H
90	D, G or H
100	G or H
110	G or H
120	G or H
130	H
140	H
150	H

For SI: 1 mile per hour = 0.447 m/s.

TABLE R905.2.4.1
CLASSIFICATION OF ASPHALT SHINGLES

Maximum Basic Wind Speed from Figure R301.1(4)A or ASCE-7	V_{asd}	ASTM D7158	ASTM D 3161
110	85	D, G or H	A, D or F
116	90	D, G or H	A, D or F
129	100	G or H	A, D or F
142	110	G or H	F
155	120	G or H	F
168	160	H	F
181	140	H	F
194	150	H	F

For SI: 1 foot = 304.8 mm; 1 mph = 0.447 m/s.

TABLE R905.2.4.1(2)
CLASSIFICATION OF ASPHALT SHINGLES PER ASTM D 3161

MAXIMUM BASIC WIND SPEED FROM FIGURE 301.2(4)A (mph)	CLASSIFICATION REQUIREMENT
85	A, D or F
90	A, D or F
100	A, D or F
110	F
120	F
130	F
140	F
150	F

For SI: 1 mile per hour = 0.447 m/s.

Reason: The proposal reflects changes to ASCE-7-10 that modify the basic wind speeds. The change will require correlation to ensure appropriate product selection of asphalt shingles evaluated to the referenced standards.

Cost Impact: The code change proposal will not increase the cost of construction.

RB419-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R905.2.4.1-RB-FISCHER.doc

RB420 – 13

R905.2.4.1

Proponent: W. Harvey Cappel, P.E., Racelectric Engineering F-1525, representing self
(hcappel@aol.com)

Revise as follows:

R905.2.4.1 Wind resistance of asphalt shingles adhesive strips. Asphalt shingles shall be tested for wind resistance of the adhesive strips in accordance with ASTM D 7158. Asphalt shingles shall meet the classification requirements of Table R905.2.4.1(1) for the appropriate maximum basic wind speed. Asphalt shingle packaging shall bear a *label* to indicate compliance with ASTM D 7158 and the required classification in Table R905.2.4.1(1).

Exception: Asphalt shingles not included in the scope of ASTM D 7158 shall be tested and *labeled* to indicate compliance with ASTM D 3161 and the required classification in Table R905.2.4.1(2).

Reason: The referenced test standards test the adhesive and its resistance to tab failure due to wind loads (test simulated) on the upwind side of the roof. These tests do not test fasteners or the resistances of fasteners to withdrawal from the wood deck or shingle pull thru. Mr. Mike Noone, Chairman of ASTM Subcommittee D08-02 (the authors of ASTM D 3161 and similar test codes) will confirm this. The problem with the current wording is that it is misleading causing some to believe that use of the manufactures' nail standard during this test is a test of the nails and therefore the standard nailing required, for these shingles, on any roof for winds up to the test standard wind speeds. This is not true. Per Section R905.1 the fasteners attachment must be designed to resist the component and cladding loads specified in Table R301.2(2) adjusted for height and exposure in accordance with Table R301.2(3). Shingle attachment fasteners are not tested nor do they need to be. Sufficient data is already available to Engineers for the design of fastener systems.

Note: I will submit other changes to related sections of this code to completely correct this problem.

Cost Impact: This code change proposal will not increase the cost of construction. The only impact this code change proposal will have on cost is to those that have been wrongly interpreting the intent of the Code. In this case the cost of only a few more nails per shingle will be insignificant especially as compared to the cost of a failed shingle system cause by inadequate nailing.

RB420-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R905.2.4.1-RB-CAPPEL.doc

RB421 – 13

R905.2.5

Proponent: W. Harvey Cappel, P.E., Racelectric Engineering F-1525, representing self (hcappel@aol.com)

Revise as follows:

R905.2.5 Fasteners. Fasteners for asphalt shingles shall be galvanized steel, stainless steel, aluminum or copper roofing nails, minimum 12 gage [0.105 inch (3 mm)] shank with a minimum 3/8-inch (10 mm) diameter head, ASTM F 1667, of a length to penetrate through the roofing materials and ~~a minimum of 3/4 inch (19 mm) into the roof sheathing. Where the roof sheathing is less than 3/4 inch (19 mm) thick, the fasteners shall penetrate through the sheathing~~ penetrate through the minimum required roof sheathing or penetrate to an equivalent embedment into the thicker than minimum required roof sheathing. Fasteners shall comply with ASTM F 1667.

Reason: The current Section wording is ambiguous. It implies an either or standard with the in-between not in compliance with the Code. This is ridiculous. If a 3/8 inch penetration (typical for minimum deck thickness) is in compliance with the Code then all greater penetrations and embedment's up to and including the other Code required ¾ inch penetration are also in compliance with the Code. The problem with this incorrect wording is that it is being used as evidence of non-compliance, which is senseless.

Note: I will submit other changes to related sections of this code to completely correct this problem.

Cost Impact: This code change proposal will not increase the cost of construction. There will be no cost impact related to this proposed Code change; only less confusion and potentially a cost savings.

RB421-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R905.2.5-RB-CAPPEL.doc

RB422 – 13

R905.2.5

Proponent: Mark S. Graham, National Roofing Contractors Association (mgraham@nrca.net)

Revise as follows:

R905.2.5 Fasteners. Fasteners for asphalt shingles shall be galvanized steel, stainless steel, aluminum or copper roofing nails, minimum 12 gage [0.105 inch (3 mm)] shank with a minimum 3/8-inch-diameter (10 mm) head, complying with ASTM F 1667, of a length to penetrate through the roofing materials and a minimum of 3/4 inch (19 mm) into the roof sheathing. Where the roof sheathing is less than 3/4 inch (19 mm) thick, the fasteners shall penetrate through the sheathing. ~~Fasteners shall comply with F 1667.~~

Reason: This code change proposal is intended to remove a redundant requirement with Section R905.2.5.

Cost Impact: This code change proposal will not increase the cost of construction.

RB422-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R905.2.5-RB-GRAHAM.doc

RB423 – 13

R905.2.6

Proponent: Andrew Herseith, US Dept of Homeland Security, representing Federal Emergency Management Agency (FEMA) and Glenn Overcash, URS Corporation representing FEMA

Revise as follows:

R905.2.6 Attachment. Asphalt shingles shall have the minimum number of fasteners required by the manufacturer, but not less than four fasteners per strip shingle or two fasteners per individual shingle. Shingles applied where wind design is required by in accordance with Section R301.2.1.1, shall be fastened with not less than six fasteners per strip shingle. Where the roof slope exceeds 21 units vertical in 12 units horizontal (21:12), 175-percent slope), shingles shall be installed as required by the manufacturer.

Reason: Use of six fasteners to attach strip shingles in high wind areas has long been recognized. For example:

- National Bureau of Standards *Report BMS70* (April 10, 1941) *Asphalt-Prepared Roll Roofings and Shingles* states "For severe conditions, such as prevailing high winds, the shingles will be fastened more securely" if six nails per shingle are used.
- Section 3.2 of the current edition (2009) of *The NRCA Roofing Manual: Steep-slope Roof Systems* states "For areas considered to be high-wind regions, six-nail attachment of asphalt strip shingles may be required by the applicable building code. For these situations, manufacturers generally specify full-width shingles be fastened with six nails."
- The current edition (2006) of the Asphalt Manufacturers Association (ARMA) *Asphalt Roofing Residential Manual* states "for areas considered to be high wind regions from historical experience or by local building code authorities, the following six nail method should be considered:"
- Shingle manufacturer's instructions regarding fastening in high wind areas vary. One manufacturer states "For areas where local knowledge indicates exposure to high winds may occur, shingles must be applied with 6 nails ...".

Use of four nails per shingle rather than six was frequently observed on damaged roofs by FEMA Mitigation Assessment Teams (MAT) deployed after Hurricanes Charley (FL, 2004), Ivan (2004), Katrina (LA and MS, 2005) and Ike (TX, 2008). All of the damaged roofs were located in areas where the basic wind speed is 110 mph or higher [per Figure R301.2(4)A]. MAT observations are documented in FEMA publications 488, 489, 549 and P-757.

This code change proposal seeks to explicitly require the use of six fasteners per strip shingle in high wind areas, and it defines "high wind". This proposal eliminates ambiguity currently found in industry publications and manufacturers' literature, and it facilitates code enforcement.

Note: There are two "best practices" publications that recommend use of six fasteners at speeds lower than that given in this proposal. However, as a code minimum, areas with a basic wind speed greater than 110 mph is proposed, which is consistent with the shaded area in Figure R301.2(4)B, which stipulates where wind design is required.

- FEMA's Coastal Construction Manual (P-55, 2011) recommends six fasteners per strip shingle where the basic wind speed is greater than 90 mph [per Figure R301.2(4)A]
- *Fortified For Safer Living Standards* (2008), published by the Insurance Institute for Business and Home Safety (IBHS) requires the use of six nails per strip shingle where the basic wind speed is greater than 100 mph [per Figure R301.2(4)A].

Cost Impact: The code change proposal will not increase the cost of construction because if current guidance is properly followed, shingles would be attached with six fasteners.

RB423-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R905.2.6-RB-HERSETH-OVERCASH.doc

RB424 – 13

R905.2.6

Proponent: W. Harvey Cappel, P.E., Racelectric Engineering F-1525, representing self
(hcappel@aol.com)

Revise as follows:

R905.2.6 Attachment. Asphalt shingles shall have the minimum number of fasteners required by the manufacturer, but not less than four fasteners per strip shingle or two fasteners per individual shingle. Where the roof slope exceeds 21 units vertical in 12 units horizontal (21:12, 175 percent slope), or where the basic wind speed is equal to or exceeds 100 mph shingles shall be installed as required by the manufacturer, but with not less than six nails per shingle and as required to comply with Section R905.1.

Reason: The current Code is being misinterpreted (mainly because of a misunderstanding of the ASTM D 3161 test (it only tests adhesives) requirement for high wind areas) regarding the fastening requirements to resist wind loads. This proposed change will help reinforce the known requirement that additional fasteners are required in high wind areas. The shingle manufacturers cannot be relied on for this requirement since they cannot and do not take responsibility for fastening design or fastening installation in high wind areas. There, wind related, limit of warranty and responsibility typically stops with assurance against manufacturer's defects and compliance with one of the ASTM adhesive tests standards. Knowing that four nails per shingle are typically inadequate in high wind areas here is opportunity to set a minimum standard for high wind areas. The extreme number of shingle failures as a result of recent hurricanes Rita and Ike with wind speeds well below the typical coastal design standards should be sufficient motivation to make a change in our shingle installation Codes. What we have in force now, (basically four nails per shingle everywhere) is not working.

Note: I will submit other changes to related sections of this code to completely correct this problem.

Cost Impact: This code change proposal will not increase the cost of construction. There will be no cost impact (as compared to the original intent of the Code) related to this proposed Code change. Even if this change causes some construction projects to use six nails per shingle instead of the incorrect four nails per shingle, the additional cost will be minimal, especially as compared to the cost of an inadequate and failed shingle installation.

RB424-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R905.2.6-RB-CAPPEL.doc

RB425 – 13

R905.2.7.1

Proponent: Bill McHugh, Chicago Roofing Contractors Association (bill@crca.org)

Revise as follows:

R905.2.7.1 Ice barrier. In areas where there has been a history of ice forming along the eaves causing a backup of water as designated in Table R301.2(1), an ice barrier that consists of a least two layers of underlayment cemented together or of a self-adhering polymer modified bitumen sheet, shall be used in lieu of normal underlayment and extend from the lowest edges of all roof surfaces to a point at least 24 inches (610 mm) inside the exterior wall line of the building.

Exceptions:

1. Detached *accessory structures* that contain no *conditioned floor area*.
2. Roofs with slope equal to or greater than 8 units vertical in 12 units horizontal, the ice barrier shall be applied not less than 36 inches (914 mm) measured along the roof slope from the eave edge of the building.

Reason: In steep slope applications in climates where ice forms at the eave edge of roofs, ice melts due to heat from below, then freezes where the water meets roof surfaces that are over unheated areas, making a buildup of ice. This buildup becomes a 'dam' that backs water up under the roof covering and underlayment leaking into the building.

The purpose of this proposal is to bring the Code into alignment with the practical application of the ice barrier underlayment products in the field. Since gravity stops water from backing up very far on super steep slopes greater than 8" in 12" there needs to be a limit to the amount of ice barrier underlayment applied.

On very steep sloped roofs, the ice dams will still occur. However, buildup of ice cannot build far beyond the ball that forms at the gutter edge on slopes greater than 8" in 12" due to the slope. Secondly, the water will not defy gravity and move very far upward, when the physics of the application are that the water will drip over the dam first.

For very high sloped roofs where the vertical surface never intersects the heated wall, complete coverage of underlayment is needed. In short, the way the current code is written, ice barrier material may be needed on the complete 'high sloped' roof deck rather than protect just the eave edges and 3' up slope. The intent of 3' of underlayment applied past the warm vertical wall intersection up slope is met with this change.

Through clarifying this requirement with the second exception, the intent of the code is met while not burdening the building official with a variance request on a very small cost item.

Cost Impact: The code change proposal will not increase the cost of construction. It decreases the cost.

RB425-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R905.2.7.1 #1-RB-MCHUGH.doc

RB426 – 13

R905.2.7.1

Proponent: Bill McHugh, Chicago Roofing Contractors Association (bill@crca.org)

Revise as follows:

R905.2.7.1 Ice barrier. In areas where there has been a history of ice forming along the eaves causing a backup of water as designated in Table R301.2(1), an ice barrier that consists of a least two layers of underlayment cemented together or of a self-adhering polymer modified bitumen sheet, shall be used in lieu of normal underlayment and extend 2 inches (51 mm) down the fascia and under the drip edge and from the lowest edges of all roof surfaces to a point at least 24 inches (610 mm) inside the exterior wall line of the building.

Reason: In steep slope applications in climates where ice forms at the eave edge of roofs, ice melts due to heat from below, then freezes where the water meets roof surfaces that are over unheated areas. The frozen water builds, resulting in a dam that blocks water flow of water that continues to flow due to heat. That 'dam' blocks water flow causing water to stand on the roof, even when it has slope. The result is that the 'dam' buildup forces water upslope under roof covering causing leaks.

Studies show that roof recover applications typically fail at flashings on all roof slopes. The roof edge flashings are most susceptible to leaks from water backing up under the underlayment and roof covering because it freezes at the eave edge first causing water back up the slope of the structure.

According to CRCA roofing contractors, if the code required underlayment is applied to the top of the metal drip edge, a seal may be difficult and the water will leak into the structure where a void exists. Voids form due to joints in the metal, uneven or dirty surfaces before application of the underlayment. Further, if underlayment is applied to these flashings, water can be pushed by the ice dam working on the 'back water lap' up slope possibly causing leaks. The leak(s) may be difficult to detect in the concealed space location.

In new construction, tear off and roof replacement situations, the roofing underlayment is easily installed before the drip edges at the eave edge. In reroofing and roof-recover applications, it does mean removing edge metal and reapplication.

We believe this will provide needed guidance to both new construction, reroofing, roof recover and roof replacements providing better service to the residential building owner.

Cost Impact: This may slightly increase cost of reroofing, roof recover. There is a very small increase in cost for new construction.

RB426-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R905.2.7.1 #2-RB-MCHUGH.doc

RB427 – 13

R905.3.3.1, R905.3.3.2, R905.3.3.3, R905.3.4.1 (NEW)

Proponent: Mark S. Graham, National Roofing Contractors Association (mgraham@nrca.net)

Revise as follows:

~~R905.3.3.1 Low-slope roofs~~ R905.3.4 Underlayment Application. For roof slopes from two and one-half units vertical in 12 units horizontal (2½:12), up to four units vertical in 12 units horizontal (4:12), underlayment shall be a minimum of two layers underlayment applied as follows: in the following manner.
~~1. Starting at the eave, Apply a 19-inch (483 mm) strip of underlayment shall be applied parallel with to and starting at the eaves, and fastened sufficiently to hold in place.~~ ~~2. Starting at the eave, apply 36-inch-wide (914 mm) strips sheets of underlayment felt shall be applied, over-lapping successive sheets 19 inches (483 mm), and fastened sufficiently to hold in place.~~

~~R905.3.3.2 High-slope roofs.~~ For roof slopes of four units vertical in 12 units horizontal (4:12) or greater, underlayment shall be a minimum of one layer of underlayment felt applied in the following manner. Underlayment shall be applied shingle fashion, parallel to and starting from the eaves and lapped 2 inches (51 mm), fastened sufficiently to hold in place. End laps shall be offset by 6 feet (1829 mm).

R905.3.4.1 Ice barrier. In areas where there has been a history of ice forming along the eaves causing a backup of water as designated in Table R301.2(1), an ice barrier that consists of at least two layers of underlayment cemented together or of a self-adhering polymer modified bitumen sheet, shall be used in lieu of normal underlayment and extend from the lowest edges of all roof surfaces to a point at least 24 inches (610 mm) inside the exterior wall line of the building.

Exception: Detached accessory structures that contain no conditioned floor area.

~~R905.3.3.3~~ R905.3.4.2 Underlayment and high winds. Underlayment applied in areas subject to high wind [above 110 miles per hour (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of ¾-inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

Reason: This code change proposal is intended to clarify the code's requirements regarding underlayment for clay and concrete tile roof systems.

As currently written, the underlayment requirements for clay and concrete tile roof systems are formatted differently and are somewhat more confusing than the similar underlayment requirements for other steep-slope roof system types. This code change proposal reformats Section R905.3.3.1-Low Slope Roofs, Section R905.3.3.2-High Slope Roofs and Section R905.3.3.3-Underlayment and High Winds into a clearer, more concise format similar to that used in the Code for asphalt shingles.

Only two technical changes have been incorporated into this code change proposal: 1) The addition of "End laps shall be offset by 6 feet (1829 mm)." which is included the underlayment requirements for asphalt shingles. 2) The addition of specific ice barrier membrane requirements (new Section R905.3.4.1), which are already included for other steep-slope roof system types, but had apparently been omitted for clay and concrete tile roof systems.

Cost Impact: This code change proposal will not increase the cost of construction.

RB427-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R905.3.3.1-RB-GRAHAM.doc

RB428 – 13

R905.2.3, R905.2.7.2, R905.3.3, R905.4.3, R905.4.3.2, R905.5.3, R905.5.3.2, R905.6.3, R905.6.3.2, R905.7.3, R905.7.3.2, R905.8.3, R905.8.3.2

Proponent: Mark S. Graham, National Roofing Contractors Association (mgraham@nrca.net)

Revise as follows:

R905.2.3 Underlayment. Unless otherwise noted, required underlayment shall conform to ~~ASTM D 226 Type I~~, ASTM D 4869 Type I, or ASTM D 6757.

Self-adhering polymer modified bitumen sheet shall comply with ASTM D 1970.

R905.2.7.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ~~ASTM D 226 Type II~~, ASTM D 4869 Type IV, or ASTM D 6757. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.3.3 Underlayment. Unless otherwise noted, required underlayment shall conform to ~~ASTM D 226 Type II~~, ASTM D 2626 Type I; or ASTM D 6380 Class M mineral surfaced roll roofing.

R905.4.3 Underlayment. Underlayment shall comply with ~~ASTM D 226, Type I or Type II~~, ASTM D 4869, Type I or Type II, or ASTM D 1970. ~~Underlayment shall be installed in accordance with the manufacturer's installation instructions.~~

R905.4.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ~~ASTM D 226 Type II~~, ASTM D 4869 Type IV, ~~or ASTM D 1970~~. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32 gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.5.3 Underlayment. Underlayment shall comply with ~~ASTM D 226, Type I or~~ ASTM D 4869, Type I or II.

R905.5.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ~~ASTM D 226 Type II or~~ ASTM D 4869 Type IV. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.6.3 Underlayment. Underlayment shall comply with ~~ASTM D 226, Type I, or~~ ASTM D 4869, Type I or II. ~~Underlayment shall be installed in accordance with the manufacturer's installation instructions.~~

R905.6.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ~~ASTM D 226 Type II or~~ ASTM D 4869 Type IV. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.7.3 Underlayment. Underlayment shall comply with ~~ASTM D 226, Type I or~~ ASTM D 4869, Type I or II.

R905.7.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ~~ASTM D 226 Type II or~~ ASTM D 4869 Type IV. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all Head laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.8.3 Underlayment. Underlayment shall comply with ~~ASTM D 226, Type I or~~ ASTM D 4869, Type I or II.

R905.8.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ~~ASTM D 226 Type II or~~ ASTM D 4869 Type IV. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of ³/₄ inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

Reason: This code change proposal is intended to remove roofing felt-type products complying with ASTM D 226 from being considered as underlayment for steep-slope roof assemblies.

While ASTM D 226 products have previously been sometimes considered appropriate for use as underlayment, this is no longer the case. The scope of ASTM D 226 indicates the product is intended to be used as a ply sheet for built-up roof systems (such as in Section R905.9) or in membrane waterproofing systems. Use of this type of product as a steep-slope underlayment is clearly outside of the scope of the standard.

ASTM D4869, Type III and Type IV products have physical properties and dimensions and masses that are identical to ASTM D 226 Type I and Type II, respectively. However, ASTM D4869 also includes a resistance of the material to liquid water (a "water spray test") that is an important property for steep-slope underlayment products. ASTM D 226 does not include such a water spray test.

Also, in Section R905.4.3.2, reference to ASTM D 1970 is removed. Adhered underlayment does not require attachment. This is already addressed in the Exception to Section R905.4.3.

The statement "Underlayment shall be installed..." is also being deleted from Section R905.4.3 and Section R905.6.3 because it is redundant; this requirement is already provided in Section R904.1

Cost Impact: The code change proposal will not increase the cost of construction.

RB428-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R905.2.7.2-RB-GRAHAM.doc

RB429 – 13

R905.2.7.2, R905.3.3.3, R905.4.3.2, R905.5.3.2, R905.6.3.2, R905.7.3.2, R905.8.3.2, R905.10.5.1

Proponent: John Kurtz, International Staple, Nail & Tool Association (isanta@ameritech.net)

Revise as follows:

R905.2.7.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II, ASTM D 4869 Type IV, or ASTM D 6757. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12-gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4-inch (19 mm) into the roof sheathing. Underlayment shall be attached using cap nails or cap staples. Caps shall be metal or plastic with a nominal head diameter of not less than 1 inch (25.4 mm). Metal caps shall have a thickness of at least 32-gauge sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch (0.25 mm). Minimum thickness of the outside edge of plastic caps shall be 0.035 inch (0.89 mm). Cap-nail shank shall be a minimum of 12 gauge (0.105 inches). Staple gage shall be a minimum 21 gage. Cap-nail shank and cap staple legs shall have a length sufficient to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.3.3.3 Underlayment and high winds. Underlayment applied in areas subject to high wind [above 110 miles per hour (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12-gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4-inch (19 mm) into the roof sheathing. Underlayment shall be attached using cap nails or cap staples. Caps shall be metal or plastic with a nominal head diameter of not less than 1 inch (25.4 mm). Metal caps shall have a thickness of at least 32-gauge sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch (0.25 mm). Minimum thickness of the outside edge of plastic caps shall be 0.035 inch (0.89 mm). Cap-nail shank shall be a minimum of 12 gauge (0.105 inches). Staple gage shall be a minimum 21 gage. Cap-nail shank and cap staple legs shall have a length sufficient to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.4.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II, ASTM D 4869 Type IV, or ASTM D 1970. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). ~~Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12-gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ inch (19 mm) into the roof sheathing.~~ Underlayment shall be attached using cap nails or cap staples. Caps shall be metal or plastic with a nominal head diameter of not less than 1 inch (25.4 mm). Metal caps shall have a thickness of at least 32-gauge sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch (0.25 mm). Minimum thickness of the outside edge of plastic caps shall be 0.035 inch (0.89 mm). Cap-nail shank shall be a minimum of 12 gauge (0.105 inches). Staple gage shall be a minimum 21 gage. Cap-nail shank and cap staple legs shall have a length sufficient to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.5.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II or ASTM D 4869 Type IV. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). ~~Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12-gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ inch (19 mm) into the roof sheathing.~~ Underlayment shall be attached using cap nails or cap staples. Caps shall be metal or plastic with a nominal head diameter of not less than 1 inch (25.4 mm). Metal caps shall have a thickness of at least 32-gauge sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch (0.25 mm). Minimum thickness of the outside edge of plastic caps shall be 0.035 inch (0.89 mm). Cap-nail shank shall be a minimum of 12 gauge (0.105 inches). Staple gage shall be a minimum 21 gage. Cap-nail shank and cap staple legs shall have a length sufficient to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.6.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II or ASTM D 4869 Type IV. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102

mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12-gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ inch (19 mm) into the roof sheathing. Underlayment shall be attached using cap nails or cap staples. Caps shall be metal or plastic with a nominal head diameter of not less than 1 inch (25.4 mm). Metal caps shall have a thickness of at least 32-gauge sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch (0.25 mm). Minimum thickness of the outside edge of plastic caps shall be 0.035 inch (0.89 mm). Cap-nail shank shall be a minimum of 12 gauge (0.105 inches). Staple gage shall be a minimum 21 gage. Cap-nail shank and cap staple legs shall have a length sufficient to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.7.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II or ASTM D 4869 Type IV. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all Head laps shall be a minimum of 4 inches (102 mm). ~~Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12-gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ inch (19 mm) into the roof sheathing.~~ Underlayment shall be attached using cap nails or cap staples. Caps shall be metal or plastic with a nominal head diameter of not less than 1 inch (25.4 mm). Metal caps shall have a thickness of at least 32-gauge sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch (0.25 mm). Minimum thickness of the outside edge of plastic caps shall be 0.035 inch (0.89 mm). Cap-nail shank shall be a minimum of 12 gauge (0.105 inches). Staple gage shall be a minimum 21 gage. Cap-nail shank and cap staple legs shall have a length sufficient to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.8.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II or ASTM D 4869 Type IV. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). ~~Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12-gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ inch (19 mm) into the roof sheathing.~~ Underlayment shall be attached using cap nails or cap staples. Caps shall be metal or plastic with a nominal head diameter of not less than 1 inch (25.4 mm). Metal caps shall have a thickness of at least 32-gauge sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch (0.25 mm). Minimum thickness of the outside edge of plastic caps shall be 0.035 inch (0.89 mm). Cap-nail shank shall be a minimum of 12 gauge (0.105 inches). Staple gage shall be a minimum 21 gage. Cap-nail shank and cap staple legs shall have a length sufficient to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.10.5.1 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). ~~Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12-gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4-inch (19 mm) into the roof sheathing.~~ Underlayment shall be attached using cap nails or cap staples. Caps shall be metal or plastic with a nominal head diameter of not less than 1 inch (25.4 mm). Metal caps shall have a thickness of at least 32-gauge sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch (0.25 mm). Minimum thickness of the outside edge of plastic caps shall be 0.035 inch (0.89 mm). Cap-nail shank shall be a minimum of 12 gauge (0.105 inches). Staple gage shall be a minimum 21 gage. Cap-nail shank and cap staple legs shall have a length sufficient to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

Reason: The IRC requirement for cap nails for attachment of roof covering underlayment in high-wind areas does not reflect commercially available cap staples successfully used in roofing material application. This proposal expands fastener to include cap staples based on tests indicating underlayment tears before proposed cap staples fail. Cap staple bearing area on underlayment is same as for cap nail - being determined by cap diameter.

Tests were conducted with ASTM D 4869 Type IV underlayment ("30 pound"). That underlayment is at high end of the thickness and toughness range of code-required underlayment - a "worst-case test" for the cap staple.

Test procedure and results accompany this proposal. (below)

Report on Testing
July 2012

Testing was performed by Stanley Black & Decker at the request of International Staple, Nail and Tool Association (ISANTA.)

Reference Standards

State of Florida

- Testing Application Standards (TAS) published in the State of Florida Building Code, 2007 for High Velocity Hurricane Zone (HVHZ) product approval testing.
- TAS 111(B)-95, Test Procedure for Edge Metal Pull-off Performance.
- TAS 117(C)-95, Test Procedure for Dynamic Pull-off Performance of Roofing Nail Heads or Fasteners with Bearing Plates.
- TAS 117(A)-95, Test Procedure for Withdrawal Resistance Testing of Mechanical Fasteners Used in Roof System Assemblies.
- TAS 117(B)-95, test Procedure for Dynamic Pull-through Performance of Roofing Membranes over Fastener Heads or Fasteners with Metal Bearing Plates.

ASTM Standards

- D1037, Standard Test Methods for Evaluating Properties of Wood-base fiber and Particle Panel Materials, Nail head Pull-through Test.
- D4869, Standard Specification for Asphalt-Saturated Organic Felt Underlayment Used in Steep Slope Roofing.
- D412, Test Method for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension.

Acceptance Criteria

- ICC-ES, AC188: Acceptance Criteria for Roof Underlayments. July 2007.

Materials

- Roofing paper, 30# (ASTM D 4869, Type IV)
- Sheathing material – 4-ply, 15/32-in. Southern Pine Plywood, cut in 2 by 2 in. squares
- Fasteners – Ring shank cap nails with nail shank diameters before threading of 0.083 inch and 0.105 inch. Cap staples, 18 gage and 21 gage.
- Caps – 1 inch diameter plastic caps

Method - The test method was designed to facilitate one of three potential failure modes: cap failure, fastener withdrawal, or cap pulling through underlayment. A 14x14-in. sheet of underlayment was cut from the roll. The cap-fastener was driven through the center of the underlayment sheet into a 2x2-in. block of sheathing material. The assembled test specimen was turned over so that the sheathing block was visible and the fastener head was down. The assembled specimen was secured in the test fixture base with the fastener centered below sheathing block clamping fixture. The sheathing block was clamped by the fixture attached to the traversing head of the test machine. The test specimen was loaded at constant displacement of 1 in./min. until failure. Load and displacement were monitored continuously during the test. Failure mode was observed and peak force was recorded as the failure load. Photographs provided.

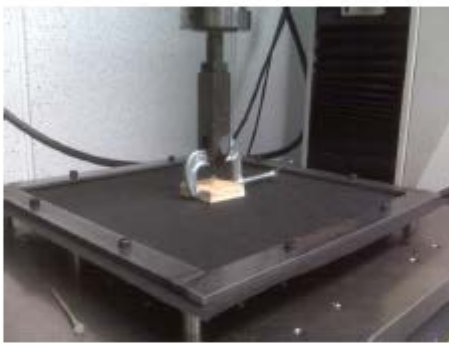
Discussion - The test is intended to evaluate the functionality of the ISANTA proposal for adding additional commercially available cap fasteners for use on same spacing as IBC's 0.105" cap nail with a plastic or metal 1" diameter cap (as specified.) The underlayment is not wind qualified. However, AC188 evaluation includes a requirement for tensile strength by using one of three ASTM standards, for example, ASTM D412. The AC does not include a punch-through or pull-through evaluation. The minimum tensile strength criterion of AC188 is 20 lbf/in-width. The 20 lbf/in-width is a valuable benchmark in that it could also be used to assess the potential uplift resistance of the underlayment because that is controlled by tensile strength.

Tensile strength also appears to be a predictor of pull-through performance. The 1-in. caps generally pulled through the underlayment at approximately 32 lb. Some nonlinear behavior occurs at the start of the loading process, then the load-deflection diagram becomes linear, and as the load approaches the maximum a minor plastic region develops that reflects fiber separation and cap yielding. This was generally characteristic for all cap-fasteners.

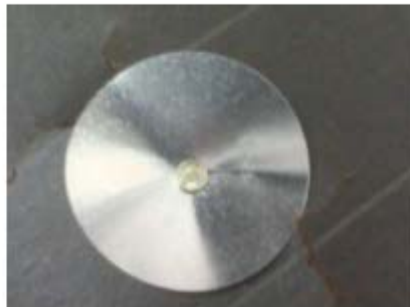
Conclusions - From the testing and review of test standards and acceptance criteria, we can conclude that the underlayment minimum tensile strength is the controlling strength property of the system and it can be used as a reasonable approximation of the potential holding capacity of the cap-fasteners based on the cap diameter. Engineering analysis of the negative pressures on roof surfaces should provide reasonable estimates of expected forces that will be resisted by fasteners and can be used to establish fastening schedules that reflect the fastener holding capacity (pull-through or withdrawal) and tensile strength of the underlayment when loaded as a membrane between fasteners.



Test machine fixtures for the pull-through test.



Pull-through test in progress; (left) early in test; (right) nearing failure.



Metal cap with roofing nail fastener after the pull-through test. Observe the permanent deformation of the metal cap and the pull-through tears in the underlayment.

Results of Cap Fastener Testing with ASTM D 4869, Type IV Underlayment

Cap Fastener ¹	Failure Load (pounds)	Number of Failures, by Failure Mode		
		Fastener Withdrawal	Cap Failure	Under-layment Tear
"Code" Nail 2012 IBC Cap Nail 0.105" nail diameter ring shank nail	31.8	1	7	8
0.083" nail diameter ring shank nail	32.4	0	4	2
21 Gage staple	36.2	0	0	5
18 Gage staple	32.1	0	2	9

¹ All cap fasteners had plastic caps meeting IBC requirements.

Cost Impact: The code change proposal will not increase the cost of construction. Proposed option would allow contractors to select option which provides equivalent protection with minimized material and labor costs.

RB429-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R905.2.7.2 #1-RB-KURTZ.doc

RB430 – 13

R905.2.7.2, R905.3.3.3, R905.4.3.2, R905.5.3.2, R905.6.3.2, R905.7.3.2, 905.8.3.2, R905.10.5.1

Proponent: John Kurtz, International Staple, Nail & Tool Association (mgraham@nrca.net)

Revise as follows:

R905.2.7.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II, ASTM D 4869 Type IV, or ASTM D 6757. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12-gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing. Underlayment shall be attached using metal or plastic cap nails with a nominal cap diameter of not less than 1 inch (25.4 mm.) Metal caps shall have a thickness of at least 32-gauge sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch (0.25 mm). Minimum thickness of the outside edge of plastic caps shall be 0.035 inch (0.89 mm). The cap-nail shank shall be a minimum of 0.083 inch (2.11 mm) for ring shank cap nails and 0.091 inch (2.31 mm) for smooth shank cap nails. Cap nails shall have a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.3.3.3 Underlayment and high winds. Underlayment applied in areas subject to high wind [above 110 miles per hour (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12-gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing. Underlayment shall be attached using metal or plastic cap nails with a nominal cap diameter of not less than 1 inch (25.4 mm.) Metal caps shall have a thickness of at least 32-gauge sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch (0.25 mm). Minimum thickness of the outside edge of plastic caps shall be 0.035 inch (0.89 mm). The cap-nail shank shall be a minimum of 0.083 inch (2.11 mm) for ring shank cap nails and 0.091 inch (2.31 mm) for smooth shank cap nails. Cap nails shall have a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.4.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant

fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II, ASTM D 4869 Type IV, or ASTM D 1970. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). ~~Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12-gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ inch (19 mm) into the roof sheathing.~~ Underlayment shall be attached using metal or plastic cap nails with a nominal cap diameter of not less than 1 inch (25.4 mm.) Metal caps shall have a thickness of at least 32-gauge sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch (0.25 mm). Minimum thickness of the outside edge of plastic caps shall be 0.035 inch (0.89 mm). The cap-nail shank shall be a minimum of 0.083 inch (2.11 mm) for ring shank cap nails and 0.091 inch (2.31 mm) for smooth shank cap nails. Cap nails shall have a length to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.5.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II or ASTM D 4869 Type IV. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). ~~Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12-gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ inch (19 mm) into the roof sheathing.~~ Underlayment shall be attached using metal or plastic cap nails with a nominal cap diameter of not less than 1 inch (25.4 mm.) Metal caps shall have a thickness of at least 32-gauge sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch (0.25 mm). Minimum thickness of the outside edge of plastic caps shall be 0.035 inch (0.89 mm). The cap-nail shank shall be a minimum of 0.083 inch (2.11 mm) for ring shank cap nails and 0.091 inch (2.31 mm) for smooth shank cap nails. Cap nails shall have a length to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.6.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II or ASTM D 4869 Type IV. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). ~~Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12-gauge (0.105 inches) with a length to penetrate through the roof sheathing or a~~

minimum of $\frac{3}{4}$ inch (19 mm) into the roof sheathing. Underlayment shall be attached using metal or plastic cap nails with a nominal cap diameter of not less than 1 inch (25.4 mm.) Metal caps shall have a thickness of at least 32-gauge sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch (0.25 mm). Minimum thickness of the outside edge of plastic caps shall be 0.035 inch (0.89 mm). The cap-nail shank shall be a minimum of 0.083 inch (2.11 mm) for ring shank cap nails and 0.091 inch (2.31 mm) for smooth shank cap nails. Cap nails shall have a length to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.7.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II or ASTM D 4869 Type IV. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all Head laps shall be a minimum of 4 inches (102 mm). ~~Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12-gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ inch (19 mm) into the roof sheathing.~~ Underlayment shall be attached using metal or plastic cap nails with a nominal cap diameter of not less than 1 inch (25.4 mm.) Metal caps shall have a thickness of at least 32-gauge sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch (0.25 mm). Minimum thickness of the outside edge of plastic caps shall be 0.035 inch (0.89 mm). The cap-nail shank shall be a minimum of 0.083 inch (2.11 mm) for ring shank cap nails and 0.091 inch (2.31 mm) for smooth shank cap nails. Cap nails shall have a length to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.8.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II or ASTM D 4869 Type IV. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). ~~Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12-gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ inch (19 mm) into the roof sheathing.~~ Underlayment shall be attached using metal or plastic cap nails with a nominal cap diameter of not less than 1 inch (25.4 mm.) Metal caps shall have a thickness of at least 32-gauge sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch (0.25 mm). Minimum thickness of the outside edge of plastic caps shall be 0.035 inch (0.89 mm). The cap-nail shank shall be a minimum of 0.083 inch (2.11 mm) for ring shank cap nails and 0.091 inch (2.31 mm) for smooth shank cap nails. Cap nails shall have a length to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.10.5.1 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). ~~Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12-gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4-inch (19 mm) into the roof sheathing.~~ Underlayment shall be attached using metal or plastic cap nails with a nominal cap diameter of not less than 1 inch (25.4 mm.) Metal caps shall have a thickness of at least 32-gauge sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch (0.25 mm). Minimum thickness of the outside edge of plastic caps shall be 0.035 inch (0.89 mm). The cap-nail shank shall be a minimum of 0.083 inch (2.11 mm) for ring shank cap nails and 0.091 inch (2.31 mm) for smooth shank cap nails. Cap nails shall have a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

Reason: The cap nail listed for attachment of roof covering underlayment in high-wind areas does not reflect commercially available cap nails successfully used in roofing material application. IRC presently lists a minimum nail shank diameter of 0.105". This proposal lowers the minimum shank diameter based on tests indicating underlayment tears before proposed cap nails fail. (Minimum diameter of 0.083" for ring shank cap nails and minimum diameter of 0.091" for smooth shank cap nails.)

Tests were conducted with ASTM D 4869 Type IV underlayment ("30 pound"). That underlayment is at high end of the thickness and toughness range of code-required underlayment - a "worst-case test" for the fastener. Proposal addresses both commercially available hand-driven and power-driven cap-nails.

Test procedure and results accompany this proposal. (below)

Report on Testing
July 2012

Testing was performed by Stanley Black & Decker at the request of International Staple, Nail and Tool Association (ISANTA.)

Reference Standards

State of Florida

- Testing Application Standards (TAS) published in the State of Florida Building Code, 2007 for High Velocity Hurricane Zone (HVHZ) product approval testing.
- TAS 111(B)-95, Test Procedure for Edge Metal Pull-off Performance.
- TAS 117(C)-95, Test Procedure for Dynamic Pull-off Performance of Roofing Nail Heads or Fasteners with Bearing Plates.
- TAS 117(A)-95, Test Procedure for Withdrawal Resistance Testing of Mechanical Fasteners Used in Roof System Assemblies.
- TAS 117(B)-95, test Procedure for Dynamic Pull-through Performance of Roofing Membranes over Fastener Heads or Fasteners with Metal Bearing Plates.

ASTM Standards

- D1037, Standard Test Methods for Evaluating Properties of Wood-base fiber and Particle Panel Materials, Nail head Pull-through Test.
- D4869, Standard Specification for Asphalt-Saturated Organic Felt Underlayment Used in Steep Slope Roofing.
- D412, Test Method for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension.

Acceptance Criteria

- ICC-ES, AC188: Acceptance Criteria for Roof Underlayments. July 2007.

Materials

- Roofing paper, 30# (ASTM D 4869, Type IV)
- Sheathing material – 4-ply, 15/32-in. Southern Pine Plywood, cut in 2 by 2 in. squares
- Fasteners – Ring shank cap nails with nail shank diameters before threading of 0.083 inch and 0.105 inch. Cap staples, 18 gage and 21 gage.
- Caps – 1 inch diameter plastic caps

Method - The test method was designed to facilitate one of three potential failure modes: cap failure, fastener withdrawal, or cap pulling through underlayment. A 14x14-in. sheet of underlayment was cut from the roll. The cap-fastener was driven through the center of the underlayment sheet into a 2x2-in. block of sheathing material. The assembled test specimen was turned over so that the sheathing block was visible and the fastener head was down. The assembled specimen was secured in the test fixture base with the fastener centered below sheathing block clamping fixture. The sheathing block was clamped by the fixture attached to the traversing head of the test machine. The test specimen was loaded at constant displacement of 1 in./min. until failure. Load and displacement were monitored continuously during the test. Failure mode was observed and peak force was recorded as the failure load. Photographs provided.

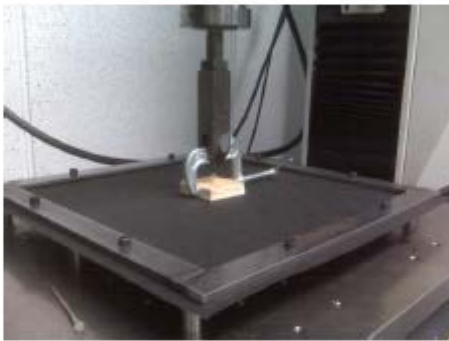
Discussion - The test is intended to evaluate the functionality of the ISANTA proposal for adding additional commercially available cap fasteners for use on same spacing as IBC's 0.105" cap nail with a plastic or metal 1" diameter cap (as specified.) The underlayment is not wind qualified. However, AC188 evaluation includes a requirement for tensile strength by using one of three ASTM standards, for example, ASTM D412. The AC does not include a punch-through or pull-through evaluation. The minimum tensile strength criterion of AC188 is 20 lbf/in-width. The 20 lbf/in-width is a valuable benchmark in that it could also be used to assess the potential uplift resistance of the underlayment because that is controlled by tensile strength.

Tensile strength also appears to be a predictor of pull-through performance. The 1-in. caps generally pulled through the underlayment at approximately 32 lb. Some nonlinear behavior occurs at the start of the loading process, then the load-deflection diagram becomes linear, and as the load approaches the maximum a minor plastic region develops that reflects fiber separation and cap yielding. This was generally characteristic for all cap-fasteners.

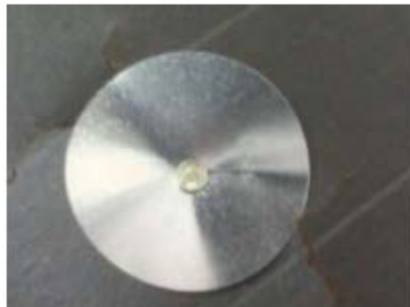
Conclusions - From the testing and review of test standards and acceptance criteria, we can conclude that the underlayment minimum tensile strength is the controlling strength property of the system and it can be used as a reasonable approximation of the potential holding capacity of the cap-fasteners based on the cap diameter. Engineering analysis of the negative pressures on roof surfaces should provide reasonable estimates of expected forces that will be resisted by fasteners and can be used to establish fastening schedules that reflect the fastener holding capacity (pull-through or withdrawal) and tensile strength of the underlayment when loaded as a membrane between fasteners.



Test machine fixtures for the pull-through test.



Pull-through test in progress; (left) early in test; (right) nearing failure.



Metal cap with roofing nail fastener after the pull-through test. Observe the permanent deformation of the metal cap and the pull-through tears in the underlayment.

Results of Cap Fastener Testing with ASTM D 4869, Type IV Underlayment

Cap Fastener ¹	Failure Load (pounds)	Number of Failures, by Failure Mode		
		Fastener Withdrawal	Cap Failure	Under-layment Tear
"Code" Nail 2012 IBC Cap Nail 0.105" nail diameter ring shank nail	31.8	1	7	8
0.083" nail diameter ring shank nail	32.4	0	4	2
21 Gage staple	36.2	0	0	5
18 Gage staple	32.1	0	2	9

¹ All cap fasteners had plastic caps meeting IBC requirements.

Cost Impact: The code change proposal will not increase the cost of construction. Proposed options would allow contractors to select options which provide equivalent protection with minimized material and labor costs.

RB430-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

R905.2.7.2 #2-RB-KURTZ.doc

RB431 – 13

Table R905.2.7.1 (NEW), R905.2.7.2, R905.3.3.3, R905.4.3.2, R905.5.3.2, R905.6.3.2, R905.7.3.2, R905.8.3.2, R905.10.5.1

Proponent: John Kurtz, International Staple, Nail & Tool Association (isanta@ameritech.net)

Revise as follows:

**TABLE R905.2.7.1
ROOF COVERING UNDERLAYMENT ATTACHMENT**

<u>Alternate Fastener^a</u>	<u>Maximum center-to-center spacing of alternate fasteners and grid lines if required center-to-center spacing of code fastener is</u>	
	<u>6" (152 mm) o.c.</u>	<u>12" (305 mm) o.c.</u>
<u>5/8" leg, 21 gage staple</u>	<u>3" (76 mm)</u>	<u>6" (152 mm)</u>
<u>21 gage staple</u>	<u>3" (76 mm)</u>	<u>7" (178 mm)</u>
<u>20 gage staple</u>	<u>4" (102 mm)</u>	<u>8" (203 mm)</u>
<u>0.080 - .083 diam. nail</u>	<u>4" (102 mm)</u>	<u>9" (229 mm)</u>
<u>0.090 diam. Nail</u>	<u>5" (127 mm)</u>	<u>10" (254 mm)</u>
<u>18 gage staple</u>		
<u>0.105 diam. Nail (12 gage)</u>	<u>6" (152 mm)</u>	<u>12" (305 mm)</u>
<u>17 gage staple</u>		
<u>0.120 diam. nail (11 gage)</u>		

a. Minimum nail shank length or staple leg length is 3/4" (19 mm) unless otherwise stated.

R905.2.7.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II, ASTM D 4869 Type IV, or ASTM D 6757. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

Exceptions:

1. As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.
2. As an alternative, cap nails and cap staples complying with requirements of ASTM F1667 and fastened in accordance with Table R905.2.7.1 shall be permitted.

R905.3.3.3 Underlayment and high winds. Underlayment applied in areas subject to high wind [above 110 miles per hour (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The

cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4-inch (19 mm) into the roof sheathing.

Exceptions:

1. As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.
2. As an alternative, cap nails and cap staples complying with requirements of ASTM F1667 and fastened in accordance with Table R905.2.7.1 shall be permitted.

R905.4.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center. Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II, ASTM D 4869 Type IV, or ASTM D 1970. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm).

Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32 gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

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R905.5.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center. Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II or ASTM D 4869 Type IV. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm).

Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

Exceptions:

1. As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.
2. As an alternative, cap nails and cap staples complying with requirements of ASTM F1667 and fastened in accordance with Table R905.2.7.1 shall be permitted.

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Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II or ASTM D 4869 Type IV. The underlayment shall be attached in a grid pattern

of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

Exceptions:

1. As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.
2. As an alternative, cap nails and cap staples complying with requirements of ASTM F1667 and fastened in accordance with Table R905.2.7.1 shall be permitted.

R905.7.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II or ASTM D 4869 Type IV. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all Head laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

Exceptions:

1. As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.
2. As an alternative, cap nails and cap staples complying with requirements of ASTM F1667 and fastened in accordance with Table R905.2.7.1 shall be permitted.

R905.8.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II or ASTM D 4869 Type IV. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

Exceptions:

1. As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.
2. As an alternative, cap nails and cap staples complying with requirements of ASTM F1667 and fastened in accordance with Table R905.2.7.1 shall be permitted.

R905.10.5.1 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant

fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

Exceptions:

1. As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.
2. As an alternative, cap nails and cap staples complying with requirements of ASTM F1667 and fastened in accordance with Table R905.2.7.1 shall be permitted.

Reason: The fastener listed for attachment of roof covering underlayment in high-wind areas does not reflect commercially available fasteners successfully used in roofing material application. The code presently lists only one nail shank diameter, 0.105". This proposal addresses both commercially available hand-driven and power-driven cap-fasteners.

Tighter spacing of fasteners specified in the proposed table ensures that spacing of fasteners with diameters not currently specified in the Code would achieve equal (or greater) withdrawal strength than the currently listed nail diameter. Sufficient fastener withdrawal ensures that fastener shanks remain in roof deck while cap transfers uplift forces to the deck. This is a conservative approach because developing data indicates that the relevant failure mode is cap pulling through underlayment, rather than fastener shank withdrawal.

ASTM F1667-11a controls fastener nominal dimensions and tolerances as well as relevant fastener features.

Structure of proposal minimizes complexity of code requirements. An "Exception" is added to each roof covering's section. One table presents fastener spacing for all roof coverings.

Cost Impact: The code change proposal will not increase the cost of construction. The numerous options would allow contractors to select options which provide equivalent protection with minimized material and labor costs.

RB431-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R905-RB-KURTZ.doc

RB432 – 13

R905.2.7.2, R905.3.3.3, R905.4.3.2, R905.5.3.2, R905.6.3.2, R905.7.3.2, R905.8.3.2, R905.10.5.1

Proponent: Timothy Reinhold, Insurance Institute for Business & Home Safety

Revise as follows:

R905.2.7.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II, ASTM D 4869 Type IV, or ASTM D 6757. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ inch (19 mm) into the roof sheathing.

Exceptions:

1. As an alternative, ~~adhered~~ self-adhering polymer modified bitumen underlayment complying with ASTM D 1970 installed in accordance with the manufacturer's installation instructions for the deck material, roof ventilation configuration and climate exposure for the roof covering to be installed shall be permitted.
2. As an alternative, a minimum 4-inch wide strip of self-adhering polymer modified bitumen membrane complying with ASTM D 1970 installed in accordance with the manufacturer's installation instructions for the deck material shall be applied over all joints in the roof decking. An approved underlayment for the applicable roof covering shall be applied over the 4-inch wide membrane strips.

R905.3.3.3 Underlayment and high winds. Underlayment applied in areas subject to high wind [above 110 miles per hour (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ -inch (19 mm) into the roof sheathing.

Exceptions:

1. As an alternative, ~~adhered~~ self-adhering polymer modified bitumen underlayment complying with ASTM D 1970 installed in accordance with the manufacturer's installation instructions for the deck material, roof ventilation configuration and climate exposure for the roof covering to be installed shall be permitted.
2. As an alternative, a minimum 4-inch wide strip of self-adhering polymer modified bitumen membrane complying with ASTM D 1970 installed in accordance with the manufacturer's

installation instructions for the deck material shall be applied over all joints in the roof decking. An approved underlayment for the applicable roof covering shall be applied over the 4-inch wide membrane strips.

R905.4.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II, ASTM D 4869 Type IV, or ASTM D 1970. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32 gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ inch (19 mm) into the roof sheathing.

Exceptions:

1. As an alternative, ~~adhered~~ self-adhering polymer modified bitumen underlayment complying with ASTM D 1970 installed in accordance with the manufacturer's installation instructions for the deck material, roof ventilation configuration and climate exposure for the roof covering to be installed, shall be permitted.
2. As an alternative, a minimum 4-inch wide strip of self-adhering polymer modified bitumen membrane complying with ASTM D 1970 installed in accordance with the manufacturer's installation instructions for the deck material shall be applied over all joints in the roof decking. An approved underlayment for the applicable roof covering shall be applied over the 4-inch wide membrane strips.

R905.5.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II or ASTM D 4869 Type IV. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ inch (19 mm) into the roof sheathing.

Exceptions:

1. As an alternative, ~~adhered~~ self-adhering polymer modified bitumen underlayment complying with ASTM D 1970 installed in accordance with the manufacturer's installation instructions for the deck material, roof ventilation configuration and climate exposure for the roof covering to be installed, shall be permitted shall be permitted.
2. As an alternative, a minimum 4-inch wide strip of self-adhering polymer modified bitumen membrane complying with ASTM D 1970 installed in accordance with the manufacturer's installation instructions for the deck material shall be applied over all joints in the roof decking. An approved underlayment for the applicable roof covering shall be applied over the 4-inch wide membrane strips.

R905.6.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II or ASTM D 4869 Type IV. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ inch (19 mm) into the roof sheathing.

Exceptions:

1. As an alternative, ~~adhered~~ self-adhering polymer modified bitumen underlayment complying with ASTM D 1970 installed in accordance with the manufacturer's installation instructions for the deck material, roof ventilation configuration and climate exposure for the roof covering to be installed shall be permitted.
2. As an alternative, a minimum 4-inch wide strip of self-adhering polymer modified bitumen membrane complying with ASTM D 1970 installed in accordance with the manufacturer's installation instructions for the deck material shall be applied over all joints in the roof decking. An approved underlayment for the applicable roof covering shall be applied over the 4-inch wide membrane strips.

R905.7.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II or ASTM D 4869 Type IV. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all Head laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ inch (19 mm) into the roof sheathing.

Exceptions:

1. As an alternative, ~~adhered~~ self-adhering polymer modified bitumen underlayment complying with ASTM D 1970 installed in accordance with the manufacturer's installation instructions for the deck material, roof ventilation configuration and climate exposure for the roof covering to be installed shall be permitted.
2. As an alternative, a minimum 4-inch wide strip of self-adhering polymer modified bitumen membrane complying with ASTM D 1970 installed in accordance with the manufacturer's installation instructions for the deck material shall be applied over all joints in the roof decking. An approved underlayment for the applicable roof covering shall be applied over the 4-inch wide membrane strips.

R905.8.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant

fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II or ASTM D 4869 Type IV. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ inch (19 mm) into the roof sheathing.

Exceptions:

1. As an alternative, ~~adhered~~ self-adhering polymer modified bitumen underlayment complying with ASTM D 1970 installed in accordance with the manufacturer's installation instructions for the deck material, roof ventilation configuration and climate exposure for the roof covering to be installed shall be permitted.
2. As an alternative, a minimum 4-inch wide strip of self-adhering polymer modified bitumen membrane complying with ASTM D 1970 installed in accordance with the manufacturer's installation instructions for the deck material shall be applied over all joints in the roof decking. An approved underlayment for the applicable roof covering shall be applied over the 4-inch wide membrane strips.

R905.10.5.1 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ inch (19 mm) into the roof sheathing.

Exceptions:

1. As an alternative, ~~adhered~~ self-adhering polymer modified bitumen underlayment complying with ASTM D 1970 installed in accordance with the manufacturer's installation instructions for the deck material, roof ventilation configuration and climate exposure for the roof covering to be installed shall be permitted.
2. As an alternative, a minimum 4-inch wide strip of self-adhering polymer modified bitumen membrane complying with ASTM D 1970 installed in accordance with the manufacturer's installation instructions for the deck material shall be applied over all joints in the roof decking. An approved underlayment for the applicable roof covering shall be applied over the 4-inch wide membrane strips.

Reason: This proposal simply seeks to provide clarity and additional specification for using a self-adhering polymer modified bitumen membrane as an underlayment in high wind regions. The proposal does not require the use of the self-adhering membrane, as it is already permitted by the code. In fact, the existing exception for using the self-adhering membrane was requested to be included by the IBC Structural Committee during the last code change cycle so that it was clear that a self-adhering membrane was permitted as an alternative to the underlayment provisions for high wind. This proposal simply clarifies the permitted installations of the self-adhering membrane that would provide an equivalent or better level of water intrusion prevention to the underlayment requirements for high wind. The criteria specified are consistent with the IBHS Fortified program requirements for

creating a “sealed roof deck”. Additionally, the provisions of this proposal are the most widely accepted methods recognized by insurance companies for providing discounts and credits in hurricane-prone regions.

Cost Impact: The code change proposal will not increase the cost of construction.

RB432-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R905.2.7.2-RB-REINHOLD.doc

RB433 – 13

R905.2.7.2, R905.3.3.3, R905.4.3.2, R905.5.3.2, R905.6.3.2, R905.7.3.2, R905.8.3.2, R905.10.5.1

Proponent: T. Eric Stafford, Insurance Institute for Business and Home Safety

Revise as follows:

R905.2.7.2 Underlayment and high winds. ~~Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.~~

Underlayment installed where the basic wind speed equals or exceeds 110 120 mph (54 m/s) shall comply with ASTM D 226 Type II, ASTM D 4869 Type IV, or ASTM D 6757. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using corrosion resistant metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.3.3.3 Underlayment and high winds. ~~Underlayment applied in areas subject to high wind [above 110 miles per hour (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.~~

Underlayment installed where the basic wind speed equals or exceeds 110 120 mph (54 m/s) shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Sections R905.3.3.1 and R905.3.3.2 ~~R905.2.7~~ except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using corrosion resistant metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4-inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.4.3.2 Underlayment and high winds. ~~Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.~~

Underlayment installed where the basic wind speed equals or exceeds 110 120 mph (54 m/s) shall comply with ASTM D 226 Type II, ASTM D 4869 Type IV, or ASTM D 1970. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with the manufacturer's installation instruction ~~Section R905.2.7~~ except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using corrosion resistant metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32 gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.5.3.2 Underlayment and high winds. ~~Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.~~

Underlayment installed where the basic wind speed equals or exceeds 110 ~~120~~ mph (54 m/s) shall comply with ASTM D 226 Type II or ASTM D 4869 Type IV. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with the manufacturer's installation instruction ~~Section R905.2.7~~ except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using corrosion resistant metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.6.3.2 Underlayment and high winds. ~~Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.~~

Underlayment installed where the basic wind speed equals or exceeds 110 ~~120~~ mph (54 m/s) shall comply with ASTM D 226 Type II or ASTM D 4869 Type IV. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with the manufacturer's installation instruction ~~Section R905.2.7~~ except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using corrosion resistant metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.7.3.2 Underlayment and high winds. ~~Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914mm) on center.~~

Underlayment installed where the basic wind speed equals or exceeds 110 ~~120~~ mph (54 m/s) shall comply with ASTM D 226 Type II or ASTM D 4869 Type IV. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with the manufacturer's installation instruction ~~Section R905.2.7~~ except all ~~Head~~ laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using corrosion resistant metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.8.3.2 Underlayment and high winds. ~~Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant~~

~~fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.~~

Underlayment installed where the basic wind speed equals or exceeds ~~110~~ 120 mph (54 m/s) shall comply with ASTM D 226 Type II or ASTM D 4869 Type IV. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with the manufacturer's installation instruction Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using corrosion resistant metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.10.5.1 Underlayment and high winds. ~~Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.~~

Underlayment installed where the basic wind speed equals or exceeds ~~110~~ 120 mph (54 m/s) shall comply with ASTM D 226 Type II. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with the manufacturer's installation instruction Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using corrosion resistant metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

Reason: Water intrusion continues to be an issue with hurricanes and high wind events. Significant improvements have been made recently to the codes and other voluntary methods that help prevent water intrusion through the roof decking when the primary roof covering has been blown off or damaged. These include the enhanced underlayment and high wind requirements in the 2012 IBC and the 2012 IRC in addition to the Sealed Roof Deck provisions recommended by the IBHS Fortified program and FEMA hurricane retrofit program guidance. Post-storm investigations also show that water intrusion is an issue in inland areas when the primary roof covering has been blown off.

This proposal seeks to lower the wind speed threshold that triggers the enhanced underlayment provisions from 120 mph to 110 mph. The original code change that pegged this trigger at 120 mph was developed to correspond with the wind speed maps in the 2009 IRC and ASCE 7-05. During the last code cycle, the wind speed maps in the IBC and IRC have been updated for consistency with ASCE 7-10. The wind speed map in the IRC is essentially the same map that is in ASCE 7-10, but the wind speed values have been converted to ASD levels specifically for the IRC. A simple conversion of the enhanced underlayment provisions wind speed trigger does not accurately reflect the intent of the original proposal, particularly as it relates to the geographic areas affected. The trigger as originally proposed, was essentially chosen to capture the coastal areas of the hurricane-prone regions, where the potential for loss of roof covering is increased, accompanied by exposure to significant amounts of rainfall. The trigger was chosen based up a geographic location on the wind speed map rather than a particular design limitation. However, the new maps in ASCE 7-10 have shifted the contours closer to the coast for the entire hurricane-prone region, which resulted in a reduction of the geographic area required to comply with the enhanced underlayment provisions. This proposal sets wind speed trigger for the enhanced underlayment provisions at 110 mph, which corresponds, better geographically with the 120 mph trigger that was intended to work the 2009 IRC and ASCE 7-05.

Cost Impact: The code change proposal will increase the cost of construction.

RB433-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R905.2.7.2-RB-STAFFORD.doc

RB434 – 13

R905.2.7.2, R905.4.3.2, R905.5.3.2, R905.6.3.2, R905.7.3.2, R905.8.3.2, R905.10.5.1

Proponent: Mark Zehnal, Florida Roofing, Sheet Metal and Air Conditioning Contractors Association (FRSA)

Revise as follows:

R905.2.7.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) V_{ult} equals to or greater than 130 mph, in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center. Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II, ASTM D 4869 Type IV, or ASTM D 6757. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12-gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ -inch (19 mm) into the roof sheathing. be installed using one of the following methods:

1. For roof slopes from two units vertical in 12 units horizontal (17-percent slope), and less than four units vertical in 12 units horizontal (33-percent slope). Underlayment shall comply with ASTM D 226, Type I or Type II or ASTM D 4869, Type II or Type IV or ASTM D 6757 and shall be two layers applied in the following manner. Apply a 19-inch (483 mm) strip of underlayment felt parallel to and starting at the eaves, fastened sufficiently to hold in place. Starting at the eave, apply 36-inch-wide (914 mm) sheets of underlayment, overlapping successive sheets 19 inches (483 mm), and fastened with 1 inch (25 mm) round plastic cap, metal cap nails or nails and tin-tabs attached to a nailable deck with one row in the field of the sheet with a maximum fastener spacing of 12 in. o.c. (305 mm), and one row at the overlaps fastened 6 in. o.c. (152 mm). Synthetic underlayment shall be fastened in accordance with this section and the manufacturer's recommendations.
2. For roof slopes of four units vertical in 12 units horizontal (33-percent slope) or greater. Underlayment shall comply with ASTM D 226, Type II or ASTM D 4869, Type IV or ASTM D 6757 and shall be one layer applied in the following manner. Underlayment shall be applied shingle fashion, parallel to and starting from the eave and lapped 2 inches (51 mm), fastened with 1 inch (25 mm) round plastic cap, metal cap nails or nails and tin-tabs attached to a nailable deck with two staggered rows in the field of the sheet with a maximum fastener spacing of 12 in. o.c. (305 mm), and one row at the overlaps fastened 6 in. o.c. (152 mm). Synthetic underlayment shall be fastened in accordance with this section and the manufacturer's recommendations. End laps shall be offset by 6 feet (1829 mm).
3. As an alternative, the entire roof deck shall be covered with an approved self-adhering polymer modified bitumen sheet meeting ASTM D 1970 or an approved self-adhering synthetic underlayment installed in accordance with the manufacturer's installation instructions.

Exception: ~~As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.~~

R905.4.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) V_{ult} equals to or greater than 130 mph, in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center. Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II, ASTM D 4869 Type IV, or ASTM D 6757. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side

laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ inch (19 mm) into the roof sheathing. be installed using one of the following methods:

1. For roof slopes from two units vertical in 12 units horizontal (17-percent slope), and less than four units vertical in 12 units horizontal (33-percent slope). Underlayment shall comply with ASTM D 226, Type I or Type II or ASTM D 4869, Type II or Type IV or ASTM D 6757 and shall be two layers applied in the following manner. Apply a 19-inch (483 mm) strip of underlayment felt parallel to and starting at the eaves, fastened sufficiently to hold in place. Starting at the eave, apply 36-inch-wide (914 mm) sheets of underlayment, overlapping successive sheets 19 inches (483 mm), and fastened with 1 inch (25 mm) round plastic cap, metal cap nails or nails and tin-tabs attached to a nailable deck with one row in the field of the sheet with a maximum fastener spacing of 12 in. o.c. (305 mm), and one row at the overlaps fastened 6 in. o.c. (152 mm). Synthetic underlayment shall be fastened in accordance with this section and the manufacturer's recommendations.
2. For roof slopes of four units vertical in 12 units horizontal (33-percent slope) or greater. Underlayment shall comply with ASTM D 226, Type II or ASTM D 4869, Type IV or ASTM D 6757 and shall be one layer applied in the following manner. Underlayment shall be applied shingle fashion, parallel to and starting from the eave and lapped 2 inches (51 mm), fastened with 1 inch (25 mm) round plastic cap, metal cap nails or nails and tin-tabs attached to a nailable deck with two staggered rows in the field of the sheet with a maximum fastener spacing of 12 in. o.c. (305 mm), and one row at the overlaps fastened 6 in. o.c. (152 mm). Synthetic underlayment shall be fastened in accordance with this section and the manufacturer's recommendations. End laps shall be offset by 6 feet (1829 mm).
3. As an alternative, the entire roof deck shall be covered with an approved self-adhering polymer modified bitumen sheet meeting ASTM D 1970 or an approved self-adhering synthetic underlayment installed in accordance with the manufacturer's installation instructions.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.5.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) V_{ult} equals to or greater than 130 mph, in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center. Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II, ASTM D 4869 Type IV, or ASTM D 6757. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ inch (19 mm) into the roof sheathing. be installed using one of the following methods:

1. For roof slopes from two units vertical in 12 units horizontal (17-percent slope), and less than four units vertical in 12 units horizontal (33-percent slope). Underlayment shall comply with ASTM D 226, Type I or Type II or ASTM D 4869, Type II or Type IV or ASTM D 6757 and shall be two layers applied in the following manner. Apply a 19-inch (483 mm) strip of underlayment felt parallel to and starting at the eaves, fastened sufficiently to hold in place. Starting at the eave, apply 36-inch-wide (914 mm) sheets of underlayment, overlapping successive sheets 19 inches (483 mm), and fastened with 1 inch (25 mm) round plastic cap, metal cap nails or nails and tin-tabs attached to a nailable deck with one row in the field of the sheet with a maximum fastener spacing of 12 in. o.c. (305 mm), and one row at the overlaps fastened 6 in. o.c. (152 mm).

Synthetic underlayment shall be fastened in accordance with this section and the manufacturer's recommendations.

2. For roof slopes of four units vertical in 12 units horizontal (33-percent slope) or greater. Underlayment shall comply with ASTM D 226, Type II or ASTM D 4869, Type IV or ASTM D 6757 and shall be one layer applied in the following manner. Underlayment shall be applied shingle fashion, parallel to and starting from the eave and lapped 2 inches (51 mm), fastened with 1 inch (25 mm) round plastic cap, metal cap nails or nails and tin-tabs attached to a nailable deck with two staggered rows in the field of the sheet with a maximum fastener spacing of 12 in. o.c. (305 mm), and one row at the overlaps fastened 6 in. o.c. (152 mm). Synthetic underlayment shall be fastened in accordance with this section and the manufacturer's recommendations. End laps shall be offset by 6 feet (1829 mm).
3. As an alternative, the entire roof deck shall be covered with an approved self-adhering polymer modified bitumen sheet meeting ASTM D 1970 or an approved self-adhering synthetic underlayment installed in accordance with the manufacturer's installation instructions.

Exception: ~~As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.~~

R905.6.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 140 mph (49 m/s) V_{ult} equals to or greater than 130 mph, in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center. Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II, ASTM D 4869 Type IV, or ASTM D 6757. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12-gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ inch (19 mm) into the roof sheathing. ~~be installed using one of the following methods:~~

1. For roof slopes from two units vertical in 12 units horizontal (17-percent slope), and less than four units vertical in 12 units horizontal (33-percent slope). Underlayment shall comply with ASTM D 226, Type I or Type II or ASTM D 4869, Type II or Type IV or ASTM D 6757 and shall be two layers applied in the following manner. Apply a 19-inch (483 mm) strip of underlayment felt parallel to and starting at the eaves, fastened sufficiently to hold in place. Starting at the eave, apply 36-inch-wide (914 mm) sheets of underlayment, overlapping successive sheets 19 inches (483 mm), and fastened with 1 inch (25 mm) round plastic cap, metal cap nails or nails and tin-tabs attached to a nailable deck with one row in the field of the sheet with a maximum fastener spacing of 12 in. o.c. (305 mm), and one row at the overlaps fastened 6 in. o.c. (152 mm). Synthetic underlayment shall be fastened in accordance with this section and the manufacturer's recommendations.
2. For roof slopes of four units vertical in 12 units horizontal (33-percent slope) or greater. Underlayment shall comply with ASTM D 226, Type II or ASTM D 4869, Type IV or ASTM D 6757 and shall be one layer applied in the following manner. Underlayment shall be applied shingle fashion, parallel to and starting from the eave and lapped 2 inches (51 mm), fastened with 1 inch (25 mm) round plastic cap, metal cap nails or nails and tin-tabs attached to a nailable deck with two staggered rows in the field of the sheet with a maximum fastener spacing of 12 in. o.c. (305 mm), and one row at the overlaps fastened 6 in. o.c. (152 mm). Synthetic underlayment shall be fastened in accordance with this section and the manufacturer's recommendations. End laps shall be offset by 6 feet (1829 mm).
3. As an alternative, the entire roof deck shall be covered with an approved self-adhering polymer modified bitumen sheet meeting ASTM D 1970 or an approved self-adhering synthetic underlayment installed in accordance with the manufacturer's installation instructions.

Exception: ~~As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.~~

R905.7.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) V_{ult} equals to or greater than 130 mph, in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II, ASTM D 4869 Type IV, or ASTM D 6757. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12-gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ inch (19 mm) into the roof sheathing. be installed using one of the following methods:

1. For roof slopes from two units vertical in 12 units horizontal (17-percent slope), and less than four units vertical in 12 units horizontal (33-percent slope). Underlayment shall comply with ASTM D 226, Type I or Type II or ASTM D 4869, Type II or Type IV or ASTM D 6757 and shall be two layers applied in the following manner. Apply a 19-inch (483 mm) strip of underlayment felt parallel to and starting at the eaves, fastened sufficiently to hold in place. Starting at the eave, apply 36-inch-wide (914 mm) sheets of underlayment, overlapping successive sheets 19 inches (483 mm), and fastened with 1 inch (25 mm) round plastic cap, metal cap nails or nails and tin-tabs attached to a nailable deck with one row in the field of the sheet with a maximum fastener spacing of 12 in. o.c. (305 mm), and one row at the overlaps fastened 6 in. o.c. (152 mm). Synthetic underlayment shall be fastened in accordance with this section and the manufacturer's recommendations.
2. For roof slopes of four units vertical in 12 units horizontal (33-percent slope) or greater. Underlayment shall comply with ASTM D 226, Type II or ASTM D 4869, Type IV or ASTM D 6757 and shall be one layer applied in the following manner. Underlayment shall be applied shingle fashion, parallel to and starting from the eave and lapped 2 inches (51 mm), fastened with 1 inch (25 mm) round plastic cap, metal cap nails or nails and tin-tabs attached to a nailable deck with two staggered rows in the field of the sheet with a maximum fastener spacing of 12 in. o.c. (305 mm), and one row at the overlaps fastened 6 in. o.c. (152 mm). Synthetic underlayment shall be fastened in accordance with this section and the manufacturer's recommendations. End laps shall be offset by 6 feet (1829 mm).

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.8.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) V_{ult} equals to or greater than 130 mph, in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center. Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II, ASTM D 4869 Type IV, or ASTM D 6757. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12-gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ inch (19 mm) into the roof sheathing. be installed using one of the following methods:

1. For roof slopes from two units vertical in 12 units horizontal (17-percent slope), and less than four units vertical in 12 units horizontal (33-percent slope). Underlayment shall comply with ASTM D 226, Type I or Type II or ASTM D 4869, Type II or Type IV or ASTM D 6757 and shall be two layers applied in the following manner. Apply a 19-inch (483 mm) strip of underlayment felt parallel to and starting at the eaves, fastened sufficiently to hold in place. Starting at the eave, apply 36-inch-wide (914 mm) sheets of underlayment, overlapping successive sheets 19 inches (483 mm), and fastened with 1 inch (25 mm) round plastic cap, metal cap nails or nails and tin-tabs attached to a nailable deck with one row in the field of the sheet with a maximum fastener spacing of 12 in. o.c. (305 mm), and one row at the overlaps fastened 6 in. o.c. (152 mm). Synthetic underlayment shall be fastened in accordance with this section and the manufacturer's recommendations.
2. For roof slopes of four units vertical in 12 units horizontal (33-percent slope) or greater. Underlayment shall comply with ASTM D 226, Type II or ASTM D 4869, Type IV or ASTM D 6757 and shall be one layer applied in the following manner. Underlayment shall be applied shingle fashion, parallel to and starting from the eave and lapped 2 inches (51 mm), fastened with 1 inch (25 mm) round plastic cap, metal cap nails or nails and tin-tabs attached to a nailable deck with two staggered rows in the field of the sheet with a maximum fastener spacing of 12 in. o.c. (305 mm), and one row at the overlaps fastened 6 in. o.c. (152 mm). Synthetic underlayment shall be fastened in accordance with this section and the manufacturer's recommendations. End laps shall be offset by 6 feet (1829 mm).

Exception: ~~As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.~~

R905.10.5.1 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) V_{ult} equals to or greater than 130 mph, in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

~~Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II, ASTM D 4869 Type IV, or ASTM D 6757. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of $\frac{3}{4}$ inch (19 mm) into the roof sheathing. be installed using one of the following methods:~~

1. For roof slopes from two units vertical in 12 units horizontal (17-percent slope), and less than four units vertical in 12 units horizontal (33-percent slope). Underlayment shall comply with ASTM D 226, Type I or Type II or ASTM D 4869, Type II or Type IV or ASTM D 6757 and shall be two layers applied in the following manner. Apply a 19-inch (483 mm) strip of underlayment felt parallel to and starting at the eaves, fastened sufficiently to hold in place. Starting at the eave, apply 36-inch-wide (914 mm) sheets of underlayment, overlapping successive sheets 19 inches (483 mm), and fastened with 1 inch (25 mm) round plastic cap, metal cap nails or nails and tin-tabs attached to a nailable deck with one row in the field of the sheet with a maximum fastener spacing of 12 in. o.c. (305 mm), and one row at the overlaps fastened 6 in. o.c. (152 mm). Synthetic underlayment shall be fastened in accordance with this section and the manufacturer's recommendations.
2. For roof slopes of four units vertical in 12 units horizontal (33-percent slope) or greater. Underlayment shall comply with ASTM D 226, Type II or ASTM D 4869, Type IV or ASTM D 6757 and shall be one layer applied in the following manner. Underlayment shall be applied shingle fashion, parallel to and starting from the eave and lapped 2 inches (51 mm), fastened with 1 inch (25 mm) round plastic cap, metal cap nails or nails and tin-tabs attached to a nailable deck with

two staggered rows in the field of the sheet with a maximum fastener spacing of 12 in. o.c. (305 mm), and one row at the overlaps fastened 6 in. o.c. (152 mm). Synthetic underlayment shall be fastened in accordance with this section and the manufacturer's recommendations End laps shall be offset by 6 feet (1829 mm).

3. As an alternative, the entire roof deck shall be covered with an approved self-adhering polymer modified bitumen sheet meeting ASTM D 1970 or an approved self-adhering synthetic underlayment installed in accordance with the manufacturer's installation instructions.

Exception: ~~As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.~~

Reason: Provides prescriptive attachment/installation guidelines for underlayment in high wind sections.

Cost Impact: The code change proposal will not increase the cost of construction.

RB434-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R905.2.7.2-RB-ZEHNAL.doc

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R905.1.1 (NEW), R905.1.2 (NEW), Table R905.1.1(1) (NEW), Table R905.1.1(2) (NEW), Table R905.1.1(3) (NEW), R905.2.3, R905.2.7, R905.2.7.1, R905.2.7.2, R905.3.3, R905.3.3.1, R905.3.3.2, R905.3.3.3, R905.4.3, R905.4.3.1, R905.4.3.2, R905.5.3, R905.5.3.1, R905.5.3.2, R905.6.3, R905.6.3.1, R905.6.3.2, R905.7.3, R905.7.3.1, R905.7.3.2, R905.8.3, R905.8.3.1, R905.8.3.2, R905.10.5, R905.10.5.1

Proponent: T. Eric Stafford, representing Insurance Institute for Business and Home Safety

Revise as follows:

R905.1.1 Underlayment. Underlayment for asphalt shingles, clay and concrete tile, metal roof shingles, mineral-surfaced roll roofing, slate and slate-type shingles, wood shingles, wood shakes, and metal roof panels shall be in accordance with this section. Underlayment types shall be in accordance with Table R905.1.1(1). Underlayment shall be applied in accordance with Table R905.1.1(2). Underlayment shall be attached in accordance with Table R905.1.1(3).

Exceptions:

1. As an alternative, self-adhering polymer modified bitumen underlayment complying with ASTM D 1970 installed in accordance with the manufacturer's installation instructions for the deck material, roof ventilation configuration and climate exposure for the roof covering to be installed, shall be permitted.
2. As an alternative, a minimum 4-inch wide strip of self-adhering polymer modified bitumen membrane complying with ASTM D 1970 installed in accordance with the manufacturer's installation instructions for the deck material shall be applied over all joints in the roof decking. An approved underlayment for the applicable roof covering for design wind speeds less than 120 mph shall be applied over the 4-inch wide membrane strips.

R905.1.2 Ice barriers. In areas where there has been a history of ice forming along the eaves causing a backup of water as designated in Table R301.2(1), an ice barrier shall be installed for asphalt shingles, metal roof shingles, mineral-surfaced roll roofing, slate and slate-type shingles, wood shingles, and wood shakes. The ice barrier shall consist of at least two layers of underlayment cemented together or a self-adhering polymer modified bitumen sheet shall be used in place of normal underlayment and extend from the lowest edges of all roof surfaces to a point at least 24 inches (610 mm) inside the exterior wall line of the building.

Exception: Detached accessory structures that contain no conditioned floor area.

TABLE R905.1.1(1)
UNDERLAYMENT TYPES

<u>Roof Covering</u>	<u>Section</u>	<u>Design Wind Speed < 120 mph</u>	<u>Design Wind Speed ≥ 120 mph</u>
<u>Asphalt shingles</u>	<u>R905.2</u>	<u>ASTM D 226 Type I</u> <u>ASTM D 4869 Type I</u> <u>ASTM D 6757</u>	<u>ASTM D 226 Type II</u> <u>ASTM D 4869 Type IV</u> <u>ASTM D 6757</u>
<u>Clay and concrete tile</u>	<u>R905.3</u>	<u>ASTM D 226 Type II</u> <u>ASTM D 2626 Type I</u> <u>ASTM D 6380 Class M mineral surfaced roll roofing</u>	<u>ASTM D 226 Type II</u> <u>ASTM D 2626 Type I</u> <u>ASTM D 6380 Class M mineral surfaced roll roofing</u>
<u>Metal roof shingles</u>	<u>R905.4</u>	<u>ASTM D 226 Type I or Type II</u> <u>ASTM D 4869 Type I or Type II</u>	<u>ASTM D 226 Type II</u> <u>ASTM D 4869 Type IV</u>

<u>Mineral-surfaced roll roofing</u>	<u>R905.5</u>	<u>ASTM D 226 Type I</u> <u>ASTM D 4869 Type I or Type II</u>	<u>ASTM D 226 Type II</u> <u>ASTM D 4869 Type IV</u>
<u>Slate and slate-type shingles</u>	<u>R905.6</u>	<u>ASTM D 226 Type I</u> <u>ASTM D 4869 Type I or Type II</u>	<u>ASTM D 226 Type II</u> <u>ASTM D 4869 Type IV</u>
<u>Wood shingles</u>	<u>R905.7</u>	<u>ASTM D 226 Type I</u> <u>ASTM D 4869 Type I or Type II</u>	<u>ASTM D 226 Type II</u> <u>ASTM D 4869 Type IV</u>
<u>Wood shakes</u>	<u>R905.8</u>	<u>ASTM D 226 Type I</u> <u>ASTM D 4869 Type I or Type II</u>	<u>ASTM D 226 Type II</u> <u>ASTM D 4869 Type IV</u>
<u>Metal panels</u>	<u>R905.10</u>	<u>Manufacturer's instructions</u>	<u>ASTM D 226 Type II</u> <u>ASTM D 4869 Type IV</u>

TABLE R905.1.1(2)
UNDERLAYMENT APPLICATION

<u>Roof Covering</u>	<u>Section</u>	<u>Design Wind Speed < 120 mph</u>	<u>Design Wind Speed ≥ 120 mph</u>
<u>Asphalt shingles</u>	<u>R905.2</u>	<p>For roof slopes from two units vertical in 12 units horizontal (2:12), up to four units vertical in 12 units horizontal (4:12), underlayment shall be two layers applied in the following manner. Apply a 19-inch (483 mm) strip of underlayment felt parallel to and starting at the eaves. Starting at the eave, apply 36-inch-wide (914 mm) sheets of underlayment, overlapping successive sheets 19 inches (483 mm). Distortions in the underlayment shall not interfere with the ability of the shingles to seal.</p> <p>For roof slopes of four units vertical in 12 units horizontal (4:12) or greater, underlayment shall be one layer applied in the following manner. Underlayment shall be applied shingle fashion, parallel to and starting from the eave and lapped 2 inches (51 mm). Distortions in the underlayment shall not interfere with the ability of the shingles to seal. End laps shall be 4 inches and shall be offset by 6 feet (1829 mm).</p>	<p>Same as Design Wind Speeds < 120 mph except all laps shall be a minimum of 4 inches.</p>
<u>Clay and concrete tile</u>	<u>R905.3</u>	<p>For roof slopes from two and one-half units vertical in 12 units horizontal (2 1/2:12), up to four units vertical in 12 units horizontal (4:12), underlayment shall be a minimum of two layers underlayment applied as follows. Starting at the eave,</p>	<p>Same as Design Wind Speeds < 120 mph except all laps shall be a minimum of 4 inches.</p>

		<p><u>apply a 19-inch (483 mm) strip of underlayment shall be applied parallel with the eave. Starting at the eave, apply a 36-inch-wide (914 mm) strips of underlayment felt shall be applied, overlapping successive sheets 19 inches (483 mm).</u></p> <p><u>For roof slopes of four units vertical in 12 units horizontal (4:12) or greater, underlayment shall be a minimum of one layer of underlayment felt applied shingle fashion, parallel to and starting from the eaves and lapped 2 inches (51 mm). End laps shall be 4 inches and shall be offset by 6 feet (1829 mm).</u></p>	
<u>Metal roof shingles</u>	<u>R905.4</u>		<p><u>For roof slopes from two units vertical in 12 units horizontal (2:12), up to four units vertical in 12 units horizontal (4:12), underlayment shall be two layers applied in the following manner. Apply a 19-inch (483 mm) strip of underlayment felt parallel to and starting at the eaves. Starting at the eave, apply 36-inch-wide (914 mm) sheets of underlayment, overlapping successive sheets 19 inches (483 mm), and fastened sufficiently to hold in place.</u></p> <p><u>For roof slopes of four units vertical in 12 units horizontal (4:12) or greater, underlayment shall be one layer applied in the following manner. Underlayment shall be applied shingle fashion, parallel to and starting from the eave and lapped 4 inches (51 mm), End laps shall be 4 inches and shall be offset by 6 feet (1829 mm).</u></p>
<u>Mineral-surfaced roll roofing</u>	<u>R905.5</u>		
<u>Slate and slate-type shingles</u>	<u>R905.6</u>		
<u>Wood shingles</u>	<u>R905.7</u>		
<u>Wood shakes</u>	<u>R905.8</u>		
<u>Metal panels</u>	<u>R905.10</u>	<p><u>Apply in accordance with the manufacturer's installation instructions.</u></p>	

TABLE R905.1.1(3)
UNDERLAYMENT ATTACHMENT

<u>Roof Covering</u>	<u>Section</u>	<u>Design Wind Speed ≤ 110 mph</u>	<u>110 mph < Design Wind Speed < 120 mph</u>	<u>Design Wind Speed ≥ 120 mph</u>
<u>Asphalt shingles</u>	<u>R905.2</u>	<u>Fastened sufficiently to hold in place</u>	<u>Corrosion-resistant fasteners in accordance with the manufacturer's installation instruction. Apply fasteners along laps not farther apart than 36 inches (914 mm) on center.</u>	<u>The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.</u>
<u>Clay and concrete tile</u>	<u>R905.3</u>			
<u>Metal roof shingles</u>	<u>R905.4</u>	<u>Manufacturer's installation instructions.</u>	<u>Corrosion-resistant fasteners in accordance with the manufacturer's installation instruction. Apply fasteners along laps not farther apart than 36 inches (914 mm) on center.</u>	<u>The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.</u>
<u>Mineral-surfaced roll roofing</u>	<u>R905.5</u>			
<u>Slate and slate-type shingles</u>	<u>R905.6</u>			
<u>Wood shingles</u>	<u>R905.7</u>			
<u>Wood shakes</u>	<u>R905.8</u>			
<u>Metal panels</u>	<u>R905.10</u>			

R905.2.3 Underlayment. Underlayment shall comply with Section R905.1.1. ~~Unless otherwise noted,~~ required underlayment shall conform to ASTM D 226 Type I, ASTM D 4869 Type I, or ASTM D 6757. Self-adhering polymer modified bitumen sheet shall comply with ASTM D 1970.

R905.2.7 Underlayment application. For roof slopes from two units vertical in 12 units horizontal (17-percent slope), up to four units vertical in 12 units horizontal (33-percent slope), underlayment shall be two layers applied in the following manner. Apply a 19-inch (483 mm) strip of underlayment felt parallel to and starting at the eaves, fastened sufficiently to hold in place. Starting at the eave, apply 36-inch-wide (914 mm) sheets of underlayment, overlapping successive sheets 19 inches (483 mm), and fastened sufficiently to hold in place. Distortions in the underlayment shall not interfere with the ability of the

shingles to seal. For roof slopes of four units vertical in 12 units horizontal (33-percent slope) or greater, underlayment shall be one layer applied in the following manner. Underlayment shall be applied shingle fashion, parallel to and starting from the eave and lapped 2 inches (51 mm), fastened sufficiently to hold in place. Distortions in the underlayment shall not interfere with the ability of the shingles to seal. End laps shall be offset by 6 feet (1829 mm).

R905.2.7.1 R905.2.7 Ice barrier. Where required, ice barriers shall comply with Section R905.1.2. In areas where there has been a history of ice forming along the eaves causing a backup of water as designated in Table R301.2(1), an ice barrier that consists of a least two layers of underlayment cemented together or of a self-adhering polymer modified bitumen sheet, shall be used in lieu of normal underlayment and extend from the lowest edges of all roof surfaces to a point at least 24 inches (610 mm) inside the exterior wall line of the building.

Exception: ~~Detached accessory structures that contain no conditioned floor area.~~

R905.2.7.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II, ASTM D 4869 Type IV, or ASTM D 6757. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12-gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.3.3 Underlayment. Underlayment shall comply with Section R905.1.1. Unless otherwise noted, required underlayment shall conform to ASTM D 226 Type II; ASTM D 2626 Type I; or ASTM D 6380 Class M mineral surfaced roll roofing.

R905.3.3.1 Low slope roofs. For roof slopes from two and one-half units vertical in 12 units horizontal (21/2:12), up to four units vertical in 12 units horizontal (4:12), underlayment shall be a minimum of two layers underlayment applied as follows:

1. Starting at the eave, a 19-inch (483 mm) strip of underlayment shall be applied parallel with the eave and fastened sufficiently in place.
2. Starting at the eave, 36-inch-wide (914 mm) strips of underlayment felt shall be applied, overlapping successive sheets 19 inches (483 mm), and fastened sufficiently in place.

R905.3.3.2 High slope roofs. For roof slopes of four units vertical in 12 units horizontal (4:12) or greater, underlayment shall be a minimum of one layer of underlayment felt applied shingle fashion, parallel to and starting from the eaves and lapped 2 inches (51 mm), fastened sufficiently in place.

R905.3.3.3 Underlayment and high winds. Underlayment applied in areas subject to high wind [above 110 miles per hour (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Sections R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a

head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12-gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4-inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.4.3 Underlayment. Underlayment shall comply with Section R905.1.1, ASTM D 226, Type I or Type II, ASTM D 4869, Type I or Type II, or ASTM D 1970. Underlayment shall be installed in accordance with the manufacturer's installation instructions.

R905.4.3.1 Ice barrier. Where required, ice barriers shall comply with Section R905.1.2. In areas where there has been a history of ice forming along the eaves causing a backup of water as designated in Table R301.2(1), an ice barrier that consists of a least two layers of underlayment cemented together or of a self-adhering polymer modified bitumen sheet, shall be used in lieu of normal underlayment and extend from the lowest edges of all roof surfaces to a point at least 24 inches (610 mm) inside the exterior wall line of the building.

Exception: Detached accessory structures that contain no conditioned floor area.

R905.4.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II, ASTM D 4869 Type IV, or ASTM D 1970. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12-gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.5.3 Underlayment. Underlayment shall comply with Section R905.1.1, ASTM D 226, Type I or ASTM D 4869, Type I or II.

R905.5.3.1 Ice barrier. Where required, ice barriers shall comply with Section R905.1.2. In areas where there has been a history of ice forming along the eaves causing a backup of water as designated in Table R301.2(1), an ice barrier that consists of a least two layers of underlayment cemented together or of a self-adhering polymer modified bitumen sheet, shall be used in lieu of normal underlayment and extend from the lowest edges of all roof surfaces to a point at least 24 inches (610 mm) inside the exterior wall line of the building.

Exception: Detached accessory structures that contain no conditioned floor area.

R905.5.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II or ASTM D 4869 Type IV. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less

than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12-gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.6.3 Underlayment. Underlayment shall comply with Section R905.1.1, ASTM D 226, Type I, or ASTM D 4869, Type I or II. Underlayment shall be installed in accordance with the manufacturer's installation instructions.

R905.6.3.1 Ice barrier. Where required, ice barriers shall comply with Section R905.1.2. In areas where there has been a history of ice forming along the eaves causing a backup of water as designated in Table R301.2(1), an ice barrier that consists of a least two layers of underlayment cemented together or of a self-adhering polymer modified bitumen sheet, shall be used in lieu of normal underlayment and extend from the lowest edges of all roof surfaces to a point at least 24 inches (610 mm) inside the exterior wall line of the building.

Exception: Detached accessory structures that contain no conditioned floor area.

R905.6.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II or ASTM D 4869 Type IV. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12-gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.7.3 Underlayment. Underlayment shall comply with Section R905.1.1, ASTM D 226, Type I or ASTM D 4869, Type I or II.

R905.7.3.1 Ice barrier. Where required, ice barriers shall comply with Section R905.1.2. In areas where there has been a history of ice forming along the eaves causing a backup of water as designated in Table R301.2(1), an ice barrier that consists of a least two layers of underlayment cemented together or of a self-adhering polymer modified bitumen sheet, shall be used in lieu of normal underlayment and extend from the lowest edges of all roof surfaces to a point at least 24 inches (610 mm) inside the exterior wall line of the building.

Exception: Detached accessory structures that contain no conditioned floor area.

R905.7.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II or ASTM D 4869 Type IV. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all Head laps shall be a minimum of 4 inches

(102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.8.3 Underlayment. Underlayment shall comply with Section R905.1.1. ASTM D 226, Type I or ASTM D 4869, Type I or II.

R905.8.3.1 Ice barrier. Where required, ice barriers shall comply with Section R905.1.2. In areas where there has been a history of ice forming along the eaves causing a backup of water as designated in Table R301.2(1), an ice barrier that consists of a least two layers of underlayment cemented together or of a self-adhering polymer modified bitumen sheet, shall be used in lieu of normal underlayment and extend from the lowest edges of all roof surfaces to a point at least 24 inches (610 mm) inside the exterior wall line of the building.

Exception: ~~Detached accessory structures that contain no conditioned floor area.~~

R905.8.3.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

~~Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II or ASTM D 4869 Type IV. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.~~

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.10.5 Underlayment. Underlayment shall comply with Section R905.1.1, be installed in accordance with the manufacturer's installation instructions.

R905.10.5.1 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

~~Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 226 Type II. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.~~

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

Reason: This proposal is primarily a reorganization of the underlayment provisions contained within the IRC. In the current IRC, underlayment provisions are specified individually for each type of roof covering. Many of the roof covering provisions contain

similar and overlapping requirements for underlayment type, application, and attachment. This proposal relocates the underlayment requirements for each roof covering to a single section at the beginning of Section R905. This reorganization results in three new tables that address underlayment type, application, and attachment for each of the roof coverings in the IRC that require underlayment. Consolidating the underlayment requirements into a single section will make the provisions more user-friendly and in particular highlights the key differences between the requirements for underlayment for the different types of roof coverings addressed by the IRC.

This proposal also includes two minor technical changes. ASTM D 4859 Type IV underlayment is included as an acceptable underlayment for metal roof panels where wind speeds are 120 mph and greater. The IBC permits this underlayment for metal roof panels and there is no reason it should not be permitted for metal roof panels installed in accordance with the IRC.

The second technical change is primarily a clarification regarding the use of ASTM D 1970 as an underlayment. The proposal does not require the use of the self-adhering membrane, as it is already permitted by the code. In fact, the existing exception for using the self-adhering membrane was requested to be included by the IBC Structural Committee, and subsequently approved by the IRC Committee during the last code change cycle so that it was clear that a self-adhering membrane was permitted as an alternative to the underlayment provisions for high wind. This proposal simply clarifies the permitted installations of the self-adhering membrane that would provide an equivalent or better level of water intrusion prevention to the underlayment requirements for high wind. The criteria specified are consistent with the IBHS Fortified program requirements for creating a "sealed roof deck". Additionally, the provisions of this proposal are the most widely accepted methods recognized by insurance companies for providing discounts and credits in hurricane-prone regions.

Cost Impact: The code change proposal will not increase the cost of construction.

RB435-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R905.1.1 (NEW)-RB-STAFFORD.doc

RB436 – 13

R905.2.8.3

Proponent: Kirk Nagle, City of Arvada, CO, representing self (knagle@arvada.org)

Revise as follows:

R905.2.8.3 Sidewall flashing. Base flashing against a vertical sidewall shall be ~~continuous~~ or step flashing and shall be a minimum of 4 inches (102 mm) in height and 4 inches (102 mm) in width and shall direct water away from the vertical sidewall onto the roof and/or into the gutter. Where siding is provided on the vertical sidewall, the vertical leg of the flashing shall be continuous under the siding. Where anchored masonry veneer is provided on the vertical sidewall, the base flashing shall be provided in accordance with this section and counterflashing shall be provided in accordance with Section R703.7.2.2. Where exterior plaster or adhered masonry veneer is provided on the vertical sidewall, the base flashing shall be provided in accordance with this section and Section R703.6.3.

Reason: Step flashing is the approved method of installation by the asphalt roofing manufacturers for sidewall intersections. The method of continuous flashing was removed from the codes in the late 90's because it was a serious problem for leaking, deteriorated roof sheathing and mold. The step flashing moves the water from each layer onto the top of the shingle below so it can move to the gutter and not under the roofing material. If a continuous piece of flashing is used the water can continue under the shingles and eventually onto the underlayment where it can leak and keep the underside of the roofing material wet for long periods of time causing the growth of mold. This installation was used by roofing contractors and was continuous problem for the owners of buildings/homes. The problem was initially thought to be solved by allowing continuous flashing with a kick back (a piece of the metal bent back at over 45 degrees approximately ½ inch of metal) that would keep the water on the continuous flashing and eventually to the gutter, however this created water under the roofing material which would allow for mold growth and leaking. Proper step flashing applied to each shingle puts the water on the upper part of the shingle below and onto the exposed roofing material, which will prevent mold growth and leaking, by having the water under the shingles. I have repaired this problem on many roofs in the past and as a roofing inspector diagnosed the problem of leaks and observed roofing material destroyed by water, roof sheathing destroyed by mold and leaking because water go under the shingles. The water behaves like a funnel one it has a place to go it moves in that direction, just like a siphon. The water moves under the shingles, builds up hydrostatic pressure and forces its way into the tiniest of holes to leak or just keep the underside of the roofing material wet. The continuous flashing was removed from the codes for these reasons and should be removed from the codes today to have proper water resistive systems in place for all buildings/homes.

Cost Impact: The code change proposal will not increase the cost of construction, but will reduce the cost of building maintenance.

RB436-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R905.2.8.3-RB-NAGLE.doc

RB437 – 13

R905.2.8.3

Proponent: Thomas M. Pino, Sweetwater Home Inspection

Delete and substitute as follows:

~~**R905.2.8.3 Sidewall flashing.** Base flashing against a vertical sidewall shall be continuous or step flashing and shall be a minimum of 4 inches (102 mm) in height and 4 inches (102 mm) in width and shall direct water away from the vertical sidewall onto the roof and/or into the gutter. Where siding is provided on the vertical sidewall, the vertical leg of the flashing shall be continuous under the siding. Where anchored masonry veneer is provided on the vertical sidewall, the base flashing shall be provided in accordance with this section and counterflashing shall be provided in accordance with Section R703.7.2.2. Where exterior plaster or adhered masonry veneer is provided on the vertical sidewall, the base flashing shall be provided in accordance with this section and Section R703.6.3.~~

R905.2.8.3 Sidewall flashing. Flashing against a vertical sidewall shall be by the step-flashing method. The flashing shall be a minimum of 4 inches (102 mm) high and 4 inches (102 mm) wide. At the end of the vertical sidewall the step flashing shall be turned out in a manner that directs water away from the wall and onto the roof and/or gutter.

Reason: Reason: Eliminating the need for properly sized step flashing when using asphalt roof shingles has poor implication especially in 100 mile per hour or above high shear wind conditions as is noted under the code number R301.2. BASIC WIND SPEEDS FOR 50-YEAR MEAN RECURRENCE INTERVAL. All major asphalt roofing manufacturers require the each shingle be nailed between 1 and 1 1/2 inch from the edge of the shingle. With a continuous flashing method that is allowed in the 2012 edition of the IRC, the continuous flashing does not allow the roofer to nail within 6 to 8 inches from the edge of the shingle. Therefore when high wind shear factors hit these areas even if just one shingle that is not properly nailed, that shingle can blow off creating areas where water can penetrate. After the hurricane "Ike" that hit Galveston County, Harris County, Brazoria County, Fort Bend County Chambers County, Liberty County and others in Texas with much of the damage to the roofs was due to use of continuous flashing methods. On the majority of the residential homes that had proper step flashing installed little or no roof damage was done because of blow off. Whereas where roof damage was evident one of the main cause was due to the continuous flashing which brought on further damage to the structure through water penetration.

The code R905.2.8.3 of the IRC 2009 edition addresses this issue and specifically stating that step flashing shall be used. Period. The same code in the 2012 edition specifically states "OR" a continuous flashing shall be used. (By the way, at the end of the code it states, "in accordance with" and on the next page it does not continue on the next page.) Was this a typographical error?

Step flashing methods have been around for 8 or more decades and have performed adequately in almost all cases. Continuous flashing method is used to shorten the time it takes to nail a shingle on the roof decking and cut costs but has not proven to always function as a proper flashing method.

Cost Impact: This code change will increase the cost of construction. Minimal cost to a builder and/or a roofing contractor.

RB437-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R905.2.8.3-RB-PINO.doc

RB438 – 13

R905.2.8.5

Proponent: Bill McHugh, Chicago Roofing Contractors Association (bill@crca.org)

Revise as follows:

R905.2.8.5 Drip edge. A drip edge shall be provided at eaves and gables of shingle roofs. Adjacent pieces of drip edge shall be overlapped a minimum of 2 inches (51 mm). Drip edges shall extend a minimum of 0.25 inch (6.4 mm) below the roof sheathing and extend up the roof deck a minimum of 2 inches (51 mm). Drip edges shall be mechanically fastened to the roof deck at a maximum of 12 inches (305 mm) o.c. with fasteners as specified in Section R905.2.5. Underlayment shall be installed ~~over~~ under the drip edge along eaves and under the underlayment on gables. Unless specified differently by the shingle manufacturer, shingles are permitted to be flush with the drip edge.

Reason: The roof edge flashings are most susceptible to leaks from water backing up under the underlayment and roof covering because it freezes at the eave edge first causing water to lay on the roof driving water back up the slope of the structure.

According to CRCA roofing contractors, if the code required underlayment is applied to the top of the metal drip edge, a seal may be difficult and the water will leak into the structure where a void exists. Voids form due to joints in the metal, uneven or dirty surfaces before application of the underlayment. Further, if underlayment is applied to these flashings, water can be pushed by the ice dam working on the 'back water lap' up slope possibly causing leaks. The leak(s) may be difficult to detect in the concealed space location.

We believe this will provide needed guidance in new construction, reroofing, roof recover and roof replacements providing better service and less leaks to the residential building owner.

Cost Impact: This proposal will not increase the cost of construction.

RB438-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R905.2.8.5-RB-MCHUGH.doc

RB439 – 13

R905.2.8.5

Proponent: Mark S. Graham, National Roofing Contractors Association (mgraham@nrca.net)

Revise as follows:

R905.2.8.5 Drip edge. A drip edge shall be provided at eaves and ~~gables~~ rake edges of shingle roofs. Adjacent ~~pieces~~ segments of drip edge shall be overlapped a minimum of 2 inches (51 mm). Drip edges shall extend a minimum of 0.25 inch (6.4 mm) below the roof sheathing and extend ~~up back on to the roof~~ deck a minimum of 2 inches (51 mm). Drip edges shall be mechanically fastened to the roof deck at a maximum of 12 inches (305 mm) o.c. with fasteners as specified in Section R905.2.5. Underlayment shall be installed over the drip edge along eaves and under the underlayment ~~on gables~~ along rake edges. ~~Unless specified differently by the shingle manufacturer, shingles are permitted to be flush with the drip edge.~~

Reason: This code change proposal is intended to clarify the Code's intent regarding drip edges for asphalt shingle roofs, makes the provision conform to industry practices and makes the IRC's requirements consistent with the requirements in IBC's Section 1507.2.9.3, which was modified by Group A code change S36-12 that was Approved as Modified.

Cost Impact: This code change proposal will not increase the cost of construction.

RB439-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R905.2.8.5-RB-GRAHAM.doc

RB440 – 13

R905.2.8.5

Proponent: Rick Davidson, City of Maple Grove, MN, representing Association of Minnesota Building Officials (rdavidson@maplegrovern.gov)

Delete without substitution as follows:

R905.2.8.5 Drip edge. ~~A drip edge shall be provided at eaves and gables of shingle roofs. Adjacent pieces of drip edge shall be overlapped a minimum of 2 inches (51 mm). Drip edges shall extend a minimum of 0.25 inch (6.4 mm) below the roof sheathing and extend up the roof deck a minimum of 2 inches (51 mm). Drip edges shall be mechanically fastened to the roof deck at a maximum of 12 inches (305 mm) o.c. with fasteners as specified in Section R905.2.5. Underlayment shall be installed over the drip edge along eaves and under the underlayment on gables. Unless specified differently by the shingle manufacturer, shingles are permitted to be flush with the drip edge.~~

Reason: The requirement for drip edge was placed in the code during the past cycle. Following is the reason given by the proponent for the change:

Reason: Unlike the IBC, the IRC does not include drip edge requirements for shingle roofs. This new text brings the IRC into uniformity with the IBC, reflects manufacturers' requirements for shingle roof installations, and uses identical wording and placement as found in IBC 1507.2.9.3.

Cost Impact: The code change proposal will not increase the cost of construction.

The proponent's arguments are somewhat conflicted. Although the IBC does require drip edge, the solution for consistency should have been to remove it from the IBC rather than add it to the IRC. The proponent stated that it reflects manufacturer's requirements for shingle roof installations. The proponent provided no evidence of this in support of the statement and, if manufacturers do require drip edge, it would be required by existing language in the IRC (see end of section). In fact, the Asphalt Roofing Manufacturer's Association only **recommends** the use of drip edge; they do not say it is required. Then the proponent stated that requiring drip edge where it wasn't previously required would **not** increase the cost of construction. Clearly this will increase the cost of construction.

While the committee approved this proposal, their reason statement makes little sense. They state that the drip edge "will provide protection of the shingles and give(s) rigidity to the shingle edges". I'm not sure how drip edge protects the shingles and the projection of the shingles over the roof edge is governed by the manufacturer's installation instructions. Sometimes finding a good reason to approve something is a struggle.

Committee Reason: This is a good change that will provide protection of the shingles and gives rigidity to the shingle edges. This is consistent with the IBC.

The code language also creates a number of problems that need to be considered. The 2012 IRC has been amended to permit overlays (again). The question that comes up is how drip edge can or should be installed in an overlay situation. The Asphalt Roofing Manufacturer's Association and drip edge manufacturers don't address that problem. Also, installing drip edge on existing homes with gutters creates another unique problem. Many of the attachment methods for gutters make it virtually impossible to install drip edge along an eave without cutting the drip edge to pieces or removing and reinstalling the gutters which drives up the cost. And there are sure to be roofing contractors who will use the new rules to increase installation costs on their customers and blame the increase on the local building department.

SECTION R905 REQUIREMENTS FOR ROOF COVERINGS

R905.1 Roof covering application. *Roof coverings shall be applied in accordance with the applicable provisions of this section and the manufacturer's installation instructions. Unless otherwise specified in this section, roof coverings shall be installed to resist the component and cladding loads specified in Table R301.2(2), adjusted for height and exposure in accordance with Table R301.2(3).*

It is reasonable that this proposal be approved because the current language in the IRC is not well thought out, will create conflicts for reroofing, was not shown to be necessary or to serve any useful purpose, and will increase the cost of construction.

Cost Impact: The code change proposal will not increase the cost of construction.

RB440-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R905.2.8.5-RB-DAVIDSON.doc

RB441 – 13

R905.2.9 (NEW)

Proponent: Andrew Herseth, US Dept of Homeland Security, representing Federal Emergency Management Agency (FEMA) and Glenn Overcash, URS Corporation representing FEMA

Add new text as follows:

R905.2.9 Cold Weather Application. The installation of asphalt shingles during cold weather (less than 40° F [5° C]) shall comply with the manufacturer's cold weather installation instructions.

Reason: If shingles are installed during cold weather, the shingle's thermally activated tab sealant may not activate and seal the tabs. When tabs are unsealed, they are susceptible to wind blow-off. The sealant may activate during return of warm weather, but proper sealing may be inhibited by contaminants blown onto the sealant before thermal activation occurs.

Most manufacturers provide special instructions for installing shingles during cold weather - typically through applying dabs of adhesive to the backs of the each tab. Section R905.1 already requires installation to comply with the manufacturer's installation instructions. However, this code change proposal explicitly directs attention to the issue of cold weather application, and it facilitates code enforcement by defining "cold weather".

Cost Impact: The code change proposal will not increase the cost of construction because if R905.1 is followed, the application would be in accordance with the manufacturer's cold weather application instructions.

RB441-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R905.2.9 (NEW)-RB-HERSETH-OVERCASH.doc

RB442 – 13

R905.6

Proponent: Mark S. Graham, National Roofing Contractors Association (mgraham@nrca.net)

Revise as follows:

R905.6 Slate and slate-type shingles. The installation of slate and slate-type shingles shall comply with the provisions of this section.

Reason: This code change proposal is intended to remove “slate-type” shingle products from being applicable to this section. Slate-type products are not defined and the material standard requirement in Section R905.6.4-Material Standards applies specifically to slate products and not synthetic slate or slate-type products.

Cost Impact: The code change proposal will not increase the cost of construction.

RB442-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R905.6-RB-GRAHAM.doc

RB443 – 13

R905.14.2, Chapter 44

Proponent: Steve Loftis, NFCl Polyurethanes

Revise as follows:

R905.14.2 Material standards. Spray-applied polyurethane foam insulation shall comply with ~~ASTM C 1029, Type III or IV~~ ASTM D7425.

Add new standard to Chapter 44 as follows:

ASTM

D 7425-11 Standard Specification for Spray Polyurethane Foam Used for Roofing Applications

Reason: ASTM D7425 Standard Specification for Spray Polyurethane Foam Used for Roofing Applications was developed to establish the required physical properties of spray foam (SPF) for use in SPF roofing applications. ASTM C1029 is a specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation and does not specifically address properties of SPF for use in roofing applications. ASTM D7425 is the appropriate reference standard.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, ASTM D 7425 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

RB443-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R905.14.2-RB-LOFTIS.doc

RB444 – 13

R202 (NEW), R902, R902.1, R902.3 (NEW), R902.4 (NEW)

Proponent: Lorraine Ross, Intech Consulting Inc., representing The Dow Chemical Company
(intech@tampabay.rr.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE IRC RESIDENTIAL BUILDING CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY IRC PLUMBING/MECHANICAL CODE DEVELOPMENT COMMITTEE.

PART I – IRC BUILDING

Revise as follows:

SECTION R902 ROOF FIRE CLASSIFICATION

R902.1 Roofing covering materials. Roofs shall be covered with materials as set forth in Sections R904 and R905. Class A, B or C roofing shall be installed in areas jurisdictions designated by law as requiring their use or when the edge of the roof is less than 3 feet (914 mm) from a lot line. Classes A, B and C roofing required by this section to be listed shall be tested in accordance with UL 790 or ASTM E 108.

Exceptions:

1. Class A roof assemblies include those with coverings of brick, masonry and exposed concrete roof deck.
2. Class A roof assemblies also include ferrous or copper shingles or sheets, metal sheets and shingles, clay or concrete roof tile, or slate installed on noncombustible decks.
3. Class A roof assemblies include minimum 16 oz/ft² copper sheets installed over combustible decks.

R902.3 Building integrated photovoltaic product. Building integrated photovoltaic products installed as the roof covering shall be tested, listed and labeled for fire classification in accordance with Section R902.1.

R902.4 Rooftop mounted photovoltaic panels and modules. Rooftop mounted photovoltaic panels and modules installed on or above the roof covering shall be tested, listed and identified with a fire classification in accordance with UL 1703. Class A, B or C photovoltaic panels and modules shall be installed in jurisdictions designated by law as requiring their use or when the edge of the roof is less than 3 feet (914 mm) from a lot line.

PART II – IRC PLUMBING/MECHANICAL

Add new definitions as follows:

BUILDING INTEGRATED PHOTOVOLTAIC (BIPV) PRODUCT. A building product that incorporates photovoltaic modules, and functions as a component of the building envelope.

PHOTOVOLTAIC MODULE. A complete, environmentally protected unit consisting of solar cells, optics, and other components, exclusive of tracker, designed to generate DC power when exposed to sunlight.

PHOTOVOLTAIC PANEL. A collection of photovoltaic modules mechanically fastened together, wired, and designed to provide a field-installable unit.

Reason: This section has been renamed Fire Classification in order to clarify the subject of the section. Two new sections have been added to clearly identify the fire classification requirements for both building integrated photovoltaic products that serve as the roof covering and rooftop mounted photovoltaic panels that are installed on or above the roof covering. This concept was also approved in the 2015 *International Building Code* development process.

There is also a change to clarify Section 902.1, where the word “area” was changed to “jurisdiction” because there has been interpretation that the word “area” referred to is a place on the roof itself rather than a geographic area, such as the Urban Wildfire Interface Zone or other jurisdictional requirements for fire classified roofs. Section 902 is in place to prevent fire from spreading from rooftop to rooftop. Where classified roofs are required, it applies to the entire roof not just portions or “areas” of the roof.

New definitions are added for BUILDING INTEGRATED PHOTOVOLTAIC (BIPV) PRODUCT, PHOTOVOLTAIC MODULE and PHOTOVOLTAIC PANEL. All of these definitions were approved in the 2015 International Building Code development process.

Cost Impact: The code change proposal will not increase the cost of construction.

RB444-13

PART I – IRC BUILDING

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IRC PLUMBING/MECHANICAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R902-RB-ROSS.doc

RB445 – 13

R202, R905.16, R905.16.1, R905.16.2, R905.16.3

Proponent: Lorraine Ross, Intech Consulting Inc., representing The Dow Chemical Company
(intech@tampabay.rr.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE IRC RESIDENTIAL BUILDING CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY IRC PLUMBING/MECHANICAL CODE DEVELOPMENT COMMITTEE.

PART I – IRC BUILDING

Revise as follows:

R905.16 Photovoltaic modules/shingles. The installation of photovoltaic modules/shingles shall comply with the provisions of this section.

R905.16.1 Material standards. Photovoltaic modules/shingles shall be listed and labeled in accordance with UL 1703.

R905.16.2 Attachment. Photovoltaic modules/shingles shall be attached in accordance with the manufacturer's installation instructions.

R905.16.3 Wind resistance. Photovoltaic modules/shingles shall be tested in accordance with procedures and acceptance criteria in ASTM D 3161. Photovoltaic modules/shingles shall comply with the classification requirements of Table R905.2.4.1(2) for the appropriate maximum basic wind speed. Photovoltaic modules/shingle packaging shall bear a label to indicate compliance with the procedures in ASTM D 3161 and the required classification from Table R905.2.4.1(2).

PART II – IRC PLUMBING/MECHANICAL

Revise definitions as follows:

PHOTOVOLTAIC MODULES/SHINGLES. ~~A roof covering composed of flat plate photovoltaic modules fabricated in sheets that resemble three-tab composite~~ resembling shingles that incorporates photovoltaic modules.

PHOTOVOLTAIC MODULE. A complete, environmentally protected unit consisting of solar cells, optics, and other components, exclusive of tracker, designed to generate DC power when exposed to sunlight.

Reason: This code change is intended to coordinate with action taken for photovoltaic shingles in the 2015 *International Building Code* development hearings. Appropriate section numbers have been added here for the *International Residential Code*. Both definitions proposed in this code change were also approved in the 2015 IBC.

The successful IBC code change was referenced as S2-12 and contained this reasoning statement:

"This code change proposal is intended to clarify the term and definition for "Photovoltaic modules/shingles" in Chapter 2-Definitions and carrying this clarification through to the specific requirements for photovoltaic shingles in Section 1507.17

The word "modules" is being deleted from the term and definition because it is not defined in the code in the context of photovoltaic applications and it is not necessary to clearly identify and define the term. Similarly, "/" is being deleted because it is not necessary to identify or define the term; it is not clear whether the "/" is intended to mean "and" or "or". Also, "flat-plate", "three-tab" and "composite" are being deleted because these are not defined in the IBC and these are not necessary to clearly define the term."

No changes in the current code's technical requirements are intended with this code change proposal."

Cost Impact: The code change will not increase the cost of construction.

RB445-13

PART I – IRC BUILDING

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IRC PLUMBING/MECHANICAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R905.16-RB-ROSS.doc

RB446 – 13

R905.16, R905.16.1, R905.16.2, R905.16.3, R905.16.4, R905.16.4.1, R905.16.4.2

Proponent: Mark S. Graham, National Roofing Contractors Association (mgramham@nrca.net)

Revise as follows:

R905.16 Photovoltaic modules/shingles. The installation of photovoltaic modules/shingles shall comply with the provisions of this section, Section M2302 and NFPA 70.

R905.16.1 Deck requirements. Photovoltaic shingles shall be applied to a solid or closely-fitted deck, except where the roof covering is specifically designed to be applied over spaced sheathing.

R905.16.2 Deck slope. Photovoltaic shingles shall be used only on roof slopes of three units vertical in 12 units horizontal (3:12) or greater.

R905.16.3 Underlayment. Unless otherwise noted, required underlayment shall conform to ASTM D 4869 or ASTM D6757.

R905.16.4 Underlayment application. Underlayment shall be applied shingle fashion, parallel to and starting from the eave, lapped 2 inches (51 mm) and fastened sufficiently to hold in place.

R905.16.4.1 Ice barrier. In areas where there has been a history of ice forming along the eaves causing a backup of water as designated in Table R301.2(1), an ice barrier that consists of at least two layers of underlayment cemented together or of a self-adhering polymer modified bitumen sheet, shall be used in lieu of normal underlayment and extend from the lowest edges of all roof surfaces to a point at least 24 inches (610 mm) inside the exterior wall line of the building.

Exception: Detached accessory structures that contain no conditioned floor area.

R905.16.4.2 Underlayment and high winds. Underlayment applied in areas subject to high winds [above 110 mph (49 m/s) in accordance with Figure R301.2(4)A] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

Underlayment installed where the basic wind speed equals or exceeds 120 mph (54 m/s) shall comply with ASTM D 4869 Type IV, or ASTM D 6757. The underlayment shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. Underlayment shall be applied in accordance with Section R905.2.7 except all laps shall be a minimum of 4 inches (102 mm). Underlayment shall be attached using metal or plastic cap nails with a head diameter of not less than 1 inch (25.4 mm) with a thickness of at least 32-gauge sheet metal. The cap-nail shank shall be a minimum of 12 gauge (0.105 inches) with a length to penetrate through the roof sheathing or a minimum of 3/4 inch (19 mm) into the roof sheathing.

Exception: As an alternative, adhered underlayment complying with ASTM D 1970 shall be permitted.

R905.16.4 R905.16.5 Material standards. Photovoltaic modules/shingles shall be listed and labeled in accordance with UL 1703.

R905.16.2 R905.16.6 Attachment. Photovoltaic modules/shingles shall be attached in accordance with the manufacturer's installation instructions.

R905.16.3 R905.16.7 Wind resistance. Photovoltaic modules/shingles shall be tested in accordance with procedures and acceptance criteria in ASTM D 3161. Photovoltaic modules/shingles shall comply with the

classification requirements of Table R905.2.4.1(2) for the appropriate maximum basic wind speed. Photovoltaic modules/shingle packaging shall bear a label to indicate compliance with the procedures in ASTM D 3161 and the required classification from Table R905.2.4.1(2).

Reason: This code change proposal adds specific requirements for roof decks, roof deck slope, underlayment, underlayment application, ice barrier, and underlayment for high wind areas to Section R905.16.

The specific requirements being added are consistent with similar attributes for other steep-slope, shingle-type roof coverings.

Reference to IRC Section M2302-Photovoltaic Solar Energy Systems and NFPA 70 is added.

This same code change proposal was submitted for consideration as S47-12 for Group A of the International Building Code and was Approved as Modified; the modifications are included as a part of this text here

Cost Impact: The code change proposal will not increase the cost of construction.

RB446-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R905.16-RB-GRAHAM.doc

RB447 – 13

R907 (NEW)

Proponent: Mark S. Graham, National Roofing Contractors Association (mgramham@nrca.net)

Add new text as follows:

SECTION R907

ROOFTOP-MOUNTED PHOTOVOLTAIC SYSTEMS

R907.1 Rooftop-mounted photovoltaic systems. Rooftop-mounted photovoltaic panels or modules shall be installed in accordance with this section, Section M2302 and NFPA 70.

R907.2 Wind resistance. Rooftop-mounted photovoltaic panel or modules systems shall be installed to resist the component and cladding loads specified in Table R301.2(2), adjusted for height and exposure in accordance with Table R301.2(3).

R907.3 Fire classification. Rooftop-mounted photovoltaic panels or modules shall have the same fire classification as the roof assembly required in Section R902.

R907.4 Installation. Rooftop mounted photovoltaic panels or modules shall be installed in accordance with the manufacturer's installation instructions.

R907.5 Photovoltaic panels and modules. Rooftop-mounted photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703 and shall be installed in accordance with the manufacturer's printed installation instructions.

Reason: : This code change proposal is intended to add specific requirements applicable to rooftop-mounted photovoltaic panels and modules, and complement the already existing requirements for photovoltaic solar energy systems in Section M2302.

The roofing-specific requirements proposed here are adapted from IBC Section 1509.7-Photovoltaic Systems, which address rooftop-mounted panel and rack systems.

Building-integrated photovoltaic systems, such as photovoltaic shingles, are already addressed in IRC Section 905.16.

Cost Impact: The code change proposal will not increase the cost of construction.

RB447-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R907 (NEW)-RB-GRAHAM.doc

RB448 – 13

R202 (NEW), R902.3 (NEW), R908 (NEW), M2302, M2302.2, M2302.2.1, M2302.2.2, M2302.2.3, M2302.3, M2302.4

Proponent: Lorraine Ross, Intech Consulting Inc., representing The Dow Chemical Company
(intech@tampabay.rr.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE IRC RESIDENTIAL BUILDING CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY IRC PLUMBING/MECHANICAL CODE DEVELOPMENT COMMITTEE.

PART I – IRC BUILDING

Add new text as follows:

R902.3 Rooftop mounted photovoltaic panels and modules. Rooftop mounted photovoltaic panels and modules mounted on or above the roof covering shall be tested, *listed* and identified with a fire classification in accordance with UL 1703. Class A, B or C photovoltaic panels and modules shall be installed in jurisdictions designated by law as requiring their use or when the edge of the roof is less than 3 feet (914 mm) from a lot line.

SECTION R908 **ROOFTOP MOUNTED PHOTOVOLTAIC PANEL SYSTEMS**

R908.1 General. The installation of photovoltaic panel systems that are mounted on or above the roof covering shall comply with the provisions of this code, the *International Fire Code* and *NFPA 70*.

R908.1.1 Material standards. Photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703.

R908.1.2 Structural requirements. Rooftop mounted photovoltaic panel systems shall be designed to structurally support the system and withstand applicable loads in accordance with Chapter 3. The roof upon which these systems are installed shall be constructed to support the loads imposed by such systems in accordance with Chapter 8.

R908.1.3 Installation. Rooftop mounted photovoltaic systems shall be installed in accordance with the manufacturer's installation instructions. Roof penetrations shall be flashed in accordance with this chapter.

R908.1.4 Inverters. Inverters shall be listed and labeled in accordance with UL 1741. Systems connected to the utility grid shall use inverters listed for utility interaction.

PART II – IRC PLUMBING/MECHANICAL

Add new definitions as follows:

PHOTOVOLTAIC MODULE. A complete, environmentally protected unit consisting of solar cells, optics, and other components, exclusive of tracker, designed to generate DC power when exposed to sunlight.

PHOTOVOLTAIC PANEL. A collection of photovoltaic modules mechanically fastened together, wired, and designed to provide a field-installable unit.

PHOTOVOLTAIC PANEL SYSTEM. A system that incorporates discrete photovoltaic panels, which convert solar radiation into electricity, including rack support systems.

Add new text as follows:

SECTION M2302
GROUND MOUNTED PHOTOVOLTAIC SOLAR ENERGY SYSTEMS

M2302.1 General. This section provides for the design, construction, installation, alteration, and repair of ground mounted photovoltaic equipment and systems.

M2302.2 Requirements. The installation, inspection, maintenance, repair and replacement of ground-mounted photovoltaic systems and all system components shall comply with the manufacturer's instructions, Sections M2302.2.1 through M2302.2.3, the International Fire Code and NFPA 70.

~~**M2302.2.1 Roof-mounted panels and modules.** Where photovoltaic panels and modules are installed on roofs, the roof shall be constructed to support the loads imposed by such modules. Roof-mounted photovoltaic panels and modules that serve as roof covering shall conform to the requirements for roof coverings in Chapter 9. Where mounted on or above the roof coverings, the photovoltaic panels and modules and supporting structure shall be constructed of noncombustible materials or fire-retardant treated wood equivalent to that required for the roof construction~~

~~**M2302.2.2 Roof and wall penetrations.** Roof and wall penetrations shall be flashed and sealed in accordance with Chapter 9 to prevent entry of water, rodents, and insects.~~

~~**M2302.2.3**~~ **M2302.2.1 Ground-mounted panels and modules.** Ground-mounted panels and modules shall be designed in accordance with Section R301 and installed in accordance with the manufacturer's instructions.

~~**M2302.3**~~ **M2302.2.2 Ground-mounted Photovoltaic panels and modules.** Ground-mounted Photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703.

~~**M2302.4**~~ **M2302.2.3 Inverters.** Inverters shall be listed and labeled in accordance with UL 1741. Systems connected to the utility grid shall use inverters listed for utility interaction.

Reason: Installation of rooftop mounted photovoltaic panel systems is common in the residential market. Yet, specific details about installation of these systems are missing, vague or buried in the mechanical chapter Section M2302. This code proposal adds a new Section R908 to Chapter 9 to clarify details for the design and installation of rooftop mounted photovoltaic panels installed on or above the roof covering. In doing so, a number of other sections have been added or revised. Details of the proposal are explained as follows:

1. **New definitions for PHOTOVOLTAIC MODULE, PHOTOVOLTAIC PANEL, and PHOTOVOLTAIC PANEL SYSTEM.**
All of these definitions were approved in the 2015 *International Building Code* development process.
2. **Adds fire classification section for rooftop mounted photovoltaic panels and modules mounted on or above the roof covering.**
Specific details on this provision is missing from the *International Residential Code* and is a critical factor in the safe installation of rooftop mounted photovoltaic systems.
3. **New Section R908 ROOFTOP MOUNTED PHOTOVOLTAIC PANEL SYSTEMS**
This code change proposal places requirements for rooftop mounted photovoltaic panel systems that are installed on or above the roof covering in Chapter 9 as a new Section R908, which is a much more logical place. The General section references the need to comply with this section as well as the *International Fire Code* and NFPA 70. Other important provisions for safe installation of these systems are detailed, including material standards, structural requirements, installation and inverters. Likewise, provisions for these systems in Section 2302 are deleted. Section 2302 is now limited to ground-mounted photovoltaic systems and has been amended accordingly.
4. **Revise Section M2302.**
Since this code change proposal relocates all rooftop photovoltaic provisions, Section M2302 is now limited to ground-mounted photovoltaic systems and has been revised accordingly. A requirement to design these systems in accordance with Section R301 has been added.

Cost Impact: The code change proposal will not increase the cost of construction.

RB448-13**PART I – IRC BUILDING**

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IRC PLUMBING/MECHANICAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R902.3 (NEW)-RB-ROSS.doc

RB449 – 13

Table R906.2

Proponent: Mark S. Graham, National Roofing Contractors Association (mgram@nrca.net)

Revise as follows:

TABLE R906.2
MATERIAL STANDARDS FOR ROOF INSULATION

Cellular glass board	ASTM C 552
Composite boards	ASTM C 1289, Type III, IV, V or VI
Expanded polystyrene	ASTM C 578
Extruded polystyrene board	ASTM C 578
Perlite board	ASTM C 728
Polyisocyanurate board	ASTM C 1289, Type I or II
Wood fiberboard	ASTM C 208
<u>Fiber-reinforced gypsum board</u>	<u>ASTM C1278</u>
<u>Glass-faced gypsum board</u>	<u>ASTM C1177</u>

Reason: This code change proposal is intended to add recognized product standards to Table R906.2-Material Standards for Roof Insulation for fiber-reinforced gypsum board and glass-faced gypsum board commonly used in roof assemblies.

ASTM C 1278, "Standard Specification for Fiber-Reinforced Gypsum Panel," is the U.S. product standard applicable to fiber-reinforced gypsum board used in roof assemblies.

ASTM C1177, "Standard Specification for Glass Mat Substrate Used as Sheathing," is the U.S. product standard applicable to glass-faced gypsum board used in roof assemblies.

This same code change proposal was submitted for the International Building Code as S50-12 in Group A and was Approved as Submitted.

Cost Impact: The code change proposal will not increase the cost of construction.

RB449-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R906.2T-RB-GRAHAM.doc

RB450 – 13

R202 (NEW), R907 (NEW), Chapter 44

Proponent: Vickie Lovell, InterCode Incorporated, representing the Reflective Insulation Manufacturers Association International (Vickie@intercodeinc.com)

Revise as follows:

SECTION R907 **RADIANT BARRIER-ABOVE DECK**

R907.1 General. A radiant barrier installed above a deck shall comply with Sections R907.2 through R907.4.

R907.2 Fire Testing. Radiant barriers shall be permitted for use above decks where the radiant barrier is covered with an *approved* roof covering and the system consisting of the radiant barrier and the roof covering complies with the requirements of either FM 4550 or UL 1256.

R907.3 Installation. The low emittance surface of the radiant barrier shall face the continuous air space between the barrier and the roof covering.

R907.4 Material standards. A radiant barrier installed above a deck shall comply with ASTM C1313/C1313M.

Add new definition as follows:

RADIANT BARRIER. A material having a low emittance surface of 0.1 or less installed in building assemblies.

Add new standard to Chapter 44 as follows:

ASTM

C1313/C1313M-12 Standard Specification for Sheet Radiant Barriers for Building Construction Applications

Reason: The IBC understood this and accepted S51-12, which introduced a new section 1509, following section 1508 on Roof Insulation, associated with Radiant barriers above deck. The present proposal uses the same language accepted into the IBC and proposes it for the IRC, once more following the section on roof insulation (R906) and not as another part of that section.

The new text is necessary for the following reasons:

- (1) An important issue that needs to be addressed in the new proposed section R907 is how the fire testing of the system is to be done. The fire testing (FM 4550 or 1256) must be done using the combination of the radiant barrier **and** the approved roof covering and the total system needs to pass the fire test.
- (2) A definition is needed for radiant barriers, and one is being proposed, which is identical to the one adopted by the IBC.
- (3) A standard specification needs to be referenced, and the same specification (ASTM C1313) is being proposed as was adopted by the IBC.
- (4) A key requirement for the installation of radiant barrier products is that there needs to be an air space or air gap between the radiant barrier and the roof covering. This is explained in the proposed section on installation. There is confusion in the market place concerning this "air space" or "air gap". All radiant barrier applications require an air space on at least one low emittance side of the material. Installations that do not include an air space do not provide the desired radiant barrier benefit.

Radiant barrier products have been on the market for over 24 years and are used by 87 of the top 100 US Builders. They have an established history and have been accepted into several regional code requirements [building codes in Hawaii, Austin, Texas, Florida and I California's Title 24] and are included in the Energy Star Homes Guidelines.

For information, ASTM has issued separate specifications for radiant barriers used in buildings ASTM C1313, "Standard Specification for Sheet Radiant Barriers for Building Construction Applications" and for reflective insulations used in buildings ASTM C1224, "Standard Specification for Reflective Insulation for Building Applications". This proposal includes a reference to the appropriate specification, ASTM C1313. The scope of ASTM C1313 reads as follows. "This specification covers the general physical property requirements of radiant barrier materials for use in building construction. The scope is specifically limited to requirements

for radiant barrier sheet materials that consist of at least one surface, such as metallic foils or metallic deposits mounted or unmounted on substrates. Sheet radiant barrier materials shall consist of low emittance surface(s) that may be in combination with any substrates and adhesives required to meet the specified physical material properties. The following test methods shall be performed: surface emittance; water vapor transmission; surface burning characteristics; corrosivity; tear resistance; and adhesive performance."

Cost Impact: This proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, ASTM C 1313/ C1313M with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

RB450-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R907 (NEW)-RB-LOVELL.doc

RB451 – 13

R907.1

Proponent: Mark S. Graham, National Roofing Contractors Association (mgraham@nrca.net)

Revise as follows:

R907.1 General. Materials and methods of application used for re-covering or replacing an existing roof covering shall comply with the requirements of Chapter 9.

Exceptions:

1. Reroofing shall not be required to meet the minimum design slope requirements of one-quarter unit vertical in 12 units horizontal (2-percent slope) in Section R905 for roofs that provide positive drainage.
2. For roofs that provide positive drainage, re-covering or replacing an existing roof covering shall not require the secondary (emergency overflow) drains or scuppers of Section R903.4.1 to be added to an existing roof.

Reason: : IRC 2006 and subsequent editions include a requirement in Section R903.4-Roof Drainage that for roof drainage systems with roof drains or scuppers, secondary (emergency overflow) drains or scuppers also be provided in the event the primary roof drainage systems becomes clogged.

Section R907.1-Reroofing requires all materials and methods used in re-covering or replacing an existing roof covering comply with the requirements of Chapter 9 (except the minimum roof slope requirement of ¼:12 can be waived for roofs that provide "...positive roof drainage."). This statement can be interpreted to require the secondary (emergency overflow) drains and scupper provision also apply in reroofing. Since many existing buildings were designed and constructed before the code included a secondary requirement, the secondary drainage provision being applicable in reroofing and the need for adding secondary drains in existing buildings during reroofing can be a very costly and disruptive undertaking for owners and occupants.

This proposed code change adds an exception to Section R907.1-Reroofing that waives the secondary drainage requirement when reroofing existing buildings when the roof drains properly, that being provides positive drainage as is defined by the Code.

This same code change proposal was submitted for the International Building Code as S60-12 in Group A and was Approved as Modified by Public Comment 2. This proposal includes the AMPC2 language.

Cost Impact: The code change proposal will not increase the cost of construction.

RB451-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R907.1-RB-GRAHAM.doc

RB452 – 13

R907.3, R907.4, R907.5, R907.6

Proponent: Andy Williams, Metal Construction Association (afwilliams@metalconstruction.org)

Revise as follows:

R907.3 Fire classification. The roof covering fire classification shall not be reduced due to repairs from the fire classification required when installed. The roof covering fire classification for a recovering shall comply with the fire classification in Section R902.

R907.3 R907.4 Recovering versus replacement. New roof coverings shall not be installed without first removing all existing layers of roof coverings where any of the following conditions exist:

1. Where the existing roof or roof covering is water soaked or has deteriorated to the point that the existing roof or roof covering is not adequate as a base for additional roofing.
2. Where the existing roof covering is wood shake, slate, clay, cement or asbestos-cement tile.
3. Where the existing roof has two or more applications of any type of roof covering.

Exceptions:

1. Complete and separate roofing systems, such as standing-seam metal roof systems, that are designed to transmit the roof loads directly to the building's structural system and that do not rely on existing roofs and roof coverings for support, shall not require the removal of existing roof coverings.
2. Installation of metal panel, metal shingle and concrete and clay tile roof coverings over existing wood shake roofs shall be permitted when the application is in accordance with Section R907.5.
3. The application of new protective coating over existing spray polyurethane foam roofing systems shall be permitted without tear-off of existing roof coverings.
4. Where the existing roof assembly includes an ice barrier membrane that is adhered to the roof deck, the existing ice barrier membrane shall be permitted to remain in place and covered with an additional layer of ice barrier membrane in accordance with Section R905.

R907.4 R907.5 Roof recovering. Where the application of a new roof covering over wood shingle or shake roofs creates a combustible concealed space, the entire existing surface shall be covered with gypsum board, mineral fiber, glass fiber or other *approved* materials securely fastened in place.

R907.5 R907.6 Reinstallation of materials. Existing slate, clay or cement tile shall be permitted for reinstallation, except that damaged, cracked or broken slate or tile shall not be reinstalled. Any existing flashings, edgings, outlets, vents or similar devices that are a part of the assembly shall be replaced when rusted, damaged or deteriorated. Aggregate surfacing materials shall not be reinstalled.

R907.6 R907.7 Flashings. Flashings shall be reconstructed in accordance with *approved* manufacturer's installation instructions. Metal flashing to which bituminous materials are to be adhered shall be primed prior to installation.

Reason: Section R907.3 is added to clarify that the roof covering is required to comply with the fire classification mandated by the IRC. For repairs to a roof covering, the repairs are required to maintain the roof covering fire classification required by the IRC when the roof covering was initially installed. For a recovering, the roof covering is required to have the fire classification required by the IRC adopted at the time of the recovering.

Cost Impact: The code change proposal will not increase the cost of construction.

RB452-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R907.3 (NEW)-RB-WILLIAMS.doc

RB453– 13

R907.3, R907.3.1 (NEW), R907.3.1.1 (NEW)

Proponent: Michael D. Fischer, Kellen Company, representing the Asphalt Roofing Manufacturers Association (mfischer@kellencompany.com)

Revise as follows:

~~R907.3 Recovering versus replacement.~~ New roof coverings shall not be installed without first removing all existing layers of roof coverings where any of the following conditions exist:

- ~~1. Where the existing roof or roof covering is watersoaked or has deteriorated to the point that the existing roof or roof covering is not adequate as a base for additional roofing.~~
- ~~2. Where the existing roof covering is wood shake, slate, clay, cement or asbestos-cement tile.~~
- ~~3. Where the existing roof has two or more applications of any type of roof covering.~~

Exceptions:

- ~~1. Complete and separate roofing systems, such as standing-seam metal roof systems, that are designed to transmit the roof loads directly to the building's structural system and that do not rely on existing roofs and roof coverings for support, shall not require the removal of existing roof coverings.~~
- ~~2. Installation of metal panel, metal shingle and concrete and clay tile roof coverings over existing wood shake roofs shall be permitted when the application is in accordance with Section R907.4.~~
- ~~3. The application of new protective coating over existing spray polyurethane foam roofing systems shall be permitted without tear-off of existing roof coverings.~~
- ~~4. Where the existing roof assembly includes an ice barrier membrane that adhered to the roof deck, the existing ice barrier membrane shall be permitted to remain in place and covered with an additional layer of ice barrier membrane in accordance with Section R905.~~

R907.3 Roof replacement. Roof replacement shall include the removal of all existing layers of roof coverings down to the roof deck.

Exception: Where the existing roof assembly includes an ice barrier membrane that is adhered to the roof deck, the existing ice barrier membrane shall be permitted to remain in place and covered with an additional layer of ice barrier membrane in accordance with Section R905.

R907.3.1 Roof recover. The installation of a new roof covering over an existing roof covering shall be permitted where any of the following conditions occur:

1. Where the new roof covering is installed in accordance with the roof covering manufacturers approved installation instructions
2. Complete and separate roofing systems, such as standing-seam metal roof systems, that are designed to transmit the roof loads directly to the building's structural system and that do not rely on existing roofs and roof coverings for support, shall not require the removal of existing roof coverings.
3. Metal panel, metal shingle and concrete and clay tile roof coverings shall be permitted to be installed over existing wood shake roofs when applied in accordance with Section R907.4.
4. The application of a new protective coating over an existing spray polyurethane foam roofing system shall be permitted without tear-off of existing roof coverings.

R907.3.1.1 A roof recover shall not be permitted where any of the following conditions occur:

1. Where the existing roof or roof covering is water soaked or has deteriorated to the point that the existing roof or roof covering is not adequate as a base for additional roofing.
2. Where the existing roof covering is slate, clay, cement or asbestos-cement tile.
3. Where the existing roof has two or more applications of any type of roof covering.

Reason: The intent of this proposal is to clarify the requirements for roof recover and roof replacement. In the new Section R907.3, the requirements for roof replacement (and the exception for ice barrier membranes) remain intact. The new Section R907.3.1 provides a much clearer path to identify those conditions where recover is permitted by the code. The current provisions for roof recover remain intact, except for two technical changes:

1. The current code contains a conflict related to the covering of wood shakes. The public comment provides a remedy by eliminating the prohibition contained in the text, which is in conflict with the application in accordance with Section R907.4.

2. The code lists several prescriptive options for recover, but does not specifically provide for other conditions where products have been evaluated for recover applications. The proposal includes that option, but requires installation in accordance with the manufacturer's instructions.

Cost Impact: The code change proposal will not increase the cost of construction.

RB453-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R907.3-RB-FISCHER.doc

RB454 – 13

R907.3

Proponent: Andrew Herseth, US Dept of Homeland Security, representing Federal Emergency Management Agency (FEMA) and Glenn Overcash, URS Corporation representing FEMA

Revise as follows:

R907.3 Recovering versus replacement. New roof coverings shall not be installed without first removing all existing layers of roof coverings where any of the following conditions exist:

1. Where the existing roof or roof covering is watersoaked or has deteriorated to the point that the existing roof or roof covering is not adequate as a base for additional roofing.
2. Where the existing roof covering is wood shake, slate, clay, cement or asbestos-cement tile.
3. Where the existing roof has two or more applications of any type of roof covering.
4. Where the existing roof covering is asphalt shingles and the new roof covering is asphalt shingles and where wind design is required in accordance with Section R301.2.1.1.

Exceptions:

1. Complete and separate roofing systems, such as standing-seam metal roof systems, that are designed to transmit the roof loads directly to the building's structural system and that do not rely on existing roofs and roof coverings for support, shall not require the removal of existing roof coverings.
2. Installation of metal panel, metal shingle and concrete and clay tile roof coverings over existing wood shake roofs shall be permitted when the application is in accordance with Section R907.4.
3. The application of new protective coating over existing spray polyurethane foam roofing systems shall be permitted without tear-off of existing roof coverings.
4. Where the existing roof assembly includes an ice barrier membrane that is adhered to the roof deck, the existing ice barrier membrane shall be permitted to remain in place and covered with an additional layer of ice barrier membrane in accordance with Section R905.

Reason: Removing the existing roof covering allows the roof deck to be inspected for deterioration and adequacy of attachment. Also, in the case of asphalt shingles, installation of new shingles over existing decreases the likelihood that the new shingles will be fully sealed because of substrate variation caused by the old shingles. Intermittent bonding of new shingles installed over existing has been observed by FEMA Mitigation Assessment Teams (MAT) deployed after Hurricanes Charley (FL, 2004), Ivan (2004), Katrina (LA and MS, 2005) and Ike (TX, 2008). All of the damaged roofs were located in areas where the basic wind speed is greater than 110 mph [ASCE 7-05 3-second gust per Figure R301.2(4)A]. MAT observations are documented in FEMA publications 488, 489, 549 and P-757.

This code change proposal seeks to require tear-off of existing roofs when re-roofing in high wind areas, and it clearly defines "high wind".

As a "best practice" FEMA P-499, *Home Builder's Guide to Coastal Construction* (FEMA, 2010) and P-804, *Wind Retrofit Guide for Residential Buildings* (FEMA, 2010) recommend that the existing roof covering be torn-off rather than roofed over where the basic wind speed is greater than 90 mph [ASCE 7-05 3-second gust per Figure R301.2(4)A]. However, as a code minimum, only areas with a basic wind speed of 110 mph [ASCE 7-05 3-second gust] or higher are proposed, which is consistent with the shaded area in Figure R301.2(4)B that stipulates where wind design is required. The Insurance Institute for Business and Home Safety (IBHS) *Fortified* publications also recommend tear-off rather than recover.

Cost Impact: The code change proposal will increase the cost of construction associated with a limited set of re-roofing projects.

RB454-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R907.3-RB-HERSETH-OVERCASH.doc

RB455 – 13

R1002.2, R1002.5, Chapter 44

Proponent: Timothy N. Seaton, B.S.C.E., Empire Masonry Heaters LLC
(tseaton@timelyconstruction.com)

Revise as follows:

1002.2 Installation. Masonry heaters shall be installed in accordance with this section and comply with one of the following:

1. Masonry heaters shall comply with the requirements of ASTM E 1602; or
2. Masonry heaters shall be *listed* and labeled in accordance with UL 1482 or EN 15250 and installed in accordance with the manufacturer's installation instructions.

1002.5 Masonry heater clearance. Combustible materials shall not be placed within 36 inches (765 mm) of the outside surface of a masonry heater in accordance with NFPA 211, Section 8-7 (clearances for solid fuel-burning appliances), and the required space between the heater and combustible material shall be fully vented to permit the free flow of air around all heater surfaces.

Exceptions:

1. When the masonry heater wall thickness is at least 8 inches (203 mm) thick of solid masonry and the wall thickness of the heat exchange channels is at least 5 inches (127 mm) thick of solid masonry, combustible materials shall not be placed within 4 inches (102 mm) of the outside surface of a masonry heater. A clearance of at least 8 inches (203 mm) shall be provided between the gas-tight capping slab of the heater and a combustible ceiling.
2. Masonry heaters *listed* and labeled in accordance with UL 1482 or EN 15250 and installed in accordance with the manufacturer's instructions.

Add new standard to Chapter 44 as follows:

EN **European Committee for Standardization (EN)**
 Central Secretariat
 Rue de stassart 36
 B-10 50 Brussels

EN 15250 Slow Heat Release Appliances Fired By Solid Fuel. Requirements And Test Methods.

Reason: This proposal harmonizes IRC Section 1002 with the corresponding 2013 IBC Section 2112.

UL 1482, *Solid-Fuel Type Room Heaters*, was created to evaluate wood stoves and similar appliances. It does not address thermal mass storage devices of masonry construction such as masonry heaters and contains significant deficiencies in evaluating them. Specifically, UL 1482 stipulates fueling the appliance until temperature equilibrium is reached at which point the safety clearances are verified. This is not an appropriate end of test for masonry heaters and cannot in testing application actually be clearly reached. While UL 1482 may eventually be modified to specifically address masonry heaters, in 2007 the European standard EN 15250, *Slow heat release appliances fired by solid fuel. Requirements and test method*, was finalized specifically to address masonry heaters and similar devices and has since been adopted by 37 countries in Europe and elsewhere. Since Europe is the original source of virtually all masonry heater technology and since IBC already references European Union standards elsewhere, it is appropriate to reference this standard here. EN 15250 stipulates the same allowable temperature elevations of adjacent combustible materials as UL 1482 but uses an appropriate test fueling method.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, EN 15250 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

RB455-13

Public Hearing: Committee: AS AM D

Assembly:

ASF

AMF

DF

R1002.2-RB-SEATON.doc

RB456 – 13

R1002.5

Proponent: Timothy N. Seaton, B.S.C.E., Empire Masonry Heaters LLC
(tseaton@timelyconstruction.com)

Revise as follows:

1002.5 Masonry heater clearance. Combustible materials shall not be placed within 36 inches (914 mm) or the distance of the allowed reduction method ~~of from~~ the outside surface of a masonry heater in accordance with NFPA 211, Section 8-7 ~~(clearances for solid fuel-burning appliances)~~ 12.6, Clearances from Solid Fuel-Burning Appliances, and the required space between the heater and combustible material shall be fully vented to permit the free flow of air around all heater surfaces.

Exceptions:

1. When the masonry heater wall is at least 8 inches (203 mm) thick of *solid masonry* and the wall of the heat exchange channels is at least 5 inches (127 mm) thick of *solid masonry*, combustible materials shall not be placed within 4 inches (102 mm) of the outside surface of a masonry heater. A clearance of at least 8 inches (203 mm) shall be provided between the gas-tight capping slab of the heater and a combustible ceiling.
2. Masonry heaters listed and labeled in accordance with UL 1482 may be installed in accordance with the listing specifications and the manufacturer's written instructions.

Reason: This proposal harmonizes IRC Section 1002 with the corresponding 2013 IBC Section 2112.

1) Metric conversion is incorrect; 2) NFPA 211 citation is incorrect; and 3) NFPA 211 Section 12.6 allows clearances under 36" with stipulated distance reduction strategies.

Cost Impact: The code change proposal will not increase the cost of construction.

RB456-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R1002.5 #1-RB-SEATON.doc

RB457 – 13

R1002.5, Chapter 44

Proponent: Timothy N. Seaton, B.S.C.E.; Empire Masonry Heaters LLC
(tseaton@timelyconstructon.com)

Revise as follows:

1002.5 Masonry heater clearance. Combustible materials shall not be placed within 36 inches (765 mm) of the outside surface of a masonry heater in accordance with NFPA 211, Section 8-7 (clearances for solid fuel-burning appliances), and the required space between the heater and combustible material shall be fully vented to permit the free flow of air around all heater surfaces.

Exceptions:

1. When the masonry heater is unlisted wall thickness is at least 8 inches (203 mm) thick of solid masonry and the wall thickness of the heat exchange channels is at least 5 inches (127 mm) thick of solid masonry, combustible materials shall not be placed within 4 inches (102 mm) of the outside surface of a masonry heater. A clearance of at least 8 inches (203 mm) shall be provided between the gas-tight capping slab of the heater and a combustible ceiling. clearances shall conform to TRVB 105.
2. When masonry heaters are listed and labeled in accordance with UL 1482 maybe and installed in accordance with the listing, specifications and manufacturer's written instructions, clearances shall be as listed.

Add new standard to Chapter 44 as follows:

TRVB 105 – Fireplaces for Solid Fuels

Reason: Make masonry heater clearances safe and rational!

North American masonry heater technology is virtually all sourced in Europe where the devices have been built for centuries. In conformance with typical European standards, ASTM E1602, *Standard Guide for Construction of Solid Fuel Burning Masonry Heaters*, does not stipulate masonry heater wall thickness nor relate it to clearances to combustibles. In contrast to masonry fireplace construction and operation, masonry heater wall thickness is not the critical design feature but instead material thermal conductivity. Greater wall thicknesses actually create a more dangerous situation by creating more thermal storage with eventual radiation.

Heat storing masonry heaters are being designed and installed at the same clearances as fireplaces which are not designed to store heat. Until recent IBC and IRC code revisions, all minimum masonry heater clearances were 4" (102 mm) to surface wall or protective shield as per ASTM E1602. Although I can locate no documented examples of wall ignition from masonry heaters of any wall thickness at this clearance:

1. no European country allows this low of a clearance for any masonry heater without testing and listing or a safety shielding strategy for clearance reduction.
2. no UL 1482 testing exists for any masonry heater with this low of a clearance.
3. ASTM E1602 mentions safety shielding but gives no prescription for use.
4. TRVB 105 remedies this by establishing greater safety clearances and outlining reduction strategies.

In the recent IBC/IRC code revision "NFPA 211, Section 8-7 (clearances for solid fuel-burning appliances)" (*sic*) was made a ruling standard for masonry heater clearances instead of ASTM E1602:

1. this standard was created for wood stoves and similar appliances and not masonry heaters.
2. no European country stipulates masonry heater clearances to combustibles anywhere near 36".
3. UL 1482 masonry heater testing is not yielding clearances anywhere near 36".
4. NFPA 211 has recently moved masonry heaters from the chapter on solid fuel burning appliances to their own chapter, recognizing the difference in the devices.

The typical masonry heater sold is custom in design and cannot support laboratory safety testing. We cannot expect that such units will be listed. TRVB 105 is a consensus document from the experts in the technology and is the more conservative of such European standards.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, TRVB 105 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2012.

RB457-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R1002.5 #2-RB-SEATON.doc

RB458 – 13

R1003.18

Proponent: Jim Buckley, Buckley Rumford Co. representing Masonry Alliance for Codes and Standards and Clay Lining Institute (buckley@rumford.com)

Revise as follows:

R1003.18 Chimney clearances. Any portion of a masonry chimney located in the interior of the building or within the exterior wall of the building shall have a minimum air space clearance to combustibles of 2 inches (51 mm). Chimneys located entirely outside the exterior walls of the building, including chimneys that pass through the soffit or cornice, shall have a minimum air space clearance of 1 inch (25 mm). The air space shall not be filled, except to provide fire blocking in accordance with Section R1003.19.

Exceptions:

1. Masonry chimneys equipped with a chimney lining system listed and *labeled* for use in chimneys in contact with combustibles in accordance with UL 1777 and installed in accordance with the manufacturer's installation instructions are permitted to have combustible material in contact with their exterior surfaces.
2. When masonry chimneys are constructed as part of masonry or concrete walls, combustible materials shall not be in contact with the masonry or concrete wall less than 12 inches (305 mm) from the inside surface of the nearest flue lining.
3. Exposed combustible trim and the edges of sheathing materials, such as wood siding and flooring, shall be permitted to abut the masonry chimney side walls, in accordance with Figure R1003.18, provided such combustible trim or sheathing is a minimum of ~~12 inches (305 mm)~~ 8 inches (203 mm) from the inside surface of the nearest flue lining. ~~Combustible material and trim shall not overlap the corners of the chimney by more than 1 inch (25 mm).~~

Reason: Tests have shown that the currently required 12" chimney wall thickness for the chimney to be in contact with combustible trim is overly restrictive. Chimneys with enclosing walls of 8" in contact with combustible material are at least as safe as the current basic code requiring chimneys to have 4" thick solid masonry walls two inches clear of combustibles. This change would provide for timber frame or wood ceilings to safely abut a masonry chimney.

Eight Inch Chimney Wall Test
In support of Buckley Code Change Proposal R1003.18 - 9/20/12

Purpose of test: To determine if a chimney built so that the clay flue liner is enclosed with 8" of solid masonry in contact with combustible materials is as safe as the current code requirement that the clay flue liner be enclosed with 4" of solid masonry plus 2" of air space to combustible materials.

We conclude that building chimney walls 8" thick in contact with combustible materials is at least as safe as building chimneys with 4" thick walls 2" clear of combustible materials which is current code.

Method: To build a masonry chimney with one side built to code - 4" thick wall plus 2" of air space to combustibles - and the opposite side built 8" thick in contact with combustibles and subject the chimney to flue gas temperatures representing an over fire or chimney fire condition. If the combustibles in contact with the 8" thick masonry did not become as hot as the combustibles 2" clear of a 4" thick masonry chimney wall (the code compliant condition) we can conclude that a chimney with 8" thick walls in contact with combustibles is at least as safe as the code compliant chimney with 4" walls plus a 2" air space to combustibles.

Results:

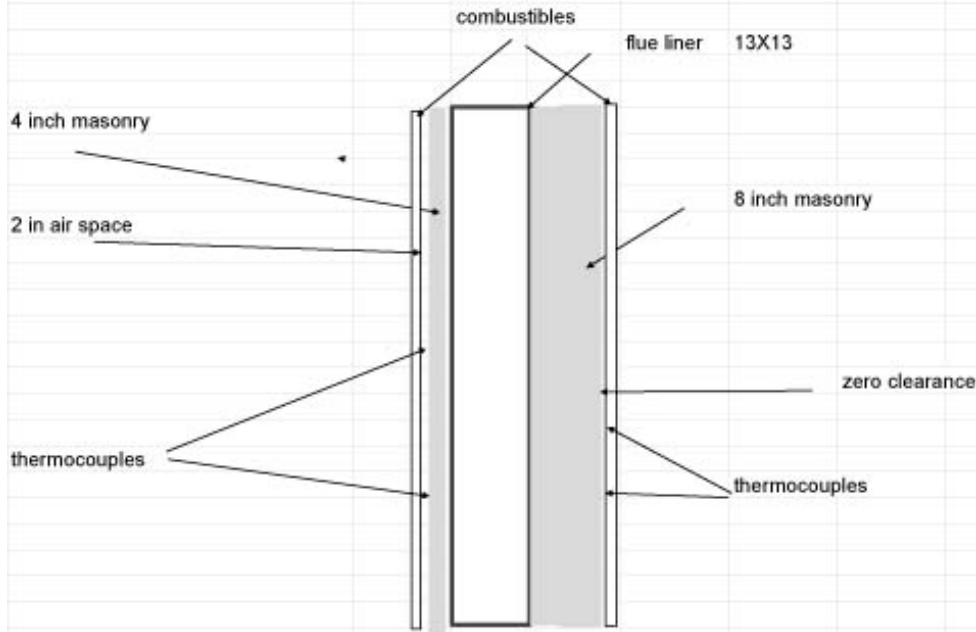
The combustibles on the code compliant side - 4" thick wall plus 2" of air space to combustibles - reached 90 deg.F above ambient temperature after four hours at a flue gas temperature of 1,000 deg. F while the combustibles in contact with the 8" thick side made it to five hours before reaching 90 degrees above ambient. By that time the combustibles on the code compliant side had reached 45 deg.F above the 90 deg.F above ambient failure temperature.



sept 14 2012

chimney test

4 inch brick with 2 inch air space versus 8 inch brick zero clearance



Time	flue	flue	zero	zero	zero	2 inch	2 inch	2 inch	ambient
start	71	71	66	66	66	66	66	66	56
1 hour	1000	1008	66	66	66	66	71	74	56
2 hr	1000	1005	85	78	79	94	102	111	56
3 hr	1001	992	111	102	104	127	132	137	58
4 hr	1001	993	147	142	142	168	165	175	57
5 hr	1002	995	144	160	168	200	201	197	74
6 hr	1000	992	167	170	170	220	226	227	78
7 hr	1000	992	191	194	197	230	232	236	83
8 hr	1002	995	203	202	205	231	231	240	83
1 hour of cooling time temps declined after this point	387	423	217	220	220	211	215	214	85

Test #2 Sept 19, 2012

1 Hr to heat chimney to 1400 then held for 3 hrs at 1400 then spiked to 2100 for 10 min cooled 1 hr and repeated twice

Time									
start	47	49	52	49	51	51	52	49	47
1 hour	1400	1338	52	53	53	71	71	76	52
2 hour	1403	1358	61	62	65	137	142	143	55
3 hour	1403	1355	87	94	101	208	215	218	61
4 hour	1401	1357	127	125	119	243	236	222	60
10 min hold at 2100	2100	1911	107	113	114	236	242	221	61
after 1 hour cool	702	693	136	143	147	235	241	248	64
10 min hold at 2100	2100	1928	131	135	137	239	241	248	62
after 1 hr cool	637	714	135	138	143	229	268	270	64
10 min hold at 2100	2073	1962	127	127	136	218	257	255	64
peak temp during 2 1/2 hr cooling	329	406	139	139	180	206	287	288	63

Cost Impact: The code change proposal will not increase the cost of construction, it would reduce the cost.

RB458-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R1003.18-RB-BUCKLEY.doc

RB459 – 13

R1004.5 (NEW)

Proponent: Bob Eugene, Underwriters Laboratories Inc, UL (robert.eugene@ul.com), David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

THIS CODE CHANGE WILL BE HEARD BY THE IRC-PLUMBING/MECHANICAL COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

Add new text as follows:

R1004.5 Gasketed fireplace doors. A gasketed fireplace door shall not be installed on a factory-built fireplace except where the fireplace system has been specifically tested, *listed* and *labeled* for such use in accordance with UL 127.

Reason:

(Eugene) Consistent with action on Proposal M163-12 in Group A codes.

(Hall) Because of requirements in the IECC that require all fireplaces to be provided with gasketed doors, a great deal of controversy has resulted. Most factory-built fireplaces are not tested for use with sealed glass doors and installing such doors on fireplaces that are not tested for these doors could cause overheating of the fireplace resulting in a fire hazard. Without testing, the effect of the doors will be an unknown. This text was approved for the 2015 IMC.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Cost Impact: The code change proposal will not increase the cost of construction.

RB459-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R1004.5 (NEW)-RB-EUGENE-HALL.doc

RB460 – 13

R1005.2

Proponent: Jim Buckley, Buckley Rumford Co., representing Masonry Alliance for Codes and Standards and Clay Lining Institute (buckley@rumford.com)

Revise as follows:

R1005.2 Decorative shrouds. Decorative shrouds shall not be installed at the termination of factory-built chimneys except where the shrouds are *listed* and *labeled* for use with the specific factory-built chimney system and installed in accordance with the manufacturer's installation instructions or comply with Section R1003.9.

Reason: It is impractical to test each custom decorative shroud with every listed chimney system so the manufacturers of the various UL listed chimney systems have added "supplementary instructions" to provide minimum dimensions and construction guidelines that are written in prescriptive language that is similar to that already in Section R1003.9 of the code. Individual home builders and manufacturers of chimney rain caps, spark arrestors, chimney caps or shrouds should not have to list their decorative shrouds as long as they meet the requirements set forth in Section R1003.9. This change would not prevent the use of listed decorative shrouds but it would provide for a safe way to install custom decorative shrouds - unlisted by complying with code.

Cost Impact: The code change proposal will not increase the cost of construction, it will reduce the cost.

RB460-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R1005.2-RB-BUCKLEY.doc

RB461 – 13

R1006.2, R1006.5

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

THIS CODE CHANGE WILL BE HEARD BY THE IRC-PLUMBING/MECHANICAL COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

Revise as follows:

R1006.2 Exterior air intake. The exterior air intake shall be capable of supplying all *combustion air* from the exterior of the *dwelling* or from spaces within the *dwelling* ventilated with ~~outside~~ outdoor air such as nonmechanically ventilated crawl or *attic* spaces. The exterior air intake shall not be located within the garage or *basement* of the *dwelling*. ~~nor~~ The exterior air intake, for other than listed factory-built fireplaces, shall not be located at an elevation higher than the firebox. The exterior air intake shall be covered with a corrosion-resistant screen of 1/4-inch (6 mm) mesh.

R1006.5 Outlet. ~~Locating the exterior air outlet in the back or sides of the firebox chamber or within 24 inches of the firebox opening on or near the floor is permitted.~~ The exterior air outlet shall be located in the back or side of the firebox chamber or shall be located outside of the firebox, at the level of the hearth and not greater than 24 inches (610mm) from the firebox opening. The outlet shall be closable and designed to prevent burning material from dropping into concealed combustible spaces.

Reason: The requirement that the exterior air intake not be located higher than the firebox appears to conflict with Section R1006.1.1 which simply defers the installation to the fireplace manufacturer's instructions. The proposed revision makes this requirement applicable only to masonry fireplaces. If the exterior air intake was not allowed to be higher than the firebox, listed factory-built fireplaces could not be installed in basements or the lower levels of split level homes. The only way around this appears to be the case where the air outlet is installed outside of the firebox as allowed in Section R1006.5, thus negating the concern for fire and hot gases entering the exterior air duct. (this hazard is not possible if the outlet is not within the firebox).

The revision to Section R1006.5 simply cleans up language and eliminates subjective text. The current first sentence does not require anything, rather, it offers some things that you are allowed to do. The location text "on or near the floor" is subjective. The intent is simply at the same level as the hearth, so, the outlet could be in the floor or in a wall at the intersection of the floor and wall.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Cost Impact: The code change proposal will not increase the cost of construction.

RB461-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

R1006.2-RB-HALL-PMGCAC

RB462 – 13

Appendix F

Proponent: Rick Davidson, City of Maple Grove, Association of Minnesota Building Officials
(rdavidson@maplegrovern.gov)

Revise as follows:

APPENDIX F RADON CONTROL METHODS PASSIVE RADON GAS CONTROLS

(The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.)

SECTION AF101 SCOPE

AF101.1 General. This appendix contains requirements for new construction in *jurisdictions* where radon-resistant construction is required. These requirements are intended to provide a passive means of resisting radon gas entry and prepare the dwelling for post-construction radon mitigation, if necessary (see Figure AF102). Active construction techniques may be used in lieu of passive techniques where approved.

Inclusion of this appendix by *jurisdictions* shall be determined through the use of locally available data or determination of Zone 1 designation in Figure AF101 and Table AF101(1).

SECTION AF102 DEFINITIONS

AF102.1 General. For the purpose of these requirements, the terms used shall be defined as follows:

DRAIN TILE LOOP. A continuous length of drain tile or perforated pipe extending around all or part of the internal or external perimeter of a *basement* or crawl space footing.

ENCLOSED CRAWL SPACE. A crawl space that is enclosed with foundation walls that may include windows, doors, access openings, and required vents.

GAS-PERMEABLE LAYER. A gas-permeable layer shall consist of one of the following:

1. A uniform layer of clean aggregate that is not less than 4 inches (102 mm) thick. The aggregate shall consist of material that will pass through a 2-inch (51 mm) sieve and be retained by a 1/4-inch (6.4 mm) sieve.
2. A uniform layer of sand (native or fill) that is not less than 4 inches (102 mm) thick and that is overlain by a soil gas collection mat or soil gas matting installed in accordance with the manufacturer's installation instructions.

RADON GAS. A naturally occurring, chemically inert, radioactive gas ~~that is not detectable by human senses. As a gas, it can move readily through particles of soil and rock, and can accumulate under the slabs and foundations of homes where it can easily enter into the living space through construction cracks and openings.~~

SOIL-GAS-RETARDER. A continuous membrane of 6-mil (0.15 mm) polyethylene ~~or other equivalent material~~ used to retard the flow of soil gases into a building dwelling.

SUBMEMBRANE DEPRESSURIZATION SYSTEM (Passive). A system designed to achieve lower submembrane air pressure relative to basement or crawl space air pressure by use of a vent pipe drawing air from beneath the soil-gas-retarder membrane.

SUBSLAB DEPRESSURIZATION SYSTEM (Active). A system designed to achieve lower subslab air pressure relative to indoor air pressure by use of a fan-powered vent drawing air from beneath the slab.

SUBSLAB DEPRESSURIZATION SYSTEM (Passive). A system designed to achieve lower subslab air pressure relative to indoor air pressure by use of a vent pipe ~~outed through the conditioned space of a building and connecting the subslab area with outdoor air, thereby relying on the convective flow of air upward in the vent to draw air from beneath the slab~~ drawing air from beneath concrete floor slabs or other floor assemblies that are in contact with the ground.

VENT PIPE. Not less than a 3-inch diameter (76 mm) ABS or PVC gastight pipe extending from the gas permeable layer through the roof.

SECTION AF103 REQUIREMENTS PASSIVE RADON RESISTANT SYSTEM REQUIREMENTS

AF103.1 General. The following construction techniques are intended to resist radon entry and prepare the building for post-construction radon mitigation, if necessary (see Figure AF102). These techniques are required in areas where designated by the *jurisdiction*. The following components of a passive submembrane or subslab depressurization system shall be installed during construction.

AF103.2 Subfloor preparation. A layer of gas-permeable material shall be placed under all concrete slabs and other floor systems that directly contact the ground and are within the walls of the living spaces of the building, to facilitate future installation of a subslab depressurization system, if needed. The gas-permeable layer shall consist of one of the following:

1. A uniform layer of clean aggregate, a minimum of 4 inches (102 mm) thick. The aggregate shall consist of material that will pass through a 2-inch (51 mm) sieve and be retained by a 1/4-inch (6.4 mm) sieve.
2. A uniform layer of sand (native or fill), a minimum of 4 inches (102 mm) thick, overlain by a layer or strips of geotextile drainage matting designed to allow the lateral flow of soil gases.
3. Other materials, systems or floor designs with demonstrated capability to permit depressurization across the entire subfloor area.

AF103.3 Soil-gas-retarder. A minimum 6-mil (0.15 mm) [or 3-mil (0.075 mm) cross-laminated] polyethylene or equivalent flexible sheeting material shall be placed on top of the gas-permeable layer prior to casting the slab or placing the floor assembly to serve as a soil-gas-retarder by bridging any cracks that develop in the slab or floor assembly, and to prevent concrete from entering the void spaces in the aggregate base material. The sheeting shall cover the entire floor area with separate sections of sheeting lapped at least 12 inches (305 mm). The sheeting shall fit closely around any pipe, wire or other penetrations of the material. All punctures or tears in the material shall be sealed or covered with additional sheeting.

AF103.4 AF103.2 Entry routes. Potential radon entry routes shall be closed in accordance with Sections AF103.4.1 AF103.2.1 through AF103.4.10 AF103.2.8.

AF103.4.1 AF103.2.1 Floor openings. Openings around bathtubs, showers, water closets, pipes, wires or other objects that penetrate concrete slabs, or other floor assemblies, shall be filled with a polyurethane caulk, or expanding foam or equivalent sealant applied in accordance with the manufacturer's ~~recommendations~~ installation instructions.

AF103.4.2 Concrete joints. All control joints, isolation joints, construction joints, and any other joints in concrete slabs or between slabs and foundation walls shall be sealed with a caulk or sealant. Gaps and joints shall be cleared of loose material and filled with polyurethane caulk or other elastomeric sealant applied in accordance with the manufacturer's recommendations.

AF103.4.3 Condensate drains. Condensate drains shall be trapped or routed through nonperforated pipe to daylight.

AF103.4.4 AF103.2.2 Sumps. Sumps pits open to soil or serving as the termination point for subslab or exterior drain tile loops shall be covered with a gasketed or otherwise sealed lid. Sumps used as the suction point in a subslab depressurization system shall have a lid designed to accommodate the vent pipe. Sumps used as a floor drain shall have a lid equipped with a trapped inlet.

AF103.4.5 AF103.2.3 Foundation walls. Hollow block masonry foundation walls shall be constructed with either a continuous course of *solid masonry*, one course of masonry grouted solid, or a solid concrete beam at or above finished ground surface grade to prevent the passage of air from the interior of the wall into the living space. Where a brick veneer or other masonry ledge is installed, the course immediately below that ledge shall be sealed *solid masonry, one course of masonry grouted solid, or a solid concrete beam*. Joints, cracks or other openings around all penetrations of both exterior and interior surfaces of masonry block or wood foundation walls below the ground surface grade shall be filled with polyurethane caulk or equivalent sealant. Penetrations of concrete walls shall be filled.

AF103.4.6 AF103.2.4 Dampproofing. The exterior surfaces of portions of concrete and masonry block foundation walls below the ground surface grade shall be dampproofed in accordance with Section R406.

AF103.4.7 AF103.2.5 Air-handling units Air-conditioning systems. Air-handling units Entry points, joints, or other openings into air conditioning systems in enclosed crawl spaces shall be sealed to prevent air from being drawn into the unit.

Exception: Units Systems with gasketed seams or units that are otherwise sealed by the manufacturer to prevent leakage.

AF103.4.8 AF103.2.6 Ducts. Ductwork passing through or beneath a slab within a dwelling shall be of seamless material unless the air-handling air-conditioning system is designed to maintain continuous positive pressure within such ducting. Joints in such ductwork shall be sealed to prevent air leakage.

Ductwork located in enclosed crawl spaces shall have all seams and joints sealed by closure systems in accordance with Section M1601.4.1.

AF103.4.9 Crawl space floors. Openings around all penetrations through floors above crawl spaces shall be caulked or otherwise filled to prevent air leakage.

AF103.4.10 AF103.2.7 Crawl space access. Access doors and other openings or penetrations between basements and adjoining crawl spaces shall be closed, gasketed or otherwise filled to prevent air leakage sealed.

AF103.5 Passive submembrane depressurization system AF103.3 Basements or enclosed crawl spaces with soil floors. In buildings dwellings with basements or enclosed crawl spaces foundations with soil floors, the following components of a passive submembrane depressurization system shall be installed during construction.

Exception: Buildings in which an approved mechanical crawl space ventilation system or other equivalent system is installed. Basements or enclosed crawl spaces that are provided with a continuously operated mechanical exhaust system in accordance with Section R408.3.

AF103.5.1 Ventilation. ~~Crawl spaces shall be provided with vents to the exterior of the building. The minimum net area of ventilation openings shall comply with Section R408.1.~~

AF103.5.2 AF103.3.1 Soil-gas-retarder. The soil in basements and enclosed crawl spaces shall be covered with a continuous layer of minimum 6-mil (0.15 mm) polyethylene soil-gas-retarder. The ~~ground cover~~ soil-gas-retarder shall be lapped a minimum of 12 inches (305 mm) at joints and shall extend to all foundation walls enclosing the basement or crawl space area. The soil-gas-retarder shall fit closely around any pipe, wire or other penetrations of the material. All punctures or tears in the material shall be sealed or covered with additional sheeting.

AF103.5.3 Vent pipe AF103.3.2 "T" fitting and vent pipe. ~~A plumbing tee or other approved connection~~ A 3- or 4-inch "T" fitting shall be inserted horizontally beneath the ~~sheeting~~ soil gas retarder and connected to a 3- or 4-inch-diameter (76 or 102 mm) fitting with a vertical vent pipe installed through the ~~sheeting~~ and be connected to a vent pipe. The vent pipe shall ~~be extended up through the building floors,~~ extend through the conditioned space of the dwelling and terminate at least 12 inches (305 mm) above the roof in a location at least 10 feet (3048 mm) away from any window or other opening into the ~~conditioned spaces of the building that is less than 2 feet (610 mm) below the exhaust point, and 10 feet (3048 mm) from any window or other opening in adjoining or adjacent buildings.~~

AF103.6 AF103.4 Passive subslab depressurization system Basements or enclosed crawl spaces with concrete floors or other floor systems and slab on grade dwellings. ~~In basement or slab on-grade buildings, the~~ The following components of a passive subslab depressurization system shall be installed during construction in slab on grade dwellings or in dwellings with basements or crawl spaces with concrete or other floor systems.

AF103.4.1 Sub-slab preparation. A layer of gas-permeable material shall be placed under all concrete slabs and other floor systems that directly contact the ground and are within the walls of the dwelling.

AF103.4.2 Soil-gas-retarder. A soil gas retarder shall be placed on top of the gas-permeable layer prior to casting the slab or placing the floor assembly. The soil-gas-retarder shall cover the entire floor area with separate sections lapped at least 12 inches (305 mm). The soil-gas-retarder shall fit closely around any pipe, wire, or other penetrations of the material. All punctures or tears in the material shall be sealed or covered.

AF103.6.1 AF103.4.3 Vent pipe "T" fitting and vent pipe. A minimum 3-inch-diameter (76 mm) ABS, PVC or equivalent gas-tight pipe shall be embedded vertically into the subslab aggregate or other permeable material before the slab is cast. A "T" fitting or equivalent method shall be used to ensure that the pipe opening remains within the subslab permeable material. Alternatively, the 3-inch (76 mm) pipe shall be inserted directly into an interior perimeter drain tile loop or through a sealed sump cover where the sump is exposed to the subslab aggregate or connected to it through a drainage system.

The pipe shall be extended up through the building floors, and terminate at least 12 inches (305 mm) above the surface of the roof in a location at least 10 feet (3048 mm) away from any window or other opening into the ~~conditioned spaces of the building that is less than 2 feet (610 mm) below the exhaust point, and 10 feet (3048 mm) from any window or other opening in adjoining or adjacent buildings.~~ Before a slab is cast or other floor system is installed, a "T" fitting shall be inserted below the slab or other floor system and the soil-gas-retarder. The "T" fitting shall be connected to a vent pipe. The vent pipe shall extend through the conditioned space of the dwelling and terminate not less than 12 inches (305 mm) above the roof in a location at least 10 feet (3048 mm) away from any window or other opening into the conditioned spaces of the building that is less than 2 feet (610 mm) below the exhaust point.

AF103.5 Drain tile and sump used for depressurization. As an alternative to inserting a vent pipe into a "T" fitting, a vent pipe shall be permitted to be inserted directly into an interior perimeter drain tile loop or through a sump cover where the drain tile and/or sump is exposed to the gas permeable layer.

~~AF103.6.2~~ AF103.6 Multiple vent pipes. In buildings dwellings where interior footings or other barriers separate the subslab aggregate or other gas-permeable material layer, each area shall be fitted with an individual vent pipe. Vent pipes shall connect to a single vent that terminates above the roof or each individual vent pipe shall terminate separately above the roof.

~~AF103.7~~ AF103.7 Combination foundations. Where basement or crawl space floors are on different levels, each level shall have a separate vent pipe. Multiple vent pipes may be connected to a single vent pipe that terminates above the roof.

~~AF103.7~~ AF103.8 Vent pipe drainage. All components of the radon vent pipe system shall be installed to provide positive drainage to the ground beneath the slab or soil-gas-retarder.

~~AF103.8~~ AF103.8 Vent pipe accessibility. Radon vent pipes shall be accessible for future fan installation through an attic or other area outside the habitable space.

Exception: The radon vent pipe need not be accessible in an attic space where an approved roof-top electrical supply is provided for future use.

AF103.9 Vent pipe identification. All exposed and visible interior radon vent pipes shall be identified with at least one label on each floor and in accessible attics. The label shall read: "Radon Reduction System."

~~AF103.10~~ AF103.10 Combination foundations. Combination basement/ crawl space or slab-on-grade/crawl space foundations shall have separate radon vent pipes installed in each type of foundation area. Each radon vent pipe shall terminate above the roof or shall be connected to a single vent that terminates above the roof.

~~AF103.11~~ AF103.11 Building depressurization. Joints in air ducts and plenums in unconditioned spaces shall meet the requirements of Section M1601. Thermal envelope air infiltration requirements shall comply with the energy conservation provisions in Chapter 11. Fireblocking shall meet the requirements contained in Section R302.11.

~~AF103.12~~ AF103.10 Power source and access for future radon fan. To provide for future installation of an active submembrane or subslab depressurization system a radon fan, an electrical circuit terminated in an approved box shall be installed during construction in the attic or other anticipated location of vent pipe the radon fans. An electrical supply shall also be accessible in anticipated locations of system failure alarms. An accessible clear space 24 inches in diameter by 3 feet in height adjacent to the vent pipe shall be provided at the anticipated location of a future radon fan.

Reason: First is it important to point out that the current radon rules only require a "passive" system. The current rules do not require a radon fan and do not regulate fans or "active" systems when they are installed. This proposal does not change that.

Second, there may be flaws in the existing language other than what are pointed out here. For example, current code language does not address some of the fine points of installing a soil-gas-retarder. Someone with greater expertise will need to correct those problems in subsequent code changes if they believe it is necessary.

And third, these rules have gone unchanged since being placed in the appendix of the 2000 IRC. Because they are in the appendix and because they are very infrequently adopted, they have not received the attention they might otherwise have had if they had been in the main body of the code. For those jurisdictions that have had the misfortune of having to enforce radon rules, they have proven problematic because the current rules are not well written and include conflicts, repetitive language, and vagaries. This proposal is intended to rearrange the sections in a more logical manner, create new definitions, delete unnecessary and repetitive language, and eliminate conflicts.

What follows is a section by section explanation of the revisions that are proposed.

APPENDIX F RADON CONTROL METHODS PASSIVE RADON GAS CONTROLS

(The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.)

Reason: The proposed title revision is intended to make clear that this appendix chapter only requires "passive radon controls".

SECTION AF101 SCOPE

AF101.1 General. This appendix contains requirements for new construction in *jurisdictions* where radon-resistant construction is required. These requirements are intended to provide a passive means of resisting radon gas entry and prepare the dwelling for post-construction radon mitigation, if necessary (see Figure AF102). Active construction techniques may be used in lieu of passive techniques when approved.

Inclusion of this appendix by *jurisdictions* shall be determined through the use of locally available data or determination of Zone 1 designation in Figure AF101 and Table AF101(1).

Reason: The language added to the Scope has been relocated from AF103.1. It seems more appropriate to have this explanatory language in the scope. It further explains that "Active" systems are permitted when approved. There is no attempt here to provide any direction on an appropriate active system since there is none in the current rule.

SECTION AF102 DEFINITIONS

AF102.1 General. For the purpose of these requirements, the terms used shall be defined as follows:

DRAIN TILE LOOP. A continuous length of drain tile or perforated pipe extending around all or part of the internal or external perimeter of a basement or crawl space footing.

ENCLOSED CRAWL SPACE. A crawl space that is enclosed with foundation walls that may include windows, doors, access openings, and required vents.

Reason: This definition is necessary because the term "crawl space" is frequently used in the section but there is no differentiation between an enclosed and unenclosed crawl space. The presumption here is that a crawl space that is open to the exterior (ex. dwelling constructed on piers) does not pose a risk from radon gas. The application proposed in this revision is that we are only concerned with enclosed crawl spaces.

GAS-PERMEABLE LAYER. A gas-permeable layer shall consist of one of the following:

1. A uniform layer of clean aggregate that is a minimum of 4 inches (102 mm) thick. The aggregate shall consist of material that will pass through a 2-inch (51 mm) sieve and be retained by a 1/4-inch (6.4 mm) sieve.
2. A uniform layer of sand (native or fill) that is a minimum of 4 inches (102 mm) thick and that is overlain by a soil gas collection mat or soil gas matting installed in accordance with the manufacturer's installation instructions.

Reason: Rather than frequent repetition of what constitutes a gas-permeable layer, a definition is proposed. This language is taken from AF103.2. Furthermore, the term "geotextile drainage matting" is replaced with "soil gas collection mat or soil gas matting" which is the term found in the EPA handbook entitled "Build Radon Out". An internet search of those terms will result in many "hits".

A. Gas Permeable Layer

Usually a 4-inch layer of clean, coarse gravel is used beneath the slab to allow the soil gas to move freely underneath the house. Other options are to install a loop of perforated pipe or soil gas collection mat (also known as drainage mat or soil gas matting).

Additionally, it is proposed that soil gas collection mats be installed in accordance with the manufacturer's installation instructions. The following link is an example of the installation instructions for this particular product indicating that there is significant detail and direction given.

<http://www.radon.biz/soilgascollectormattingpriceperrollcomesin45footrolls.aspx>

Placing the Mat

1. Lay out the Soil Gas Collector (SGC) on the sub grade after the final preparation and before the concrete is poured. It is typically laid out in a rectangular loop in the largest area with branches or legs into the smaller areas.
2. Position the "T-Riser" in appropriate location and nail down with a 12-inch spike through hole in center.
3. Slide the SGC into openings in "T-Riser" with a portion of the fabric around the outside. Tape the fabric to the outside of the "T-Riser" with duct tape and staple the SGC to the ground with a landscaping staple near the "T-Riser"
4. Roll out the SGC, smooth it onto the ground. To avoid wrinkles and buckling, work away from the "T-Riser", stapling it to the ground as you go. The SGC should be stapled to the ground every three to four feet, in addition to the corners, "tee's" and ends.

5. Corners are constructed by peeling back the filter fabric, cutting the two ends of the SGC matrix at 45 angles and butting (or overlap no more than 1½ inch) the matrix together. Pull the filter fabric back and tape into place. Staple across the joint of the matrix and each leg of the corner. Use a minimum of four staples at each corner - two across the joint and one on each leg.
6. The "tees" for branches or legs are constructed by slitting the fabric of the main loop at the location desired. Cut the fabric of branch at the edges and expose 2 inches of the matrix. Cut off the exposed matrix and butt the matrix of the branch (or overlap no more than 1½ inch) to the matrix of the main loop. Pull the filter fabric of the branch back over the main loop and tape into place. Staple across the joint of the matrix with two staples and one each on the branch and the main loop. Use a minimum of four staples at each "tee" - two across the joint and one on each on the loop and branch
7. All openings in the fabric at joints, "tee's and ends of the branches should be taped to keep out the concrete.
8. When the building is ready for the soil gas vent pipe to be installed, the top of the "T-Riser" is cut off and a four-inch pipe is inserted, caulked with polyurethane and secured with screws. The vent pipe should be labeled to avoid confusion with the plumbing pipes.

Note: The openings in the riser are laid out at 180 to accommodate straight runs of the SGC only. If the riser is to be located in a corner, which is Not uncommon, the front of the "tee" can be cut off and the SGC inserted into the new opening. The side of the "tee" which will not be used should be sealed with duct tape. This creates a "90 tee" which will allow the riser to be placed in a corner with either end of the SGC loop running into the "tee" at a 90 angle.

Pouring Concrete:

The filter fabric that comes sewn around the soil gas collector prevents the wet concrete from entering the mat and reducing its air collection capacity. The only precaution that needs to be taken is that the fabric is duct tape closed at seams of splices and corners sufficiently to keep the uncured concrete from entering.

The mat also needs to be secured to the soil with landscape staples to prevent the concrete from lifting it off the soil while it is being applied. Reinforcing bars and wire can be laid right on top of the mat.

Note that the mat is strong enough to withstand concrete workers and their wheelbarrows as they cross over it during the course of installing the slab.

Riser has special hole and spike for securing it in place.

Making Corners and Splices

The mat should be routed around the inside perimeter of the foundation. This will require an occasional corner.

Furthermore, splices will have to be made to join two lengths of mat together. Corners and splices are very easy to make, and do not require any special fittings. Cut back the filter fabric to expose the core material. In the case of a splice merely overlap the core by at least one corrugation replace the cloth and tape it. Use two landscape staples to hold the splice in place. In the case of a corner slice the core of two adjoining legs of the mat at 45-degree angles, overlap the edges by one corrugation, tape the cloth and landscape staple together. The corner is illustrated below:

Cut back the cloth. Cut the core at a 45 degree angle. Overlap corrugations

Replace filter cloth. Duct tape edges to keep out concrete. Staple in place.

Connecting The Mat To The Riser

A convenient riser with a dual entry allows for either end of the loop of mat to be secured to the soil gas vent riser.

Slide the mat into either end of the riser and tape the edge to prevent wet concrete from entering.

The riser comes with a molded cap to keep out concrete Later this cap can be cut off and the 4" Sch. 40 PVC riser can be inserted, screwed and caulked into place

Risers are often placed in corners for convenience of later pipe routing. The plastic riser "tee" can be cut to allow for such situations.

RADON GAS. A naturally occurring, chemically inert, radioactive gas that is not detectable by human senses. As a gas, it can move readily through particles of soil and rock, and can accumulate under the slabs and foundations of homes where it can easily enter into the living space through construction cracks and openings.

Reason: There is a significant amount of commentary and unnecessary language in this definition that is proposed for deletion.

SOIL-GAS-RETARDER. A continuous membrane of 6-mil (0.15 mm) polyethylene or other equivalent material used to retard the flow of soil gases into a building dwelling.

Reason: There are two editorial revisions in this definition. The first deletes the reference to equivalencies which is frequently found in the section. Equivalencies are always permitted by R104.11. The second revision replaces the term "building" with "dwelling" here and throughout the section. This is to help make clear that the rules apply only to the dwelling and not an accessory building such as a garage.

SUBMEMBRANE DEPRESSURIZATION SYSTEM (Passive). A system designed to achieve lower submembrane air pressure relative to basement or crawl space air pressure by use of a vent pipe drawing air from beneath the soil-gas-retarder membrane.

Reason: The term "basement or" is added to avoid conflicts where an underfloor space that meets the definition of a basement does not have a concrete or other floor system but only a soil floor.

SUBSLAB DEPRESSURIZATION SYSTEM (Active). A system designed to achieve lower subslab air pressure relative to indoor air pressure by use of a fan-powered vent drawing air from beneath the slab.

Reason: It is necessary that code language be easily understood by the public and code enforcement. Including language in the code that references non-required systems conflicts with that goal and can mislead the use and interpretation of the rule simply because the extra language exists. The feeling is that it must somehow apply because it is there. Users of the code may confuse the definition for active systems with passive systems and misapply the rule. The IRC language only requires a **passive** system. While it is necessary to define a passive system, it is not necessary to define an active system. It is therefore reasonable to delete this language as it serves no purpose.

SUBSLAB DEPRESSURIZATION SYSTEM (Passive). A system designed to achieve lower subslab air pressure relative to indoor air pressure by use of a vent pipe routed through the conditioned space of a building and connecting the subslab area with outdoor air, thereby relying on the convective flow of air upward in the vent to draw air from beneath the slab drawing air from beneath concrete floor slabs or other floor assemblies that are in contact with the ground.

Reason: It is not necessary to repeat language in the definition that is found elsewhere. Furthermore, a definition is proposed for the term "vent pipe" that contains the deleted language. The added language is for clarification and consistency with the definition of submembrane depressurization system.

VENT PIPE. A minimum 3-inch diameter (76 mm) ABS or PVC gastight pipe extending from the gas permeable layer through the roof.

Reason: Again this definition is proposed to avoid the need to frequently repeat what a vent pipe is.

SECTION AF103 REQUIREMENTS PASSIVE RADON RESISTANT SYSTEM REQUIREMENTS

AF103.1 General. The following construction techniques are intended to resist radon entry and prepare the building for post-construction radon mitigation, if necessary (see Figure AF102). These techniques are required in areas where designated by the jurisdiction. The following components of a passive submembrane or subslab depressurization system shall be installed during construction.

Reason: The sentence deleted has been moved to the Scope as that is a more appropriate location.

AF103.2 Subfloor preparation. A layer of gas-permeable material shall be placed under all concrete slabs and other floor systems that directly contact the ground and are within the walls of the living spaces of the building, to facilitate future installation of a subslab depressurization system, if needed. The gas-permeable layer shall consist of one of the following:

1. A uniform layer of clean aggregate, a minimum of 4 inches (102 mm) thick. The aggregate shall consist of material that will pass through a 2-inch (51 mm) sieve and be retained by a 1/4-inch (6.4 mm) sieve.
2. A uniform layer of sand (native or fill), a minimum of 4 inches (102 mm) thick, overlain by a layer or strips of geotextile drainage matting designed to allow the lateral flow of soil gases.
3. Other materials, systems or floor designs with demonstrated capability to permit depressurization across the entire subfloor area.

AF103.3 Soil-gas-retarder. A minimum 6-mil (0.15 mm) [or 3-mil (0.075 mm) cross-laminated] polyethylene or equivalent flexible sheeting material shall be placed on top of the gas-permeable layer prior to casting the slab or placing the floor assembly to serve as a soil-gas-retarder by bridging any cracks that develop in the slab or floor assembly, and to prevent concrete from entering the void spaces in the aggregate base material. The sheeting shall cover the entire floor area with separate sections of sheeting lapped at least 12 inches (305 mm). The sheeting shall fit closely around any pipe, wire or other penetrations of the material. All punctures or tears in the material shall be sealed or covered with additional sheeting.

Reason: The two previous sections have been relocated to the subslab and submembrane sections below so that they are located more appropriately. Also, a new definition for "gas-permeable layer" has been added to the definitions that incorporates much of the language in AF103.3.

AF103.4 AF103.2 Entry routes. Potential radon entry routes shall be closed in accordance with Sections AF103.4.1 AF103.2.1 through AF103.4.10 AF103.2.7.

AF103.4.1 AF103.2.1 Floor openings. Openings around bathtubs, showers, water closets, pipes, wires or other objects that penetrate concrete slabs, or other floor assemblies, shall be filled with a polyurethane caulk, or expanding foam or equivalent sealant applied in accordance with the manufacturer's recommendations installation instructions.

Reason: These are largely editorial revisions but also provide for the use of expanding foam in larger spaces where caulking is not appropriate.

AF103.4.2 Concrete joints. All control joints, isolation joints, construction joints, and any other joints in concrete slabs or between slabs and foundation walls shall be sealed with a caulk or sealant. Gaps and joints shall be cleared of loose material and filled with polyurethane caulk or other elastomeric sealant applied in accordance with the manufacturer's recommendations.

Reason: This section requires that various joints in the floor slab be "sealed". The EPA booklet "Build Radon Out" gives some perspective on the need to "seal" these joints. The text found on page 51 follows:

Seal control joints

Control joints in the concrete slab, whether they are saw cut or made with grooving tools, should be cleaned and filled with caulk. Even if they are not cracked initially, they will likely develop cracks in the future and caulking them before the floor finishes are in place makes sense. A gun-grade polyurethane or a flowable polyurethane can be used. This seal does not interfere with the expansion of the control joint, but does block radon entry.

The presumption advanced by the EPA booklet is that these joints, even if not initially cracked, will eventually crack and "caulking them before the floor finishes are in place makes sense".

However, the EPA booklet also states that one purpose for installing the soil gas membrane (plastic sheeting), is that it can bridge cracks that develop in the floor. This is stated on page 42 of the booklet.

Laying plastic sheeting between the gas permeable layer and the concrete slab or floor assembly serves several important purposes. The sheeting can prevent concrete from flowing down and clogging the gas permeable layer. It can also bridge any cracks that may develop in the slab or floor assembly, thereby reducing soil gas entry. Finally, the plastic sheeting can act as a vapor barrier to reduce moisture and other soil gas entry into the home.

If the plastic serves to bridge cracks, installing a sealant in the joints at the time of construction is redundant and unnecessary. The plastic will always be there. My argument is that the radon doesn't know what kind of crack it is trying to penetrate so that it cannot be more aggressive with a construction joint than it can with a crack due to shrinkage or expansion.

Also, I have received complaints from new homeowners that the sealant used in the joints in basement floors is slow to cure and that it gets on shoes and is tracked all over the new home. Clearly this is not an acceptable situation.

Also, flooring contractors complain about the caulking joint causing visible ridges in some flooring products and they almost always scrape the floors before installation removing most, if not all, of the caulking.

If the home has a crawl space, the plastic sheeting only need be overlapped by twelve inches. It is not required to be sealed. It is therefore unreasonable to seal a joint in a concrete floor over a plastic sheet when laps in the sheet do not need any special treatment when there is no floor. There just is no reasonable explanation that can be given.

Therefore, it is necessary that this section of the rule be deleted. This proposal is reasonable because sealing the joints is redundant given the language in the EPA booklet and laps in plastic sheeting need not be sealed when there is no floor.

AF103.4.3 Condensate drains. Condensate drains shall be trapped or routed through nonperforated pipe to daylight.

Reason: *Why can't condensate drains discharge to a floor drain or a sump? Why must they be trapped? This is already regulated by M1411.3.*

AF103.4.4 AF103.2.2 Sumps. Sumps pits open to soil or serving as the termination point for subslab or exterior drain tile loops shall be covered with a gasketed or otherwise sealed lid. Sumps used as the suction point in a subslab depressurization system shall have a lid designed to accommodate the vent pipe. Sumps used as a floor drain shall have a lid equipped with a trapped inlet.

AF103.4.5 AF103.2.3 Foundation walls. Hollow block masonry foundation walls shall be constructed with either a continuous course of solid masonry, one course of masonry grouted solid, or a solid concrete beam at or above finished ground surface grade to prevent the passage of air from the interior of the wall into the living space. Where a brick veneer or other masonry ledge is installed, the course immediately below that ledge shall be sealed solid masonry, one course of masonry grouted solid, or a solid concrete beam. Joints, cracks or other openings around all penetrations of both exterior and interior surfaces of ~~masonry block or wood~~ foundation walls below the ground surface grade shall be filled with polyurethane caulk or equivalent sealant. Penetrations of concrete walls shall be filled.

Reason: *Revisions are editorial to eliminate repetition, commentary language, and for clarity.*

AF103.4.6 AF103.2.4 Dampproofing. The exterior surfaces of portions of concrete and masonry block foundation walls below the ground surface grade shall be dampproofed in accordance with Section R406.

Reason: *Editorial revisions.*

AF103.4.7 AF103.2.5 Air-handling units Air-conditioning systems. Air-handling units Entry points, joints, or other openings into air conditioning systems in enclosed crawl spaces shall be sealed to prevent air from being drawn into the unit.

Exception: Units Systems with gasketed seams or units that are otherwise sealed by the manufacturer to prevent leakage.

Reason: *The term "air-handling units" is not defined. "Air-conditioning systems" is defined in the IRC as: A system that consists of heat exchangers, blowers, filters, supply, exhaust and return-air systems, and shall include any apparatus installed in connection therewith." It is best to use a defined term to avoid confusion.*

AF103.4.8 AF103.2.6 Ducts. Ductwork passing through or beneath a slab within a dwelling shall be of seamless material unless the air-handling air-conditioning system is designed to maintain continuous positive pressure within such ducting. Joints in such ductwork shall be sealed to prevent air leakage.

Ductwork located in enclosed crawl spaces shall have all seams and joints sealed by closure systems in accordance with Section M1601.4.1.

Reason: *Editorial revisions. Additionally, when the code includes language such as "to prevent air leakage", some code officials will interpret that to create a standard and that some testing is undertaken to illustrate that the standard is met. Some code officials will require a pressure test of the space to demonstrate that there is no air leakage. The presumption here is that such a standard was not intended.*

AF103.4.9 Crawl space floors. Openings around all penetrations through floors above crawl spaces shall be caulked or otherwise filled to prevent air leakage.

Reason: *These openings are already required to be sealed for purposes of fireblocking in section R302.11.*

AF103.4.10 AF103.2.7 Crawl space access. Access doors and other openings or penetrations between basements and adjoining crawl spaces shall be closed, gasketed or otherwise filled to prevent air leakage sealed.

Reason: *Elimination of commentary language. Additionally, when the code includes language such as "to prevent air leakage", some code officials will interpret that to create a standard and that some testing is undertaken to illustrate that the standard is met. Some code officials will require a pressure test of the space to demonstrate that there is no air leakage. The presumption here is that such a standard was not intended.*

AF103.5 Passive submembrane depressurization system AF103.3 Basements or enclosed crawl spaces having soil floors. In buildings dwellings with basements or enclosed crawl spaces foundations with soil floors, the following components of a passive submembrane depressurization system shall be installed during construction.

Exception: Buildings in which an approved mechanical crawl space ventilation system or other equivalent system is installed. Basements or enclosed crawl spaces that are provided with a continuously operated mechanical exhaust system in accordance with R408.3.

Reason: *Editorial revisions. Revisions also recognize any underfloor space with a soil floor regardless of what the space is called. Also, the exception references an "approved mechanical crawl space ventilation system or other equivalent system." It is not clear what the criteria might be for approving such a system or an equivalent system to that approved. So what is proposed here is the continuous mechanical exhaust system identified in R408.3.*

AF103.5.1 Ventilation. Crawl spaces shall be provided with vents to the exterior of the building. The minimum net area of ventilation openings shall comply with Section R408.1.

Reason: Crawl spaces are already required to be ventilated by R408.1. It isn't necessary to repeat that language here.

AF103.5.2 AF103.3.1 Soil-gas-retarder. The soil in basements and enclosed crawl spaces shall be covered with a continuous layer of minimum 6-mil (0.15 mm) polyethylene soil-gas-retarder. The ground cover soil-gas-retarder shall be lapped a minimum of 12 inches (305 mm) at joints and shall extend to all foundation walls enclosing the basement or crawl space area. The soil-gas-retarder shall fit closely around any pipe, wire or other penetrations of the material. All punctures or tears in the material shall be sealed or covered with additional sheeting.

Reason: Editorial revisions. The last two sentences are taken from AF103.3 as the rules are applicable at this location.

AF103.5.3 Vent pipe AF103.3.2 "T" fitting and vent pipe. A plumbing tee or other approved connection A 3- or 4-inch "T" fitting shall be inserted horizontally beneath the sheeting soil gas retarder and connected to a 3- or 4-inch diameter (76 or 102 mm) fitting with a vertical vent pipe installed through the sheeting and be connected to a vent pipe. The vent pipe shall be extended up through the building floors, extend through the conditioned space of the dwelling and terminate at least 12 inches (305 mm) above the roof in a location at least 10 feet (3048 mm) away from any window or other opening into the conditioned spaces of the building that is less than 2 feet (610 mm) below the exhaust point, and 10 feet (3048 mm) from any window or other opening in adjoining or adjacent buildings.

Reason: Largely editorial but also recognizing that definitions address the deleted language.

AF103.6 AF103.4 Passive subslab depressurization system Basements or enclosed crawl spaces having concrete floors or other floor systems and slab on grade dwellings. In basement or slab-on-grade buildings, the The following components of a passive subslab depressurization system shall be installed during construction in slab on grade dwellings or in dwellings with basements or crawl spaces having concrete or other floor systems.

Reason: Editorial revisions. Revisions also recognize any underfloor space with a concrete or other floor system regardless of what the space is called. It is not uncommon for crawl spaces to have concrete floors.

AF103.4.1 Sub-slab preparation. A layer of gas-permeable material shall be placed under all concrete slabs and other floor systems that directly contact the ground and are within the walls of the dwelling.

Reason: This is text that has been relocated from AF103.2.

AF103.4.2 Soil-gas-retarder. A soil gas retarder shall be placed on top of the gas-permeable layer prior to casting the slab or placing the floor assembly. The soil-gas-retarder shall cover the entire floor area with separate sections lapped at least 12 inches (305 mm). The soil-gas-retarder shall fit closely around any pipe, wire, or other penetrations of the material. All punctures or tears in the material shall be sealed or covered.

Reason: This text has been relocated from AF103.3.

AF103.6.1 AF103.4.3 Vent pipe "T" fitting and vent pipe. A minimum 3-inch-diameter (76 mm) ABS, PVC or equivalent gas-tight pipe shall be embedded vertically into the subslab aggregate or other permeable material before the slab is cast. A "T" fitting or equivalent method shall be used to ensure that the pipe opening remains within the subslab permeable material. Alternatively, the 3-inch (76 mm) pipe shall be inserted directly into an interior perimeter drain tile loop or through a sealed sump cover where the sump is exposed to the subslab aggregate or connected to it through a drainage system. The pipe shall be extended up through the building floors, and terminate at least 12 inches (305 mm) above the surface of the roof in a location at least 10 feet (3048 mm) away from any window or other opening into the conditioned spaces of the building that is less than 2 feet (610 mm) below the exhaust point, and 10 feet (3048 mm) from any window or other opening in adjoining or adjacent buildings. Before a slab is cast or other floor system is installed, a "T" fitting shall be inserted below the slab or other floor system and the soil-gas-retarder. The "T" fitting shall be connected to a vent pipe. The vent pipe shall extend through the conditioned space of the dwelling and terminate at least 12 inches (305 mm) above the roof in a location at least 10 feet (3048 mm) away from any window or other opening into the conditioned spaces of the building that is less than 2 feet (610 mm) below the exhaust point.

Reason: Largely editorial but also recognizing that definitions address the deleted language. A portion of the new text came from AF103.3.

AF103.5 Drain tile and sump used for depressurization. As an alternative to inserting a vent pipe into a "T" fitting, a vent pipe may be inserted directly into an interior perimeter drain tile loop or through a sump cover where the drain tile and/or sump is exposed to the gas permeable layer.

Reason: This is new text that recognizes that a sump or drain tile can be used in a passive radon system.

AF103.6.2 AF103.5 Multiple vent pipes. In buildings dwellings where interior footings or other barriers separate the subslab aggregate or other gas-permeable material layer, each area shall be fitted with an individual vent pipe. Vent pipes shall connect to a single vent that terminates above the roof or each individual vent pipe shall terminate separately above the roof.

Reason: Editorial revisions.

AF103.5 Combination foundations. Where basement or crawl space floors are on different levels, each level shall have a separate vent pipe. Multiple vent pipes may be connected to a single vent pipe that terminates above the roof.

Reason: This section has been relocated from later in the section to group like requirements. It has also been editorially revised for clarity.

AF103.7 AF103.8 Vent pipe drainage. All components of the radon vent pipe system shall be installed to provide positive drainage to the ground beneath the slab or soil-gas-retarder.

AF103.8 Vent pipe accessibility. Radon vent pipes shall be accessible for future fan installation through an ~~attic~~ or other area outside the ~~habitable space~~.

Exception: The radon vent pipe need not be accessible in an ~~attic~~ space where an ~~approved~~ roof-top electrical supply is provided for future use.

Reason: *This section has been moved to the end of the section to group like requirements.*

AF103.9 AF103.9 Vent pipe identification. All exposed and visible interior radon vent pipes shall be identified with at least one ~~label~~ on each floor and in accessible ~~attics~~. The ~~label~~ shall read: "Radon Reduction System."

AF103.10 Combination foundations. ~~Combination basement/ crawl space or slab-on-grade/crawl space foundations shall have separate radon vent pipes installed in each type of foundation area. Each radon vent pipe shall terminate above the roof or shall be connected to a single vent that terminates above the roof.~~

Reason: *This section has been moved up to group like requirements.*

AF103.11 Building depressurization. Joints in air ducts and plenums in ~~unconditioned spaces~~ shall meet the requirements of Section M1601. Thermal envelope air infiltration requirements shall comply with the energy conservation provisions in Chapter 11. Fireblocking shall meet the requirements contained in Section R302.11.

Reason: *It seems unnecessary to repeat requirements that are found elsewhere in the code.*

AF103.12 AF103.10 Power source and access for future radon fan. To provide for future installation of an active submembrane or subslab depressurization system a radon fan, an electrical circuit terminated in an ~~approved~~ box shall be installed during construction in the ~~attic or other anticipated location of vent pipe~~ the radon fans. An electrical supply shall also be accessible in anticipated locations of system failure alarms. An accessible clear space 24 inches in diameter by 3 feet in height adjacent to the vent pipe shall be provided at the anticipated location of a future radon fan.

Reason: *This text applies to providing a space and power source for the future installation of a radon fan. The term "attic" has been deleted as it unnecessarily confuses where the placement of the electrical termination should be. The term "other anticipated location" implies that the fan could be placed anywhere, not just an attic. And since active systems aren't regulated, there will be no oversight to the final location of a fan anyway. The reference to "system failure alarms" is deleted as there are non-electrical ways of monitoring active systems and it would seem that the same box used to power the fan could power the alarm.*

To aid in understanding the impact of these changes, what follows is the revised text minus the cross-outs and underlines.

APPENDIX F PASSIVE RADON GAS CONTROLS

(The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.)

SECTION AF101 SCOPE

AF101.1 General. This appendix contains requirements for new construction in *jurisdictions* where radon-resistant construction is required. These requirements are intended to provide a passive means of resisting radon gas entry and prepare the dwelling for post-construction radon mitigation, if necessary (see Figure AF102). Active construction techniques may be used in lieu of passive techniques when approved.

Inclusion of this appendix by *jurisdictions* shall be determined through the use of locally available data or determination of Zone 1 designation in Figure AF101 and Table AF101(1).

SECTION AF102 DEFINITIONS

AF102.1 General. For the purpose of these requirements, the terms used shall be defined as follows:

DRAIN TILE LOOP. A continuous length of drain tile or perforated pipe extending around all or part of the internal or external perimeter of a *basement* or crawl space footing.

ENCLOSED CRAWL SPACE. A crawl space that is enclosed with foundation walls that may include windows, doors, access openings, and required vents.

GAS-PERMEABLE LAYER. A gas-permeable layer shall consist of one of the following:

1. A uniform layer of clean aggregate that is a minimum of 4 inches (102 mm) thick. The aggregate shall consist of material that will pass through a 2-inch (51 mm) sieve and be retained by a 1/4-inch (6.4 mm) sieve.
2. A uniform layer of sand (native or fill) that is a minimum of 4 inches (102 mm) thick and that is overlain by a soil gas collection mat or soil gas matting installed in accordance with the manufacturer's installation instructions.

RADON GAS. A naturally occurring, chemically inert, radioactive gas.

SOIL-GAS-RETARDER. A continuous membrane of 6-mil (0.15 mm) polyethylene used to retard the flow of soil gases into a dwelling.

SUBMEMBRANE DEPRESSURIZATION SYSTEM (Passive). A system designed to achieve lower submembrane air pressure relative to basement or crawl space air pressure by use of a vent pipe drawing air from beneath the soil-gas-retarder membrane.

SUBSLAB DEPRESSURIZATION SYSTEM (Passive). A system designed to achieve lower subslab air pressure relative to indoor air pressure by use of a vent drawing air from beneath concrete floor slabs or other floor assemblies that are in contact with the ground.

VENT PIPE. A minimum 3-inch diameter (76 mm) ABS or PVC gastight pipe extending from the gas permeable layer through the roof.

SECTION AF103 PASSIVE RADON RESISTANT SYSTEM REQUIREMENTS

AF103.1 General. The following components of a passive submembrane or subslab depressurization system shall be installed during construction.

AF103.2 Entry routes. Potential radon entry routes shall be closed in accordance with Sections AF103.2.1 through AF103.2.8.

AF103.2.1 Floor openings. Openings around bathtubs, showers, water closets, pipes, wires or other objects that penetrate concrete slabs or other floor assemblies shall be filled with a polyurethane caulk or expanding foam applied in accordance with the manufacturer's installation instructions.

AF103.2.2 Sumps. Sumps open to soil or serving as the termination point for subslab or exterior drain tile loops shall be covered with a gasketed or sealed lid. Sumps used as the suction point in a subslab depressurization system shall have a lid designed to accommodate the vent pipe. Sumps used as a floor drain shall have a lid equipped with a trapped inlet.

AF103.2.3 Foundation walls. Hollow block masonry foundation walls shall be constructed with either a continuous course of *solid masonry*, one course of masonry grouted solid, or a solid concrete beam at or above grade. Where a brick veneer or other masonry ledge is installed, the course immediately below that ledge shall be solid masonry, one course of masonry grouted solid, or a solid concrete beam. Joints, cracks or other openings around all penetrations of both exterior and interior surfaces of foundation walls below grade shall be filled with polyurethane caulk.

AF103.2.4 Dampproofing. The exterior surfaces of foundation walls below grade shall be dampproofed in accordance with Section R406.

AF103.2.5 Air-conditioning systems. Entry points, joints, or other openings into air conditioning systems in enclosed crawl spaces shall be sealed.

Exception: Systems with gasketed seams or that are otherwise sealed by the manufacturer.

AF103.2.6 Ducts. Ductwork passing through or beneath a slab within a dwelling shall be of seamless material unless the air-conditioning system is designed to maintain continuous positive pressure within such ducting. Joints in such ductwork shall be sealed.

Ductwork located in enclosed crawl spaces shall have all seams and joints sealed by closure systems in accordance with Section M1601.4.1.

AF103.2.7 Crawl space access. Access doors and other openings or penetrations between *basements* and adjoining crawl spaces shall be closed, gasketed or sealed.

AF103.3 Basements or enclosed crawl spaces having soil floors. In dwellings with basements or enclosed crawl spaces with soil floors, the following components of a passive submembrane depressurization system shall be installed during construction.

Exception: Basements or enclosed crawl spaces that are provided with a continuously operated mechanical exhaust system in accordance with R408.3.

AF103.3.1 Soil-gas-retarder. The soil in basements and enclosed crawl spaces shall be covered with a soil-gas-retarder. The soil-gas-retarder shall be lapped a minimum of 12 inches (305 mm) at joints and shall extend to all foundation walls enclosing the basement or crawl space. The soil-gas-retarder shall fit closely around any pipe, wire or other penetrations of the material. All punctures or tears in the material shall be sealed or covered with additional sheeting.

AF103.3.2 "T" fitting and vent pipe. A 3- or 4-inch "T" fitting shall be inserted beneath the soil gas retarder and be connected to a vent pipe. The vent pipe shall extend through the conditioned space of the dwelling and terminate at least 12 inches (305 mm) above the roof in a location at least 10 feet (3048 mm) away from any window or other opening into the *conditioned spaces* of the building that is less than 2 feet (610 mm) below the exhaust point.

AF103.4 Basements or enclosed crawl spaces having concrete floors or other floor systems and slab on grade dwellings. The following components of a passive subslab depressurization system shall be installed during construction in slab on grade dwellings or in dwellings with basements or crawl spaces having concrete or other floor systems.

AF103.4.1 Sub-slab preparation. A layer of gas-permeable material shall be placed under all concrete slabs and other floor systems that directly contact the ground and are within the walls of the dwelling.

AF103.4.2 Soil-gas-retarder. A soil gas retarder shall be placed on top of the gas-permeable layer prior to casting the slab or placing the floor assembly. The soil-gas-retarder shall cover the entire floor area with separate sections lapped at least 12 inches (305 mm). The soil-gas-retarder shall fit closely around any pipe, wire, or other penetrations of the material. All punctures or tears in the material shall be sealed or covered.

AF103.4.3 "T" fitting and vent pipe. Before a slab is cast or other floor system is installed, a "T" fitting shall be inserted below the slab or other floor system and the soil-gas-retarder. The "T" fitting shall be connected to a vent pipe. The vent pipe shall extend through the conditioned space of the dwelling and terminate at least 12 inches (305 mm) above the roof in a location at least 10 feet (3048 mm) away from any window or other opening into the *conditioned spaces* of the building that is less than 2 feet (610 mm) below the exhaust point.

AF103.5 Drain tile and sump used for depressurization. As an alternative to inserting a vent pipe into a "T" fitting, a vent pipe may be inserted directly into an interior perimeter drain tile loop or through a sump cover where the drain tile and/or sump is exposed to the gas permeable layer.

AF103.6 Multiple vent pipes. In dwellings where interior footings or other barriers separate the gas-permeable layer, each area shall be fitted with an individual vent pipe. Vent pipes shall connect to a single vent that terminates above the roof or each individual vent pipe shall terminate separately above the roof.

AF103.7 Combination foundations. Where basement or crawl space floors are on different levels, each level shall have a separate vent pipe. Multiple vent pipes may be connected to a single vent pipe that terminates above the roof.

AF103.8 Vent pipe drainage. All components of the radon vent pipe system shall be installed to provide positive drainage to the ground beneath the soil-gas-retarder.

AF103.9 Vent pipe identification. All exposed and visible interior vent pipes shall be identified with at least one *label* on each floor and in accessible *attics*. The *label* shall read: "Radon Reduction System."

AF103.10 Power source and access for future radon fan. To provide for future installation of a radon fan, an electrical circuit terminated in an *approved* box shall be installed during construction in the anticipated location of the radon fan. An accessible clear space 24 inches in diameter by 3 feet in height adjacent to the vent pipe shall be provided at the anticipated location of a future radon fan.

Cost Impact: None

RB462-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

APPENDIX F-RB-DAVIDSON

RB463 – 13

AG101.2, AG103.3, AG103.3 (New), AG103.4 (New)

Proponent: Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency (Gregory.wilson2@fema.dhs.gov) and Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency (rcquinn@earthlink.net).

Revise as follows:

AG101.2 AG103.3 Pools in flood hazard areas. Pools that are located in flood hazard areas established by Table R301.2(1), including above-ground pools, on-ground pools and in-ground pools that involve placement of fill, shall comply with this section. ~~Sections AG101.2.1 or AG101.2.2.~~

AG103.3.1 Determination of impacts based on location. Pools shall comply with Section AG103.3.1.1 or AG103.1.2.

Exception: Pools located in riverine flood hazard areas which are outside of designated floodways and pools located in flood hazard areas where the source of flooding is tides, storm surges or coastal storms.

AG101.2.1 AG103.3.1.1 Pools located in designated floodways. Where pools are located in designated floodways, documentation shall be submitted to the building official, which demonstrates that the construction of the pool will not increase the design flood elevation at any point within the jurisdiction.

AG101.2.2 AG103.3.1.2 Pools located where floodways have not been designated. Where pools are located where design flood elevations are specified but floodways have not been designated, the applicant shall provide a floodway analysis that demonstrates that the proposed pool will not increase the design flood elevation more than 1 foot (305 mm) at any point within the jurisdiction.

AG103.3 AG103.3.2 Pools in flood coastal high hazard areas. In ~~flood coastal high hazard areas established by Table R301.2(1), pools in coastal high hazard areas~~ shall be designed and constructed in conformance with ASCE 24.

AG103.3.3 Protection of equipment. Equipment shall be elevated to or above the design flood elevation or be anchored to prevent flotation and protected to prevent water from entering or accumulating within the components during conditions of flooding.

AG103.3.4 GFCI protection. Electrical equipment installed below the design flood elevation shall be supplied by branch circuits that have ground-fault circuit interrupter protection.

Reason: This proposal consolidates existing requirements in one section (AG103.3), which is how the flood requirements are formatted in the International Swimming Pool and Spa Code (see Section 304 Flood Hazard Areas). When consolidated, the exception to AG103.3.1 is less confusing. AG103.3.1 is intended to capture pools in floodways (which must satisfy AG103.3.1.1) and pools in flood hazard areas with base flood elevations but without floodways (which must satisfy AG103.3.1.2). All other pools are covered by the exception and do not need to satisfy any additional determination based on location.

The addition of requirements for equipment and electrical equipment protection, which apply to all pools, is consistent with the requirements in the 2012 International Swimming Pool and Spa Code, Section 304.4 and 304.5, respectively.

Cost Impact: This proposal should not increase costs because pools and pool equipment, where installed in flood hazard areas, have long been subject to these requirements under local floodplain management regulations adopted and enforced by communities that participate in the national flood insurance program.

RB463-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

AG101.2-RB-QUINN-WILSON.DOC

RB464 – 13

NUMBER NOT USED

RB465 – 13

Appendix G, R324 (New), R324.1 (New)

Proponent: Kris Bridges, CBO, Chair, ICC Swimming Pool Code Drafting Committee (SPCDC)

Delete Appendix G in its entirety:

~~APPENDIX G~~ ~~SWIMMING POOLS, SPAS AND HOT TUBS~~

Add new Section and new text as follows:

SECTION R324 SWIMMING POOLS, SPAS AND HOT TUBS

R324.1 General. The design and construction of aquatic vessels shall comply with the *International Swimming Pool and Spa Code*.

Reason: The drafting of the *International Swimming Pool and Spa Code* (ISPSC) started in October/2010 by the Swimming Pool Code Drafting Committee (SPCDC) which was established by the ICC Board of Directors, with the Association of Pool & Spa Professionals (APSP) as a Cooperating Sponsor. The SPCDC was a broad based committee representing a balance of interests composed of 15 individuals from public, private and nonprofit sectors with expertise in disciplines critical to the topics in the *International Swimming Pool and Spa Code*. The SPCDC was supported by four Work Groups composed of numerous interested parties and stakeholders.

The intent was to develop a comprehensive set of regulations for swimming pools and spas consistent and coordinated with the I-Codes. Technical content was developed from provisions from the International Codes and the applicable APSP standards. The APSP standards considered were:

- ANSI-1 2003 Public Swimming Pools
- ANSI-2 1999 Public Spas
- ANSI-3 1999 Permanent Residential Spas
- ANSI-4 2007 Aboveground/On-ground Residential Swimming Pools
- ANSI-5 2003 Residential In-ground Swimming Pools
- ANSI-6 1999 Portal Spas
- ANSI-7 2006 Suction Entrapment Avoidance
- ANSI-8 2005 Model Barrier Code
- ANSI-9 2005 Aquatic Recreational Facilities
- ANSI-11 2009 Standard for water quality in public swimming pools and spas

The SPCDC and its Work Groups comprehensively reviewed the requirements in the existing 2009 International Codes and the standards noted above in an effort to draft comprehensive language for pool and spa safety while at the same time making sure the language resulted in adoptable and enforceable I-Code language.

The SPCDC held three face-to-face drafting meetings and there were weekly work group conference calls. The drafting effort of the SBCDC culminated in Public Version 1.0 (PV 1.0) which was completed in February/2011.

Public Version 1.0 was then subjected to a full cycle of ICC Code Development in 2011 as follows:

- PV 1.0 posted for code change submittals on February 1, 2011
- 100 code changes were submitted
- The ISPSC code committee comprised of both SBCDC members and new members acted on the code changes at the 2011 Code Development Hearings held May 16, 2011 in Dallas.
- Public comments were submitted on 22 of the code changes and were acted on by the ICC membership at the 2011 Final Action Hearings held October 31, 2011 in Phoenix
- The 2012 International Swimming Pool and Spa Code is published.

The ISPSC uses the term “aquatic vessels” to cover all types of vessels including pools, water parks, spas and hot tubs. This proposal is limited to the use and application of vessels under the IRC, including pools, spas and hot tubs. The ISPSC provisions comprehensively address all aspects of such vessels including;

- Administration and Definitions
- Construction features for pools including size and depth, wall and floor construction, and calculation of bather occupant load
- Safety features such as barriers to pool entry, depth markers and throwing ropes
- Mechanical, plumbing and electrical provisions

- Equipment such as suction entrapment avoidance, circulation, filters, pumps and motors, skimmers, heaters, return and suction fittings
- Appurtenances such as ladders and diving equipment

The ISPSC covers both residential and public aquatic vessels. A similar proposal was submitted to Section 3109 of the IBC in Group A 2012 (G193 Part I). The committee action was AM. The final action was D.

Cost Impact: This code change proposal will not increase the cost of construction.

RB465-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

APPENDIX G-RB-BRIDGES.doc

RB466 – 13

AH106.4.1, AH106.4.3, Table AH106.4(1), Table AH106.4(2), Figure AH106 (New)

Proponent: Gary J. Ehrlich, P.E., National Association of Home Builders (NAHB) (gehrlich@nahb.org); Daniel J. Walker, P.E., Thomas Associates, Inc. representing National Sunroom Association.

Revise as follows:

AH106.4.1 Wind Load. Structural members supporting screen enclosures shall be designed to support the minimum wind loads given in Tables AH106.4(1) and AH106.4(2) for the ultimate design wind speed, V_{ult} , determined from Figure AH106. Where any value is less than 10 pounds per square foot (psf) (0.479 kN/m²) use 10 pounds per square foot foot (0.479 kN/m²).

AH106.4.3 Importance factor. ~~The wind factor for screen enclosures shall be 0.77 in accordance with Section 6.5.5 of ASCE 7.~~

TABLE AH106.4(1)
DESIGN WIND PRESSURES FOR ALUMINUM SCREEN ENCLOSURE FRAMING WITH AN
IMPORTANCE FACTOR OF 0.77^{a, b, c}

LOAD CASE	WALL	Basic Wind Speed (mph)											
		100		110		120		130		140		150	
		Exposure Category Design Pressure (psf)											
		C	B	C	B	C	B	C	B	C	B	C	B
A ^d	Windward and leeward walls (flow thru) and windward wall (nonflow thru) $L/W = 0.4$	12	8	14	10	17	12	19	14	23	16	26	18
A ^d	Windward and leeward walls (flow thru) and windward wall (nonflow thru) $L/W = 2$	13	9	16	11	19	14	22	16	26	18	30	21
B ^e	Windward: Nongable roof	16	12	20	14	24	17	28	20	32	23	37	26
B ^e	Windward: Gable roof	22	16	27	19	32	23	38	27	44	31	50	36
-	ROOF	-											
All ^f	Roof-screen	4	3	5	4	6	4	7	5	8	6	9	7
All ^f	Roof-solid	12	9	15	11	18	13	21	15	24	17	28	20

For SI: 1 mile per hour = 0.44 m/s, 1 pound per square foot = 0.0479 kPa, 1 foot = 304.8 mm.

a. Values have been reduced for 0.77 importance factor in accordance with Section AH106.4.3.

b. Minimum design pressure shall be 10 psf in accordance with Section AH106.4.1.

c. ~~Loads are applicable to screen enclosures with a mean roof height of 30 feet or less. For screen enclosures of different heights, the pressures given shall be adjusted by multiplying the table pressure by the adjustment factor given in Table AH106.4(2).~~

d. ~~For Load Case A flow thru condition, the pressure given shall be applied simultaneously to both the upwind and downwind screen walls acting in the same direction as the wind. The structure shall also be analyzed for wind coming from the opposite direction. For the nonflow thru condition, the screen enclosure wall shall be analyzed for the load applied acting toward the interior of the enclosure.~~

e. ~~For Load Case B, the table pressure multiplied by the projected frontal area of the screen enclosure is the total drag force, including drag on screen surfaces parallel to the wind, which must be transmitted to the ground. Use Load Case A for members directly supporting the screen surface perpendicular to the wind. Load Case B loads shall be applied only to structural members which carry wind loads from more than one surface.~~

f. ~~The roof structure shall be analyzed for the pressure given occurring both upward and downward.~~

TABLE AH106.4(2)
HEIGHT ADJUSTMENT FACTORS

MEAN	EXPOSURE	
Roof Height (feet)	B	C
15	1	0.86
20	1	0.92
25	1	0.96
30	1	1.00
35	1.05	1.03
40	1.09	1.06
45	1.12	1.09
50	1.16	1.11
55	1.19	1.14
60	1.22	1.16

For SI: 1 foot = 304.8 mm.

TABLE AH106.4(1)
DESIGN WIND PRESSURES FOR SCREEN ENCLOSURE FRAMING^{a,b,e,f,g,h}

LOAD CASE	WALL	Ultimate Design Wind Speed, V_{ult} (mph)									
		100	105	110	120	130	140	150	160	170	180
		Exposure Category B Design Pressure (psf)									
A ^c	Windward and leeward walls (flow thru) and windward wall (nonflow thru) $L/W = 0-1$	6	7	8	9	11	13	14	16	18	21
A ^c	Windward and leeward walls (flow thru) and windward wall (nonflow thru) $L/W = 2$	7	8	9	11	12	14	16	19	21	24
B ^d	Windward: Nongable roof	9	10	11	13	15	18	21	23	26	30
B ^d	Windward: Gable roof	11	13	14	16	19	22	26	29	33	37
	ROOF										
Al ^e	Roof-screen	2	3	3	3	4	4	5	6	7	7
Al ^e	Roof-solid	7	8	8	10	12	13	15	18	20	22

For SI: 1 mile per hour = 0.44 m/s, 1 pound per square foot = 0.0479 kPa, 1 foot = 304.8 mm.

a. Minimum design pressure shall be 10 psf in accordance with Section AH106.4.1.

b. Loads are applicable to screen enclosures with a mean roof height of 30 feet or less in Exposure B. For screen enclosures of different heights or exposure, the pressures given shall be adjusted by multiplying the table pressure by the adjustment factor given in Table AH106.4(2).

c. For Load Case A flow thru condition, the pressure given shall be applied simultaneously to both the upwind and downwind screen walls acting in the same direction as the wind. The structure shall also be analyzed for wind coming from the opposite direction. For the nonflow thru condition, the screen enclosure wall shall be analyzed for the load applied acting toward the interior of the enclosure.

d. For Load Case B, the table pressure multiplied by the projected frontal area of the screen enclosure is the total drag force, including drag on screen surfaces parallel to the wind, which must be transmitted to the ground. Use Load Case A for members directly supporting the screen surface perpendicular to the wind. Load Case B loads shall be applied only to structural members which carry wind loads from more than one surface.

e. The roof structure shall be analyzed for the pressure given occurring both upward and downward.

f. Table pressures are MWFRS loads. The design of solid roof panels and their attachments shall be based on component and cladding loads for enclosed or partially enclosed structures as appropriate.

g. Table pressures apply to 20 x 20 x 0.013" mesh screen. For 18 x 14 x 0.013" mesh screen, pressures on screen surfaces shall be permitted to be multiplied by 0.88. For screen densities greater than 20 x 20 x 0.013", pressures for enclosed buildings shall be used.

h. Linear interpolated shall be permitted.

TABLE AH106.4(2)
ADJUSTMENT FACTOR
FOR BUILDING HEIGHT AND EXPOSURE

Mean Roof Height (ft)	Exposure		
	B	C	D
15	1.00	1.21	1.47
20	1.00	1.29	1.55
25	1.00	1.35	1.61
30	1.00	1.40	1.66
35	1.05	1.45	1.70
40	1.09	1.49	1.74
45	1.12	1.53	1.78
50	1.16	1.56	1.81
55	1.19	1.59	1.84
60	1.22	1.62	1.87

For SI: 1 foot = 304.8mm

Figure AH106
Ultimate Design Wind Speeds for Patio Covers and Screen Enclosures

Reason: The purpose of this code change is to bring the wind provisions of the IRC in line with the 2012 IBC and ASCE 7-10. As a result of the schedule changes implemented during the 2009-2010 ICC code development cycle, there was not sufficient time to revise the IRC to fully implement the new ultimate wind speed basis of ASCE 7-10 and the 2012 IBC, due to the extent of prescriptive IRC provisions and tables which are directly related to basic wind speed.. New maps based on the ASCE 7-10 ultimate wind speed data but converted back down to nominal (ASD) basis were provided in the IRC. This has led to a fair amount of confusion among those stakeholders who work with both codes.

A working group of stakeholders including NAHB, the major material associations, ASCE, and the Insurance Institute for Business and Home Safety developed a series of IRC proposals to implement the new ultimate wind speed basis. This proposal updates Table AH106.4(1) and AH106.4(2) for patio covers. Since ASCE 7-10 implemented a new 300-year mean return interval map for Risk Category I structures (which includes patio covers) to replace the use of the 0.87 (non-hurricane) and 0.77 (hurricane) importance factors, Section AH106.4.3 is deleted and a new Figure AH106 copies the Risk Category I wind map from IBC Figure 1609C.

The coefficients used to produce the updated table are the same as that from the previous tables in IRC Appendix "H", which were based on wind tunnel testing commissioned by the Aluminum Association of Florida and conducted at the Clemson and Virginia Tech wind tunnels by Dr. Timothy Reinhold, P.E., Ph.D and Mr. Charley Everly, P.E. The original test report can be downloaded for review from the following link:

<http://aaof.org/documents/WindLoadsOnScreenEnclosures%28Reinhold%29.pdf>. Additional clarification has also been added to the table footnotes based on additional details found in the referenced report.

Cost Impact: The code change proposal will not increase the cost of construction.

RB466-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

AH106.4.1-RB-EHRLICH-WALKER

RB467 – 13

Appendix J

Proponent: Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee
(cbaldassarra@rjagroup.com)

Revise as follows:

AJ102.4 Replacement windows and replacement safety glazing. Regardless of the category of work, when an existing window, including the sash and glazed portion, or safety glazing is replaced, the replacement window or safety glazing shall comply with the following requirements as applicable: ~~of Chapter 11.~~

AJ102.4.1 Energy efficiency. Replacement windows shall comply with the requirements of Chapter 11.

AJ102.4.2 Safety glazing. Replacement glazing in hazardous locations shall comply with the safety glazing requirements of Section R308.

AJ102.4.3 Emergency escape and rescue openings. Where windows are required to provide emergency escape and rescue openings, replacement windows shall be exempt from the maximum sill height requirements of Sections R310.1 and the requirements of Sections R310.1.1, R310.1.2, R310.1.3 and R310.2 provided the replacement window meets the following conditions:

1. The replacement window is the manufacturer's largest standard size window that will fit within the existing frame or existing rough opening. The replacement window shall be permitted to be of the same operating style as the existing window or a style that provides for an equal or greater window opening area than the existing window.
2. The replacement window is not part of a change of occupancy.
3. Window opening control devices complying with ASTM F 2090 shall be permitted for use on windows required to provide emergency escape and rescue openings.

AJ102.4.4 Window control devices. Where window fall prevention devices complying with ASTM F2090 are not provided, window opening control devices complying with ASTM F 2090 shall be installed where an existing window is replaced and where all the following apply to the replacement window:

1. The window is operable;
2. The window replacement includes replacement of the sash and the frame;
3. The top of the sill of the window opening is at a height less than 24 inches (610 mm) above the finished floor;
4. The window will permit openings that will allow passage of a 4-inch diameter (102 mm) sphere when the window is in its largest opened position; and,
5. The vertical distance from the top of the sill of the window opening to the finished grade or other surface below, on the exterior of the building, is greater than 72 inches (1829 mm).

The window opening control device, after operation to release the control device allowing the window to fully open, shall not reduce the minimum net clear opening area of the window unit.

~~**AJ301.3 Safety glazing.** Replacement glazing in hazardous locations shall comply with the safety glazing requirements of Section R308.1.~~

Reason: This proposed change is a result of the CTC's investigation of the area of study entitled "Child Window Safety". The scope of the activity is noted as:

To evaluate the necessity of developing code proposals for the inclusion of requirements dealing with the conditions, circumstances and devices for window safety which could reduce the number of falls by children to surfaces below.

The purpose of this proposal is to coordinate the existing building provisions of the IRC with the changes approved to the IBC/IEBC in the 2012 Group A cycle. Code changes G225-12 and G227-12 were approved as modified by public comment to revise Section 3407 of the IBC (IEBC Section 406 – see below). In addition, Code change G201-12 last cycle removed the existing building provisions from Chapter 34 of the IBC in favor of a reference to the IEBC. This action was subsequently affirmed by the ICC Board as this was a code change related to I-Code scoping.

The format/terminology of Appendix J in the IRC is a bit different than the approach in the IEBC. However, Section AJ102 stipulates that the provisions of the section are applicable to all categories of work. It is for this reason that the provisions have been comprehensively located in AJ102 versus the sections that deal with the different categories of work (ie repairs in AJ301; renovations in AJ401; and alterations in AJ501).

For reference, the approved IEBC text is as follows:

IEBC SECTION 406 GLASS REPLACEMENT AND REPLACEMENT WINDOWS

406.1 Replacement glass. *The installation or replacement of glass shall be as required for new installations.*

406.2 Replacement Window Opening Control Devices. *In Group R-2 or R-3 buildings containing dwelling units, window opening control devices complying with ASTM F2090 shall be installed where an existing window is replaced and where all the following apply to the replacement window:*

1. *The window is operable;*
2. *The window replacement includes replacement of the sash and the frame;*
3. *The top of the sill of the window opening is at a height less than 36 inches (915 mm) above the finished floor;*
4. *The window will permit openings that will allow passage of a 4-inch diameter (102 mm) sphere when the window is in its largest opened position; and*
5. *The vertical distance from the top of the sill of the window opening to the finished grade or other surface below, on the exterior of the building, is greater than 72 inches (1829 mm).*

The window opening control device, after operation to release the control device allowing the window to fully open, shall not reduce the minimum net clear opening area of the window unit to less than the area required by Section 1029.2.

Exceptions:

1. *Operable windows where the top of the sill of the window opening is located more than 75 feet (22.86 m) above the finished grade or other surface below, on the exterior of the room, space or building, and that are provided with window fall prevention devices that comply with ASTM F 2006.*
2. *Operable windows with openings that are provided with window fall prevention devices that comply with ASTM F2090.*

406.3 Replacement Window Emergency Escape and Rescue Openings. *Where windows are required to provide emergency escape and rescue openings in Group R-2 and R-3 occupancies, replacement windows shall be exempt from the requirements of Sections 1029.2, 1029.3 and 1029.5 provided the replacement window meets the following conditions:*

1. *The replacement window is the manufacturer's largest standard size window that will fit within the existing frame or existing rough opening. The replacement window shall be permitted to be of the same operating style as the existing window or a style that provides for an equal or greater window opening area than the existing window.*
2. *The replacement of the window is not part of a change of occupancy.*

This proposal is submitted by the ICC Code Technology Committee. The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty-five meetings - all open to the public. In 2012, three of the 25 face-to face meetings were held. In addition to the CTC meetings, the CTC established Study Groups (SG) of interested parties for each of the areas of study. These SG's are responsible for reviewing the available information and making recommendations to the CTC. All totaled, the SG's held over 70 conference calls in 2012.

Cost Impact: This code change proposal will not increase the cost of construction.

RB467- 13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	D

AJ102.4-RB-BALDASSARRA-CTC

RB468 – 13

AJ102.4, AJ102.4.1 (New), AJ102.4.2 (New), AJ102.4.3 (New), AJ102.4.4 (New), and AJ301.3

Proponent: Jeff Inks, Window and Door Manufacturers Association, representing the Window & Door Manufacturers Association.

Revise as follows:

AJ102.4 Replacement windows and replacement safety glazing. Regardless of the category of work, when an existing window, including the sash and glazed portion, or safety glazing is replaced, the replacement window or safety glazing shall comply with the requirements of Sections AJ102.4.1 through AJ102.4.4 as applicable; of Chapter 11.

AJ102.4.1 Energy efficiency. Replacement windows shall comply with the requirements of Chapter 11.

AJ102.4.2 Safety glazing. Replacement glazing in hazardous locations shall comply with the safety glazing requirements of Section R308.1.

AJ102.4.3 Emergency escape and rescue openings. Where windows are required to provide emergency escape and rescue openings, replacement windows shall be exempt from the maximum sill height requirements of Sections R310.1 and the requirements of Sections R310.1.1, R310.1.2, R310.1.3 and R310.2 provided the replacement window meets the following conditions:

1. The replacement window is the manufacturer's largest standard size window that will fit within the existing frame or existing rough opening. The replacement window shall be permitted to be of the same operating style as the existing window or a style that provides for an equal or greater window opening area than the existing window.
2. The replacement window is not part of a change of occupancy.

Window opening control devices complying with ASTM F 2090 shall be permitted for use on windows required to provide *emergency escape and rescue openings*.

AJ102.4.4 Window opening control devices. Window opening control devices complying with ASTM F 2090 shall be installed where an existing window is replaced and where all the following apply to the replacement window:

1. The window is operable;
2. The window replacement includes replacement of the sash and the frame;
3. The top of the sill of the window opening is at a height less than 24 inches (610 mm) above the finished floor;
4. The window will permit openings that will allow passage of a 4-inch diameter (102 mm) sphere when the window is in its largest opened position; and,
5. The vertical distance from the top of the sill of the window opening to the finished grade or other surface below, on the exterior of the building, is greater than 72 inches (1829 mm).

The window opening control device, after operation to release the control device allowing the window to fully open, shall not reduce the minimum net clear opening area of the window unit.

AJ301.3 Safety glazing. ~~Replacement glazing in hazardous locations shall comply with the safety glazing requirements of Section R308.1.~~

Reason: The intent of this proposal is to update Appendix J with respect window replacements to ensure window replacements also meet the requirements for new construction for window opening control devices and emergency escape and rescue openings for new construction when practical and avoid discouraging or preventing the replacement of windows when it is not -- provided there is no reduction in existing safety. In addition, this proposal moves all provisions for window and glazing replacements under existing

Section AJ102.4 as they are intended to apply to all replacements regardless of work classification and so improves the organization and use of the Appendix with respect to glazing and window replacements.

With respect to the proposed emergency escape and rescue opening provisions, they are based on Minnesota's residential code which actually (and effectively) incorporates them into the main body of the code in Chapter 3, under Section 310.1. The same provisions have also already been approved for Chap. 4 of the IEBC (during the Group A proceedings) and we, as well as the ICC CTC are also proposing the same provisions for Chap. 7 of the IEBC (in addition to this proposal for IRC Appendix J). Most importantly, it's important to note that the provisions do not allow for any decrease in safety and rather will help ensure improvements in safety can be made.

More specifically, the intent of this proposal is to ensure that the IRC does not discourage or prevent improvements in emergency escape and rescue openings, especially for fire safety, in older residential occupancies by requiring replacement windows to meet all of the provisions of Section 310 when doing so can only be accomplished by increasing the size of the rough opening or altering the interior wall.

Because many of these older buildings were constructed under codes that did not include the same emergency escape and rescue opening provisions that the IRC now requires for new construction, the only way to fully meet all of the requirements of Section 310 for new construction if required when windows are replaced, is to enlarge the rough opening and/or make significant alterations to the interior wall in order to accommodate any increase in window size or lowering of a sill.

At the very least, the significant cost and design challenges of altering the rough opening or interior wall can discourage or prevent window replacement and at worst can discourage or prevent the replacement of older windows that are harder to operate or inoperable all together because of their age or poor maintenance and, that are significantly less energy efficient. When that happens, improvements to safety as well as to energy efficiency are needlessly compromised.

Furthermore and on the whole, while some bedroom windows in older homes may not provide the full clear opening that is required for new construction or may have a sill height above 44 inches, they nonetheless still provide a viable emergency and escape rescue opening which is the primary intent of the code. Replacement of these windows with the same type of operating window or other type that can provide an equal or greater clear opening than the existing window -- even if they do not fully meet the clear opening or sill height requirements of Section 310 -- is always an improvement in safety, especially when a replacement opening can provide a larger clear opening than the existing window. Such improvements in safety should not be discouraged or prevented by overly onerous requirements for replacement windows.

This proposal will help ensure that doesn't happen by providing limited exceptions to the requirements of Section 310 that can only be applied when certain conditions are met and that as already noted, will not result in a decrease in safety.

The requirements for new construction that emergency escape and rescue openings be provided as well as the operational requirements of Section 310.1.4 are maintained and still applicable to replacement windows.

With respect to the proposed provisions for window opening control devices on replacement windows, they are intended to ensure window fall protection is provided where required for new construction when windows, including sash and frame, are replaced. Like the EERO provisions, the WOOD provisions have already been approved by for Chap. 4 of the IEBC and are also be proposed for IEBC Chap. 7 by us and the ICC CTC.

Item #3 simply deletes the safety glazing provisions from Section AJ301.3 because they were moved to Section AJ102.4.2

Cost Impact: This code change proposal will not increase the cost of construction.

RB468-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

AJ102.4-RB-INKS

RB469 – 13

AJ102.6

Proponent: David Bonowitz, Chair, Existing Buildings Subcommittee, Code Advisory Committee, National Council of Structural Engineers Associations (dbonowitz@att.net)

Revise as follows:

AJ102.6 Equivalent alternatives. Work performed in accordance with the *International Existing Building Code* shall be deemed to comply with the provisions of this appendix. These provisions are not intended to prevent the use of any alternative material, alternative design or alternative method of construction not specifically prescribed herein, provided any alternative has been deemed to be equivalent and its use authorized by the *building official*.

Reason: This proposal recognizes the IEBC as a specific “deemed to comply” alternative to Appendix J. The proposed provision would parallel IRC section R301.1.3, which states, “Engineered design in accordance with the *International Building Code* is permitted for all buildings and structures, and parts thereof, included in the scope of this code.” It is also consistent with IRC section R104.11, which states, “Compliance with the specific performance-based provisions of the International Codes in lieu of specific requirements of this code shall also be permitted as an alternate.”

From its terminology and organization, it is clear that Appendix J and the current IEBC Work Area method have a common ancestor; they each evolved from the “Nationally Applicable Recommended Rehabilitation Provisions,” written by NAHB and others for HUD and published in 1997. The IEBC is thus a natural and appropriate alternative to Appendix J.

Indeed, one could easily make a case that Appendix J (as well as some of the IRC’s other provisions for existing buildings) could, or should, be replaced in its entirety by a reference to the IEBC. We have not proposed that step. For now, we are merely proposing that the IEBC be recognized as an appropriate alternative.

While its provisions differ slightly (owing to the fact that the IEBC has been maintained and improved in recent cycles while Appendix J has not), the IEBC does offer certain advantages to the design professional and code official. It has more complete and consistent provisions that address specific load cases and combinations, cite appropriate national standards, include Appendix A3 for prescriptive seismic retrofit, include appropriate quality control measures, etc. Using the IEBC would also avoid some of the obsolete and internally inconsistent provisions in Appendix J (such as the definitions of “dangerous” and “load-bearing element,” the confusing reference to “extensive alterations,” etc.).

Cost Impact: None

RB469-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

AJ102.6-RB-BONOWITZ

RB470 – 13

AJ102.7

Proponent: David Bonowitz, Chair, Existing Buildings Subcommittee, Code Advisory Committee, National Council of Structural Engineers Associations (dbonowitz@att.net)

Revise text as follows:

AJ102.7 Other alternatives. Where compliance with these provisions or with this code as required by these provisions is technically infeasible or would impose disproportionate costs because of structural, construction or dimensional difficulties, other alternatives may be accepted by the building official. These alternatives may include materials, design features and/or operational features.

Reason: This proposal removes the "structural" conditions from the list of conditions that might be found cost-prohibitive. The idea of allowing workarounds and reasonable variances for "technically infeasible" triggered improvements is fair; usually it applies only to accessibility improvements and sometimes to prescriptive requirements for new construction that are not met to the letter by an existing building. But we do not believe it is the intent of the IRC to allow the code official to waive basic structural safety requirements triggered by the IRC or Appendix J.

Further, Appendix J is already careful to trigger structural work only in rare cases of demonstrated deficiency and or in cases of major alterations. Triggered structural upgrades will be rare, and where they are triggered they will address actual hazards, not just procedural nonconformities. Therefore, it is inappropriate to allow structural safety provisions to be waived simply on cost grounds.

Cost Impact: None

RB470-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

AJ102.7-RB-BONOWITZ

RB471 – 13

Appendix R (New)

Proponent: Paula Baker-Laporte, FAIA, EcoNest Company, representing Natural Building Network (paula@econest.com)

Add new text as follows:

APPENDIX R LIGHT STRAW-CLAY CONSTRUCTION

The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.

SECTION AR101 GENERAL

AR101.1 Scope. This appendix shall govern the use of light straw-clay as a non-bearing building material and wall infill system.

SECTION AR102 DEFINITIONS

AR102.1. General. The following words and terms shall, for the purposes of this appendix, have the meanings shown herein. Refer to Chapter 2 of the *International Residential Code* for general definitions.

CLAY. Inorganic soil with particle sizes of less than 0.00008 inch (0.002 mm) having the characteristics of high to very high dry strength and medium to high plasticity.

CLAY SLIP. A suspension of clay soil in water.

CLAY SOIL. Inorganic soil containing 50% or more clay by volume.

INFILL. Light straw-clay that is placed between the structural members of a building.

LIGHT STRAW-CLAY. A mixture of straw and clay compacted to form insulation and plaster substrate between or around structural and non-structural members in a wall.

NON-BEARING. Not bearing the weight of the building other than the weight of the light straw-clay itself and its finish.

STRAW. The dry stems of cereal grains after the seed heads have been removed.

VOID. Any space in a light straw-clay wall in which a 2-inch (51 mm) sphere can be inserted.

SECTION AR103 NON-BEARING LIGHT STRAW-CLAY CONSTRUCTION

AR103.1 General. Light straw-clay shall be limited to infill between or around structural and non-structural wall framing members.

AR103.2 Structure. The structure of buildings using light straw-clay shall be in accordance with the *International Residential Code* or shall be in accordance with an approved design by a *registered design professional*.

AR103.2.1 Number of stories. Use of light straw-clay infill shall be limited to buildings that are not more than one-story above grade plane.

Exception: Buildings using light straw-clay infill that are greater than one-story above grade plane shall be in accordance with an *approved design by a registered design professional*.

AR103.2.2 Bracing. Wind and seismic bracing shall be in accordance with Section R602.10 and shall use Method LIB. The required length of bracing shall comply with Section R602.10.3, with the additional requirements that Table 602.10.3(3) shall be applicable to all buildings in Seismic Design Category C, and that the minimum total length of bracing in Table R602.10.3(3) shall be increased by 90%. In lieu of these prescriptive requirements, wind and seismic bracing shall be in accordance with an *approved design by a registered design professional*. Walls with light straw-clay infill shall not be sheathed with solid sheathing.

AR103.2.3 Weight of light straw-clay. Light straw-clay shall be deemed to have a design dead load of 40 pounds per cubic foot (640 kg per cubic meter) unless otherwise demonstrated to the building official.

AR103.2.4 Reinforcement of light straw-clay. Light straw-clay shall be reinforced as follows:

1. Vertical reinforcing shall be a minimum of nominal 2-inch by 6-inch (51 mm by 152 mm) wood members at a maximum of 32 inches (813 mm) on center where the vertical reinforcing is nonload-bearing and at 24"(610mm) on center where it is load-bearing. The vertical reinforcing shall not exceed an unrestrained height of 10 feet (3,048 mm) and shall be attached at top and bottom in accordance with Chapter 6 of the International Residential Code. In lieu of these requirements, vertical reinforcing shall be in accordance with an *approved design by a registered design professional*.
2. Horizontal reinforcing shall be installed in the center of the wall at not more than 24 inches (610 mm) on center and shall be secured to vertical members. Horizontal reinforcing shall be of any of the following: ¾ inch (19 mm) bamboo, ½ inch (13 mm) fiberglass rod, 1-inch (25 mm) wood dowel or nominal 1-inch by 2-inch (25 mm by 51 mm) wood.

AR103.3 Materials. The materials used in light straw-clay construction shall be in accordance with Sections AR103.3.1 through AR103.3.4.

AR103.3.1 Straw. Straw shall be wheat, rye, oats, rice, or barley, and shall be free of visible decay and insects.

AR103.3.2 Clay soil. Suitability of clay soil shall be determined in accordance with the Figure 2 Ribbon Test or the Figure 3 Ball Test of the Appendix to ASTM E2392/E2392M.

AR103.3.3 Clay slip. Clay slip shall be of sufficient viscosity such that a finger dipped in the slip and withdrawn remains coated with an opaque coating.

AR103.3.4 Light straw-clay mixture. Light straw-clay shall contain a not less than 65% and not more than 85% straw, by volume of bale-compacted straw to clay soil. Loose straw shall be mixed and coated with clay slip such that there is not more than 5% uncoated straw.

AR103.4 Wall Construction. Light straw-clay wall construction shall be in accordance with the requirements of Sections AR103.4.1 through AR103.4.7.

AR103.4.1 Light straw-clay maximum thickness. Light straw-clay shall be not more than 12 inches (305 mm) thick, to allow adequate drying of the installed material.

AR103.4.2 Distance above grade. Light straw-clay and its exterior finish shall be not less than 8 inches (203 mm) above exterior finished grade.

AR103.4.3 Moisture barrier. An approved moisture barrier shall separate the bottom of light straw-clay walls from any masonry or concrete foundation or slab that directly supports the walls. Penetrations and joints in the barrier shall be sealed with an approved sealant.

AR103.4.4 Contact with wood members. Light straw clay shall be permitted to be in contact with untreated wood members.

AR103.4.5 Contact with non-wood structural members. Non-wood structural members in contact with light straw-clay shall be resistant to corrosion or shall be coated to prevent corrosion with an approved coating.

AR103.4.6 Installation. Light straw-clay shall be installed in accordance with the following:

1. Formwork shall be sufficiently strong to resist bowing when the light straw-clay is compacted into the forms.
2. Light straw-clay shall be uniformly placed into forms and evenly tamped to achieve stable walls free of voids. Light straw-clay shall be placed in lifts of no more than 6 inches (152 mm) and shall be thoroughly tamped before additional material is added.
3. Formwork shall be removed from walls within 24 hours after tamping, and walls shall remain exposed until moisture content is in accordance with Section AR103.5.1. Any visible voids shall be patched with light straw-clay prior to plastering.

AR103.4.7 Openings in Walls. Openings in walls shall be in accordance with the following:

1. Rough framing for doors and windows shall be fastened to structural members in accordance with the -International Residential Code. Windows and doors shall be flashed in accordance with the International Residential Code.
2. An approved moisture barrier shall be installed at window sills in light straw-clay walls prior to installation of windows.

AR103.5 Wall Finishes. The interior and exterior surfaces of light straw-clay walls shall be protected with a finish in accordance with Sections AR103.5.1 through AR103.5.5.

AR103.5.1 Moisture content of light straw-clay prior to application of finish. Light straw-clay walls shall be dry to a moisture content of not more than 20% at a depth of 4 inches (102 mm), as measured from each side of the wall, prior to the application of finish on either side of the wall. Moisture content shall be measured with a moisture meter equipped with a probe that is designed for use with baled straw or hay.

AR103.5.2 Plaster finish. Exterior plaster finishes shall be clay plaster or lime plaster. Interior plaster finishes shall be clay plaster, lime plaster, or gypsum plaster. Plasters shall be permitted to be applied directly to the surface of the light straw-clay walls without reinforcement, except that the juncture of dissimilar substrates shall be in accordance with Section AR103.5.3. Plasters shall have a thickness of not less than ½ inch (13 mm) and not more than 1 inch (25 mm) and shall be installed in no less than 2 coats. Exterior clay plaster shall be finished with a lime-based or silicate-mineral coating.

AR103.5.3 Separation of wood and plaster. Where wood framing occurs in light straw-clay walls, such wood surfaces shall be separated from exterior plaster with No.15 asphalt felt, grade D paper, or other approved material except where the wood is preservative-treated or naturally durable.

Exception: Exterior clay plasters shall not be required to be separated from wood.

AR103.5.4 Bridging across dissimilar substrates. Bridging shall be installed across dissimilar substrates prior to the application of plaster. Acceptable bridging materials include: expanded metal lath, woven wire mesh, welded wire mesh, fiberglass mesh, reed matting, or burlap. Bridging shall extend not less than 4 inches (102 mm), on both sides of the juncture.

AR103.5.5 Exterior siding. Exterior wood, metal, or composite material siding shall be spaced at least 3/4 inch (19 mm) from the light straw-clay such that a ventilation space is created to allow for moisture diffusion. The siding shall be fastened to wood furring strips in accordance with manufacturer's recommendations. Furring strips shall be spaced not more than 32 inches (813 mm) on center, and shall be securely fastened to the vertical wall reinforcing or structural framing. Insect screening shall be provided at the top and bottom of the ventilation space. An *air barrier* consisting of not more than 3/8" thick clay plaster or lime plaster shall be applied to the light straw-clay prior to application of siding.

SECTION AR104 **THERMAL INSULATION**

AR104.1 R-value. Light straw-clay, where installed in accordance with this appendix, shall be deemed to have an R-value of 1.6 per inch.

SECTION AR105 **REFERENCED STANDARDS**

ASTM E 2392/E 2392M-10 Standard Guide for Design of Earthen Wall Building Systems AR104.1

Reason: The purpose of the proposed code change is to include Light Straw Clay as a nonload-bearing building material and wall infill system into the IRC because no such section currently exists.

Light straw-clay construction has proven to be a viable, ecologically sound, and energy efficient building method. To date, permitting of light straw-clay construction has generally been left to the discretion of individual building officials on a case-by-case basis. Two exceptions are the State of New Mexico and the State of Oregon. Since 1998 the State of New Mexico has successfully permitted straw-clay construction using its standard permitting process when a project complies with its "Clay Straw Guidelines".

The proposed light straw-clay section of the IBC is derived from and builds upon the fourteen years of success of New Mexico's Clay Straw Guidelines. In October of 2011 the Oregon Reach Code (ORC) was amended to include light straw-clay construction. Inclusion in the IBC would make proven provisions accessible to more designers and builders interested in using this environmentally beneficial material and to building officials who will be evaluating and enforcing its proper use.

The proposed mixture of clay and straw as a monolithic non-load bearing building enclosure has been successfully used in the United States since 1990 and since 1950 in Europe. Prior to this a heavier form of clay, straw, and woven wood construction known as wattle and daub was in common use throughout Europe, Africa, Asia, and North and South America. Many thousands of existing structures dating back 300-400 years have been continuously occupied, attesting to the durability of these natural materials. In the United States residential and non-residential structures using straw-clay have been completed in 17 states, and most of those have been constructed with full permits and inspections.

The centuries old European predecessors and light straw clay buildings built to date in North America have all been constructed without the use of a moisture barrier. The proposed light straw clay materials are vapor permeable and do not require a moisture barrier. Code precedents for vapor permeable construction exist for adobe construction, log construction and half-timber construction. In these systems as in light straw clay construction there is sufficient hygric capacity to hold and re-release moisture without damage to structural members or degradation of the wall due to weather related moisture fluctuations. Furthermore for exterior siding applications, with ventilated space and rain screen a water resistive barrier is not necessary.

Through The EcoNest Company, and as a licensed architect for over 25 years, I have been involved in the design and/or construction of over 50 buildings utilizing light straw-clay construction. In 2005 I co-authored, with my husband and business partner Robert Laporte, the book "Econest, Creating Sustainable Sanctuaries of Clay, Straw and Timber".

Official guidelines for straw-clay construction have been in effect in New Mexico since 1998. At least 20 residential structures have been successfully permitted and built since that time in New Mexico following these guidelines. Other building officials in surrounding States have also permitted straw-clay construction in their jurisdictions based on these guidelines.

In 2004 the Canada Mortgage and Housing Corporation (CMHC) funded a study to explore the material characteristics of Straw Light Clay (SLC) construction. The proposed section for the IBC uses this study as well as the many years of experience of our company and other practitioners of light straw-clay construction as its basis. The CMHC study includes issues of thermal performance, fire-resistance, moisture, and vapor permeability. The CMHC study and other supporting documentation is available for viewing and download at: <http://www.econesthomes.com/natural-building-resources/technical/>. EcoNest's numerous projects utilizing light straw-clay construction can be viewed at www.econesthomes.com

Bibliography:

2011 Oregon Reach Code (Section 1307) (Based on 2012 International Green Construction Code)
Baker-Laporte, Laporte (2005) *Econest, Creating Sustainable Sanctuaries of Clay, Straw and Timber*, Gibbs Smith Publishers (This book is available only by purchase. See <http://www.econesthomes.com/bookstore/>)
J. Thornton (2004) *Initial Material Characterization of Straw Light Clay* Canada Mortgage and Housing Corporation
State of New Mexico Construction Industries Division (2001) *Clay Straw Guidelines*
Richard Duncan PE, Resistance to Out-Of -Plane Lateral Forces of Light Straw Clay Wall Infill

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, [ASTM E2392/E2392M-10] with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

RB471-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

APPENDIX AR (NEW)-RB-BAKER_LAPORTE

RB472 – 13

Appendix R (New)

Proponent: Michael Cudahy, Plastic Pipe and Fittings Association representing the Plastic Pipe and Fittings Association (PPFA) (mikec@cmservnet.com)

Add new appendix and text as follows:

APPENDIX R

PIPING STANDARDS FOR VARIOUS APPLICATIONS

SECTION AR101

PLASTIC PIPING STANDARDS

AR101.1 Plastic piping. Table AR101.1 provides a listing of plastic piping product standards for various applications.

TABLE AR101.1
PLASTIC PIPING STANDARDS
FOR
VARIOUS APPLICATIONS^{a,b}

<u>APPLICATION</u>	<u>LOCATION</u>	<u>TYPE OF PLASTIC PIPING</u>								
		<u>ABS</u>	<u>CPVC</u>	<u>PE</u>	<u>PE-AL-PE</u>	<u>PE-RT</u>	<u>PEX</u>	<u>PEX-AL-PEX</u>	<u>PP</u>	<u>PVC</u>
<u>CENTRAL VACUUM</u>	<u>SYSTEM PIPING</u>	-	-	-	-	-	-	-	-	<u>ASTM F2158</u>
<u>FOUNDATION DRAINAGE</u>	<u>SYSTEM PIPING</u>	<u>ASTM F628</u>	-	<u>ASTM F405</u>	-	-	-	-	-	<u>ASTM D2665</u> <u>ASTM D2729</u> <u>ASTM D3034</u>
<u>GEOHERMAL GROUNDLOOP</u>	<u>SYSTEM PIPING</u>	-	<u>ASTM F441</u> <u>ASTM F442</u> <u>ASTM F2855</u> <u>ASTM D2846</u> <u>CSA B137.6</u>	<u>ASTM D2239</u> <u>ASTM D2737</u> <u>ASTM D3035</u>	<u>ASTM F1282</u>	<u>ASTM F2623</u> <u>ASTM F2769</u>	<u>ASTM F876</u> <u>CSA B137.5</u>	<u>ASTM F1281</u>	<u>ASTM F2389</u> <u>CSA B137.11</u>	<u>ASTM D1785</u> <u>ASTM D2241</u> <u>CSA B137.3</u>

<u>APPLICATION</u>	<u>LOCATION</u>	<u>TYPE OF PLASTIC PIPING</u>								
		<u>ABS</u>	<u>CPVC</u>	<u>PE</u>	<u>PE-AL-PE</u>	<u>PE-RT</u>	<u>PEX</u>	<u>PEX-AL-PEX</u>	<u>PP</u>	<u>PVC</u>
	<u>LOOP PIPING</u>	:	:	ASTM D2239 ASTM D2737 ASTM D3035 NSF 358-1	ASTM F1282	ASTM F2623 ASTM F2769	ASTM F876 CSA B137.5	:	ASTM F2389 CSA B137.11	:
<u>GRAY WATER</u>	<u>NON-PRESS-URE</u> <u>DISTRIBUTION / COLLEC-TION</u>	ASTM F628	:	ASTM D2239 ASTM D2737 ASTM D3035 ASTM F2306	:	:	:	:	ASTM F2389 CSA B137.11	ASTM F891 ASTM D2949 ASTM D1785 ASTM D2729 ASTM D3034 ASTM F1760 CSA B137.3
	<u>PRESS-URE / DISTRIBUTION</u>	:	ASTM F441 ASTM F442 ASTM F2855 ASTM D2846 CSA B137.6	ASTM D2239 ASTM D2737 ASTM D3035	ASTM F1282	ASTM F2623 ASTM F2769	ASTM F876 CSA B137.5	ASTM F1281	ASTM F2389 CSA B137.11	ASTM D1785 ASTM D2241 CSA B137.3
<u>RADIANT COOLING</u>	<u>LOOP PIPING</u>	:	ASTM F441 ASTM F442 ASTM F2855 ASTM D2846	ASTM D2239 ASTM D2737 ASTM D3035	ASTM F1282	ASTM F2623 ASTM F2769	ASTM F876 CSA B137.5	ASTM F1281	ASTM F2389 CSA B137.11	:
<u>RADIANT HEATING</u>	<u>LOOP PIPING</u>	:	ASTM	:	ASTM F1282	ASTM F2623	ASTM F876	ASTM F1281	ASTM F2389	:

<u>APPLICATION</u>	<u>LOCATION</u>	<u>TYPE OF PLASTIC PIPING</u>								
		<u>ABS</u>	<u>CPVC</u>	<u>PE</u>	<u>PE- AL-PE</u>	<u>PE-RT</u>	<u>PEX</u>	<u>PEX- AL- PEX</u>	<u>PP</u>	<u>PVC</u>
			<u>F441</u> <u>ASTM F442</u> <u>ASTM F2855</u> <u>ASTM D2846</u>			<u>ASTM F2769</u>	<u>CSA B137.5</u>		<u>CSA B137.11</u>	
<u>RAINWATER HARVESTING</u>	<u>NON-PRESS- URE / COLLEC-TION</u>	<u>ASTM F628</u>	-	<u>ASTM F1901</u>	-	-	-	-	<u>ASTM F2389</u> <u>CSA B137.11</u>	<u>ASTM F891</u> <u>ASTM D2949</u> <u>ASTM D1785</u> <u>ASTM D2729</u> <u>ASTM F1760</u> <u>CSA B137.3</u>
	<u>PRESS-URE / DISTRIBU- TION</u>	-	<u>ASTM F441</u> <u>ASTM F442</u> <u>ASTM F2855</u> <u>ASTM D2846</u> <u>CSA B137.6</u>	<u>ASTM D2239</u> <u>ASTM D2737</u> <u>ASTM D3035</u>	<u>ASTM F1282</u>	<u>ASTM F2623</u> <u>ASTM F2769</u>	<u>ASTM F876</u> <u>CSA B137.5</u>	<u>ASTM F1281</u>	<u>ASTM F2389</u> <u>CSA B137.11</u>	<u>ASTM D1785</u> <u>ASTM D2241</u> <u>CSA B137.3</u>
<u>RADON VENTING</u>	<u>SYSTEM PIPING</u>	<u>ASTM F628</u>	-	-	-	-	-	-	-	<u>ASTM F891</u> <u>ASTM D1785</u> <u>ASTM F1760</u>

APPLICATION	LOCATION	TYPE OF PLASTIC PIPING								
		ABS	CPVC	PE	PE-AL-PE	PE-RT	PEX	PEX-AL-PEX	PP	PVC
RECLAIMED WATER	MAIN TO BUILDING SERVICE	-	<u>ASTM F441</u> <u>ASTM F442</u> <u>ASTM F2855</u> <u>ASTM D2846</u> <u>CSA B137.6</u>	<u>ASTM D3035</u> <u>AWWA C901</u> <u>CSA B137.1</u>	<u>ASTM F1282</u>	<u>ASTM F2623</u> <u>ASTM F2769</u>	<u>ASTM F876</u> <u>AWWA C904</u> <u>CSA B137.5</u>	-	<u>ASTM F2389</u> <u>CSA B137.11</u>	<u>ASTM D1785</u> <u>ASTM D2241</u> <u>AWWA C905</u> <u>CSA B137.3</u>
	PRESS-URE / DISTRIBUTION / IRRIGATION	-	<u>ASTM F441</u> <u>ASTM F442</u> <u>ASTM F2855</u> <u>ASTM D2846</u> <u>CSA B137.6</u>	<u>ASTM D2239</u> <u>ASTM D2737</u> <u>ASTM D3035</u>	<u>ASTM F1282</u>	<u>ASTM F2623</u> <u>ASTM F2769</u>	<u>ASTM F876</u> <u>CSA B137.5</u>	<u>ASTM F1281</u>	<u>ASTM F2389</u> <u>CSA B137.11</u> <u>AWWA C900</u>	<u>ASTM D1785</u> <u>ASTM D2241</u> <u>AWWA C900</u>
RESIDENTIAL FIRE SPRINKLERS ^c	SPRINK-LER PIPING	-	<u>ASTM F441</u> <u>ASTM F442</u> <u>CSA B137.6</u> <u>UL 1821</u>	-	-	<u>ASTM F2769</u>	<u>ASTM F876</u> <u>CSA B137.5</u> <u>UL 1821</u>		<u>ASTM F2389</u> <u>CSA B137.11</u>	-
SOLAR HEATING	PRESS-URE / DISTRIBUTION		<u>ASTM F441</u> <u>ASTM F442</u> <u>ASTM F2855</u> <u>ASTM D2846</u>	-	-	<u>ASTM F2623</u> <u>ASTM F2769</u>	<u>ASTM F876</u> <u>CSA B137.5</u>	<u>ASTM F1281</u>	<u>ASTM F2389</u> <u>CSA B137.11</u>	-

- a. This table indicates manufacturing standards for plastic piping materials that are suitable for use in the applications indicated. Such applications support green and sustainable building practices. The system designer or the installer of piping shall verify that the piping chosen for an application complies with local codes and the recommendations of the manufacturer of the piping.
- b. Fittings applicable for the piping shall be as recommended by the manufacturer of the piping.
- c. Piping systems for fire sprinkler applications shall be listed for the application.

Add standards to Chapter 44 as follows:

ASTM

F1760-01(2011)	<u>Standard Specification for Coextruded Poly(Vinyl Chloride) (PVC) Non-Pressure Plastic Pipe Having Reprocessed-Recycled Content</u>
F1901-10	<u>Standard Specification for Polyethylene (PE) Pipe and Fittings for Roof Drain Systems</u>
F2158-08	<u>Standard Specification for Residential Central-Vacuum Tube and Fittings</u>
F2306-08	<u>12" to 60" Annular Corrugated Profile-wall Polyethylene (PE) Pipe and Fittings for Gravity Flow Storm Sewer and Subsurface Drainage Applications</u>
F2623-08	<u>Standard Specification for Polyethylene of Raised Temperature (PE-RT) SDR 9 Tubing</u>
F2855-12	<u>Standard Specification for Chlorinated Poly(Vinyl Chloride)/Aluminum/Chlorinated Poly(Vinyl Chloride) (CPVC-AL-CPVC) Composite Pressure Tubing</u>

AWWA

900-07	<u>Polyvinyl chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 in. through 12 in. (350mm through 1200mm), for Water transmission and Distribution</u>
905-10	<u>Polyvinyl chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 in. through 48 in. (100 mm through 300mm)</u>

NSF

358-1-2012	<u>Polyethylene Pipe and Fittings for Water-Based Ground-Source "Geothermal" Heat Pump Systems</u>
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UL

1821-2011	<u>Standard for Thermoplastic Sprinkler Pipe and Fittings for Fire Protection Service</u>
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Reason: PPFA is recommending that this table to be added as an appendix. The table will assist builders and code officials to properly select and inspect plastic piping used in green and sustainable piping systems that may be encouraged or required due to other codes, standards or rating systems. These systems are often not covered in the model codes, and some guidance would improve the code until all the applications are covered in the code body.

Cost Impact: None

Analysis: A review of the standards proposed for inclusion in the code, ASTM F1760, F1901, F2158 and F2855; AWWA C900 and C905; NSF 358-1 and UL 1821 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1 2013. The following standards proposed for inclusion in the code are already referenced by other 2012 I-codes: ASTM F2306 (IPC) and F2623 (IMC).

RB472-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

APPENDIX R (NEW)-RB-CUDAHY.DOC

RB473 – 13

Appendix R (New)

Proponent: Martin Hammer, representing: California Straw Building Association, Colorado Straw Bale Association, Straw Bale Construction Association – New Mexico, Ontario Straw Bale Building Coalition, Development Center for Appropriate Technology and Ecological Building Network (mfhammer@pacbell.net)

Add new text as follows:

APPENDIX R STRAWBALE CONSTRUCTION

The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.

SECTION AR101 GENERAL

AR101.1 Scope. This appendix provides prescriptive and performance-based requirements for the use of baled straw as a building material. Other methods of strawbale construction shall be subject to approval in accordance with Section 104.11 of the *International Residential Code*. Buildings using strawbale walls shall comply with the *International Residential Code* except as otherwise stated in this appendix.

SECTION AR102 DEFINITIONS

AR102.1 Definitions. The following words and terms shall, for the purposes of this appendix, have the meanings shown herein. Refer to Chapter 2 of the *International Residential Code* for general definitions.

BALE. Equivalent to *straw bale*.

CLAY. Inorganic soil with particle sizes less than 0.00008 in. (0.002 mm) having the characteristics of high to very high dry strength and medium to high plasticity.

CLAY SLIP. A suspension of *clay* particles in water.

FINISH. Completed compilation of materials on the interior or exterior faces of stacked *bales*.

FLAKE. An intact section of compressed *straw* removed from an untied *bale*.

LAI D FLAT. The orientation of a *bale* with its largest faces horizontal, its longest dimension parallel with the wall plane, its *ties* concealed in the unfinished wall and its *straw* lengths oriented across the thickness of the wall.

LOAD-BEARING WALL. A strawbale wall that supports more than 100 pounds per linear foot (1459 N/m) of vertical load in addition its own weight.

MESH. An openwork fabric of linked strands of metal, plastic, or natural or synthetic fiber, embedded in plaster.

NONSTRUCTURAL WALL. All walls other than *load-bearing walls* or *shear walls*.

ON-EDGE. The orientation of a *bale* with its largest faces vertical, its longest dimension parallel with the wall plane, its *ties* on the face of the wall, and its *straw* lengths oriented vertically.

PIN. A vertical metal rod, wood dowel, or bamboo, driven into the center of stacked *bales*, or placed on opposite surfaces of stacked *bales* and through-tied.

PLASTER. Gypsum or cement plaster, as defined in Section R702 and in Section AR104, or clay plaster, soil-cement plaster, lime plaster, or cement-lime plaster as defined in Section AR104.

PRE-COMPRESSION. Vertical compression of stacked *bales* before the application of *finish*.

REINFORCED PLASTER. A plaster containing mesh reinforcement.

RUNNING BOND. The placement of *straw bales* such that the head joints in successive courses are offset at least one-quarter the bale length.

SHEAR WALL. A *strawbale* wall designed and constructed to resist lateral seismic and wind forces parallel to the plane of the wall in accordance with Section AR106.13.

SKIN. The compilation of *plaster* and reinforcing, if any, applied to the surface of stacked bales.

STRUCTURAL WALL. A wall that meets the definition for a *load-bearing wall* or *shear wall*.

STACK BOND. The placement of *straw bales* such that head joints in successive courses are vertically aligned.

STRAW. The dry stems of cereal grains after the seed heads have been removed.

STRAW BALE. A rectangular compressed block of *straw*, bound by *ties*.

STRAWBALE. The adjective form of *straw bale*.

STRAW-CLAY. Loose *straw* mixed and coated with *clay slip*.

TIE. A synthetic fiber, natural fiber, or metal wire used to confine a *straw bale*.

TRUTH WINDOW. An area of a *strawbale* wall left without its *finish*, to allow view of the *straw* otherwise concealed by its *finish*.

SECTION AR103 **BALES**

AR103.1 Shape. Bales shall be rectangular in shape.

AR103.2 Size. Bales shall have a minimum height and thickness of 12 inches (305 mm), except as otherwise permitted or required in this appendix. Bales used within a continuous wall shall be of consistent height and thickness to ensure even distribution of loads within the wall system.

AR103.3 Ties. Bales shall be confined by synthetic fiber, natural fiber, or metal ties sufficient to maintain required bale density. Ties shall be not less than 3 inches (76 mm) and not more than 6 inches (152 mm) from the two faces without ties and shall be spaced not more than 12 (305 mm) inches apart. Bales with broken ties shall be retied with sufficient tension to maintain required bale density.

AR103.4 Moisture content. The moisture content of bales at the time of application of the first coat of plaster or the installation of another finish shall not exceed 20 percent of the weight of the bale. The moisture content of bales shall be determined by use of a moisture meter designed for use with baled straw or hay, equipped with a probe of sufficient length to reach the center of the bale. At least 5 percent and not less than ten bales used shall be randomly selected and tested.

AR103.5 Density. Bales shall have a minimum dry density of 6.5 pounds per cubic foot (104 kg/cubic meter). The dry density shall be calculated by subtracting the weight of the moisture in pounds (kg) from the actual bale weight and dividing by the volume of the bale in cubic feet (cubic meters). At least 2 percent and not less than five bales to be used shall be randomly selected and tested on site.

AR103.6 Partial bales. Partial bales made after original fabrication shall be retied with ties complying with Section AR103.3.

AR103.7 Types of straw. Bales shall be composed of straw from wheat, rice, rye, barley, or oat.

AR103.8 Other baled material. The dry stems of other cereal grains shall be acceptable when *approved* by the *building official*.

SECTION AR104 **FINISHES**

AR104.1 General. Finishes applied to strawbale walls shall be any type permitted by the *International Residential Code*, and shall comply with this section and with Chapters 3 and 7 of the *International Residential Code* unless stated otherwise in this section.

AR104.2 Purpose, and where required. Strawbale walls shall be finished so as to provide mechanical protection, fire resistance, protection from weather, and to restrict the passage of air through the bales, in accordance with this appendix and the *International Residential Code*. Vertical strawbale wall surfaces shall receive a coat of plaster not less than 3/8 inches (10 mm) thick, or greater where required elsewhere in this appendix, or shall fit tightly against a solid wall panel. The tops of strawbale walls shall receive a coat of plaster not less than 3/8 inches (10 mm) thick where straw would otherwise be exposed.

Exception: Truth windows shall be permitted where a fire-resistive rating is not required. Weather-exposed truth windows shall be fitted with a weather-tight cover. Interior truth windows in Climate Zones 5, 6, 7, 8, and Marine 4 shall be fitted with an air-tight cover.

AR104.3 Vapor retarders. Class I and Class II vapor retarders shall not be used on a strawbale wall, nor shall any other material be used that has a vapor permeance rating of less than 3 perms, except as permitted or required elsewhere in this appendix.

AR104.4 Plaster. Plaster applied to bales shall be any type described in this section, and as required or limited in this appendix. Plaster thickness shall not exceed 2 inches (51 mm).

AR104.4.1 Plaster and membranes. Plaster shall be applied directly to strawbale walls to facilitate transpiration of moisture from the bales, and to secure a mechanical bond between the *skin* and the bales, except where a membrane is allowed or required elsewhere in this appendix.

AR104.4.2 Lath and mesh for plaster. The surface of the straw bales functions as lath, and no other lath or mesh shall be required, except as required for out-of-plane resistance by Table 105.4, or for *structural walls* by Table AR106.12 and Table AR106.13(1).

AR104.4.3 Clay plaster. Clay plaster shall comply with Sections AR104.4.3.1 through AR104.4.3.6.

AR104.4.3.1 General. Clay plaster shall be any plaster having a clay or clay-soil binder. Such plaster shall contain sufficient clay to fully bind the plaster, sand or other inert granular material, and shall be permitted to contain reinforcing fibers. Acceptable reinforcing fibers include chopped straw, sisal, and animal hair.

AR104.4.3.2 Lath and mesh. Clay plaster shall not be required to contain reinforcing lath or mesh except as required in Table AR105.4 and Table AR106.13(1). Where provided, mesh shall be natural fiber, corrosion-resistant metal, nylon, high-density polypropylene, or other *approved* material.

AR104.4.3.3 Thickness and coats. Clay plaster shall be not less than 1 inch (25 mm) thick, except where required to be thicker for *structural walls*, as described elsewhere in this appendix, and shall be applied in not less than two coats.

AR104.4.3.4 Rain-exposed. Clay plaster, where exposed to rain, shall be finished with lime wash, lime plaster linseed oil, or other *approved* erosion-resistant finish.

AR104.4.3.5 Prohibited finish coat. Plaster containing Portland cement shall not be permitted as a finish coat over clay plasters.

AR104.4.3.6 Plaster additives. Additives shall be permitted to increase plaster workability, durability, strength, or water resistance.

AR104.4.4 Soil-cement plaster. Soil-cement plaster shall comply with Sections AR104.4.4.1 through AR104.4.4.3.

AR104.4.4.1 General. Soil-cement plaster shall be comprised of soil (free of organic matter), sand, and not less than 10 percent and not more than 20 percent Portland cement by volume, and shall be permitted to contain reinforcing fibers.

AR104.4.4.2 Lath and mesh. Soil-cement plaster shall use any corrosion-resistant lath or mesh permitted by the *International Residential Code*, or as required in Section AR106 where used on *structural walls*.

AR104.4.4.3 Thickness. Soil-cement plaster shall be not less than 1 inch (25 mm) thick.

AR104.4.5 Gypsum plaster. Gypsum plaster shall comply with Section R702. Gypsum plaster shall be limited to use on interior surfaces of non-structural walls, and as an interior finish coat over a structural plaster that complies with this appendix.

AR104.4.6 Lime plaster. Lime plaster shall comply with Sections AR104.4.6.1 and AR104.4.6.3.

AR104.4.6.1 General. Lime plaster is any plaster whose binder is comprised of calcium hydroxide (CaOH) including Type N or Type S hydrated lime, hydraulic lime, natural hydraulic lime, or quicklime. Hydrated lime shall comply with ASTM C 206. Hydraulic lime shall comply with ASTM C 1707. Natural hydraulic lime shall comply with ASTM C 141 and EN 459. Quicklime shall comply with ASTM C 5.

AR104.4.6.2 Thickness and coats. Lime plaster shall be not less than 7/8 inch (22 mm) thick, and shall be applied in not less than three coats.

AR104.4.6.3 On structural walls. Lime plaster on strawbale *structural walls* in accordance with Table AR106.12 or Table AR106.13(1) shall use a binder of hydraulic or natural hydraulic lime.

AR104.4.7 Cement-lime plaster. Cement-lime plaster shall be plaster mixes CL, F, or FL as described in ASTM C 926.

AR104.4.8 Cement plaster. Cement plaster shall conform to ASTM C 926 and shall comply with Sections R703.6.2, R703.6.4 and R703.6.5, except that the amount of lime in all plaster coats shall be not less than 1 part lime to 6 parts cement to allow a minimum acceptable vapor permeability. The combined thickness of all plaster coats shall be not more than 1 1/2 inch (38 mm) thick.

SECTION AR105

STRAWBALE WALLS – GENERAL

AR105.1 General. Strawbale walls shall be designed and constructed in accordance with this section.

Strawbale *structural walls* shall be in accordance with the additional requirements of Section AR106.

AR105.2 Building requirements for use of strawbale nonstructural walls. Buildings using strawbale *nonstructural walls* shall be subject to the following limitations and requirements:

1. Number of stories: not more than one, except that two stories shall be allowed with an *approved engineered design*.
2. Building height: not more than 25 feet (7620 mm)
3. Wall height: in accordance with Table AR105.4
4. Braced wall panel length, and increase in seismic design categories C, D₀, D₁ and D₂: the required length of bracing for buildings using strawbale *nonstructural walls* shall comply with Section R602.10.3 of the *International Residential Code*, with the additional requirements that Table 602.10.3(3) shall be applicable to all buildings in Seismic Design Category C, and that the minimum total length of *braced wall panels* in Table R602.10.3(3) shall be increased by 60 percent.

AR105.3 Sill plates. Sill plates shall support and be flush with each face of the straw bales above and shall be of *naturally durable or preservative-treated wood* where required by the *International Residential Code*. Sill plates shall be not less than nominal 2 inches by 4 inches (51 mm by 102 mm) with anchoring complying with Section R403.1.6 and the additional requirements of Tables AR105.4 and AR106.16(1) where applicable.

AR105.4 Out-of-plane resistance and unrestrained wall dimensions. Strawbale walls shall employ a method of out-of-plane resistance in accordance with Table AR105.4, and comply with its associated limits and requirements.

AR105.4.1 Determination of out-of-plane loading. Out-of-plane loading for the use of Table AR105.4 shall be in terms of the design wind speed and seismic design category as determined in accordance with Sections R301.2.1 and R301.2.2 of the *International Residential Code*.

TABLE AR105.4
OUT-OF-PLANE RESISTANCE AND UNRESTRAINED WALL DIMENSIONS

Method of Out-of-Plane Resistance ^a	For Wind Design Speeds (mph)	For Seismic Design Categories	Unrestrained Wall Dimensions, H ^b		Mesh Staple Spacing at Boundary Restraints
			Absolute limit in feet	Limit based on bale thickness T ^c in feet (mm)	
Non-plaster finish or unreinforced plaster	≤100	A, B, C, D ₀	H ≤ 8	H ≤ 5T	none required
Pins per Section AR105.4.2	≤100	A, B, C, D ₀	H ≤ 12	H ≤ 8T	none required
Pins per Section AR105.4.2	≤110	A, B, C, D _{0,1} , D ₁ , D ₂	H ≤ 10	H ≤ 7T	none required
Reinforced ^c clay plaster	≤110	A, B, C, D _{0,1} , D ₁ , D ₂	H ≤ 10	$H \leq 8T^{0.5}$ ($H \leq 140T^{0.5}$)	≤ 6 inches
Reinforced ^c clay plaster	≤110	A, B, C, D _{0,1} , D ₁ , D ₂	10 < H ≤ 12	$H \leq 8T^{0.5}$ ($H \leq 140T^{0.5}$)	≤ 4 inches ^e
Reinforced ^c cement, cement-lime, lime, or soil-cement plaster	≤110	A, B, C, D _{0,1} , D ₁ , D ₂	H ≤ 10	$H \leq 9T^{0.5}$ ($H \leq 157T^{0.5}$)	≤ 6 inches
Reinforced ^c cement, cement-lime, lime, or soil-cement plaster	≤120	A, B, C, D _{0,1} , D ₁ , D _{2,1}	H ≤ 12	$H \leq 9T^{0.5}$ ($H \leq 157T^{0.5}$)	≤ 4 inches ^e

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm

- a. Finishes applied to both sides of stacked bales. Where different finishes are used on opposite sides of a wall, the more restrictive requirements shall apply.
- b. H = stacked bale height in feet (mm) between sill plate and top plate or other *approved* horizontal restraint, or the horizontal distance in feet (mm) between *approved* vertical restraints. For load-bearing walls, H refers to vertical height only.
- c. T = bale thickness in feet (mm).
- d. Plaster reinforcement shall be any mesh allowed in Table AR106.16 for the matching plaster type, but with staple spacing per this table. Mesh shall be installed in accordance with Section AR106.9.
- e. Sill plate attachment shall be with 5/8 inch anchor bolts or *approved* equivalent at a maximum of 48 inches on center where staple spacing is required to be ≤ 4 inches.

AR105.4.2 Pins. Pins used for out-of-plane resistance shall comply with the following or shall be in accordance with an *approved* engineered design. Pins may be external, internal or a combination of the two.

- 1. Pins shall be 1/2 inch (13 mm) diameter steel, 3/4 inch (19 mm) diameter wood, or 1/2 inch (13 mm) diameter bamboo.
- 2. External pins shall be installed vertically on both sides of the wall at a spacing of not more than 24 inches (610 mm) on center. External pins shall have full lateral bearing on the sill plate and the top plate or roof-bearing element, and shall be tightly tied through the wall to an opposing pin with ties spaced not more than 32 inches (813 mm) apart and not more than 8 inches (203 mm) from each end of the pins.
- 3. Internal pins shall be installed vertically within the center third of the bales, at spacing of not more than 24 inches (610 mm) and shall extend from top course to bottom course. The bottom course shall be similarly connected to its support and the top course shall be similarly connected to the roof- or floor-bearing member above with pins or other *approved* means. Internal pins shall be continuous or shall overlap through not less than one bale course.

AR105.5 Connection of light-frame walls to strawbale walls. Light-frame walls perpendicular to, or at an angle to a straw bale wall assembly, shall be fastened to the bottom and top wood members of the strawbale wall in accordance with requirements for wood or cold-formed steel light-frame walls in the *International Residential Code*, or the abutting stud shall be connected to alternating straw bale courses with a 1/2 inch (13mm) diameter steel, 3/4" diameter (19 mm) wood, or 5/8" diameter (16 mm) bamboo dowel, with not less than 8 inch (203 mm) penetration.

AR105.6 Moisture control. Strawbale walls shall be protected from moisture intrusion and damage in accordance with Sections AR105.6.1 through AR105.6.8.

AR105.6.1 Water-resistive barriers and vapor permeance ratings. Plastered bale walls shall be constructed without any membrane barrier between straw and plaster to facilitate transpiration of moisture from the bales, and to secure a structural bond between straw and plaster, except as permitted or required elsewhere in this appendix. Where a water-resistive barrier is placed behind an exterior finish, it shall have a vapor permeance rating of not less than 5 perms, except as permitted or required elsewhere in this appendix.

AR105.6.2 Vapor retarders. Wall finishes shall have an equivalent vapor permeance rating of a Class III vapor retarder on the interior side of exterior strawbale walls in Climate Zones 5, 6, 7, 8 and Marine 4 as defined in Chapter 11. Bales in walls enclosing showers or steam rooms shall be protected on the interior side by a Class I or Class II vapor retarder.

AR105.6.3 Penetrations in exterior strawbale walls. Penetrations in exterior strawbale walls shall be sealed with an *approved* sealant or gasket on the exterior side of the wall in all Climate Zones, and on the interior side of the wall in Climate Zones 5, 6, 7, 8 and Marine 4 as defined in Chapter 11.

AR105.6.4 Horizontal surfaces. Bale walls and other bale elements shall be provided with a *water-resistive barrier* at all weather-exposed horizontal surfaces. The *water-resistive barrier* shall be of a material and installation that will prevent water from entering the wall system. Horizontal surfaces shall include exterior window sills, sills at exterior niches, and buttresses. The finish material at such surfaces shall be sloped not less than 1 unit vertical in 12 units horizontal (8-percent slope) and shall drain away

from all bale walls and elements. Where the *water-resistive barrier* is below the finish material, it shall be sloped not less than 1 unit vertical in 12 units horizontal (8-percent slope) and shall drain to the outside surface of the bales wall's vertical finish.

AR105.6.5 Separation of bales and concrete. A sheet or liquid-applied Class II *vapor retarder* shall be installed between bales and supporting concrete or masonry. The bales shall be separated from the *vapor retarder* by not less than 3/4 inch (19 mm), and that space shall be filled with an insulating material such as wood or rigid insulation, or a material that allows vapor dispersion such as gravel, or other *approved* insulating or vapor dispersion material. Sill plates shall be installed at this interface in accordance with Section AR105.3. Where bales abut a concrete or masonry wall that retains earth, a Class II *vapor retarder* shall be provided between such wall and the bales.

AR105.6.6 Separation of bales and earth. Bales shall be separated from earth by not less than of 8" (203 mm).

AR105.6.7 Separation of exterior plaster and earth. Exterior plaster applied to straw bales shall be located not less than 6 inches (102 mm) above earth or 3 inches (51 mm) above paved areas.

AR105.6.8 Separation of wood and plaster. Where wood framing or wood sheathing occurs on the exterior face of strawbale walls, such wood surfaces shall be separated from exterior plaster with 2 layers of grade D paper, No. 15 asphalt felt, or other *approved* material in accordance with Section R703.6.3.

Exceptions:

1. Where the wood is preservative-treated or *naturally durable* and is no greater than 1-1/2 inches (38 mm) in width.

2. Clay plaster shall not be required to be separated from untreated wood that is no greater than 1-1/2 inches (38 mm) in width.

AR105.7 Inspections. The *building official* shall inspect the following aspects of strawbale construction in accordance with Section R109.1:

1. Sill plate anchors, as part of and in accordance with Section R109.1.1 Foundation inspection.

2. Mesh placement and attachment, where mesh is required by this appendix.

3. *Pins*, where required by and in accordance with Section AR105.4.

SECTION AR106 **STRAWBALE WALLS - STRUCTURAL**

AR106.1 General. Plastered strawbale walls shall be permitted to be used as *structural walls* in one-story buildings in accordance with the prescriptive provisions of this section.

AR106.2 Loads and other limitations. Live and dead loads and other limitations shall be in accordance with Section R301 of the *International Residential Code*. Strawbale wall dead loads shall not exceed 60 psf (2872 N/m²) per face area of wall.

AR106.3 Foundations. Foundations for plastered strawbale walls shall be in accordance with Chapter 4.

AR106.4 Configuration of bales. Bales in strawbale *structural walls* shall be *laid flat* or *on-edge* and in a *running bond* or *stack bond*, except that bales in *structural walls* with unreinforced plasters shall be laid in a *running bond* only.

AR106.5 Voids and stuffing. Voids between bales in strawbale *structural walls* shall not exceed 4 inches (102 mm) in width, and such voids shall be stuffed with *flakes* of straw or *straw-clay*, before application of finish.

AR106.6 Plaster on structural walls. Plaster on *load-bearing walls* shall be in accordance with Table AR106.12. Plaster on *shear walls* shall be in accordance with Table AR106.13(1).

AR106.6.1 Compressive strength. For plasters on strawbale *structural walls*, the *building official* is authorized to require a 2 inch (51mm) cube test conforming with ASTM C 109 to demonstrate a minimum compressive strength in accordance with Table AR106.6.1.

TABLE AR106.6.1
MINIMUM COMPRESSIVE STRENGTH FOR PLASTERS ON STRUCTURAL WALLS

PLASTER TYPE	MINIMUM COMPRESSIVE STRENGTH (psi)
Clay	100
Soil-cement	1000
Lime	600
Cement-lime	1000
Cement	1400

For SI: 1 pound per square inch = 6894.76 N/m².

AR106.7 Straightness of plaster. Plaster on strawbale *structural walls* shall be straight, as a function of the bale wall surfaces they are applied to, in accordance with the following:

1. As measured across the face of a bale, straw bulges shall not protrude more than 3/4 inch (19 mm) across 2 feet (610 mm) of its height or length,
2. As measured across the face of a bale wall, straw bulges shall not protrude from the vertical plane of a bale wall more than 2 inches (51 mm) over 8 feet (2438 mm), and
3. The vertical faces of adjacent bales shall not be offset more than 3/8 inch (10 mm).

AR106.8 Plaster and membranes. Strawbale *structural walls* shall not have a membrane between straw and plaster, or shall have attachment through the bale wall from one plaster *skin* to the other in accordance with an *approved* engineered design.

AR106.9 Mesh. Mesh in plasters on strawbale *structural walls*, and where required by Table AR105.4, shall be installed in accordance with Sections AR106.9.1 through AR106.9.4.

AR106.9.1 Mesh laps. Mesh required by Tables AR106.12 or Table AR105.4 shall be installed with not less than 4-inch (102 mm) laps. Mesh required by Table AR106.13(1) or in walls designed to resist wind uplift of more than 100 plf (1459 N/m), shall run continuous vertically from sill plate to the top plate or roof-bearing element, or shall lap not less than 8 inches (203 mm). Horizontal laps in such mesh shall be not less than 4 inches (102 mm).

AR106.9.2 Mesh attachment. Mesh shall be attached with staples to top plates or roof-bearing elements and to sill plates in accordance with the following:

1. **Staples.** Staples shall be pneumatically driven, stainless steel or electro-galvanized, 16 gauge with 1 1/2-inch (38 mm) legs, 7/16-inch (11 mm) crown; or manually driven, galvanized, 15 gauge with 1-inch (25 mm) legs. Other staples shall be permitted to be used as designed by a *registered design professional*. Staples into preservative-treated wood shall be stainless steel.
2. **Staple orientation.** Staples shall be firmly driven diagonally across mesh intersections at the required spacing.
3. **Staple spacing.** Staples shall be spaced not more than 4-inches (102 mm) on center, except where a lesser spacing is required by Table AR106.13(1) or Section AR106.14 as applicable.

AR106.9.3 Steel mesh. Steel mesh shall be galvanized, and shall be separated from preservative-treated wood by grade D paper, 15# roofing felt, or other *approved* barrier.

AR106.9.4 Mesh in plaster. Required mesh shall be embedded in the plaster except where staples fasten the mesh to horizontal boundary elements.

AR106.10 Support of plaster skins. Plaster *skins* on strawbale *structural walls* shall be continuously supported along their bottom edge. Acceptable supports include: a concrete or masonry stem wall, a concrete slab-on-grade, a wood-framed floor blocked with an *approved* engineered design, or a steel angle anchored with an *approved* engineered design. A weep screed as described in R703.2.1 is not an acceptable support.

AR106.11 Transfer of loads to and from plaster skins. Where plastered strawbale walls are used to support superimposed vertical loads, such loads shall be transferred to the plaster *skins* by continuous direct bearing or by an *approved* engineered design. Where plastered strawbale walls are used to resist in-plane lateral loads, such loads shall be transferred to the reinforcing mesh from the structural member or assembly above and to the sill plate in accordance with Table AR106.13(3).

AR106.12 Load-bearing walls. Plastered strawbale walls shall be permitted to be used as *load-bearing walls* in one-story buildings to support vertical loads imposed according to Section R301, in accordance with and not more than the allowable bearing capacities indicated in Table AR106.12.

AR106.12.1 Pre-compression of load-bearing strawbale walls. Prior to application of plaster, walls designed to be *load-bearing* shall be pre-compressed by a uniform load of not less than 100 plf (1459 N/m).

AR106.12.2 Concentrated loads. Concentrated loads shall be distributed by structural elements capable of distributing the loads to the bearing wall within the allowable bearing capacity listed in Table AR106.12 for the plaster type used.

TABLE AR106.12
ALLOWABLE SUPERIMPOSED VERTICAL LOADS (LBS/FOOT)
FOR PLASTERED LOAD-BEARING STRAWBALE WALLS

WALL DESIGNATION	PLASTER^a (both sides) Minimum thickness each side	MESH^b	STAPLES^c	ALLOWABLE BEARING CAPACITY^d (plf)
<u>A</u>	Clay 1-1/2"	None required	None required	<u>400</u>
<u>B</u>	Soil-cement 1"	required	required	<u>800</u>
<u>C</u>	Lime 7/8"	required	required	<u>500</u>
<u>D</u>	Cement-lime 7/8"	required	required	<u>800</u>
<u>E</u>	Cement 7/8"	required	required	<u>800</u>

For SI: 1 inch=25.4mm, 1 pound per foot = 14.5939 N/m.

- Plasters shall conform with Sections AR104.4.3 through AR104.4.8, AR106.7, and AR106.10.
- Any metal mesh allowed by this appendix and installed in accordance with Section AR106.9.
- In accordance with Section AR106.9.2, except as required to transfer roof loads to the plaster skins in accordance with Section AR106.11.
- For walls with a different plaster on each side, the lower value shall be used.

AR106.13 Braced panels. Plastered strawbale walls shall be permitted to be used as *braced wall panels* for one-story buildings in accordance with Section R602.10 of the *International Residential Code*, and with Tables AR106.13 (1), AR106.13(2) and AR106.13(3). Wind design criteria shall be in accordance with Section R301.2.1. Seismic design criteria shall be in accordance with Section R301.2.2.

AR106.13.1 Bale wall thickness. The thickness of the stacked bale wall without its plaster shall not be less than 15 inches (381 mm).

AR106.13.2 Sill plates. Sill plates shall be in accordance with Table AR106.13(1).

AR106.13.3 Sill plate fasteners. Sill plates shall be fastened with not less than 5/8-inch (16 mm) diameter steel anchor bolts with 3-inch by 3-inch by 3/16-inch steel washers, with not less than 7-inch embedment in a concrete or masonry foundation, or shall be an *approved* equivalent, with the spacing shown in Table AR106.13(1). Anchor bolts or other fasteners into framed floors shall be of an *approved* engineered design.

TABLE AR106.13(1)
PLASTERED STRAWBALE BRACED WALL PANEL TYPES

<u>WALL DESIGNATION</u>	<u>PLASTER^a (both sides)</u>		<u>SILL PLATES^b (nominal size in inches)</u>	<u>ANCHOR BOLT^c SPACING (on center)</u>	<u>MESH^d</u>	<u>STAPLE SPACING^e (on center)</u>
	<u>TYPE</u>	<u>THICK- NESS (minimum, each side)</u>				
<u>A1</u>	<u>Clay</u>	<u>1.5"</u>	<u>2 x 4</u>	<u>32"</u>	<u>None</u>	<u>None</u>
<u>A2</u>	<u>Clay</u>	<u>1.5"</u>	<u>2 x 4</u>	<u>32"</u>	<u>2" x 2" high-density polypropylene</u>	<u>2"</u>
<u>A3</u>	<u>Clay</u>	<u>1.5"</u>	<u>2 x 4</u>	<u>32"</u>	<u>2" x 2" x 14gaⁱ</u>	<u>4"</u>
<u>B</u>	<u>Soil- cement</u>	<u>1"</u>	<u>4 x 4</u>	<u>24"</u>	<u>2" x 2" x 14gaⁱ</u>	<u>2"</u>
<u>C1</u>	<u>Lime</u>	<u>7/8"</u>	<u>2 x 4</u>	<u>32"</u>	<u>17 ga woven wire</u>	<u>3"</u>
<u>C2</u>	<u>Lime</u>	<u>7/8"</u>	<u>4 x 4</u>	<u>24"</u>	<u>2" x 2" x 14gaⁱ</u>	<u>2"</u>
<u>D1</u>	<u>Cement- lime</u>	<u>7/8"</u>	<u>4 x 4</u>	<u>32"</u>	<u>17 ga woven wire</u>	<u>2"</u>
<u>D2</u>	<u>Cement- lime</u>	<u>7/8"</u>	<u>4 x 4</u>	<u>24"</u>	<u>2" x 2" x 14gaⁱ</u>	<u>2"</u>
<u>E1</u>	<u>Cement</u>	<u>7/8"</u>	<u>4 x 4</u>	<u>32"</u>	<u>2" x 2" x 14gaⁱ</u>	<u>2"</u>
<u>E2</u>	<u>Cement</u>	<u>1.5"</u>	<u>4 x 4</u>	<u>24"</u>	<u>2" x 2" x 14gaⁱ</u>	<u>2"</u>

SI: 1 inch=25.4 mm

- a. Plasters shall conform with Sections AR104.4.3 through AR104.4.8, AR106.7, AR106.8, and AR106.12.
- b. Sill plates shall be Douglas fir-larch or southern pine and shall be *preservative-treated* where required by the *International Residential Code*.
- c. Anchor bolts shall be in accordance with Section AR106.13.3 at the spacing shown in this table.
- d. Installed in accordance with Section AR106.9.
- e. Staples shall be in accordance with Section AR106.9.2 at the spacing shown in this table.

TABLE AR106.13(2)
BRACING REQUIREMENTS FOR STRAWBALE BRACED WALL PANELS BASED ON WIND SPEED

<ul style="list-style-type: none"> • <u>EXPOSURE CATEGORY B^d</u> • <u>25 FOOT MEAN ROOF HEIGHT</u> • <u>10 FOOT EAVE-TO-RIDGE HEIGHT^d</u> • <u>10 FOOT WALL HEIGHT^d</u> • <u>2 BRACED WALL LINES^d</u> 			MINIMUM TOTAL LENGTH (FEET) OF STRAWBALE BRACED WALL PANELS REQUIRED ALONG EACH BRACED WALL LINE^{a, b, c, d}		
<u>Basic Wind Speed (mph)</u>	<u>Story Location</u>	<u>Braced Wall Line Spacing (feet)</u>	<u>Strawbale Braced Wall Panel^e A2, A3</u>	<u>Strawbale Braced Wall Panel^e C1, C2, D1</u>	<u>Strawbale Braced Wall Panel^e D2, E1, E2</u>
— ≤ 85	<u>One-story building</u>	10	6.4	3.8	3.0
		20	8.5	5.1	4.0
		30	10.2	6.1	4.8
		40	13.3	6.9	5.5
		50	16.3	7.7	6.1
		60	19.4	8.3	6.6
≤ 90	<u>One-story building</u>	10	6.4	3.8	3.0
		20	9.0	5.4	4.3
		30	11.2	6.4	5.1
		40	15.3	7.4	5.9
		50	18.4	8.1	6.5
		60	21.4	8.8	7.0
≤ 100	<u>One-story building</u>	10	7.1	4.3	3.4
		20	10.2	6.1	4.8
		30	14.3	7.2	5.7
		40	18.4	8.1	6.5
		50	22.4	9.0	7.1
		60	26.5	9.8	7.8
≤ 110	<u>One-story building</u>	10	7.8	4.7	3.7
		20	12.2	6.6	5.3
		30	17.3	7.9	6.3
		40	22.4	9.0	7.1
		50	26.5	9.8	7.8
		60	31.6	11.4	8.5

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 mile per hour = 0.447 m/s.

a. Linear interpolation shall be permitted.

b. All braced wall panels shall be without openings and shall have an *aspect ratio* (H:L) ≤ 2:1.

c. Tabulated minimum total lengths are for braced wall lines using single braced wall panels with an *aspect ratio* (H:L) ≤ 2:1, or using multiple braced wall panels with *aspect ratios* (H:L) ≤ 1:1. For braced wall lines using two or more braced wall panels with an *aspect ratio* (H:L) > 1:1, the minimum total length shall be multiplied by the largest *aspect ratio* (H:L) of braced wall panels in that line.

d. Subject to applicable wind adjustment factors associated with "All methods" in Table R602.10.3(2)

e. Strawbale braced panel types indicated shall comply with AR106.13.1 through AR106.13.3 and with Table AR106.13(1)

TABLE AR106.17.4(2)
BRACING REQUIREMENTS FOR STRAWBALE BRACED WALL PANELS
BASED ON SEISMIC DESIGN CATEGORY

<ul style="list-style-type: none"> • SOIL CLASS D^d • WALL HEIGHT = 10 FEET^d • 15 PSF ROOF/CEILING DEAD LOAD^d • BRACED WALL LINE SPACING ≤ 25 FEET^d 			MINIMUM TOTAL LENGTH (FEET) OF STRAWBALE BRACED WALL PANELS REQUIRED ALONG EACH BRACED WALL LINE^{a, b, c, d}	
Seismic Design Category	Story Location	Braced Wall Line Length (feet)	Strawbale Braced Wall Panel^e A2, C1, C2, D1	Strawbale Braced Wall Panel^e B, D2, E1, E2
C	<u>One-story building</u>	10	5.7	4.6
		20	8.0	6.5
		30	9.8	7.9
		40	12.9	9.1
		50	16.1	10.4
D₀	<u>One-story building</u>	10	6.0	4.8
		20	8.5	6.8
		30	10.9	8.4
		40	14.5	9.7
		50	18.1	11.7
D₁	<u>One-story building</u>	10	6.3	5.1
		20	9.0	7.2
		30	12.1	8.8
		40	16.1	10.4
		50	20.1	13.0
D₂	<u>One-story building</u>	10	7.1	5.7
		20	10.1	8.1
		30	15.1	9.9
		40	20.1	13.0
		50	25.1	16.3

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 pound per square foot = 0.0479 kPa.

a. Linear interpolation shall be permitted.

b. All braced wall panels shall be without openings and shall have an *aspect ratio* (H:L) ≤ 2:1.

c. Tabulated minimum total lengths are for braced wall lines using single braced wall panels with an *aspect ratio* (H:L) ≤ 2:1, or using multiple braced wall panels with *aspect ratios* (H:L) ≤ 1:1. For braced wall lines using two or more braced wall panels with an *aspect ratio* (H:L) > 1:1, the minimum total length shall be multiplied by the largest *aspect ratio* (H:L) of braced wall panels in that line.

d. Subject to applicable seismic adjustment factors associated with "All methods" in Table R602.10.3(4), except "Wall dead load".

e. Strawbale braced wall panel types indicated shall comply with Sections AR106.13.1 through AR106.13.3 and with Table AR106.13(1).

AR106.14 Resistance to wind uplift forces. Plaster mesh in *skins* of strawbale walls that resist uplift forces from the roof assembly, as determined in accordance with Section R802.11, shall be in accordance with the following:

1. Plaster shall be any type and thickness allowed in Section AR 104.
2. Mesh shall be any type allowed in Table AR106.13(1), and shall be attached to top plates or roof-bearing elements and to sill plates in accordance with Section AR106.9.2.
3. Sill plates shall be a minimum nominal 2-inch by 4-inch (51 mm by 102 mm) with anchoring complying with Section R403.1.6.
4. Mesh attached with staples at 4 inches (51 mm) on center, shall be considered capable of resisting uplift forces of 100 plf (1459 N/m) for each plaster *skin*.
5. Mesh attached with staples at 2 inches (51 mm) on center, shall be considered capable of resisting uplift forces of 200 plf (2918 N/m) for each plaster *skin*.

SECTION AR107 FIRE RESISTANCE

AR107.1 Fire-resistance rating. Strawbale walls shall be considered to be non-rated, except for walls constructed in accordance with Section AR107.1.1 or AR107.1.2. Alternately, fire-resistance ratings of strawbale walls shall be determined in accordance with Section R302 of the *International Residential Code*.

AR107.1.1 1-hour rated clay plastered wall. 1-hour fire-resistance-rated non-load-bearing clay plastered strawbale walls shall comply with the following:

1. Bales shall be *laid flat* or *on-edge* in a *running bond*;
2. Bales shall maintain thickness of not less than 18 inches (457 mm);
3. Gaps shall be stuffed with *straw-clay*;
4. Clay plaster on each side of the wall shall be not less than 1 inch (25 mm) thick and shall be comprised of a mixture of 3 parts clay, 2 parts chopped straw, and 6 parts sand, or an alternative *approved* clay plaster; and
5. Plaster application shall be in accordance with AR104.4.3.3 for the number and thickness of coats.

AR107.1.2 2-hour rated cement plastered wall. 2-hour fire-resistance-rated non-load-bearing cement plastered strawbale walls shall comply with the following:

1. Bales shall be *laid flat* or *on-edge* in a *running bond*;
2. Bales shall maintain a thickness of not less than 14 inches (356 mm);
3. Gaps shall be stuffed with *straw-clay*;
4. 1 1/2 inch (38 mm) by 17 gauge galvanized woven wire mesh shall be attached to wood members with 1 1/2 inch (38 mm) staples at 6 inches (406 mm) on center. 9 gauge U-pins with minimum 8 inch (203 mm) legs shall be installed at 18 inches (457 mm) on center to fasten the mesh to the bales;
5. Cement plaster on each side of the wall shall be not less than 1 inch (25 mm) thick; and
6. Plaster application shall be in accordance with Section AR104.4.8 for the number and thickness of coats.

AR107.2 Openings in rated walls. Openings and penetrations in bale walls required to have a fire-resistance rating shall satisfy the same requirements for openings and penetrations as prescribed in the *International Residential Code*.

AR107.3 Clearance to fireplaces and chimneys. Strawbale surfaces adjacent to fireplaces or chimneys shall be finished with a minimum 3/8 inch (10 mm) thick plaster of any type permitted by this appendix. Clearance from the face of such plaster to fireplaces and chimneys shall be maintained as required from fireplaces and chimneys to combustibles in Chapter 10, or as required by manufacturer's installation instructions, whichever is more restrictive.

SECTION AR108 **THERMAL INSULATION**

AR108.1 R-value. The unit R-value of a strawbale wall with bales laid flat is R-1.3 per inch of bale thickness. The unit R-value of a strawbale wall with bales on-edge is R-2 per inch of bale thickness.

SECTION AR109 **REFERENCED STANDARDS**

ASTM

C 5 – 10	Standard Specification for Quicklime for Structural Purposes.....AR104.4.6.1
C 109/C 109M - 12	Standard Test Method for Compressive Strength of Hydraulic Cement Mortars.... AR106.6.1
C 141 / C 141M – 09	Standard Specification for Hydrated Hydraulic Lime for Structural Purposes.....AR104.4.6.1
C 206 – 03	Standard Specification for Finishing Hydrated Lime.....AR104.4.6.1

C 926 – 12a	<u>Standard Specification for Application of Portland Cement Based Plaster.....</u> <u>AR104.4.7, AR104.4.8</u>
C 1707 – 11	<u>Standard Specification for Pozzolanic Hydraulic Lime for Structural Purposes....</u> <u>AR104.4.6.1</u>
EN	<u>European Committee for Standardization</u> <u>Central Secretariat</u> <u>Rue de Stassart 36</u> <u>B-10 50 Brussels</u>
459 – 2010	<u>Part 1: Building Lime. Definitions, Specifications and Conformity Criteria; Part 2:</u> <u>Test Methods..... AR104.4.6.1</u>

Reason: Strawbale construction has proven to be a safe, durable, resource efficient, and fully viable method of construction. However, the International Residential Code (IRC) does not contain a section on strawbale construction, which has been an impediment to this construction system's proper and broader use.

First practiced in Nebraska in the late 1800's, with buildings over 100 years old still in service, strawbale construction was rediscovered in the 1980's in the American southwest. Since then it has been further developed and explored, including considerable testing and research regarding structural performance (under vertical and lateral loads), moisture, fire, and its thermal and acoustic properties.

Currently only New Mexico and Oregon have adopted statewide strawbale building codes. California has legislated strawbale construction guidelines for voluntary adoption by local jurisdictions. In addition, nine U.S. cities or counties have adopted strawbale building codes. Three countries outside of the United States – Germany, France, and Belarus - have limited strawbale building codes.

Most of the strawbale building codes that do exist are derived from the first such code, created for and adopted by Tucson / Pima County, Arizona in 1996. Much experience, testing and research since then have proven these codes to be deficient. They are often either too restrictive, or not restrictive enough, and in some cases don't address important issues at all.

Although strawbale codes are both few and flawed, strawbale buildings are now found in 49 of the 50 United States, and strawbale construction is practiced in over 45 countries throughout the world and in every climate. There are an estimated 600 strawbale buildings in California alone. The strawbale buildings in the U.S. include residences, public and private schools, libraries, office and retail buildings, wineries, multi-story buildings, buildings over 10,000 sq.ft in floor area, load-bearing strawbale structures, and structures in areas of high seismic risk (plastered strawbale walls are particularly resistant to earthquakes because they are energy-absorbing and tough). The practice of, and the desire to utilize strawbale construction, continues to increase and promises to accelerate as increased pressure is exacted on our environment and natural resources.

There is great need for a comprehensive strawbale code, with full benefit of the experience and knowledge that has been gained to date about this method of construction. The proposed Strawbale Construction appendix for the IRC was created to fulfill this need. It is based on the collective experience of the design, construction, and testing of strawbale buildings over 25 years by architects, engineers, builders, and academics throughout the U.S., Canada, and other countries throughout the world. The testing, research, and comprehensive understanding of the performance of strawbale buildings are summarized in the book *Design of Straw Bale Buildings* (B.King, et al, 2006, Green Building Press). Testing, research reports, and other supporting documentation are available for viewing and download at: <http://www.ecobuildnetwork.org/strawbale-construction-code-supporting-documentation>

As lead author of the proposed appendix, and as a licensed architect for 26 years, I have been involved in the design, construction, testing, and research of strawbale buildings since 1995. In 2001 I spearheaded legislation and revisions to the current California Guidelines for Straw-Bale Structures. The proposed Strawbale Construction appendix for the IRC has benefited from numerous peer reviews by experienced, licensed design and building professionals over the course of more than five years. It has also received input from other stakeholders including the Structural Engineers Association of California (SEAO) and the National Association of Home Builders (NAHB). The proposed appendix would serve designers, builders, owners, inhabitants, and building officials alike in the construction and utilization of strawbale buildings.

Supporting Documentation: Selected documents that are available via the above link

Answers to Common Questions Regarding the IRC Strawbale Construction Proposal

Load-Bearing Straw Bale Construction – A summary of worldwide testing and experience, B.King, PE

Testing of Straw Bale Walls with Out-of-Plane Loads – K.Donahue, SE

In-Plane Cyclic Tests of Plastered Straw Bale Wall Assemblies – C.Ash, M.Aschheim, PE, D.Mar, SE

Structural Testing of Plastered Straw Bale Wall Assemblies – K.Lerner, Architect, K.Donahue, SE

Basis for Prescriptive Use of Plastered Strawbale Walls as Braced Panels in the IRC – M. Aschheim, PE

Shake Table Test Video of Full Scale Straw Bale Building Specimen – D.Donovan, PE

Moisture Properties of Plaster and Stucco for Strawbale Buildings – J.Straube, PE

Monitoring of Hygrothermal Performance of Strawbale Walls – J.Straube, PE, C.Schumacher

ASTM E119 1-Hour Fire Resistance Test of a Non-Loadbearing Straw Bale Wall with Clay Plaster

ASTM E119 2-Hour Fire Resistance Test of a Non-Loadbearing Straw Bale Wall with Cement Plaster

ASTM E119 Fire Tests – Video

ASTM E84 Surface Burning Characteristics Test

Thermal Performance of Straw Bale Wall Systems (including Oak Ridge Lab test results) – N.Stone

Support Letters from Licensed Practitioners: Letters from 2 Structural Engineers, 4 Civil Engineers, 1 Professor of Civil Engineering, 7 Architects

Cost Impact: This code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, [ASTM C141/C141M – 09, ASTM C1707-11, and EN 459-2010] with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

RB473-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

APPENDIX R (NEW) #2-RB-HAMMER

2013 PROPOSED CHANGES TO THE INTERNATIONAL MECHANICAL/PLUMBING CODE

INTERNATIONAL MECHANICAL/PLUMBING CODE COMMITTEE

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TENTATIVE ORDER OF DISCUSSION 2013 PROPOSED CHANGES TO THE INTERNATIONAL RESIDENTIAL CODE – MECHANICAL

The following is the tentative order in which the proposed changes to the code will be discussed at the public hearings. Proposed changes which impact the same subject have been grouped to permit consideration in consecutive changes.

Proposed change numbers that are indented are those which are being heard out of numerical order. Indentation **does not** necessarily indicate that one change is related to another. Proposed changes may be grouped for purposes of discussion at the hearing at the discretion of the chair. Note that some IRC code change proposals may not be included on this list, as they are being heard by other committees. Please consult the Cross Index of Proposed Changes.

RB16-13	RB101-13	RM78-13
RB18-13	RM38-13	RM79-13
RB21-13	RM39-13	RM80-13
RB25-13	RM40-13	RM81-13
RB459 -13	RM41-13	RM82-13
RB100-13	RM42-13	RM83-13
RB461-13	RM43-13	RM84-13
RM1-13	RB97-13, Part II	RM85-13
RM2-13	RM44-13	RM86-13
RM3-13	RM45-13	RM87-13
RM4-13	RM46-13	RM88-13
RM5-13	RM47-13	RM89-13
RM6-13	RM48-13	RM90-13
RM7-13	RM49-13	RM91-13
RM8-13	RM50-13	RM92-13
RM9-13	RM51-13	RM93-13
RM10-13	RM52-13	RM94-13
RM11-13	RM53-13	RM95-13
RM12-13	RM54-13	RM96-13
RM13-13	RM55-13	RM97-13
RM14-13	RM56-13	RM98-13
RM15-13	RM57-13	RB444-13, Part II
RM16-13	RM58-13	RB445-13, Part II
RM17-13	RM59-13	RB448-13, Part II
RM18-13	RM60-13	
RM19-13	RM61-13	
RM20-13	RM62-13	
RM21-13	RM63-13	
RM22-13	RM64-13	
RM23-13	RM65-13	
RM24-13	RM66-13	
RM25-13	RM67-13	
RM26-13	RM68-13	
RM27-13	RM69-13	
RM28-13	RM70-13	
RM29-13	RM71-13	
RM30-13	RM72-13	
RM31-13	RM73-13	
RM32-13	RM74-13	
RM33-13	RM75-13	
RM34-13	RM76-13	
RM35-13	RB27-13	
RM36-13	RB26-13	
RM37-13	RM77-13	

RM1 – 13

M1301.5

Proponent: Pennie L. Feehan/Pennie L. Feehan Consulting/Copper Development Association
(penniefeehan@me.com)

Revise as follows:

M1301.5 Third-party testing and certification. Piping, tubing and fittings shall comply with the applicable referenced standards, specifications and performance criteria of this code and shall be identified in accordance with Section M1301.2. Piping, tubing and fittings not covered by applicable standards elsewhere in the code shall either be tested by an approved third-party testing agency or certified by an approved third-party certification agency.

Reason: The existing language required third-party testing or certification for all pipe, tube and fittings. This proposal adds language to clarify that approved pipe, tube, and fittings do not require testing or certification by a third-party agency.

Cost Impact: None

RM1-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1301.5-RM-FEEHAN.DOC

RM2 – 13

M1305.1

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

Revise as follows:

M1305.1 Appliance access for inspection service, repair and replacement. *Appliances* shall be accessible for inspection, service, repair and replacement without removing permanent construction, other *appliances*, or any other piping or ducts not connected to the *appliance* being inspected, serviced, repaired or replaced. A level working space at least 30 inches deep and 30 inches wide (762 mm by 762 mm) shall be provided in front of the control side to service an *appliance*. ~~Installation of room heaters shall be permitted with at least an 18-inch (457 mm) working space. A platform shall not be required for room heaters.~~

Exception: The installation of room heaters shall comply with manufacturer's instructions.

Reason: This revision is a simple text cleanup to eliminate permissive language and unclear text. The current next to last sentence says that room heaters are allowed to have a working space of 18 inches, but does not actually require that. What is an 18 inch work space? 18" x 18", 18" x 30" ?? The last sentence says that a platform is not required, yet nowhere in this section is a platform ever required. The working space is assumed to be the floor area. In the case of room heaters, it is simple to defer to the manufacturer's instructions for the required service access. This is generally not an issue anyway because room heaters are necessarily out in the open.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Cost Impact: The code change proposal will not increase the cost of construction.

RM2-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1305.1-RM-HALL-PMGCAC

RM3 – 13

M1305.1.3.1

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

Revise as follows:

M1305.1.3.1 Electrical requirements. A luminaire controlled by a switch located at the required passageway opening and a receptacle outlet shall be installed at or near the *appliance* location in accordance with Chapter 39. Exposed lamps shall be protected from damage by location or lamp guards.

Reason: The typical lamp holder (fixture) used for attics and crawl spaces is a porcelain lamp holder with a naked incandescent lamp in it. It is often placed such that service personnel can impact it with their body, tools or materials. The result is broken glass, falling hot metal lamp filaments, possible lacerations, a shock hazard and sudden darkness to top it all off. The use of simple lamp cages/guards or locating the lamp holders out of harm's way will protect service personnel, which is the intent of this entire code section.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Cost Impact: The code change proposal will not increase the cost of construction.

RM3-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1305.1.3.1-RM-HALL-PMGCAC

RM4 – 13

M1305.1.4.3

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

Revise as follows:

M1305.1.4.3 Electrical requirements. A luminaire controlled by a switch located at the required passageway opening and a receptacle outlet shall be installed at or near the *appliance* location in accordance with Chapter 39. Exposed lamps shall be protected from damage by location or lamp guards.

Reason: The typical lamp holder (fixture) used for attics and crawl spaces is a porcelain lamp holder with a naked incandescent lamp in it. It is often placed such that service personnel can impact it with their body, tools or materials. The result is broken glass, falling hot metal lamp filaments, possible lacerations, a shock hazard and sudden darkness to top it all off. The use of simple lamp cages/guards or locating the lamp holders out of harm's way will protect service personnel, which is the intent of this entire code section.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Cost Impact: The code change proposal will not increase the cost of construction.

RM4-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1305.1.4.3-RM-HALL-PMGCAC

RM5 – 13

M1306.2, M1306.2.1, M1306.2.2

Proponent: Bob Eugene, representing UL LLC (Robert.Eugene@ul.com)

Revise as follows:

M1306.2 Clearance reduction. The reduction of required clearances to combustible assemblies or combustible materials shall be based on Section M1306.2.1 or Section M1306.2.2.

M1306.2.1 Labeled assemblies. The allowable clearance shall be based on an approved reduced clearance protective assembly that is listed and labeled in accordance with UL 1618.

M1306.2.2 Reduction table. ~~M1306.2 Clearance Reduction.~~ Reduction of clearances shall be in accordance with the *appliance* manufacturer's instructions and Table M1306.2. Forms of protection with ventilated air space shall conform to the following requirements:

1. Not less than 1-inch (25 mm) air space shall be provided between the protection and combustible wall surface.
2. Air circulation shall be provided by having edges of the wall protection open at least 1 inch (25 mm).
3. If the wall protection is mounted on a single flat wall away from corners, air circulation shall be provided by having the bottom and top edges, or the side and top edges open at least 1 inch (25 mm).
4. Wall protection covering two walls in a corner shall be open at the bottom and top edges at least 1 inch (25 mm).

Reason: This provides an additional means of reduced clearances consistent with IMC 308.5.

Cost Impact: None

RM5-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1306.2-RM-EUGENE.DOC

RM6 – 13

M1307.2, P2801.7

Proponent: Stephen Kerr, S.E., representing Josephson Werdowatz and Associates, Inc.

Revise as follows:

M1307.2 Anchorage of appliances. *Appliances* designed to be fixed in position shall be fastened or anchored in an *approved* manner. In Seismic Design Categories D₀, D₁ and D₂, and in townhouses in Seismic Design Category C, water heaters shall be anchored or strapped to resist horizontal displacement caused by earthquake motion in accordance with one of the following:

1. Anchorage and strapping shall be designed to resist a horizontal force equal to one-third of the operating weight of the water heater storage tank, acting in any horizontal direction. Strapping shall be at points within the upper one-third and lower one-third of the appliance's vertical dimensions. At the lower point, the strapping shall maintain a minimum distance of 4 inches (102mm) above the controls.
2. The anchorage strapping shall be in accordance with the appliance manufacturer's recommendations.

Revise as follows:

P2801.7 Water heater seismic bracing. In Seismic Design Categories D₀, D₁ and D₂ and in townhouses in Seismic Design Category C, water heaters shall be anchored or strapped in accordance with Section M1307.2, ~~the upper one-third and in the lower one-third of the appliance to resist a horizontal force equal to one-third of the operating weight of the water heater storage tank, acting in any horizontal direction, or in accordance with the appliance manufacturer's recommendations.~~

Reason: In the 2006 IRC water heater bracing was added to section P2801.7; however, section M1307.2 already addressed the anchorage of water heaters. The intent of this proposal is to condense the seismic bracing requirements to one location. The seismic requirements from both sections were combined and placed in section M1307.2 with a cross reference from P2801.7.

Cost Impact: The proposal will not increase the cost of construction.

RM6-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1307.2 #1-RM-KERR.DOC

RM7 – 13

M1307.2, M2301.2, M2301.2.10 (New)

Proponent: Stephen Kerr, S.E., Josephson Werdowatz and Associates, Inc., representing self

Revise as follows:

M1307.2 Anchorage of appliances. *Appliances* designed to be fixed in position shall be fastened or anchored in an *approved* manner. In Seismic Design Categories D₁ and D₂, water heaters and thermal storage units shall be anchored or strapped to resist horizontal displacement caused by earthquake motion. Strapping shall be at points within the upper one-third and lower one-third of the appliance's vertical dimensions. At the lower point, the strapping shall maintain a minimum distance of 4 inches (102mm) above the controls.

M2301.2 Installation. Installation of thermal solar energy systems shall comply with Sections M2301.2.1 through M2301.2.910.

M2301.2.10 Thermal storage unit seismic bracing. In Seismic Design Categories D₀, D₁ and D₂ and in townhouses in Seismic Design Category C, thermal storage units shall be anchored in accordance with Section M1307.2.

Reason: Thermal storage tanks are similar in size and shape to water heaters, with typical residential tank sizes between 50 and 120 gallons. During past earthquakes, water storage tanks (water heaters and thermal storage tanks) have moved or tipped over if they were not securely anchored to adjacent walls or floors. This movement has resulted in water line leaks which can cause significant and costly property damage. The seismic bracing requirements for water heaters should be extended to these appliances.

Cost Impact: The cost of construction will slightly increase for the installation of thermal storage tanks.

RM7-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1307.2 #2-RM-KERR.DOC

RM8 – 13

M1308.1, M1308.2.1 (New), M1308.2.2 (New), M1308.2.3 (New)

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

Revise as follows:

M1308.1 Protection against physical damage. ~~In concealed locations where piping, other than cast iron or galvanized steel, is installed through holes or notches in studs, joists, rafters or similar members less than 1-1/2 inches (38 mm) from the nearest edge of the member, the pipe shall be protected by steel shield plates. Such shield plates shall have a thickness of not less than 0.0575 inch (1.463 mm) (No. 16 gage). Such plates shall cover the area of the pipe where the member is notched or bored and shall extend not less than 2 inches (51 mm) above sole plates and below top plates. Where piping will be concealed within light-frame construction assemblies, the piping shall be protected against penetration by fasteners in accordance with Sections M1308.2.1 through M1308.2.3.~~

Exception: Cast iron piping and galvanized steel piping shall not be required to be protected.

Add new text as follows:

M1308.2.1 Piping through bored holes or notches. Where piping is installed through holes or notches in framing members and the piping is located less than 1 ½ inches (38 mm) from the framing member face to which wall, ceiling or floor membranes will be attached, the pipe shall be protected by shield plates that cover the width of the pipe and the framing member and that extend 2 inches (51 mm) to each side of the framing member. Where the framing member that the piping passes through is a bottom plate, bottom track, top plate or top track, the shield plates shall cover the framing member and extend 2 inches (51 mm) above the bottom framing member and 2 inches (51 mm) below the top framing member.

M1308.2.2 Piping in other locations. Where the piping is located within a framing member and is less than 1 ½ inches (38 mm) from the framing member face to which wall, ceiling or floor membranes will be attached, the piping shall be protected by shield plates that cover the width and length of the piping. Where the piping is located outside of a framing member and is located less than 1 ½ inches (38 mm) from the nearest edge of the face of the framing member to which the membrane will be attached, the piping shall be protected by shield plates that cover the width and length of the piping.

M1308.2.3 Shield plates. Shield plates shall be of steel material having a thickness of not less than 0.0575 inch (1.463 mm) (No. 16 gage).

Reason: This proposal was approved for the 2015 IFGC. This proposal provides clear requirements for where shield plates are needed. Section M1308.1 uses the term "light frame construction assemblies" to describe wall, floor and roof assemblies that can be made up from either wood members or light frame, cold formed steel members.

Section M1308.2.1 covers applications where piping runs perpendicular to a framing member and passes through a bored hole or notch in the framing member. This text is nearly the same as what is currently in the IRC. If the piping is within 1 ½ inches of the face of the member where wall, ceiling or floor membranes will be attached, then the piping is required to be protected by a shield plate that covers the width of the piping by the width of the framing member plus 2 inches on either side of the framing member. Protection of the piping on either side of the framing member is needed because it is too easy for a membrane/fastener installer to miss the framing member's fastening face or penetrate the member at an angle and hit the piping that is just outside of the framing member. Section M1308.2.1 also covers the application where piping runs perpendicular to and penetrates top and bottom plates, or top and bottom tracks. Protection of the piping above the bottom framing member (or below the top framing member) is needed because it is too easy for a membrane/fastener installer to miss the framing member's fastening face or penetrate the member at an angle and hit the piping just outside of the framing member. The code fails to address the situation where piping is run within the C-channel of a metal stud or joist and it also fails to address piping run parallel to a framing member.

Section M1308.2.2 covers applications where the piping runs alongside of a framing member or in the case of a light frame, cold formed steel framing member, piping that runs parallel to the length of and within the framing member (in other words, within the channel section). If the piping is within 1 ½ inches of the face of the member where wall, ceiling or floor membranes will be attached, then the piping is required to be protected by a shield plate that covers the width of the piping by the length of piping that is within the 1 ½ inch proximity of the framing member's fastening face. Piping that is located behind the fastening face of the member and within 1 ½ inches of the fastening face of the member obviously needs protection from fastener penetration. Piping that is

located adjacent to and within 1 ½ inches of the fastening face of the member needs protection because it is too easy for a membrane/fastener installer to miss the framing member's fastening face or penetrate the member at an angle and hit the piping that is just outside of the framing member. A similar requirement in Section E3802.1 applies to wiring run parallel to framing members.

The opposition to this proposal for the IPC was related to the requirement to protect the length of piping that is run parallel to a framing member and less than 1 ½ inches from the member face to which wall board will be screwed or nailed. The concern was expressed that it would be difficult to protect the pipe for its full length, making the assumption that the pipe ran from the bottom plate up through the top plate in walls. First of all, it is unlikely that an installer would install piping from plate to plate that close to the stud, since it would be nearly impossible to drill holes that close to the stud. Secondly, the obvious way to avoid installing protection for the pipe is to simply keep it at least 1 ½ inches away from the framing member. With a little planning, the installation of pipe protection could be easily avoided.

The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Cost Impact: The code change proposal will increase the cost of construction.

RM8-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1308.1-RM-HALL-PMGCAC

RM9 – 13

M1401.3

Proponent: Richard Grace, Fairfax County VA, representing The Virginia Plumbing and Mechanical Inspectors Association and the Virginia Building and Code Officials Association

Revise as follows:

M1401.3 Equipment/appliance Sizing. Heating and cooling equipment and appliances shall be sized in accordance with ACCA Manual S based on building loads calculated in accordance with ACCA Manual J or other approved heating and cooling calculation methodologies.

Exception: Heating and cooling equipment and appliances shall not be limited to the capacities determined in accordance with Manual S where any of the following conditions apply:

1. The specified equipment or appliance utilizes multi-stage technology or variable refrigerant flow technology and the loads calculated in accordance with Manual J fall within the range of the manufacturer's published capacities for that equipment or appliance.
2. The specified equipment or appliance manufacturer's published capacities cannot satisfy both the total and sensible heat gains calculated in accordance with Manual J and the manufacturer's next larger standard size unit is specified.
3. The specified equipment or appliance is the lowest capacity unit available from the specified manufacturer.

Reason: Item 1 - Current technology is widely available that incorporates multi-stage or VRF systems for increased efficiency. Some of these appliances have such a wide span of functionality that they extend beyond the allowable requirements outlined in Manual S. However, this technology allows the appliance to operate between minimum and maximum capacities, based on loads imposed, thus eliminating the problems associated with single-stage, oversized appliances. Additionally, the appliance will operate efficiently during times where outdoor air temperatures exceed those used to calculate the loads in Manual J.

Item 2 - Often times, the appliance manufacturer's published total and sensible capacities are at odds with the requirements of Manual S. There are many cases where the total capacity of the appliance will fall within the parameters of Manual S in relation to the calculated total gain, however the sensible capacity of the appliance may fall short of the calculated sensible gain, thus unable to provide efficient sensible cooling for the space. When the manufacturer's next standard size larger is chosen to meet the sensible gain, the total capacity of the appliance may then exceed the requirements of Manual S. Choosing the larger appliance will enable a more efficient and effective system.

Item 3 - The current code language does not have provisions for sizing appliances for minimal dwelling unit or dwelling addition loads, other than forcing owners and contractors to change appliances to less desirable systems. For example; a 2 story townhouse, in climate zone 4, with 600 square feet per floor wants to utilize a two-zone system, or a separate heat pump system for each floor. A 1.5 ton unit per floor would exceed the requirements of Manual S, however a 1.5 ton unit could be the smallest available appliance made by the desired manufacturer. Current language would require a complete design change, such as utilizing a single appliance to serve the entire dwelling rather than the more desirable two-zone system, or requiring a system that utilizes electric baseboard heating and window-mounted air conditioning units. This is absurd, and an unfair to an owner that desires to reduce energy costs.

Cost Impact: none

RM9-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1401.3-RM-GRACE.DOC

RM10 – 13

M1401.4

Proponent: Jay F. Rowland, J.F.R. Enterprises, Inc., representing self (code@jfreenterprises.com)

Revise as follows:

M1401.4 Exterior installations. *Equipment* installed outdoors shall be *listed* and *labeled* for outdoor installation. Supports and foundations shall prevent excessive vibration, settlement or movement of the *equipment*. Supports and foundations shall ~~be~~ remain level and conform to the manufacturer's installation instructions. Prefabricated supports placed on grade without excavation shall maintain ground contact around the support perimeter and resist erosion and settling. Soil shall be backfilled and secured to a depth of not less than 6 inches (152mm) under the support.

Reason: "Other approved materials" (plastic and lightweight concrete pads) have seen continuous reduction of material/ribbing over the years as manufacturers lower costs and compete for market share. Plus, they want to make a lighter product that is friendly to installers. This suggested code change reminds manufacturers and installers that the equipment pads are expected to remain level over time, not just initial installation. Don't "set it and forget it" unless it's set correctly.

Take a look at homes in your neighborhood, and you will see that a large percentage of prefab equipment pads have been installed and maintained improperly. Too many pads have lost all soil under their downslope edges and are held in place largely by the weight of the unit and the line set. On the other hand, many pads have no clearance from grade.

Unfortunately, neither manufacturers nor techs have put enough focus on proper excavation of the soil, backfilling, placing rock around the pad, or other steps to resist erosion and settling (which will still occur to some degree even with a perfect install). We stop short of requiring strip footers tied into the pad from below. That's the best way to stop erosion, but it adds a higher cost, and the manufacturers can come up with similar options.

Installation instructions have been insufficient to address these common issues. In fact, prefab pads as currently made (3" height, and many of 2" height) cannot meet code if the site is properly excavated. Excavation requires going below grade, and a 3" pad cannot then extend 3" above grade. With 3" pads, the best option is to provide protection for the soil under and around the pad. Some calculations by a registered engineer are attached as substantiation of the significance of erosion.

In a nutshell, ground contact/support and erosion control (protecting soil under and around the pad) determine the actual clearance from grade.

Cost Impact: The code change proposal will not increase the cost of construction. As phrased, adding rock is an option. Rock would add a little material and labor cost, but also additional revenue. If you expressly require strip footing or a similar solution, then the cost of construction will increase.

RM10-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1404-RM-ROWLAND.DOC

RM11 – 13

M1403.1, M1601.1, Chapter 44

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee
(dave.hall@georgetown.org)

Revise as follows:

M1403.1 Heat pumps. ~~The minimum unobstructed total area of the outdoor and return air ducts or openings to a heat pump shall be not less than 6 square inches per 1,000 Btu/h (13 208 mm²/kW) output rating or as indicated by the conditions of listing of the heat pump. Electric heat pumps shall be conform to listed and labeled in accordance with UL 1995 or UL/CSA/ANCE 60335-2-40.~~

M1601.1 Duct design. *Duct systems* serving heating, cooling and *ventilation equipment* shall be installed in accordance with the provisions of this section and ACCA Manual D, the appliance manufacturer's installation instructions or other *approved methods*.

Add new standard to Chapter 44 as follows:

UL/CSA/ANCE

60335-2-40-2012 Household and Similar Electrical Appliances, Part 2-40: Particular Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers.....R1403.1.

Reason: With the exception of adding UL/CSA/ANCE 60335-2-40, this revised language was approved for the 2015 IMC. This is outdated legacy code language and is not consistent with current practice. It is up to the design professional, or the requirements from Manual D or the manufacturer of the appliances to determine minimum sizes of ducts and transfer openings, not the code. If these numbers were to be applied, then the code could be condoning an undersized system. There are too many variables and different situations for just one minimum to work for everything.

UL/CSA/ANCE 60335-2-40 Household and Similar Electrical Appliances, Part 2-40: Particular Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers is a new harmonized standard which is an alternate to UL 1995.

Cost Impact: None listed.

Analysis: A review of the standard proposed for inclusion in the code, [UL/CSA/ANCE 60335-2-40-2012] with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

RM11-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1403.1 #1-RM-HALL-PMGCAC

RM12 – 13

M1403.1, M1601.1

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee
(dave.hall@georgetown.org)

Revise as follows:

M1403.1 Heat pumps. ~~The minimum unobstructed total area of the outdoor and return air ducts or openings to a heat pump shall be not less than 6 square inches per 1,000 Btu/h (13 208 mm²/kW) output rating or as indicated by the conditions of listing of the heat pump.~~ Electric heat pumps shall be tested in accordance with UL 1995.

M1601.1 Duct design. *Duct systems* serving heating, cooling and *ventilation equipment* shall be installed in accordance with the provisions of this section and ACCA Manual D, the appliance manufacturer's installation instructions or other *approved* methods.

Reason: This language deletion was approved for the 2015 IMC. This is outdated legacy code language and is not consistent with current practice. It is up to the design professional, or the requirements from Manual D or the manufacturer of the appliances to determine minimum sizes of ducts and transfer openings, not the code. If these numbers were to be applied, then the code could be condoning an undersized system. There are too many variables and different situations for just one minimum to work for everything.

Cost Impact: None

RM12-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1403.1 #2-RM-HALL-PMGCAC

RM13 – 13

M1403.1, Chapter 44

Proponent: Bob Eugene, representing UL LLC.
(Robert.Eugene@ul.com)

Revise as follows:

M1403.1 Heat pumps. The minimum unobstructed total area of the outside and return air ducts or openings to a heat pump shall be not less than 6 square inches per 1,000 Btu/h (13 208 mm²/kW) output rating or as indicated by the conditions of the listing of the heat pump. Electric heat pumps shall conform to UL 1995 or UL/CSA/ANCE 60335-2-40.

Add new standard to Chapter 44 as follows:

UL/CSA/ANCE 60335-2-40--2012

Reason: Through AHRI, manufactures requested that UL publish a harmonized IEC based 60335-2-40, to replace UL 1995 for equipment within the scope of 60335-2-40 rated 600 volts and less. UL60335-2-40 will be effective upon publication, however UL 1995 will not sunset for new equipment until November 2020 and existing equipment by 2022. UL/CSA/ANCE 60335-2-40 is a new tri-national standard that provides a comprehensive set of construction and performance requirements that are used to evaluate and list heat pumps.

Cost Impact: None

Analysis: A review of the standard proposed for inclusion in the code, [UL/CSA/ANCE 60335-2-40-2012] with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

RM13-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1403.1-RM-EUGENE.DOC

RM14 – 13

M1403.2

Proponent: Guy McMann, MCP, Jefferson County Colorado, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO) (gmcmann@jeffco.us)

Delete as follows:

~~**M1403.2 Foundations and supports.** Supports and foundations for the outdoor unit of a heat pump shall be raised at least 3 inches (76 mm) above the ground to permit free drainage of defrost water, and shall conform to the manufacturer's installation instructions.~~

Reason: This subject is already covered in M-1305.1.4.1 and covers all appliances. There is no need to duplicate it here.

Cost Impact: None

RM14-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1403.2-RM-MCMANN.DOC

RM15 – 13

M1410.1

Proponent: Bob Eugene, representing UL LLC (Robert.Eugene@ul.com)

Revise as follows:

M1410.1 General. Vented room heaters shall be tested in accordance with ASTM E 1509 for pellet-fuel burning, UL 896 for oil-fired or UL 1482 for solid fuel-fired and installed in accordance with their *listing*, the manufacturer's installation instructions and the requirements of this code.

Reason: Clarify application of ASTM E 1509.

Cost Impact: None

RM15-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1410.1-RM-EUGENE.DOC

RM16 – 13

M1410.2

Proponent: Bob Eugene, UL LLC (Robert.Eugene@ul.com)

Revise as follows:

M1410.2 Floor mounting. Room heaters shall be installed on noncombustible floors or *approved* assemblies constructed of noncombustible materials that extend at least 18 inches (457 mm) beyond the *appliance* on all sides.

Exceptions:

1. *Listed* room heaters shall be installed on noncombustible floors, assemblies constructed of noncombustible materials or ~~*listed*~~ floor protectors *listed and labeled in accordance with UL 1618. The* ~~*with*~~ materials and dimensions *shall be* in accordance with the *appliance* manufacturer's instructions.
2. Room heaters *listed* for installation on combustible floors without floor protection shall be installed in accordance with the *appliance* manufacturer's instructions.

Reason: Add the referenced standard for listing of floor protectors.

Cost Impact: None

RM16-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1410.2-RM-EUGENE

RM17 – 13

M1411.3.1

Proponent: Jay F. Rowland, J.F.R. Enterprises, Inc., representing self (code@jfreenterprises.com)

Revise as follows:

M1411.3.1 Auxiliary and secondary drain systems. In addition to the requirements of Section M1411.3, a secondary drain or auxiliary drain pan shall be required for each cooling or evaporator coil where damage to any building components will occur as a result of overflow from the *equipment* drain pan or stoppage in the condensate drain piping. Such piping shall maintain a minimum horizontal slope in the direction of discharge of not less than $\frac{1}{8}$ unit vertical in 12 units horizontal (1-percent slope). Drain piping shall be a minimum of $\frac{3}{4}$ -inch (19 mm) nominal pipe size. One of the following methods shall be used:

1. An auxiliary drain pan with a separate drain shall be provided under the coils on which condensation will occur. The auxiliary pan drain shall discharge to a conspicuous point of disposal to alert occupants in the event of a stoppage of the primary drain. The pan shall have a minimum depth of 1.5 inches (38 mm), shall not be less than 3 inches (76 mm) larger than the unit or the coil dimensions in width and length and shall be constructed of corrosion-resistant material. Galvanized sheet steel pans shall have a minimum thickness of not less than 0.0236 inch (0.6010 mm) (No. 24 gage). Nonmetallic pans shall have a minimum thickness of not less than 0.0625 inch (1.6 mm).

The auxiliary drain pan shall be equipped with a water-level detection device conforming to UL 508 that will shut off the *equipment* served prior to overflow of the pan.

2. A separate overflow drain line shall be connected to the primary drain pan provided with the *equipment*. Such overflow drain shall discharge to a conspicuous point of disposal to alert occupants in the event of a stoppage of the primary drain. The overflow drain line shall connect to the drain pan at a higher level than the primary drain connection.

A water-level detection device conforming to UL 508 shall be provided that will shut off the *equipment* served in the event that the primary drain is blocked. The device shall be installed in the primary drain line, the overflow drain line, or in the equipment-supplied drain pan, located at a point higher than the primary drain line connection and below the overflow rim of such pan.

- ~~3. An auxiliary drain pan without a separate drain line shall be provided under the coils on which condensate will occur. Such pan shall be equipped with a water level detection device conforming to UL 508 that will shut off the *equipment* served prior to overflow of the pan. The pan shall be equipped with a fitting to allow for drainage. The auxiliary drain pan shall be constructed in accordance with Item 1 of this section.~~
- ~~4. A water-level detection device conforming to UL 508 shall be provided that will shut off the *equipment* served in the event that the primary drain is blocked. The device shall be installed in the primary drain line, the overflow drain line, or in the equipment-supplied drain pan, located at a point higher than the primary drain line connection and below the overflow rim of such pan.~~

Reason: This code change is requested in order to reduce confusion caused by the wording and to bring the code in line with traditional best procedures. The end result is building occupants saved from condensate catastrophes.

For decades, contractors have commonly installed three lines of protection against condensate overflow. Besides the drain line from the primary drain pan, they installed a secondary drain pan with a drain line *and* a float switch or similar device in the secondary drain pan. This practice is still common today, as evidenced by the strong tandem sales of shut-off devices along with secondary pans with holes pre-drilled.

The code body recognized this best practice with the opening paragraph that requires a secondary drain or auxiliary drain pan. However, the statement that "One of the following methods shall be used..." contradicts the opening statement and provides room for corners to be cut during installation.

The code, as currently interpreted in some jurisdictions, allows the installer to drop one line of protection as a way of saving a little money in the short run. The current requirement is for the drain from the primary pan to be backed up by only one other option. If the secondary drain line clogs, and there is no shut-off device, then the building is damaged. If the shut-off fails, and there is no secondary drain, then the building is damaged. The risk of a secondary device failing is significant, so a tertiary device isn't overkill. It is wise, and that seemed to be the intent of the code.

The code body should not assume that equipment is properly installed or maintained or, even if it is, that mechanical devices will always perform as desired. Especially over time, as all things perform less effectively as they age.

This code change uses existing language in a different arrangement (making methods 3 & 4 part of methods 1 & 2, respectively).

Note: We added the word "primary" to section 2 because some equipment is provided with both primary and secondary drain pans.

Cost Impact: The code change proposal will not increase the cost of construction. At least this is true for the contractors who protect their customers and follow the traditional best practices. Alternatively, we would point out that the cost of keeping the third line of defense against condensate damage is much lower than the cost of re-construction after damage is done. Home insurance usually does **not** cover this type of flooding. Thank you for your consideration.

RM17-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1411.3.1-#1-RM-ROWLAND.DOC

RM18 – 13

M1411.3.1

Proponent: Jay F. Rowland, J.F.R. Enterprises, Inc., representing self (code@jfreenterprises.com)

Revise as follows:

M1411.3.1 Auxiliary and secondary drain systems. In addition to the requirements of Section M1411.3, a secondary drain or auxiliary drain pan shall be required for each cooling or evaporator coil where damage to any building components will occur as a result of overflow from the *equipment* drain pan or stoppage in the condensate drain piping. Such piping shall maintain a minimum horizontal slope in the direction of discharge of not less than $\frac{1}{8}$ unit vertical in 12 units horizontal (1-percent slope). Drain piping shall be a minimum of $\frac{3}{4}$ -inch (19 mm) nominal pipe size. One of the following methods shall be used:

1. An auxiliary drain pan with a separate drain shall be installed under the coils on which condensation will occur. The auxiliary pan drain shall discharge to a conspicuous point of disposal to alert occupants in the event of a stoppage of the primary drain. The pan shall have a minimum depth of 1.5 inches (38 mm), shall not be less than 3 inches (76 mm) larger than the unit or the coil dimensions in width and length and shall be constructed of corrosion-resistant material. Galvanized sheet steel pans shall have a minimum thickness of not less than 0.0236-inch (0.6010 mm) (No. 24 Gage), shall have seamless corners, and the interior shall be coated with a waterproof material. Nonmetallic pans shall have a minimum thickness of not less than 0.0625 inch (1.6 mm).
2. A separate overflow drain line shall be connected to the drain pan installed with the *equipment*. This overflow drain shall discharge to a conspicuous point of disposal to alert occupants in the event of a stoppage of the primary drain. The overflow drain line shall connect to the drain pan at a higher level than the primary drain connection.
3. An auxiliary drain pan without a separate drain line shall be installed under the coils on which condensation will occur. This pan shall be equipped with a water level detection device conforming to UL 508 that will shut off the *equipment* served prior to overflow of the pan. The pan shall be equipped with a fitting to allow for drainage. The auxiliary drain pan shall be constructed in accordance with Item 1 of this section.
4. A water level detection device conforming to UL 508 shall be installed that will shut off the *equipment* served in the event that the primary drain is blocked. The device shall be installed in the primary drain line, the overflow drain line or the *equipment*-supplied drain pan, located at a point higher than the primary drain line connection and below the overflow rim of such pan.

Reason: This code change is proposed to address the quality of drain pans, which play an obviously key role in preventing damage due to condensate.

First, we suggest that drain pan corners be “seamless,” such as folded corners for metal pans. Notched corners that are later caulked, or perhaps welded, are prone to error.

More importantly, we suggest that drain pans essentially be rustproof. Resisting rust is not sufficient, because the drain pan is the one thing that should not rust through...and the technologies and products available today provide easy solutions. Polymer coatings, plastic pans, etc. have been used and proven for years. We’ve never seen a plastic pan rust through.

We stop short of saying that the entire pan must be rustproof, and focus only on the interior of the pan, because galvanized steel is so widely used. However, popularity does not justify its continued widespread use for this application. Whenever serious damage is caused to a building due to a rusted or leaky pan, it’s a pretty safe bet that the pan was galvanized steel.

Code officials should not assume that the homeowner will have their equipment (and pan) properly serviced by a professional. In that light, placing a galvanized pan above the homeowner’s ceiling is like placing a time bomb there. Besides the fact that pans rust even with proper and regular maintenance.

We believe this code change will increase the quality of construction and reflect well on the code.

Cost Impact: The code change proposal will NOT increase the cost of construction.

For residential installations, plastic pans are readily available in standard sizes. Many areas of the country have already made the switch. For contractors who insist on galvanized pans, they may coat their pans before installation, rather than after they start to rust. This will save them from some pretty ugly customer calls.

Damage from condensate overflow usually is **not** covered by the homeowner's property insurance. Therefore, the potential savings to the homeowner is significant. Thank you for your consideration.

RM18-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1411.3.1-#2-RM-ROWLAND.DOC

RM19 – 13

M1411.3.2

Proponent: Michael Cudahy, Plastic Pipe and Fittings Association, representing Plastic Pipe and Fittings Association (mikec@cmservnet.com)

Revise as follows:

M1411.3.2 Drain pipe materials and sizes. Components of the condensate disposal system shall be ABS, cast iron, copper, cross-linked polyethylene, CPVC, galvanized steel, copper, polybutylene, PE-RT, polyethylene, ABS, CPVC, polypropylene or PVC, pipe or tubing. All components shall be selected for the pressure and temperature rating of the installation. Joints and connections shall be made in accordance with the applicable provisions of Chapter 30. Condensate waste and drain line size shall not be less than ¾-inch (19 mm) internal diameter and shall not decrease in size from the drain pan connection to the place of condensate disposal. Where the drain pipes from more than one unit are manifolded together for condensate drainage, the pipe or tubing shall be sized in accordance with an *approved* method.

Reason: Delete PB material, as it is no longer available or used in this application, and add raised temperature polyethylene, and polypropylene materials that are available and could be used in this application. Also, alphabetize the list of names.

Cost Impact: None

RM19-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1411.3.2#1-RM-CUDAHY.DOC

RM20 – 13

M1411.3.2

Proponent: Michael Cudahy, Plastic Pipe and Fittings Association, representing Plastic Pipe and Fittings Association (mikec@cmservnet.com)

Revise as follows:

M1411.3.2 Drain pipe materials and sizes. Components of the condensate disposal system shall be cast iron, galvanized steel, copper, polybutylene, polyethylene, ABS, CPVC or PVC pipe or tubing. All components shall be selected for the pressure and temperature rating of the installation. All components shall be selected for the pressure and temperature rating of the installation. Joints and connections shall be made in accordance with the applicable provisions of Chapter 30. Condensate waste and drain line size shall be not less than ¾-inch (19 mm) nominal internal diameter ~~and shall not decrease in size~~ from the drain pan connection to the place of condensate disposal. Where the drain pipes from more than one unit are manifolded together for condensate drainage, the pipe or tubing shall be sized in accordance with an *approved* method.

Reason: This second proposal on this section would attempt to clarify that the pipe used is ¾" as a minimum, which seems to already be the field practice, and not ¾" ID pipe. There appeared to be some confusion on the application of the language in the field.

Cost Impact: None

RM20-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1411.3.2 #2-RM-CUDAHY.DOC

RM21 – 13

M1411.3.3 (New)

Proponents: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org); Andrew Scott Jones, President, A Better Deal Heating and Air Conditioning, Inc., a Texas Corporation, representing himself.

Add new text as follows:

M1411.3.3 Drain Line Maintenance. Condensate drain lines shall be configured to permit the clearing of blockages and performance of maintenance without requiring the drain line to be cut.

Reason:

(Hall-PMGCAC): This new language was approved for the 2015 IMC. Drain line stoppages in evaporative coils drain pan drain lines are unavoidable and common occurrences requiring clearing the drain line. Clearing these lines almost always involves cutting the drain line itself, causing water to leak into the attic, crawlspace, closet, etc. The cut must be repaired by reconnecting the drain line with a PVC coupling and solvent cement.

This process exposes the surrounding area to water leakage and spilling with the risk of damage and mold, as well as the extra time and effort of carrying extra equipment, parts and flammable solvent. The repair process takes extra time and costs the homeowner more money.

(Jones): This language is identical to the language of M32-12 which was recently adopted in Portland, Oregon. We are advised by JB Engineering that this language will be in the IMC and IPC for 2015. There appears to be no reason not to accept this identical language in the IRC. Drain line stoppages in evaporative coils drain pan drain lines are unavoidable and common occurrences requiring clearing the drain line. Clearing these lines almost always involves cutting the drain line itself, causing water to leak into the attic or closet where the drain is located, possibly collected in a bucket or soaked up with rags or paper towels. Then the technician blows compressed air through the drain line in both directions from the cut. The cut must be repaired by resealing the drain line with a PVC coupling and solvent.

This process exposes the surrounding area to water leakage and spilling with the risk of damage, mold, spilling, as well as the extra time and effort of carrying extra equipment, parts and flammable solvent. The process takes extra time and costs the homeowner more money.

With a device that permits the introduction of compressed air or nitrogen directly into the drain system permitting clearing in both directions, there is no spillage of water, no cost for the couplings or solvent and no risk of water damage or mold. The entire process requires less than ten minutes.

Typically the cost of clearing a drain equipped with such a device is at least 50% less to the homeowner than the cost of clearing a blockage through the common method of cutting the pipe, attempting to collect the condensate water and repairing the cut in the drain line.

Each time a drain line is cleared though the cutting/repair process, the repair could be accomplished by installing a \$15.00 line clearing device rather than a simple coupling. Drain lines can also be plumbed without installing a device at the time of installation.

Also, if clearing the drain lines were part of regular maintenance, line blockages could largely be prevented in the first place.

Cost Impact:

(Hall-PMGCAC): The code change will increase the cost of construction.

(Jones): The code change will increase the cost of construction, totaling an estimated \$15.00 per unit.

RM21-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1411.3.3 (NEW)-RM-HALL-PMGCAC-JONES.DOC

RM22 – 13

M1411.4 (New)

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org); Guy McMann, Jefferson County Co., representing Colorado Association of Plumbing and Mechanical Officials (CAPMO) (gmcmann@jeffco.us)

Add new text as follows:

M1411.4 Condensate pumps. Condensate pumps located in uninhabitable spaces, such as attics and crawl spaces, shall be connected to the appliance or equipment served such that when the pump fails, the appliance or equipment will be prevented from operating. Pumps shall be installed in accordance with the manufacturer's instructions.

Reason:

(Hall-PMGCAC): Most condensate pumps are factory equipped with float switch controls for this purpose. This new text simply requires the switch to be utilized. Spaces such as attics and crawls are out of sight and out of mind, therefore condensate overflow will not be noticed until damage occurs. The overflow kill switch will shut off the equipment that produces the condensate before water damage can occur.

(McMann): This was approved in the Fuel Gas Code and the IMC. Pumps that are not connected in this fashion will permit the appliances to keep operating, spilling waste water where ever the appliance is located. When this condition continues over time, it could result in damage to building components or other property. This overflow condition may result in mold issues among other things. Most pump manufacturers already have this feature incorporated into the pump but the code does not require it to be connected. Damage as a result of not connecting this feature could prove to be very costly. This is not as much of a concern when appliances are readily accessible to occupants where leakage may be noticed in a timely manner.

Cost Impact: None

RM22-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1411.4 (NEW)-RM-HALL-PMGCAC-MCMANN.DOC

RM23 – 13

M1411.6 (New)

Proponent: Guy McMann, Jefferson County Colorado, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO)

Add text as follows:

M1411.6 Location and protection of refrigerant piping. Refrigerant piping installed within 3 inches of the underside of roof decks shall be protected from damage caused by nails and other fasteners.

Reason: In many instances piping has been punctured or damaged as a result of being located too close to roof decks, discharging into attics or ceiling spaces and posing health risks. Roofing or re-roofing operations are usually the cause for this type of damage. This is very apparent in hail prone locations. Keeping the pipe away from the roof deck will prevent this from occurring reducing repair costs and yet still providing flexibility in the installation.

Cost Impact: None

RM23-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1411.6 (NEW)-RM-MCMANN.DOC

RM24 – 13

1411.6

Proponent: John Arrigo, Brevard Cooling and Heating Inc., representing self

Delete as follows:

~~**1411.6 Locking access port caps.** Refrigerant circuit access ports located outdoors shall be fitted with locking type tamper resistant caps or shall be otherwise secured to prevent unauthorized access.~~

Reason: Locking caps do not properly lock onto the third port service valve on a heat pump condenser called a "true suction port" It has been our experience and others that the locking cap does not lock fully, posing major issues. Many of these caps can be twisted off by hand, without using the key. These caps appear to be seated, but with a twist off by hand means the gasket is not fully seating! All these caps will leak refrigerant into the air causing a major environmental concern and increased costs to homeowners. If the cap can be twisted off by hand then there is no need for a locking cap! How many caps are like this? The locking key of one brand uses a tire schrader remover to remove the cap. These can be picked up at any local store! Why not consider a brass cap that is locked down with a crescent wrench as a locking cap? With this economic impact it would be cheaper and safer to use the manufactures factory supplied caps that come with the condenser. How can these locking caps be EPA approved?

Cost Impact: The code change will not increase cost of construction.

RM24-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1411.6-RM-ARRIGO.DOC

RM25 – 13

M1412.1, Chapter 44

Proponent: Bob Eugene, representing UL LLC.(Robert.Eugene@ul.com)

Revise as follows:

M1412.1 Approval of equipment. Absorption systems shall be installed in accordance with the manufacturer's installation instructions. Absorption equipment shall comply with UL 1995 or UL/CSA/ANCE 60335-2-40.

Add new standard to Chapter 44 as follows:

UL/CSA/ANCE 60335-2-40--2012

Reason: Through AHRI, manufactures requested that UL publish a harmonized IEC based 60335-2-40, to replace UL 1995 for equipment within the scope of 60335-2-40 rated 600 volts and less. UL60335-2-40 will be effective upon publication, however UL 1995 will not sunset for new equipment until November 2020 and existing equipment by 2022. UL/CSA/ANCE 60335-2-40 is a new tri-national standard that provides a comprehensive set of construction and performance requirements that are used to evaluate and list absorption systems.

Cost Impact: None

Analysis: A review of the standard proposed for inclusion in the code, [UL/CSA/ANCE 60335-2-40--2012] with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

RM25-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1412.1-RM-EUGENE.DOC

RM26 – 13

M1413.1, Chapter 44

Proponent: Bob Eugene, representing UL LLC.(Robert.Eugene@ul.com)

Revise as follows:

M1413.1 General. Evaporative cooling equipment and appliances shall comply with UL 1995 or UL/CSA/ANCE 60335-2-40 and shall be installed:

1. According to the manufacturer's instructions.
2. On level platforms in accordance with Section M1305.1.4.1.
3. So that openings in exterior walls are flashed in accordance with Section R703.8.
4. So as to protect the potable water supply in accordance with Section P2902.
5. So that air intake opening locations are in accordance with Section R303.5.1.

Add new standard to Chapter 44 as follows:

UL/CSA/ANCE 60335-2-40-2012

Reason: Through AHRI, manufactures requested that UL publish a harmonized IEC based 60335-2-40, to replace UL 1995 for equipment within the scope of 60335-2-40 rated 600 volts and less. UL60335-2-40 will be effective upon publication, however UL 1995 will not sunset for new equipment until November 2020 and existing equipment by 2022. UL/CSA/ANCE 60335-2-40 is a new tri-national standard that provides a comprehensive set of construction and performance requirements that are used to evaluate and list evaporative cooling equipment and appliances.

Cost Impact: None

Analysis: A review of the standard proposed for inclusion in the code, [UL/CSA/ANCE 60335-2-40-2012] with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

RM26-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1413.1-RM-EUGENE.DOC

RM27 – 13

M1501.2 (New)

Proponent: Dan Buuck, representing National Association of Home Builders (NAHB)
(dbuuck@nahb.org)

Add text as follows:

M1501.2 Transfer air. Air transferred from occupiable spaces, other than kitchens, bathrooms and toilet rooms, shall not be prohibited from serving as makeup air for exhaust systems. Transfer openings between spaces shall be of the same cross-sectional area as the free area of the makeup air openings. Where louvers and grilles are installed, the required size of openings shall be based on the net free area of each opening. Where the design and free area of louvers and grilles are not known, it shall be assumed that wood louvers have 25-percent free area and metal louvers and grilles have 75-percent free area.

Reason: The IMC contains language allowing makeup air to be provided from areas other than the room where the exhaust system is located (transfer air). It is just as important to clarify the allowable use of transfer air for exhaust systems in the IRC as it is in the IMC. Without this provision, Section M1503.4 can be interpreted that the total amount of makeup air is required to be introduced in the direct vicinity of the exhaust. This is not required in commercial construction, and so the IRC should be brought into alignment with the IMC in this area.

Most of the language is taken from existing sections of the code. They include: Transfer air: IMC Section 403; Transfer openings: Section M1602 Item 6; and Louvers and grilles: Section G2407.10.

Cost Impact: The code change proposal will not increase the cost of construction.

RM27-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1501.2-RM-BUUCK.DOC

RM28 – 13

M1502.1 through M1502.5

Proponent: Guy McMann, Jefferson County Co., representing Colorado Association of Plumbing and Mechanical Officials (CAPMO) (gmcman@jeffco.us)

Revise as follows:

SECTION M1502 CLOTHES DRYER EXHAUST

M1502.1 General. Clothes dryers shall be exhausted in accordance with the manufacturer's instructions and Section G2439.

Delete without substitution:

~~**M1502.2 Independent exhaust systems.** Dryer exhaust systems shall be independent of all other systems and shall convey the moisture to the outdoors.~~

~~**Exception:** This section shall not apply to listed and labeled condensing (ductless) clothes dryers.~~

~~**M1502.3 Duct termination.** Exhaust ducts shall terminate on the outside of the building. Exhaust duct terminations shall be in accordance with the dryer manufacturer's installation instructions. If the manufacturer's instructions do not specify a termination location, the exhaust duct shall terminate not less than 3 feet (914 mm) in any direction from openings into buildings. Exhaust duct terminations shall be equipped with a backdraft damper. Screens shall not be installed at the duct termination.~~

~~**M1502.4 Dryer exhaust ducts.** Dryer exhaust ducts shall conform to the requirements of Sections M1502.4.1 through M1502.4.6.~~

~~**M1502.4.1 Material and size.** Exhaust ducts shall have a smooth interior finish and shall be constructed of metal having a minimum thickness of 0.0157 inches (0.3950 mm) (No. 28 gage). The duct size shall be 4 inches (102 mm) nominal in diameter.~~

~~**M1502.4.2 Duct installation.** Exhaust ducts shall be supported at intervals not to exceed 12 feet (3658 mm) and secured in place. The insert end of the duct shall extend into the adjoining duct or fitting in the direction of airflow. Exhaust duct joints shall be sealed in accordance with Section M1601.4.1 and shall be mechanically fastened. Ducts shall not be joined with screws or similar fasteners that protrude more than 1/8 inch (3.2 mm) into the inside of the duct.~~

~~**M1502.4.3 Transition duct.** Transition ducts used to connect the dryer to the exhaust duct system shall be a single length that is listed and labeled in accordance with UL 2158A. Transition ducts shall be a maximum of 8 feet (2438 mm) in length. Transition ducts shall not be concealed within construction.~~

~~**M1502.4.4 Duct length.** The maximum allowable exhaust duct length shall be determined by one of the methods specified in Section M1502.4.4.1 or M1502.4.4.2.~~

~~**M1502.4.4.1 Specified length.** The maximum length of the exhaust duct shall be 35 feet (10668 mm) from the connection to the transition duct from the dryer to the outlet terminal. Where fittings are used, the maximum length of the exhaust duct shall be reduced in accordance with Table M1502.4.4.1. The maximum length of the exhaust does not include the transition duct.~~

**TABLE M1502.4.4.1
DRYER EXHAUST DUCT FITTING EQUIVALENT LENGTH**

DRYER EXHAUST DUCT FITTING TYPE	EQUIVALENT LENGTH
4 inch radius mitered 45 degree elbow	2 feet 6 inches
4 inch radius mitered 90 degree elbow	5 feet
6 inch radius smooth 45 degree elbow	1 foot
6 inch radius smooth 90 degree elbow	1 foot 9 inches
8 inch radius smooth 45 degree elbow	1 foot
8 inch radius smooth 90 degree elbow	1 foot 7 inches
10 inch radius smooth 45 degree elbow	9 inches
10 inch radius smooth 90 degree elbow	1 foot 6 inches

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 degree = 0.0175 rad.

M1502.4.4.2 Manufacturer's instructions. ~~The size and maximum length of the exhaust duct shall be determined by the dryer manufacturer's installation instructions. The code official shall be provided with a copy of the installation instructions for the make and model of the dryer at the concealment inspection. In the absence of fitting equivalent length calculations from the clothes dryer manufacturer, Table M1502.4.4.1 shall be used.~~

M1502.4.5 Length identification. ~~Where the exhaust duct is concealed within the building construction, the equivalent length of the exhaust duct shall be identified on a permanent label or tag. The label or tag shall be located within 6 feet (1829 mm) of the exhaust duct connection.~~

M1502.4.6 Exhaust duct required. ~~Where space for a clothes dryer is provided, an exhaust duct system shall be installed. Where the clothes dryer is not installed at the time of occupancy the exhaust duct shall be capped or plugged in the space in which it originates and identified and marked "future use."~~

Exception: ~~Where a listed condensing clothes dryer is installed prior to occupancy of the structure.~~

M1502.5 Protection required. ~~Protective shield plates shall be placed where nails or screws from finish or other work are likely to penetrate the clothes dryer exhaust duct. Shield plates shall be placed on the finished face of all framing members where there is less than 1 1/4 inches (32 mm) between the duct and the finished face of the framing member. Protective shield plates shall be constructed of steel, shall have a minimum thickness of 0.062 inch (1.6 mm) and shall extend a minimum of 2 inches (51 mm) above sole plates and below top plates.~~

Reason: This is a chance to be a little "green" and delete unnecessary duplicate language in the code as there is insignificant difference between the two sections. Gas and electric dryers are vented the same way and anything other than that would be vented according to the manufacturer. Having both Sections could lead one to believe they are different when in fact they are not.

Cost Impact: None

RM28-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1502.1-RM-MCMANN.DOC

RM29 – 13

M1502.4.5

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org); Richard Grace, Fairfax County Government, representing The Virginia Plumbing and Mechanical Inspectors Association, The Virginia Building Code Officials Association

Revise as follows:

M1502.4.5 Length identification. Where the exhaust duct equivalent length exceeds 35 feet is ~~concealed within the building construction~~, the equivalent length of the exhaust duct shall be identified on a permanent label or tag. The label or tag shall be located within 6 feet (1829 mm) of the exhaust duct connection.

Reason:

(Hall-PMGCAC): This revised language was approved for the 2015 IMC. If the equivalent length does not exceed 35', signage provides no benefit, whether or not the duct is concealed. It does not matter if the duct is concealed. The purpose of the signage is to notify the owners and installers that the dryer duct length is exceptional and any installed dryer must be compatible with that duct of exceptional length.

Grace): If the equivalent length is code compliant, there is no need for extra signage. This puts the code official in a position of recording each installation in order to verify at time of final that the stated length is accurate. This is over the top for code officials and installers to keep track of in a world of increasing duties and fewer resources. It should not matter if the duct is concealed or not as this is a benefit for the building owner or user.

Cost Impact: None.

RM29-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1502.4.5-RM-HALL-PMGCAC-GRACE.DOC

RM30 – 13

M1503.1, M1503.2

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

Revise as follows:

M1503.1 General. Range hoods shall discharge to the outdoors through a ~~single-wall~~ duct. The duct serving the hood shall have a smooth interior surface, shall be air tight, shall be equipped with a back-draft damper, and shall be independent of all other exhaust systems. Ducts serving range hoods shall not terminate in an attic or crawl space or areas inside the building.

Exception: Where installed in accordance with the manufacturer's installation instructions, and where mechanical or natural *ventilation* is otherwise provided, *listed* and *labeled* ductless range hoods shall not be required to discharge to the outdoors.

M1503.2 Duct material. ~~Single-wall~~ Ducts serving range hoods shall be constructed of galvanized steel, stainless steel or copper.

Exception: Ducts for domestic kitchen cooking *appliances* equipped with down-draft exhaust systems shall be permitted to be constructed of schedule 40 PVC pipe and fittings provided that the installation complies with all of the following:

1. The duct is installed under a concrete slab poured on grade; *and*
2. The underfloor trench in which the duct is installed is completely backfilled with sand or gravel; *and*
3. The PVC duct extends not more than 1 inch (25 mm) above the indoor concrete floor surface; *and*
4. The PVC duct extends not more than 1 inch (25 mm) above grade *outside of the building*; *and*
5. The PVC ducts are solvent cemented.

Reason: Stating "single- wall" is unnecessary and makes code users wonder if there is some hidden meaning or intent. It is assumed that the duct will be single-wall, but there is no technical reason to require only single-wall.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Cost Impact: The code change proposal will not increase the cost of construction.

RM30-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1503.1-RM-HALL-PMGCAC

RM31 – 13

Sections 202, M1503.4

Proponent: Mike Moore, P.E., Newport Ventures, representing Broan-NuTone
(mmoore@newportventures.net)

Add new definitions as follows:

AIR, MAKEUP. Any combination of outdoor and transfer air intended to replace exhaust air and exfiltration

AIR, OUTDOOR. Ambient air that enters a building through a ventilation system, through intentional openings for natural ventilation, or by infiltration.

AIR, TRANSFER. Air moved from one indoor space to another

INFILTRATION. Uncontrolled inward air leakage to conditioned spaces through unintentional openings in ceilings, floors, and walls from unconditioned spaces or the outdoors caused by pressure differences across these openings resulting from wind, indoor/outdoor temperature differences and imbalances between supply and exhaust airflow rates.

EXFILTRATION. Uncontrolled outward air leakage from conditioned spaces through unintentional openings in ceilings, floors, and walls to unconditioned spaces or the outdoors caused by pressure differences across these openings resulting from wind, indoor/outdoor temperature differences and imbalances between supply and exhaust airflow rates.

Revise text as follows:

M1503.4 Makeup air required. Kitchen Exhaust hood systems capable of exhausting in excess of 400 cubic feet per minute (0.19 m³/s) shall be provided with makeup air at a rate approximately equal to the exhaust air rate. Such makeup air systems shall be equipped with not less than one motorized damper a means of closure and that shall be automatically controlled to start and operate simultaneously with the exhaust system.

Exception: Intentional openings for makeup air are not required for kitchen exhaust systems capable of exhausting not greater than 600 cubic feet per minute provided that one of the following conditions is met:

1. Where the floor area within the air barrier of a dwelling unit is at least 1500 square feet, and where natural draft or mechanical draft space-or water-heating appliances are not located within the air barrier.
2. Where the floor area within the air barrier of a dwelling unit is at least 3000 square feet, and where natural draft space-or water-heating appliances are not located within the air barrier.

Reason: The language in 1503.4 is confusing and needs to be reworked. This proposal accomplishes the following. Detailed rationale follows the bullets.

1. Recognizes that makeup air (MUA) requirements are indifferent to the type of exhaust system (same MUA requirements should apply whether it's a hood, down draft, through the wall vent, or any other type)
2. Clarifies where MUA comes from (transfer and outdoor air), and updates definitions to align with IMC
3. Clarifies what type of MUA system should be specified (at a minimum, one motorized, automatically controlled damper)
4. Provides an exception to relax the MUA requirements where the home is assumed to have sufficient natural infiltration to minimize the chance of backdrafting for the combustion appliances within the air barrier.

First, the current language only addresses exhaust hood systems, but the physics of back drafting are indifferent as to whether the exhaust system is a hood, a down draft, a through the wall vent, or any other type of exhaust system. So, the word "hood" is removed to reflect this fact.

Second, several definitions from the 2015 IMC are inserted clarify how the MUA system operates – things like where the MUA comes from, where the air must be introduced, etc. These definitions are also aligned with ASHRAE 62.

Third, this change clarifies the minimum required component of a MUA system (at least one motorized damper). A motorized damper is required because gravity dampers can malfunction at the low pressure differentials at which naturally vented appliances can potentially back draft (i.e., 3-5 Pascals based on info from BPI, CMHC, and CAN/CSA F326-M91; see references below). Malfunction can occur through improper balancing and slight restrictions in the damper caused by dirt, debris, or other matter.

Fourth, MUA should not be required where the home is deemed sufficiently leaky to minimize the chance of backdrafting for the combustion appliances within the air barrier. This exception assumes that mechanical draft combustion appliances can be operated safely to a pressure of -15 Pascals, and that direct vent appliances can be operated safely to a pressure of -50 Pascals. It also assumes that the home has a leakage of 3 ACH 50 and that there is good pressure distribution throughout the home. Ceiling height is assumed to be 8.5 ft. Equations used to estimate building leakage at the pressures of -15 Pa and -50 Pa were sourced from 2009 ASHRAE Fundamentals 16.15 (equations 41, 43 assuming a pressure exponent of 0.65).

References:

- BPI (Building Performance Institute). *Technical Standards for the Building Analyst Professional*. http://www.bpi.org/Web%20Download/BPI%20Standards/Building%20Analyst%20Professional_2-28-05nNC-newCO.pdf
- CAN/CSA F326-M91. *Residential Mechanical Ventilation Systems, A National Standard of Canada*. Reaffirmed 2010.
- CMHC (Canada Mortgage Housing Corporation). *Chimney Safety Tests Users Manual, Second Edition*. January 12, 1988. http://publications.gc.ca/collections/collection_2011/schl-cmhc/nh18-1/NH18-1-61-1988-eng.pdf.
- Minnesota Mechanical and Fuel Gas Code 1346.0501.501.3.2. <https://www.revisor.mn.gov/rules/?id=1346.0501>.
- 2009 ASHRAE Handbook of Fundamentals.

Cost Impact: This proposal has the potential to reduce the cost of construction by adding exceptions for MUA requirements when a dedicated MUA system is not needed.

RM31-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1503.4#1-RM-MOORE.DOC

RM32 – 13

Sections 202, M1503.4, M1508 (New)

Proponent: Mike Moore, P.E., Newport Ventures, representing Broan-NuTone
(mmoore@newportventures.net)

Add new definitions as follows:

AIR, MAKEUP. Any combination of outdoor and transfer air intended to replace exhaust air and exfiltration

AIR, OUTDOOR. Ambient air that enters a building through a ventilation system, through intentional openings for natural ventilation, or by infiltration.

AIR, TRANSFER. Air moved from one indoor space to another

INFILTRATION. Uncontrolled inward air leakage to conditioned spaces through unintentional openings in ceilings, floors, and walls from unconditioned spaces or the outdoors caused by pressure differences across these openings resulting from wind, indoor/outdoor temperature differences and imbalances between supply and exhaust airflow rates.

EXFILTRATION. Uncontrolled outward air leakage from conditioned spaces through unintentional openings in ceilings, floors, and walls to unconditioned spaces or the outdoors caused by pressure differences across these openings resulting from wind, indoor/outdoor temperature differences and imbalances between supply and exhaust airflow rates.

Revise text as follows:

M1503.4 Makeup air required. Kitchen Exhaust hood systems capable of exhausting in excess of 400 600 cubic feet per minute (0.19 m³/s) shall be provided with makeup air at a rate approximately equal to the design exhaust air rate. Such makeup air systems shall be equipped with not less than one motorized damper a means of closure and that shall be automatically controlled to start and operate simultaneously with the exhaust system.

M1508 **VENTING AND DEPRESSURIZATION**

M1508.1 General. Dwelling units containing space-or water-heating combustion appliances shall comply with at least one of the following conditions:

1. Space-heating and water-heating combustion appliances located within the dwelling unit's air barrier shall be of the direct-vent type.
2. Mechanical ventilation shall be provided in accordance with Section M1507. Makeup air shall be provided for each of the dwelling unit's two largest exhaust systems, not including cooling fans intended to be operated only when windows or other air inlets are open. The makeup air shall be provided at a rate approximately equal to or greater than the design exhaust rate. Makeup air systems shall be equipped with not less than one motorized damper that shall be automatically controlled to operate simultaneously with the exhaust systems.
3. Space-heating and water-heating combustion appliances shall not be located within the dwelling unit's air barrier.
4. Depressurization within the dwelling unit shall be within the limits specified by an approved test.

Reason: As homes become tighter, there is greater potential for negative interaction between exhaust fans and combustion appliances within a dwelling unit's air barrier. This proposed change is an attempt to provide a workable solution that will reduce the potential for back drafting of combustion appliances, while not compromising the functionality of exhaust fans that are needed to maintain acceptable indoor air quality. Simultaneously, tighter requirements for venting and depressurization allow for a loosening

of requirements on makeup air. The rationale below is grouped according to the makeup air component of the proposal and the venting and depressurization components.

Venting and Depressurization Rationale

The proposed compliance paths are based on the following assumptions:

#1: Direct vent appliances are not expected to be in danger of back drafting, so no additional steps are required.

#2: Dwellings that use natural draft or mechanical draft appliances *within the unit's air barrier* may comply under path 2 or path 4. Based on industry recommendations, the highest pressure differential that natural draft appliances should be exposed to is -5 Pascals. At -5 Pascals, a small, 1200 sqft dwelling unit with 8.5 foot ceilings and an infiltration rate of 3.0 ACH 50 will have about 110 cfm of outdoor air infiltration. Some of this infiltration may be required for combustion air. There are typically at least two exhaust appliances in a dwelling that exhaust over 100 cfm (e.g., clothes dryers at ~ 130 cfm and kitchen range hoods at a minimum of 100 cfm when operated intermittently), either one of which would need virtually all of the makeup air that can be provided naturally through building leakage when pressurized to -5 Pa. To minimize the chance of back drafting, it's reasonable to require that these two largest exhaust appliances be provided with makeup air. This particular path does not guarantee that back drafting will never occur, but it improves the current code by reducing the potential for back drafting for most cases most of the time.

#3: By removing combustion appliances from the dwelling unit's air barrier, the opportunity for back drafting is also expected to be removed.

#4: An AHJ may approve a test to demonstrate acceptable combustion safety. One example that is commonly done today is BPI's combustion appliance zone test (CAZ). Approval of this or other tests for this purpose shall be at the discretion of the AHJ.

Makeup Air (MUA) Rationale

This proposal also includes new definitions to help clarify MUA (borrowed from the 2015 IMC), an increase in the cut-in target for kitchen exhaust system MUA from 400 to 600 cfm, and a clarification that at a minimum, kitchen MUA systems must use a motorized damper. The cut-in is increased to 600 for the following reasons:

- If following path 2, MUA will already be provided for the kitchen exhaust, regardless of its exhaust rate (assuming it will be one of the two largest exhaust fans)
- If following path 1 or 3, the opportunity for back drafting has been minimized by either specifying direct-vent appliances or completely removing combustion appliances from the air barrier.
- If following path 4, a test verifies that the operation of the kitchen exhaust does not negatively impact the operation of the combustion appliances.

Finally, the language in this section is clarified to require that kitchen exhaust MUA systems use at least one motorized damper. A motorized damper is required because gravity dampers can malfunction at the low pressure differentials at which naturally vented appliances can potentially back draft (i.e., 3-5 Pascals based on info from BPI, CMHC, and CAN/CSA F326-M91; see references below). Malfunction can occur through improper balancing and slight restrictions in the damper caused by dirt, debris, or other matter.

Cost Impact: With multiple compliance paths and a loosening of the cut-in flow rate at which kitchen MUA is required, the cost of construction will not necessarily increase. For builders who are not currently designing for combustion safety, there could be an increase in costs.

RM32-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1503.4 #2-RM-MOORE.DOC

RM33– 13

M1503.4

Proponent: Dan Buuck, National Association of Home Builders (NAHB) (dbuuck@nahb.org)

Revise as follows:

M1503.4 Makeup air required. Exhaust hood systems capable of exhausting in excess of ~~400-600~~ cubic feet per minute (0.19 m³/s) shall be provided with makeup air at a rate approximately equal to the exhaust air rate. Such makeup air systems shall be equipped with a means of closure and shall be automatically controlled to start and operate simultaneously with the exhaust system.

Reason: The threshold for makeup air was originally set at 400 cfm, because it was believed that most residential kitchen exhaust systems fall below that number. Many down-draft exhaust systems, however, are rated between 400 and 600 cfm, penalizing homeowners who prefer these systems by adding a lot of cost and complexity to their homes. Everyone can agree that there are certain 'monster' exhaust hoods (e.g. 1200 cfm) that need makeup air, but the current threshold is set too low.

The PMG CAC supported this change for the IMC during the Group A Final Action Hearings.

Cost Impact: The code change proposal will not increase the cost of construction.

RM33-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1503.4-RM-BUUCK.DOC

RM34 – 13

M1503.4

Proponent: Dan Buuck, National Association of Home Builders (NAHB); David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee
(dave.hall@georgetown.org)

Revise as follows:

M1503.4 Makeup air required. Exhaust hood systems capable of exhausting in excess of 400 cubic feet per minute (0.19 m³/s) shall be mechanically or naturally provided with makeup air at a rate approximately equal to the exhaust air rate. Such makeup air systems shall be equipped with a not less than one damper. Each damper shall be a gravity damper or an electrically operated damper that automatically opens when the exhaust system operates means of closure and shall be automatically controlled to start and operate simultaneously with the exhaust system. Dampers shall be accessible for inspection, service, repair and replacement without removing permanent construction or any other ducts not connected to the damper being inspected, serviced, repaired or replaced.

Reason: The first change adds the words 'mechanically or naturally'. It is important to explicitly state that both mechanical ventilation (i.e. a fan) and natural ventilation (i.e. a passive opening) is allowed by this provision for the following reasons. First of all, It is not being interpreted the same in all jurisdictions. Secondly, there is no precedence for mechanical makeup air in the IRC. The second change deals with the type of damper that is allowed. The only reason to require a 'means of closure' to the makeup air system is to limit the amount of conditioned air that leaves the building when the exhaust is not running. Both electrically-operated and gravity dampers achieve this goal, and it is important to clarify that both are allowed. Again, it is not being interpreted the same in all jurisdictions. (Some are allowing gravity dampers, but not all.) Secondly, allowing a gravity damper is in keeping with similar applications within the IRC—nowhere are automatic (motorized) dampers required for makeup or ventilation air. Finally, a gravity damper has the added benefit of equalizing depressurization in the house for any other reason (e.g. bath fans and clothes dryers). The last sentence was taken and modified from Section M1305.1 on appliance access. It emphasizes that both types of dampers, gravity and motorized, require maintenance and may need to be replaced at some time.

Cost Impact: The code change proposal will not increase the cost of construction.

RM34-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1503.4-RM-BUUCK-HALL-PMGCAC

RM35 – 13

M1503.4

Proponent: Guy McMann, MCP, Jefferson County Colorado, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO) (gmcmann@jeffco.us)

Revise as follows:

M1503.4 Makeup air required. Kitchen exhaust ~~hood~~ systems capable of exhausting in excess of 400 cubic feet per minute (0.19 m³/s) shall be mechanically or naturally provided with makeup air at a rate approximately equal to the exhaust air rate. ~~Such Gravity or mechanical~~ makeup air systems shall be equipped with a motorized means of closure and shall be automatically controlled to ~~start and~~ operate simultaneously with the exhaust system

Reason: This proposal clarifies that the makeup air systems may be mechanical or gravity depending on the designer's preferences. This also clarifies that in either case, a motorized damper will be required to ensure a positive means of closure. Striking the word "hood" captures downdraft equipment which could be construed as not being included.

Cost Impact: None

RM35-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1503.4-RM-MCMANN.DOC

RM36 – 13

M1506, M1507, and Chapter 44

Proponent: Mike Moore, P.E., Newport Ventures, representing Broan-NuTone
(mmoore@newportventures.net)

Revise as follows:

M1506.1 Ducts construction. Where exhaust duct construction is not specified in this chapter, construction shall comply with Chapter 16.

M1506.2. Duct length. The length of exhaust and supply ducts used for ventilating equipment shall not exceed the maximum lengths determined in accordance with Table M1506.2.

Exception: Duct length shall not be limited where the duct system complies with the manufacturer's design criteria or where the flow rate of the installed ventilating equipment is verified by the installer or approved third party using a flow hood, flow grid, or other airflow measuring device.

M1506.23 Exhaust openings. Air exhaust openings shall terminate not less than 3 feet (914 mm) from property lines; 3 feet (914 mm) from operable and nonoperable openings into the building and 10 feet (3048 mm) from mechanical air intakes except where the opening is located 3 feet (914 mm) above the air intake. Openings shall comply with Sections R303.5.2 and R303.6.

TABLE M1506.2
DUCT LENGTH

Duct Type	Flex Duct								Smooth-Wall Duct							
Fan Airflow Rating CFM @ 0.25 in. wc¹	50	80	10 0	12 5	15 0	20 0	25 0	30 0	50	80	10 0	12 5	15 0	20 0	25 0	30 0
Diameter ² in.	Maximum Length^{3,4,5} ft.															
3	X	X	X	X	X	X	X	X	5	X	X	X	X	X	X	X
4	56	4	X	X	X	X	X	X	11 4	31	10	X	X	X	X	X
5	N L	81	42	16	2	X	X	X	NL	15 2	91	51	28	4	X	X
6	N L	N L	15 8	91	55	18	1	X	NL	NL	NL	16 8	11 2	53	25	9
7	N L	N L	NL	NL	16 1	78	40	19	NL	NL	NL	NL	NL	14 8	88	54
8 and above	N L	N L	NL	NL	NL	18 9	11 1	69	NL	NL	NL	NL	NL	NL	19 8	13 3

1. Fan airflow rating shall be in accordance with ANSI/AMCA 210-ANSI/ASHRAE 51.

2. For non-circular ducts, calculate the diameter as four times the cross-sectional area divided by the perimeter.

3. This table assumes that elbows are not used. Fifteen feet (5 m) of allowable duct length shall be deducted for each elbow installed in the duct run.
4. NL = no limit on duct length of this size.
5. X = not allowed. Any length of duct of this size with assumed turns and fittings will exceed the rated pressure drop.

M1507.1 General. Where local exhaust or whole-house mechanical ventilation is provided, the equipment shall be designed in accordance with this section.

M1507.2 Flow Rate Verification. The flow rate for ventilating equipment shall be verified in accordance with ANSI/AMCA 210-ANSI/ASHRAE 51 or the flow rate shall be verified by the installer or approved third party using a flow hood, flow grid, or other airflow measuring device.

Add new standard to Chapter 44 as follows:

ANSI/AMCA 210-ANSI/ASHRAE 51-07, Laboratory Methods of Testing Fans for Aerodynamic Performance Rating.

Reason: Section M1507 establishes the minimum design flow rates required for local exhaust and whole house mechanical ventilation (WHMV) fans. However, field tests of ventilating fans often show that actual flow rates fall short of design. Failure of fans to meet design rates can generally be attributed to one of two reasons: either the ductwork is poorly matched to the fan, or the fan's actual airflow does not match its label (i.e., has not been verified via a standardized laboratory test). By providing a prescriptive duct sizing table, this proposal takes the guess work out of whether a fan should operate per the design rate. By requiring that either the fan flow rate be verified by the manufacturer in accordance with ANSI/AMCA 210-ANSI/ASHRAE 51 or be field verified by the installer or approved third party, this proposal provides a minimum level of quality assurance and control to the installation of ventilation fans.

The proposed table is taken directly from ASHRAE 62.2-2010, addendum F. Confirmation that a ventilation fan's flow rate is in compliance with ANSI/AMCA 210-ANSI/ASHRAE 51 is as simple as looking for an HVI sticker in the fan housing. Ventilating fans exceeding the maximum CFM in Table M1506.2 would comply with Section M1506.2 by using the exception (i.e., installing ducts in accordance with the manufacturer's design criteria or by field confirmation of the flow rate).

Cost Impact: Incremental costs associated with this proposal are expected to be minimal to zero, since this proposal reflects the minimum design practice needed to ensure that installed rates match design rates.

Analysis: A review of the standard proposed for inclusion in the code, [ANSI/AMCA 210-ANSI/ASHRAE 51-07] with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

RM36-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1506.2 (NEW)-RM-MOORE.DOC

RM37 – 13

202, M1506.2; R303.5, R303.5.1, R303.5.2

THIS IS A 2 PART CODE CHANGE. BOTH PARTS WILL BE HEARD BY THE IRC-PLUMBING AND MECHANICAL COMMITTEE AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

Proponent: Mike Moore, P.E., Newport Ventures, representing Broan-NuTone
(mmoore@newportventures.net)

PART I - IRC MECHANICAL

Add new definition as follows:

ENVIRONMENTAL AIR. Air that is conveyed to or from occupied areas through ducts that are not part of the heating or air-conditioning system, such as ventilation for human usage, domestic kitchen range exhaust, bathroom exhaust and domestic clothes dryer exhaust.

Revise text as follows:

M1506.2 Exhaust openings. ~~Air exhaust openings shall terminate not less than 3 feet (914 mm) from property lines; 3 feet (914 mm) from operable and nonoperable openings into the building and 10 feet (3048 mm) from mechanical air intakes except where the opening is located 3 feet (914 mm) above the air intake.~~ Openings shall comply with Sections R303.5.2 and R303.6.

PART II - IRC BUILDING

R303.5 Opening location. Outdoor intake and exhaust openings shall be located in accordance with Sections R303.5.1 and R303.5.2.

R303.5.1 Intake openings. Mechanical and gravity outdoor air intake openings shall be located a minimum of 10 feet (3048 mm) from any hazardous or noxious contaminant source, such as vents, chimneys, plumbing vents, streets, alleys, parking lots and loading docks, except as otherwise specified in this code. Where a ~~source of contaminant source~~ is located within 10 feet (3048 mm) of an intake opening, such opening shall be located not less than 3 feet (914 mm) below the contaminant source. For the purpose of this section, environmental air other than domestic clothes dryer exhaust ~~the exhaust from dwelling unit toilet rooms, bathrooms and kitchens~~ shall not be considered as hazardous or noxious.

R303.5.2 Exhaust openings. Exhaust air shall not be directed onto walkways. Air exhaust openings shall terminate not less than: 3 feet (914 mm) from property lines; 3 feet (914 mm) from operable and nonoperable openings into the building; and 10 feet (3048 mm) from mechanical air intakes except where the exhaust opening is located not less than 3 feet (914 mm) above the air intake.

Exception: The minimum termination distances from the building's operable openings, nonoperable openings, and mechanical air intakes shall not be required where the exhaust source is environmental air other than domestic clothes dryer exhaust.

Reason: The language on exhaust and intake openings is redundant and confusing in that it is spread throughout the code, and permits exhausts to be located near intakes but does not permit intakes to be located near exhausts. This change seeks to simplify the language, reorganize into one section, and ensure that the allowances for intakes are consistent with the allowances for exhaust. Improvements include the following:

1. Include exhaust from occupied areas among the list of non-hazardous exhaust. R303.5.1 states that exhaust from toilet rooms, bathrooms, and kitchens shall not be considered as hazardous. This list is not comprehensive, notably excluding exhaust from occupied areas like living rooms or bedrooms, which are likely to contain even less contaminants than exhaust from toilet rooms, bathrooms, and kitchens. To fix this, I've borrowed the definition of "Environmental Air" from

the IMC and excluded clothes dryer exhaust and parking garage exhaust, since this section does not currently permit these.

2. Move the text of M1506.2 to R303.5.2, and reduce the text of M1506.2 to a reference.
3. Add an exception to R303.5.2 that aligns with the language in R303.5.1. To simplify, the code currently states that A can be close to B, but B can't be close to A, which doesn't make sense. R303.5.1 specifically eliminates the minimum separation distance between intakes and exhaust terminations of toilet rooms, bathrooms, or kitchens. However, M1506.2 still states that all exhaust terminations must still observe minimum separation distances from intakes. Adding the exception to R303.5.2 brings consistency to these two sections.

Cost Impact: No impact.

RM37-13

PART I - IRC MECHANICAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II - IRC BUILDING

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1506.2-RM-MOORE.DOC

RM38 – 13

M1506.2

Proponent: Mike Winkler, Chair of the IRC Interpretations Committee, representing our committee

Revise as follows:

M1506.2 Exhaust openings. Location of exhaust outlets. ~~Air Exhaust air- openings outlets shall terminate not less than 3 feet (914mm) from property lines. Exhaust air outlets shall terminate not less than 3 feet from operable and non-operable openings that have the potential for allowing exhaust air back into the building, except where the exhaust air outlet is located not less than 3 feet (914mm) above such openings. and Exhaust air outlets shall terminate not less than 10 feet (3048mm) from mechanical air intakes, except where the exhaust air outlet opening is located not less than 3 feet (914mm) above the mechanical air intake.~~

Reason: The IRC interpretation committee is attempting to revise the language for two reasons. First, to have the title be consistent with the IMC and second, to clarify the intent. The IRC interpretation committee received a request for a formal interpretation and could not reach a consensus regarding what exactly the current text requires. A “non-operable” opening could be viewed as a fixed louver or as a fixed glass window panel. Neither can be operated but one will let air into the building and the other will not.

The text is also revised so that the terms “opening” and “exhaust air outlet” are used consistently throughout the section. The current text stated *opening* where it meant *exhaust outlet* near the end of the 1st sentence. The exhaust outlets are now clearly distinct from the “openings”, since “opening” in this context refers to air intake openings. The current text stated that exhaust openings had to be exactly 3 feet above the air intake, so, if it was 4 feet above, the allowance would not apply. The text was poorly formatted in a long run-on sentence which made it unclear if the exception for being 3 foot above applied only to the mechanical air intakes or if it also applied to other openings that could let exhaust back into the building. Breaking the run-on sentence into separate thoughts makes it perfectly clear that it applies in both cases. The proposed revisions mean to clarify what the interpretation committee believes to be the actual intent of this section, as well improve to readability of the text overall.

Cost Impact: The code change proposal will not increase the cost of construction.

RM38-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1506.2-RM-WINKLER.DOC

RM39 – 13

M1506.3 (New)

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

Add new text as follows:

M1506.3 Exhaust fans. Exhaust fans shall not discharge through common ducts.

Reason: Some installers attempt to join the outlets of two or more bathroom exhaust fans into a common discharge duct. This presents multiple problems including: 1) The common duct is typically undersized which prevents the fans from achieving their intended flow rate. 2) The backdraft dampers in such fans are not designed to be airtight or to prevent reverse flow from other fans. The result is that discharge from one fan is pushed back through any fan that is not operating. 3) The fan manufacturers provide no guidance for this nor do they recommend the practice. 4) The tees used for such arrangements often create flow resistance and direct the flow such that the air streams oppose each other. 5) If fans in different dwelling units were joined to a common duct, there would be direct communication between the two dwellings.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Cost Impact: The code change proposal will not increase the cost of construction.

RM39-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1506.3 (NEW)-RM-HALL-PMGCAC

RM40 – 13

M1507.3

Proponent: Mike Moore, P.E., Newport Ventures, representing Broan-NuTone
(mmoore@newportpartnersllc.com)

Add new text as follows:

M1507.3 Sound Ratings. Ventilation fans shall have a sound performance in accordance with the following:

1. For whole-house or continuous ventilation fans: maximum of 1.0 sone.
2. For intermittent local exhaust fans: maximum of 3.0 sone.

Exceptions:

1. Fans having a maximum rated airflow exceeding 400 cfm.
2. HVAC air handlers and fans mounted with not less than 4 ft (1 m) of ductwork between the fan and the intake grille.

(Renumber subsequent sections.)

Reason: Ventilation fans only work when they're turned on, and the number one reason typically given by home owners for not turning on a ventilation fan is, "it's too noisy".^{1,2,3} As homes have become tighter, the use of whole house mechanical ventilation (WHMV) for maintaining acceptable indoor air quality and local exhaust fans to capture and expel pollutants at their source (esp. in bathrooms and kitchens) has become necessary. Installing a fan that will not be operated due to noise is a disservice to the homeowner, a liability to their health, and a risk to the home's durability (can lead to excess condensation on windows, increased potential for mold and rot, etc.).

This proposed requirement mirrors that adopted by the state of California and ASHRAE 62.2. Maximum sone levels have been enforced by Washington State's code since the late 1980s. The sone values proposed above have been widely accepted by the industry. A sone is linear measure of loudness, meaning that a three sone fan is three times as loud as a one sone fan. The Home Ventilating Institute describes the sone scale as follows:

- 0.5 sone: rustling leaves
- 1.0 sone: refrigerator
- 3.0 sone: typical office
- 4.0 sone: typical television operating

For a fan which operates only occasionally (like a bath fan), a maximum sone level of 3.0 is considered acceptable. For a fan which is designed to operate continuously (e.g., a WHMV fan), a maximum sone level of 1.0 is necessary to avoid occupants turning off the fan from noise irritation.

The overwhelming majority of intermittent exhaust fans listed in the HVI products directory achieve a sone rating of 3 or less, so this requirement weeds out only the worst performers and therefore should have little to no impact to builders when specifying HVI certified products. The 1.0 sone requirement for WHMV fans has been achieved by over 500 fans listed in the Home Ventilating Institute's certified product directory (www.hvi.org). Further, the 1.0 sone requirement for WHMV fans can be viewed as a cost-saving measure. To find out why, see the cost impact section below.

References:

1. Nagda, N. L., M. D. Koontz, R. C. Fortmann, and I. H. Billick (1989) "Prevalence, Use, and Effectiveness of Range-Exhaust Fans." *Environment International* 15(1-6): 615-620.
2. Parrott, K., J. Emmel, and J. Beamish (2003) "Use of Kitchen Ventilation: Impact on Indoor Air Quality." In *The Forum for Family and Consumer Issues*, edited, North Carolina State University, Raleigh North Carolina.
3. Singer, B.C., W. W. Delp, and M. G. Apte (2011) *Experimental Evaluation of Installed Cooking Exhaust Fan Performance*. LBNL-4183E. Ernest Orlando Lawrence Berkeley National Laboratory, Berkeley, California.
4. Email communication with Don Stevens, Panasonic, dated 11/29/2012.

Cost Impact: Whole house mechanical ventilation (WHMV) fans are required by IRC N1103.5.1 to have a minimum fan efficacy greater than or equal to minimum required for Energy Star fans, meaning that whole-house mechanical ventilation fans are likely to also be Energy Star rated. To achieve the Energy Star rating, a fan must have a noise rating less than or equal to 1.0 sone. So, a WHMV fan which meets the energy efficacy requirements of the IRC is also likely to have a sone rating of 1.0 or less; therefore, no additional costs are expected from this change. Supposing a jurisdiction does not adopt Chapter 11 of the IRC, a builder could theoretically install a WHMV fan that has a sone rating of 3 or higher. If he does, the homeowners are not likely to operate the fan

due to unacceptable noise levels, and when they experience poor indoor air quality as a result, a call-back is the next step. The cost of a call-back far outweighs the incremental cost of a 1.0 sone WHMV fan, making the 1.0 sone WHMV fan a cost-savings measure for those builders who are not currently specifying them.

RM40-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1507.3 (NEW)-RM-MOORE.DOC

RM41 – 13

M1507.3.1

Proponent: Jerry Anderson, City of Overland Park, KS, representing self
(jerry.anderson@opkansas.org)

Revise as follows:

M1507.3.1 System design. The whole-house ventilation system shall consist of one or more supply or exhaust fans, or a combination of such, and associated ducts and controls. Local exhaust or supply fans are permitted to serve as such a system. Systems designed to supply air shall supply outdoor air.
~~Outdoor air ducts connected to the return side of an air handler shall be considered to provide supply ventilation.~~

Reason: The purpose of this code change is to make it clear that the airflow for mechanical ventilation systems designed to supply air shall take that air from the outdoors. The sentence being deleted is no longer necessary. It doesn't matter how the outdoor air is distributed. What matters in this code section is that supply air comes from the outdoors.

Cost Impact: No cost associated with this change.

RM41-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1507.3.1-RM-ANDERSON.DOC

RM42 – 13

M1507.3.2

Proponent: Jerry Anderson, representing the City of Overland Park, Kansas

Revise as follows:

M1507.3.2 System controls. ~~The~~ Whole-house mechanical ventilation systems designed for intermittent operation in accordance with Section M1507.3.3 shall utilize a 24 hour timer control capable of cycling the fan(s) on and off as needed. Whole-house mechanical ventilation systems shall be provided with controls that enable manual override.

Reason: The purpose of the code change is to require an automatic timer switch for those fans that are designed to be run intermittently. In the exception to Section M1507.3.3 the code allows for whole-house mechanical ventilation systems to be operated intermittently. The word "intermittently" can mean different things to different people. A local exhaust fan operated manually by a wall switch could easily be considered to be an intermittent fan system. I think that the code assumes that there will be some sort of automation built into intermittent systems. I don't think that the code intends the systems to be manually operated. Therefore, I have inserted language which makes it clear that a manual switch is not allowed.

Cost Impact: There would be a small cost associated with the timer switch, if they are not already being provide for.

RM42-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1507.3.2-RM-ANDERSON.DOC

RM43 – 13

M1507.3.3, Table M1507.3.3 (2)

Proponent: Mike Moore, P.E., Newport Ventures, representing Broan-NuTone
(mmoore@newportventures.net)

Revise as follows:

M1507.3.3 Mechanical ventilation rate. The whole house mechanical ventilation system shall provide outdoor air at a continuous rate of not less than that determined in accordance with Table M1507.3.3(1).

Exception: The whole-house mechanical ventilation system is ~~permitted~~ not required to operate ~~intermittently~~ continuously where the system has controls that enable operation for not less than ~~25-~~ percent 1-hour of each 4-hour ~~segment~~ period. ~~The average and the ventilation rate over the 4-hour period shall be at least that prescribed in Table M1507.3.3(1). is multiplied by the factor determined in accordance with Table M1507.3.3(2).~~

TABLE M1503.3.3(2)
INTERMITTENT WHOLE-HOUSE MECHANICAL VENTILATION RATE FACTORS^{a,b}

RUN-TIME PERCENTAGE IN EACH 4-HOUR SEGMENT	25%	33%	50%	66%	75%	100%
Factor^a	4	3	2	1.5	1.3	1.0

a. ~~For ventilation system run time values between those given, the factors are permitted to be determined by interpolation.~~

b. ~~Extrapolation beyond the table is prohibited.~~

Reason: This language simplifies this section and provides consistency with the 2015 IMC requirements for dwelling units.

Cost Impact: No impact on cost.

RM_-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

M1507.3.3-RM-MOORE.DOC

RM44 – 13

M1508.1 (New)

Proponent: Craig Conner, representing self

Add text as follows:

M1508.1 Venting and Depressurization. Gas-and oil-fired space- heating and gas-and oil-fired water-heating combustion appliances in new dwelling units shall comply with at least one of the following:

1. Space- heating and water-heating combustion appliances located within a dwelling unit's air barrier shall be of the direct-vent type.
2. Space heating appliances and water heating appliances located within a dwelling unit's air barrier shall be of the direct- vent or mechanical draft type. Mechanical ventilation shall be provided in accordance with Section M1507. Makeup air shall be provided for each of the dwelling unit's three largest exhaust systems at a rate approximately equal to or greater than the design exhaust rate. Makeup air systems shall be equipped with not less than one gravity or motorized damper. Motorized dampers shall be automatically controlled to operate simultaneously with the exhaust systems.
3. Space-heating and water-heating combustion appliances shall not be located within a dwelling unit's air barrier. For purposes of this option, appliances located in a mechanical room separated from the conditioned space by an air barrier shall be considered to be outside of a dwelling unit's air barrier.

Exceptions: The section shall not apply to:

1. Dwelling units with a tested air tightness of greater than 3 ACH50
2. Dwelling units having a tested depressurization that is within the limits specified by an approved test.

Reason: Backdrafting combustion appliances can lead to serious health consequences. The IECC and common practices are increasing the potential for backdrafting in homes. The IECC requires a building envelope tested to be 3 ACH50 or less in the middle and northern climate zones. This change is designed to greatly reduce the likelihood of backdrafting in those tight homes.

Back drafting is most likely to occur if three things are true- construction is airtight, exhaust-only ventilation is used, and atmospherically vented (natural draft) combustion appliances are in conditioned spaces. The IECC has both testing and prescriptive measures to increase envelope tightness and should routinely produce airtight construction. Mechanical ventilation is required for residences, with the least expensive form of mechanical ventilation being the exhaust-only ventilation fans already in common use. The energy code no longer encourages more efficient condensing furnaces by recognizing their high energy efficiency; thereby, removing some of the motivation for condensing furnaces. The trend towards large exhaust fans, such as kitchen hoods, also contributes to the problem. This combination is a recipe for back drafting problems.

The proposed change gives several options. These options prevent back drafting by eliminating at least one of major contributor; eliminating the natural draft (atmospherically vented) combustion appliances, eliminating the large exhaust-only ventilation, or taking the combustion outside the air barrier. An exception adds a depressurization test option, which tests for excessive depressurization levels in dwelling units.

Cost Impact: The code change proposal will not increase the cost of construction.

RM44-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1508 (NEW)-RM-CONNER.DOC

RM45 – 13

M1601.1.1

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

Revise as follows:

M1601.1.1 Above-ground duct systems. Above-ground *duct systems* shall conform to the following:

1. *Equipment* connected to *duct systems* shall be designed to limit discharge air temperature to a maximum of 250°F (121°C).
2. Factory-made air ducts shall be constructed of Class 0 or Class 1 materials as designated in Table M1601.1.1(1).
3. Fibrous duct construction shall conform to the SMACNA *Fibrous Glass Duct Construction Standards* or NAIMA *Fibrous Glass Duct Construction Standards*.
4. Minimum thickness of metal duct material shall be as listed in Table M1601.1.1(2). Galvanized steel shall conform to ASTM A 653. Metallic ducts shall be fabricated in accordance with SMACNA Duct Construction Standards Metal and Flexible.
5. Use of gypsum products to construct return air ducts or plenums is permitted, provided that the air temperature does not exceed 125°F (52°C) and exposed surfaces are not subject to condensation.
- ~~6. Duct systems shall be constructed of materials having a flame spread index not greater than 200.~~
- ~~7.6.~~ Stud wall cavities and the spaces between solid floor joists to be used as air plenums shall comply with the following conditions:
 - ~~7.1-6.1.~~ These cavities or spaces shall not be used as a plenum for supply air.
 - ~~7.2-6.2.~~ These cavities or spaces shall not be part of required fire-resistance-rated assembly.
 - ~~7.3-6.3.~~ Stud wall cavities shall not convey air from more than one floor level.
 - ~~7.4-6.4.~~ Stud wall cavities and joist-space plenum shall be isolated from adjacent concealed spaces by tight-fitting fire blocking in accordance with Section R602.8.
 - ~~7.5-6.5.~~ Stud wall cavities in the outside walls of building envelope assemblies shall not be utilized as air plenums.

Reason: Considering the subject of items #2 and #3, it is not apparent what item #6 is intended to address. Item #2 requires factory-made ducts to have a maximum flame spread index of 50, so why does item #6 state an index of 200 maximum?? Current section M1601.2 requires factory-made ducts to comply with UL 181, and UL 181 requires all ducts to have a maximum flame spread index of 50. If item #6 addresses factory-made ducts, then it conflicts with Item #2 and Section M1601.2. If item #6 was intended to address plastic ducts, it then begs the question as whether plastic ducts are allowed above ground in dwellings. An ICC formal interpretation on this exact question was issued and it states that plastic ducts are allowed above ground if they can meet class 0 or class 1, meaning that the maximum flame spread index could not exceed 50. With the broad definition of "duct systems" in the IRC, the purpose of item #6 is even more unclear. Item #6 is confusing and appears to be unnecessary because the code already addresses the various duct materials in other text.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Cost Impact: The code change proposal will not increase the cost of construction.

RM45-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1601.1.1 #1-RM-HALL-PMGCAC

RM46 – 13

M1601.1.1, Table M1601.1(1), M1601.2

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

Revise as follows:

M1601.1.1 Above-ground duct systems. Above-ground *duct systems* shall conform to the following:

1. *Equipment* connected to *duct systems* shall be designed to limit discharge air temperature to a maximum of 250°F (121°C).
2. ~~Factory-made air ducts shall be constructed of Class 0 or Class 1 materials as designated in Table M1601.1.1(1).~~ Factory made ducts shall be listed and labeled in accordance with UL 181 and installed in accordance with the manufacturer's instructions.
3. Fibrous glass duct construction shall conform to the SMACNA *Fibrous Glass Duct Construction Standards* or NAIMA *Fibrous Glass Duct Construction Standards*.
4. ~~Factory-made, field-fabricated and shop-fabricated metal and flexible duct constructions shall conform to the SMACNA HVAC Duct Construction Standard, Metal and Flexible. The minimum thicknesses of metal duct material used in field -fabricated and shop-fabricated duct constructions shall be as listed in Table M1601.1.1(2). Galvanized steel shall conform to ASTM A 653. Metallic ducts shall be fabricated in accordance with SMACNA Duct Construction Standards Metal and Flexible.~~
5. The use of gypsum products to construct return air ducts or plenums is permitted, provided that the air temperature does not exceed 125°F (52°C) and exposed surfaces are not subject to condensation.
6. *Duct systems* shall be constructed of materials having a flame spread index not greater than 200.
7. Stud wall cavities and the spaces between solid floor joists to be used as air plenums shall comply with the following conditions:
 - 7.1. These cavities or spaces shall not be used as a plenum for supply air.
 - 7.2. These cavities or spaces shall not be part of required fire-resistance-rated assembly.
 - 7.3. Stud wall cavities shall not convey air from more than one floor level.
 - 7.4. Stud wall cavities and joist-space plenum shall be isolated from adjacent concealed spaces by tight-fitting fire blocking in accordance with Section R602.8.
 - 7.5. Stud wall cavities in the outside walls of building envelope assemblies shall not be utilized as air plenums.

Table M1601.1(1)
CLASSIFICATION OF FACTORY-MADE AIR DUCTS

M1601.2 Factory-made ducts. ~~Factory-made air ducts or duct material shall be approved for the use intended, and shall be installed in accordance with the manufacturer's installation instructions. Each portion of a factory-made air duct system shall bear a listing and label indicating compliance with UL 181 and UL 181A or UL 181B.~~

Reason: Item #2 can be simplified by stating what is already required by Current Section M1601.2. There is no need to state the burning classifications of 0 and 1 and there is no need for Table M1601.1.1(1) because this is already covered in UL 181. Current Section M1601.2 is redundant with the proposed revision to Item #2 of Section M1601.1.1 and should be deleted. Item #4 is simplified and refers to ducts that are fabricated anywhere.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Cost Impact: The code change proposal will not increase the cost of construction.

RM46-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1601.1.1 #2-RM-HALL-PMGCAC

RM47 – 13

Table M1601.1.1(2)

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

Delete table and substitute as follows:

TABLE M1601.1.1(2)
DUCT CONSTRUCTION MINIMUM SHEET METAL THICKNESSES FOR SINGLE DWELLING UNITS

DUCT SIZE	GALVANIZED		ALUMINUM MINIMUM THICKNESS (in.)
	Minimum thickness (in.)	Equivalent galvanized gauge gage no.	
Round ducts and enclosed rectangular ducts			
— 14 inches or less	0.0157	-28	0.0145
16 and 18 inches	0.0187	26	0.018
20 inches and over	0.0236	24	0.023
Exposed rectangular ducts			
— 14 inches or less	0.0157	-28	0.0145
— Over 14 ^a inches	0.0187	-26	0.018

For SI: 1 inch = 25.4 mm, 1 inch water gage = 249 Pa.

a. For duct gages and reinforcement requirements at static pressures of ½-inch, 1-inch and 2-inch w.g., SMACNA *HVAC Duct Construction Standards*, Tables 2-1, 2-2, and 2-3, shall apply.

TABLE M1601.1.1(2)
DUCT CONSTRUCTION MINIMUM SHEET METAL THICKNESS FOR SINGLE DWELLING UNITS^a

ROUND DUCT DIAMETER (inches)	STATIC PRESSURE			
	½ INCH WATER GAGE		1 INCH WATER GAGE	
	THICKNESS (inches)		THICKNESS (inches)	
	GALVANIZED	ALUMINUM	GALVANIZED	ALUMINUM
≤ 12	0.013	0.018	0.013	0.018
12 to 14	0.013	0.018	0.016	0.023
15 to 17	0.016	0.023	0.019	0.027
18	0.016	0.023	0.024	0.034
19 to 20	0.019	0.027	0.024	0.034
RECTANGULAR DUCT DIMENSION (inches)				
≤ 8	0.013	0.018	0.013	0.018
9 to 10	0.013	0.018	0.016	0.023
11 to 12	0.016	0.023	0.019	0.027
13 to 16	0.019	0.027	0.019	0.027
17 to 18	0.019	0.027	0.024	0.034
19 to 20	0.024	0.034	0.024	0.034

For SI: 1 inch = 25.4 mm, 1 inch water gage = 249 Pa.

a. Ductwork that exceeds 20 inches by dimension or exceeds a pressure of 1 inch gage (250 Pa) shall be constructed in accordance with *SMACNA HVAC Duct Construction Standards Metal and Flexible*.

Reason: This revised table was approved for the 2015 IMC. The change that was previously made in the 2009 IRC (and carried forward to the 2012 IRC) unnecessarily increased the material thickness required for round sheet metal ducts.

This proposed change seeks to return to the requirements of 2006 and previous IRC editions which have historically recognized 30 gauge sheet metal as being appropriate for round ducts 14 inches or less diameter in "Single Dwelling Units".

The changes to M1601.1.1(2) in the 2009 IRC (and carried forward to the 2012 IRC):

1. Increased cost for round sheet metal ducts
2. Did not improve safety
3. Did not improve energy performance

Cost Impact: This code change proposal will not increase the cost of construction.

RM47-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1601.1.1(2)T #2-RM-HALL-PMGCAC

RM48 – 13

M1601.1.1

Proponent: Mark Terzigni, Sheet Metal and Air Conditioning Contractors' National Association, Inc. (SMACNA)

Revise as follows:

M1601.1.1 Above ground duct systems. Above-ground duct systems shall conform to the following:

- 1 through 3 *(No changes to current text)*
4. ~~Minimum thickness of metal duct material shall be as listed in Table M1601.1.1(2).~~ Galvanized steel shall conform to ASTM A 653. Rigid metallic ducts shall be fabricated in accordance with SMACNA Duct Construction Standards Metal and Flexible except as allowed by Table M1601.1.1(2).
- 5 through 7 *(No changes to current text)*

TABLE M1601.1.1(2)
GAGES OF METAL DUCTS AND PLENUMS USED FOR HEATING OR COOLING

DUCT SIZE	GALVANIZED		ALUMINUM
	Minimum Thickness (inches)	Equivalent Galvanized Gage No.	Minimum Thickness (inches)
Round ducts and enclosed rectangular ducts	0.0157	28	0.0145
14 inches or less	0.0187	26	0.018
16 and 18 inches	0.0236	24	0.023
20 inches and over			
Exposed rectangular ducts	0.0157	28	0.0145
14 inches or	0.0187	26	0.018
Over 14 ^a inches			

For SI: 1 inch = 25.4 mm.

a. For duct gages and reinforcement requirements at static pressures of 1/2 inch, 1 inch and 2 inches w.g., SMACNA *Duct Construction Standard*, Tables 2-1; 2-2 and 2-3 shall apply.

TABLE M1601.1.1(2)
DUCT CONSTRUCTION MINIMUM SHEET METAL THICKNESSES

Duct Shape and Size^a		<u>1/2 inch Water Gage</u> <u>(125 Pa)^a</u>					<u>1 inch water gage</u> <u>(250 Pa)^a</u>				
<u>ROUND</u> <u>diameter</u>		<u>Galvanized</u>			<u>Aluminum</u>		<u>Galvanized</u>			<u>Aluminum</u>	
<u>inches</u>	<u>mm</u>	<u>gage</u>	<u>inches</u>	<u>mm</u>	<u>inches</u>	<u>mm</u>	<u>gage</u>	<u>inches</u>	<u>mm</u>	<u>inches</u>	<u>mm</u>
<u>0-11</u>	<u>0-280</u>	<u>30</u>	<u>0.013</u>	<u>0.323</u>	<u>0.018</u>	<u>0.465</u>	<u>30</u>	<u>0.013</u>	<u>0.323</u>	<u>0.018</u>	<u>0.465</u>
<u>12-14</u>	<u>281-350</u>	<u>30</u>	<u>0.013</u>	<u>0.323</u>	<u>0.018</u>	<u>0.465</u>	<u>28</u>	<u>0.016</u>	<u>0.399</u>	<u>0.023</u>	<u>0.574</u>
<u>15-17</u>	<u>351-430</u>	<u>28</u>	<u>0.016</u>	<u>0.399</u>	<u>0.023</u>	<u>0.574</u>	<u>26</u>	<u>0.019</u>	<u>0.475</u>	<u>0.027</u>	<u>0.684</u>
<u>18</u>	<u>431-450</u>	<u>28</u>	<u>0.016</u>	<u>0.399</u>	<u>0.023</u>	<u>0.574</u>	<u>24</u>	<u>0.024</u>	<u>0.599</u>	<u>0.034</u>	<u>0.863</u>
<u>19-20</u>	<u>451-500</u>	<u>26</u>	<u>0.019</u>	<u>0.475</u>	<u>0.027</u>	<u>0.684</u>	<u>24</u>	<u>0.024</u>	<u>0.599</u>	<u>0.034</u>	<u>0.863</u>
<u>RECTANGULAR</u>		<u>Galvanized</u>			<u>Aluminum</u>		<u>Galvanized</u>			<u>Aluminum</u>	
<u>inches</u>	<u>mm</u>	<u>gage</u>	<u>inches</u>	<u>mm</u>	<u>inches</u>	<u>mm</u>	<u>gage</u>	<u>inches</u>	<u>mm</u>	<u>inches</u>	<u>mm</u>
<u>0-8</u>	<u>0-200</u>	<u>30</u>	<u>0.013</u>	<u>0.323</u>	<u>0.018</u>	<u>0.465</u>	<u>30</u>	<u>0.013</u>	<u>0.323</u>	<u>0.018</u>	<u>0.465</u>
<u>9-10</u>	<u>201-250</u>	<u>30</u>	<u>0.013</u>	<u>0.323</u>	<u>0.018</u>	<u>0.465</u>	<u>28</u>	<u>0.016</u>	<u>0.399</u>	<u>0.023</u>	<u>0.574</u>
<u>11-12</u>	<u>251-300</u>	<u>28</u>	<u>0.016</u>	<u>0.399</u>	<u>0.023</u>	<u>0.574</u>	<u>26</u>	<u>0.019</u>	<u>0.475</u>	<u>0.027</u>	<u>0.684</u>
<u>13-16</u>	<u>301-400</u>	<u>26</u>	<u>0.019</u>	<u>0.475</u>	<u>0.027</u>	<u>0.684</u>	<u>26</u>	<u>0.019</u>	<u>0.475</u>	<u>0.027</u>	<u>0.684</u>
<u>17-18</u>	<u>401-450</u>	<u>26</u>	<u>0.019</u>	<u>0.475</u>	<u>0.027</u>	<u>0.684</u>	<u>24</u>	<u>0.024</u>	<u>0.599</u>	<u>0.034</u>	<u>0.863</u>
<u>19-20</u>	<u>451-500</u>	<u>24</u>	<u>0.024</u>	<u>0.599</u>	<u>0.034</u>	<u>0.863</u>	<u>24</u>	<u>0.024</u>	<u>0.599</u>	<u>0.034</u>	<u>0.863</u>

a. Ductwork that exceeds 20 inches by dimension or exceeds a static pressure of 1 inch water column (250 Pa) shall be constructed in accordance with ANSI/SMACNA *HVAC Duct Construction Standards Metal and flexible*

Reason: The above proposed change would provide consistency with the changes adopted in the 2015 IMC (M143-12)

The proposed change M143-12 wanted to return 14 inch round duct to its previous gage (prior to the code change adopted in 2009). SMACNA, the developer of the duct construction standard referenced in section 603 (IMC) evaluated the request with consideration of limiting the application to single dwelling units. The above table permits the use of 30 gage (0.013 in) for dimensions up to 14 inch round if the static pressure is at or below ½ in. w.g. The table also provides options for 1 inch water gage. This should address all but the largest single dwelling units in which case the ductwork should be constructed as required by the ANSI/SMACNA HVAC Duct Construction Standard. The above modification:

1. Addresses the concern of the original proponent of M143-12
2. Complies with methods used by SMACNA (ANSI Standard Developer)
3. Provides upper limits for size and pressure
4. Provides valid options for "low" and "high" pressure single dwelling systems
5. Encourages the use of resource efficient material.

Cost Impact: This code change proposal will not increase the cost of construction.

RM48-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

M1601.1.1-RM-TERZIGNI.DOC

RM49 – 13

M1601.1.1, M1601.3, M1603 (New)

Proponent: Duncan Prael, IBACOS Inc, representing self

Revise as follows:

M1601.1.1 Above-ground duct systems. Above-ground *duct systems* shall conform to the following:

1. *Equipment* connected to *duct systems* shall be designed to limit discharge air temperature to a maximum of 250°F (121°C).
2. Factory-made air ducts shall be constructed of Class 0 or Class 1 materials as designated in Table M1601.1.1(1) except that factory-made air ducts shall have a flame spread index not greater than 25 and a smoke developed index not greater than 450 where the *duct system* is provided with a smoke detection system control that meets the requirements of Section M1603.
3. Fibrous duct construction shall conform to the *SMACNA Fibrous Glass Duct Construction Standards* or *NAIMA Fibrous Glass Duct Construction Standards*.
4. Minimum thickness of metal duct material shall be as listed in Table M1601.1.1(2). Galvanized steel shall conform to ASTM A 653. Metallic ducts shall be fabricated in accordance with *SMACNA Duct Construction Standards Metal and Flexible*.
5. Use of gypsum products to construct return air ducts or plenums is permitted, provided that the air temperature does not exceed 125°F (52°C) and exposed surfaces are not subject to condensation.
6. *Duct systems* shall be constructed of materials having a flame spread index not greater than 200.
7. Stud wall cavities and the spaces between solid floor joists to be used as air plenums shall comply with the following conditions:
 - 7.1. These cavities or spaces shall not be used as a plenum for supply air.
 - 7.2. These cavities or spaces shall not be part of a required fire-resistance-rated assembly.
 - 7.3. Stud wall cavities shall not convey air from more than one floor level.
 - 7.4. Stud wall cavities and joist-space plenums shall be isolated from adjacent concealed spaces by tight-fitting fireblocking in accordance with Section R602.8.
 - 7.5. Stud wall cavities in the outside walls of building envelope assemblies shall not be utilized as air plenums.

M1601.3 Duct insulation materials. Duct insulation materials shall conform to the following requirements:

1. Duct coverings and linings, including adhesives where used, shall have a flame spread index not higher than 25, and a smoke-developed index not over 50 when tested in accordance with ASTM E 84 or UL 723, using the specimen preparation and mounting procedures of ASTM E 2231.

Exceptions: Spray application of polyurethane foam to the exterior of ducts in *attics* and crawl spaces shall be permitted subject to all of the following:

1. The flame spread index is not greater than 25 and the smoke-developed index is not greater than 450 at the specified installed thickness.
 2. The foam plastic is protected in accordance with the ignition barrier requirements of Sections R316.5.3 and R316.5.4.
 3. The foam plastic complies with the requirements of Section R316.
2. Duct lining shall have a flame spread index not greater than 25 and a smoke developed index not greater than 450 where the *duct system* is provided with a smoke detection system control that meets the requirements of Section M1603

23. Duct coverings and linings shall not flame, glow, smolder or smoke when tested in accordance with ASTM C411 at the temperature to which they are exposed in service. The test temperature shall not fall below 250°F (121°C). Coverings and linings shall be listed and labeled.

Exception: Duct lining shall have a flame spread index not greater than 25 and a smoke developed index not greater than 450 where the *duct system* is provided with a smoke detection system control that meets the requirements of Section M1603.

34. External duct insulation and factory-insulated flexible ducts shall be legibly printed or identified at intervals not longer than 36 inches (914 mm) with the name of the manufacturer, the thermal resistance *R*-value at the specified installed thickness and the flame spread and smoke-developed indexes of the composite materials. Spray polyurethane foam manufacturers shall provide the same product information and properties, at the nominal installed thickness, to the customer in writing at the time of foam application. All duct insulation product *R*-values shall be based on insulation only, excluding air films, vapor retarders or other duct components, and shall be based on tested *C*-values at 75°F (24°C) mean temperature at the installed thickness, in accordance with recognized industry procedures. The installed thickness of duct insulation used to determine its *R*-value shall be determined as follows:

- 3.44.1. For duct board, duct liner and factory-made rigid ducts not normally subjected to compression, the nominal insulation thickness shall be used.
- 3.24.2. For ductwrap, the installed thickness shall be assumed to be 75 percent (25-percent compression) of nominal thickness.
- 3.34.3. For factory-made flexible air ducts, The installed thickness shall be determined by dividing the difference between the actual outside diameter and nominal inside diameter by two.
- 3.44.4. For spray polyurethane foam, the aged *R*-value per inch measured in accordance with recognized industry standards shall be provided to the customer in writing at the time of foam application. In addition, the total *R*-value for the nominal application thickness shall be provided.

SECTION M1603

DUCT SYSTEM SMOKE CONTROL

M1603.1 Smoke detection systems control. Controls shall be installed in *equipment and appliances* where factory-made duct materials and linings have a smoke developed index of greater than 50.

M1603.2 Controls required. *Equipment and appliance* controls associated with the *duct system* shall interconnect with the hard wired smoke alarm system required by Section R314.

Exception: Where hard wired smoke detectors are not required by Section R314.4, Exception 2, smoke detectors shall be installed in the return air duct or plenum upstream of any filters, outdoor air connections, and decontamination equipment and appliances, and shall comply with Sections 606.3 and 606.4 of the *International Mechanical Code*.

M1603.3 Controls operation. Upon activation, the smoke detectors shall shut down all operational capabilities of the *equipment and appliances* associated with *duct system*.

Reason: Codes for new construction have significantly improved and it is not uncommon for houses built to the 2012 IECC to have load densities of 900 to 1200 square feet per 12,000 Btuh of nominal cooling, which translates to roughly 0.33 to 0.44 cfm of conditioned air per square foot of living area at peak conditions. This leads to bedroom airflows of 40 to 100 cfm, and aggregate living space airflows of 150 – 250 cfm. Sprinklers and hard wired, interconnected smoke detectors are now a required feature of a house built to the 2012 IRC.

Residential space conditioning equipment is typically one unit for the entire house. Historically, higher end systems were split into two systems to zone the house, but still relied on a central air handler with a duct system that distributes the air throughout the zone. Proper design of duct systems get increasingly difficult as the room cfm drops, especially when attempting to keep the system in reasonable balance with higher supply outlet air velocities to facilitate mixing in the room.

One solution to this problem is *not* to try and locate the heating and cooling unit centrally and force the ducts to go throughout the house, but to break down the heating and cooling system into smaller discrete parts, and allow multiple systems to serve

different spaces. This allows for significantly shorter duct runs, low static pressures in the system, and potentially greater use of temperature set up / setback in spaces with regular periodic occupancy (e.g. bedrooms).

To make this strategy feasible in the US, two major hurdles exist. The first is equipment availability and cost, which is less of a technical challenge as a market challenge. Other countries have overcome this problem, and it is anticipated that the US can as well, provided alternate distribution systems are available. The other is low cost, simple, leak free duct systems that can be modularized to accommodate the necessary flows for each room in increments of approximately 10 – 15 cfm.

Past research by Ridouane (2011) has shown that high sidewall interior supply registers can provide good comfort for occupants. Ridouane (2011a) shows that 500 and 700 fpm for heating and cooling provides enough momentum for the air to mix in the room. This research has also show that lower temperature air at the outlets in the heating mode is desirable to minimize stratification. The table below gives approximate flow rates for various duct diameters:

Duct Diameter	cfm @ 500 fpm	cfm @ 700 fpm
1.5"	6	9
2"	11	15
3"	25	34
4"	44	61
5"	68	95
6"	98	137

One solution that would achieve the desired duct solution is to use readily available plastic plumbing piping. Pipe diameters could be mixed and matched to provide the appropriate airflow for a room, and the solvent welding of joints is inherently air tight. These duct systems have very low static pressure and a straight duct roughness. Currently plastic pipe is approved for use in in plumbing systems, but not for above grade duct systems. It is presumed that the rationale behind this is the potential for smoke and flame to be spread throughout the house by air handling or ventilation fans.

The first codes in the US were developed by the National Board of Fire Underwriters (NFBU) as a means to encourage the construction of buildings that would not catch fire, and if they did catch fire, it would not spread through the building or to other buildings. Relative to fire safety in ducted systems, the NFBU published a guide (1915) that requires the ducts be "made of galvanized iron or other approved non combustible material" and recommends that fans be interconnected to fire and smoke alarm systems so that the fans shut down in the event of a fire. Another NFBU publication (1935) indicates "recent fires" in metal ducts with flammable lining and that the fire department had a very difficult time fighting the fire that was inside the duct system. NFBU (1936) also indicates that "only fire resistive linings acceptable to the inspection department having jurisdiction may be used inside of ducts."

Electricity was seen as a major new contributor to fires in buildings in the early 1900's, which gave rise to the development of the National Electric Code by the NFBU. Specific recommendations in several NBFU pamphlets imply that either direct sparking or sparks from static electricity generated by fans and belts in ventilation and space conditioning systems is a specific concern that should be avoided, presumably to limit the possibility of fires.

From the early 1900's, code have progressed to accommodate new materials, products and systems. Plastics were introduced in the 1950's. As an industry we have now codified a variety of differing fire resistive requirements in one and two family dwellings. The table below is a summary of the maximum flame spread and smoke developed ratings from the 2012 International Residential Code (IRC).

Code section (IRC)	Flame Spread (ASTM E84)	Smoke Developed (ASTM E84)
R302.9 (Interior Finishes)	200 (unlimited for "trim" "Doors & Windows, and finished 1/28" thick adhered to surface no worse than paper)	450
R302.10 (Insulation)	25	450
R316.3* (Foam Plastic)	75	450
R316.5.9 Plastic Trim (<10% wall + ceiling area)	75	Unlimited
R302.9.4, R316.5.10 Foam plastic interior finish	200 (or pass NFPA 286)	450 (or pass NFPA 286)
M1601.1.1.2 (Factory Made Ducts)	0/25	Not Specified
M1601.1.1.6 (Duct Systems)	200	Not specified
M1601.1.2 (Underground Ducts, max 150°F SAT)	25 (inferred from M1601.3)	50 (inferred from M1601.3)
M1601.3.1 & 2 (Duct lining / covering, and shall not flame, glow, smolder, smoke under ASTM C411 (Test Method for Hot-surface Performance of High-temperature Thermal Insulation)	25	50

*covered by a thermal ignition barrier Per 316.4

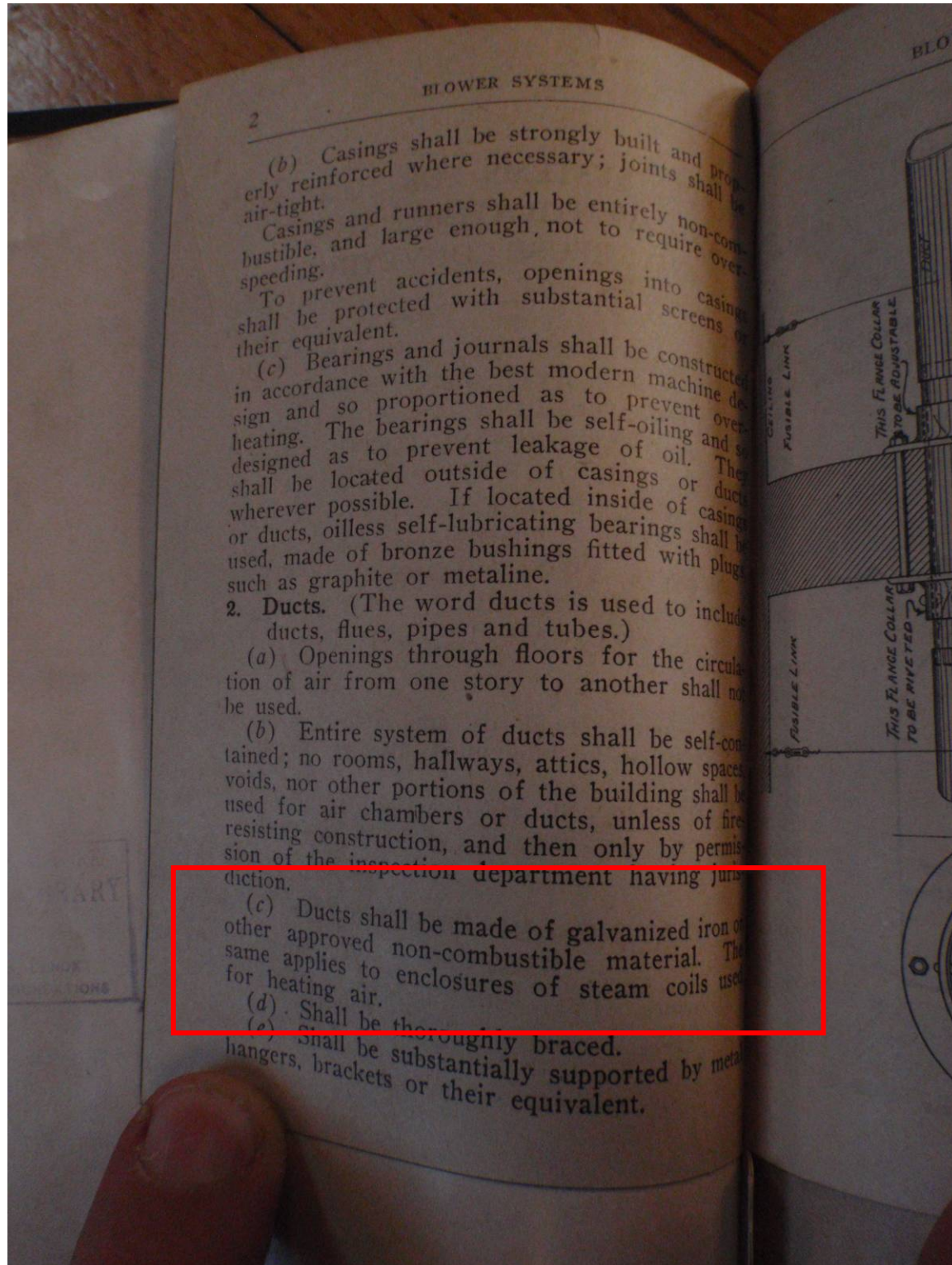
Engineering and fire protection principles indicate the following basic assumptions should be followed to limit loss of life (occupants and fire fighters) in the event of a house fire:

Characteristics	Least restrictive code limit
Use materials and systems that limit the spread of fire from the location of origin – from the burning object in the room to the rest of room, from a burning room to adjacent rooms, and from a burning building to an adjacent building.	200 Flame Spread (ASTM E84)
Use materials and systems that limit development of smoke to enable occupant escape and firefighting efforts	450 Smoke Developed (ASTM E84)
Use automatic systems to warn occupants in the event of fire and help to suppress fires before they grow out of control.	Sprinklers and smoke / CO alarms required per IRC Section R313, R314 and 315
Electrical and fuel burning equipment in buildings should not be the originating source of fire (i.e. should not create sparks, excessive heat, etc.)	UL 1995 and UL 1996
Systems in buildings (i.e. HVAC, structure, plumbing, electrical, thermal, water management, finishes) should not substantially contribute to the spread of fire, hot gases, or smoke within the building or from building to building.	UL 1995 and UL 1996, Fire restive construction per IRC Section R302, ASTM E84

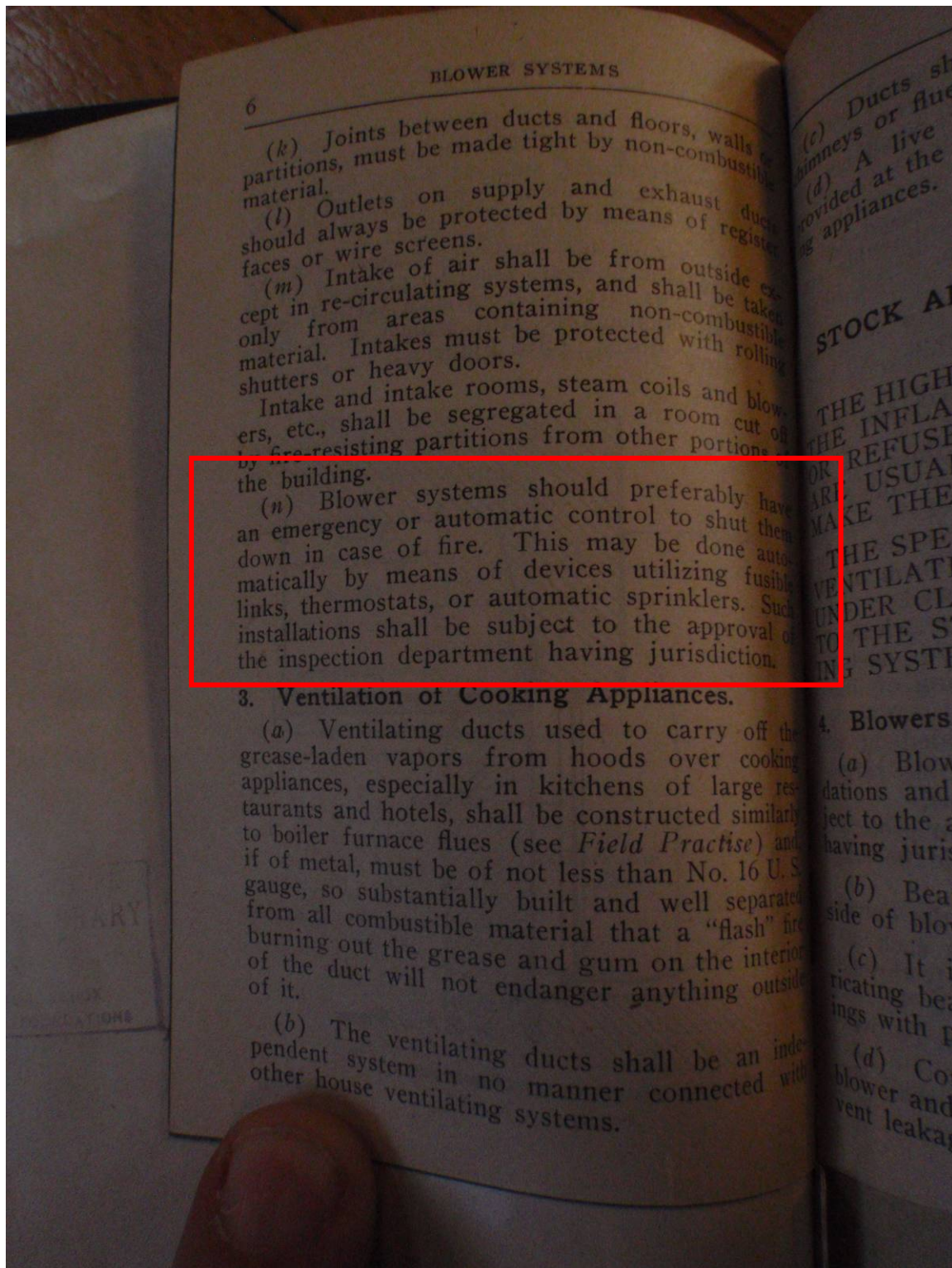
Allowing higher levels of smoke developed for duct systems if the HVAC system shut down in the event of a smoke alarm would open up new opportunities for smaller diameter duct solutions and distributed HVAC systems that are needed in today's more energy efficient houses. Some of the benefits associated with this code change include:

1. Simplify duct design. Smaller systems made of rigid ducts with very short runs allow for simple tables to be used for various airflows, and allows for more discrete increments of air delivery in each room. Airflow can be "tuned" by selecting the appropriate number and size of supply air outlets.
 2. Air tight systems inside conditioned space. At least 3% space conditioning energy savings in new construction, and significantly more in retrofits. Compact ceiling units (8" or less) can be installed in drop ceilings, eliminating the need for an air handler closet in slab on grade houses.
 3. Simplify duct installation. Routing of short small diameter ducts should take less time, and may be preferable in retrofits compared to replacing existing systems in unconditioned attic spaces.
- This should also enhance the fire safety of one and two family buildings, as the deactivation of the HVAC system in the event of a fire would presumably limit the promulgation of the fire.

Citations:



From *Regulations of the National Board of Fire Underwriters for the Installation of Blower Systems for Heating and Ventilating, Stock and Refuse Conveying* By National Board of Fire Underwriters (1915)



From *Regulations of the National Board of Fire Underwriters for the Installation of Blower Systems for Heating and Ventilating, Stock and Refuse Conveying* By National Board of Fire Underwriters (1915)

Pages 12 - 13

VENTILATING AND AIR
CONDITIONING SYSTEMS
EMPLOYING DUCTS



NATIONAL BOARD OF FIRE UNDERWRITERS

85 John Street, New York, N. Y.

1935

VEB PV

From *Ventilating and Air Conditioning Systems Employing Ducts*, New York; National Board of Fire Underwriters. (1935)

The occurrence of sparks from electrostatic charges can be largely controlled by maintaining a proper degree of humidity. At 30 per cent relative humidity sparks readily occur, at 40 per cent they occur somewhat less readily, and at 50 per cent the probability is materially lessened. By maintaining a minimum relative humidity somewhat above 50 per cent, a large degree of safety from electrostatic sparks is obtained, although high humidity of itself does not provide absolute protection. In cold weather a relative humidity of 50 per cent or over may give trouble from sweating or frosting.

Proper humidity can best be maintained by air conditioning equipment. Steam and portable evaporators may sometimes be used to advantage, although in cold climates such humidifiers can rarely be relied on to provide enough moisture to satisfy the enormous increase in moisture capacity of cold outside air heated to room temperature.

Air Ducts. The fire hazard of ventilating systems lies principally in the ducts through which smoke and hot gases can quickly spread from one room to another. Because fires in ducts are difficult to fight, large fire losses may be expected where they are made of, or are lined with combustible material, are of metal in contact with wood floors or partitions, or are not properly provided with fire dampers and other necessary protective devices.

The fire hazard of ventilating systems in large buildings can be greatly reduced by dividing the systems into several small units to reduce the building area which a single duct system can involve. In this way openings in fire walls can be avoided and the number of necessary fire dampers can be reduced.

There are several ways in which air ducts may assist in spreading fire. Fire may originate in combustible material (or in another building) located close to the fresh air intake, and burning gases and hot smoke be discharged into and ignite combustible material in various parts of the building; burning gases may enter a ventilating opening in one room and be carried through the duct into other rooms; the duct may get sufficiently hot from the hot gases passing through it to ignite woodwork or other combustible material in contact with or not properly separated from it; and there is also the possibility of a duct being ruptured by an explosion or by falling debris permitting fire to enter the duct and come out at discharge outlets in other rooms.

Aided by the forced draft of a mechanical ventilating system, the spread of fire may be very rapid and extend

throughout a large building in a short time. With a recirculating system there is the added possibility of hot burning gases from a fire in one room being drawn back to the fan and being discharged through the building. In the burning of wood, paper and other carbonaceous materials—except in the open where there is plenty of air—considerable quantities of the flammable and poisonous gas, carbon monoxide, are given off; because of this and the possibility of other dangerous fumes being present, discharging the products of combustion through a building may be a matter of life hazard as well as fire hazard.

Possibilities for spread of fire are inherent in the duct system so that safeguards are necessary for ducts of ventilating and cooling systems as well as for warm air ducts. A warm air duct would seem to present a greater fire hazard than a cold air duct, but if the duct is safeguarded in its installation against the possibilities of igniting combustible material in the event of burning gases passing through it, it will obviously be adequately safeguarded for its usual role of conveying warm air for room heating.

Ducts which carry flammable vapors, dusts or flyings present all the possibilities for contributing to the spread of fire that other ducts do, and also present an additional source of fire hazard in the burning of the materials in the ducts. Sufficient air is usually intimately mixed with the substances in the ducts to form favorable conditions for combustion or explosion. Combustion once started may proceed mildly, depending on the proportion of flammable material to air, but is more apt to result in an explosion the violence of which will be influenced by the additional factors of size and length of duct.

If a duct or system of ducts contains a flammable mixture of some substance with air, and this mixture becomes ignited at some point, flame will propagate throughout the sections which contain a flammable mixture. Fire dampers would not ordinarily operate ahead of flame propagation, and if they did, would not be effective because it is not practical to make them tight against vapors and flame, which pass through very small crevices. For these reasons it is important that duct systems handling air containing flammable substances be kept as small as practicable so that fire in them will not be spread to other sections of the building.

Accurate information on the rate of flame propagation in pipes under conditions of turbulence such as exist in ordinary air ducts is lacking, but whether flame will propagate against the usual current of air in the duct or not is immaterial, for

there is always the possibility of fire occurring when the system is not operating under mechanical draft.

By giving proper attention to construction, installation and protection of the ducts, the possibility of their serving as ready means for the spread of fire can be greatly reduced. Supplemental suggestions covering these features are given in the Regulations of the National Board of Fire Underwriters for the Installation of Blower and Exhaust Systems. These cover heating and ventilating systems including exhaust ducts from kitchen ranges, systems for the removal of flammable vapors, also dust, stock and refuse conveying systems. They do not cover air conditioning systems in dwellings, the ducts of which should be installed in accordance with the requirements for ducts of gravity warm air heating systems as contained in the Recommended Building Code of the National Board of Fire Underwriters (Fifth Edition, Section 1208). One additional feature to be remembered in connection with dwelling installations is that air should never be drawn from any basement or furnace room, not occupied as living quarters.

The fundamental principal which should be borne in mind is that the ducts should be so constructed, installed and protected as not to materially reduce the effective fire retardant value of walls, floors or partitions the integrity of which must be maintained for reasonable protection against the rapid spread of fire from one portion to another.

In two recent instances serious losses resulted from the use of readily combustible linings in ducts for purposes of sound deadening. One of these was in a ten-story office building of fireproof construction in Los Angeles. The air conditioning units were located on the roof. Duct work branching out from them to vertical ducts leading down to the several floors were located in a space between the ceiling of the top story and the roof. To prevent noises from the fan and sounds of rushing air from being carried to the rooms the duct work close to the fan was lined with a combustible sound absorbing material, over 9,000 square feet of the material being used.

When the air conditioning system was started early in the morning, smoke began to issue from the system. The engineer, who had gone down to the basement, quickly returned to the roof to shut it off, but the few minutes of operation started the lining to burn freely. The fire department was called promptly but found the fighting of the fire in the air ducts an exceedingly difficult task. The result was a very large amount of smoke and water damage on several floors of the building. If the fire had occurred during office hours the consequences could have been far more serious.

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The other loss, also a large one, occurred in a theatre of fireproof construction in New York City. These fires have demonstrated that combustible linings in air ducts constitute a serious hazard.

Fans. In case of fire fans blowing air into sections of buildings (other than basements) where the fire is, or to which it may spread, should be shut down. Because large quantities of air are needed to burn most combustible materials, continuing to blow air into the area where the fire is would assist the combustion and have the effect of adding fuel to the fire. For this reason it is important to have means for shutting down fans, which would be accessible in case of fire, or to have them arranged to shut down automatically when fire or hot gases reach them. This latter arrangement is strongly recommended. Where the movement of air from the ventilating or air conditioning system would interfere with the operation of automatic sprinklers, fans should be arranged to automatically shut down before the sprinklers operate.

It is sometimes desirable to operate certain types of exhaust systems during a fire to carry away smoke and fumes, in order to permit fire fighting operations to be more effectively pursued. It should be noted, however, that exhaust systems always draw in an amount of air corresponding to the amount of smoke and gases exhausted.

In exhaust systems where ducts become coated with flammable deposits, such as exhaust ducts from kitchen ranges, which frequently become heavily coated with grease and dust, the fan should be arranged to stop automatically in case of fire in the duct, as the coating will ordinarily burn with intense heat even without the aid of the fan.

Some details regarding the installation of and the controls for fans are contained in the Regulations of the National Board of Fire Underwriters for the Installation of Blower and Exhaust Systems. Electric wiring and apparatus in connection with fan driving and control should be installed in accordance with the National Electrical Code.

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and ventilating systems, air cooling systems, air conditioning systems, and exhaust systems. They do not apply to systems which carry air containing flammable substances (covered in Class B) nor to systems for conveying stock or refuse by means of air currents (covered in Class C).

(b) Where systems of this class are installed, the following rules and the preceding general rules shall apply except as modified herein.

(c) Installation of systems of this class in one- and two-family dwellings shall be as specified in Section 280.

210. Construction of Ducts.

211. Flexible woven asbestos, sleeve joints with rope asbestos packing or other approved non-combustible material shall be provided where flexible connections to prevent transmission of vibrations through the duct system are desired. This requirement does not apply to the joint connecting fans, where the intake or discharge of the fan is in the same room or enclosure as the joint.

212. Only fire-resistive linings acceptable to the inspection department having jurisdiction may be used inside of ducts.

213. Ducts shall be so constructed as to provide structural strength and durability at least the equivalent of galvanized sheet iron or steel of the thickness specified in Table 1.

TABLE 1. THICKNESS OF METAL FOR AIR DUCTS.

Round Ducts Diameter (Inches)	Rectangular Ducts Width (Inches)	Minimum Thickness U. S. Gauge
6 to 10	Up to 12	26
11 to 29	13 to 30	24
30 to 39	31 to 60	22
40 to 49	61 to 118	20
50 and above	119 and above	18

From *Installation of Power Operated Ventilating, Air Conditioning, Dust, Stock and Vapor Removal Systems*, New York; National Board of Fire Underwriters. (1936)

Attached PDF files:

Ridouane, El Hassan and Gawlik, Keith. Prediction of Air Mixing from High Sidewall Diffusers in Cooling Mode Preprint Presented at the ASHRAE Winter Conference Las Vegas, Nevada January 29 – February 2, 2011 Conference Paper NREL/CP-5500-49010 February 2011 Web address: www.nrel.gov/docs/fy11osti/49010.pdf, accessed 01/03/2012

Ridouane, El Hassan. Numerical Evaluation of Indoor Air Distribution in High Performance Homes Ph.D. National Renewable Energy Laboratory Residential Building Energy Efficiency Meeting 2010 July 21, 2010 Web address: http://apps1.eere.energy.gov/buildings/publications/pdfs/building_america/ns/b23_indoor_air_distr.pdf, accessed 01/03/2012

Cost Impact: The code change proposal will not increase the cost of construction.

RM49-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1601.1.1-RM-PRAHL.DOC

RM50 – 13

M1601.1.1

Proponent: Dustin McLehane, Chesterfield County, VA, representing Va. Plumbing and Mechanical Inspectors Association (VPMIA) And Va. Building Code Officials Association (VBCOA)
(McLehaneD@chesterfield.gov)

Revise as follows:

M1601.1.1 Above-ground duct systems. Above-ground duct systems shall conform to the following:

1. Equipment connected to duct systems shall be designed to limit discharge air temperature to a maximum of 250°F (121°C).
2. Factory-made air ducts shall be constructed of Class 0 or Class 1 materials as designated in Table M1601.1.1(1).
3. Fibrous duct construction shall conform to the SMACNA Fibrous Glass Duct Construction Standards or NAIMA Fibrous Glass Duct Construction Standards .
4. Minimum thickness of metal duct material shall be as listed in Table M1601.1.1(2). Galvanized steel shall conform to ASTM A 653.
5. Use of gypsum products to construct return air ducts or plenums is permitted, provided that the air temperature does not exceed 125°F (52°C) and exposed surfaces are not subject to condensation.
6. Duct systems shall be constructed of materials having a flame spread index not greater than 200.
- ~~7. Stud wall cavities and the spaces between solid floor joists to be used as air plenums shall comply with the following conditions:~~
 - ~~7.1. These cavities or spaces shall not be used as a plenum for supply air.~~
 - ~~7.2. These cavities or spaces shall not be part of a required fire-resistance-rated assembly.~~
 - ~~7.3. Stud wall cavities shall not convey air from more than one floor level.~~
 - ~~7.4. Stud wall cavities and joist space plenums shall be isolated from adjacent concealed spaces by tight-fitting fire blocking in accordance with Section R602.8.~~
 - ~~7.5. Stud wall cavities in the outside walls of building envelope assemblies shall not be utilized as air plenums.~~
7. Building framing cavities shall not be used as ducts or plenums.

Reason: IECC R403.2.3 and IRC N1103.2.3 prohibit the use of building cavities as ducts or plenums. This will ensure consistency between internal IRC sections and between the IRC and the IECC.

Cost Impact: None

RM50-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1601.1.1.1-RM-MCLEHANEY.DOC

RM51 – 13

R202, M1601.3, Chapter 44

Proponent: Vickie Lovell, InterCode Incorporated, representing the Reflective Insulation Manufacturers Association International (Vickie@InterCodeinc.com)

Add new definition as follows:

SECTION R202 DEFINITIONS

REFLECTIVE DUCT INSULATION. A thermal insulation assembly consisting of one or more surfaces that have an emittance of 0.1 or less, and that bound an enclosed air space or spaces.

Revise as follows:

SECTION M1601 DUCT CONSTRUCTION

M1601.3 Duct insulation materials. Duct insulation materials shall conform to the following requirements:

1. Duct coverings and linings, including adhesives where used, shall have a flame spread index not higher than 25, and a smoke-developed index not over 50 when tested in accordance with ASTM E 84 or UL 723, using the specimen preparation and mounting procedures of ASTM E 2231.

Exception: Spray application of polyurethane foam to the exterior of ducts in *attics* and crawl spaces shall be permitted subject to all of the following:

1. The flame spread index is not greater than 25 and the smoke-developed index is not greater than 450 at the specified installed thickness.
2. The foam plastic is protected in accordance with the ignition barrier requirements of Sections R316.5.3 and R316.5.4.
3. The foam plastic complies with the requirements of Section R316.
2. Duct coverings and linings shall not flame, glow, smolder or smoke when tested in accordance with ASTM C 411 at the temperature to which they are exposed in service. The test temperature shall not fall below 250°F (121°C). Coverings and linings shall be listed and labeled.
3. External reflective duct insulation shall be legibly printed or identified at intervals not greater than 36 inches (914 mm) with the name of the manufacturer, the product R-value at the specified installed thickness and the flame spread and smoke-developed indices. The installed thickness of the external duct insulation shall include the enclosed air space(s). The product R-value for external reflective duct insulation shall be determined in accordance with ASTM C1668.
- ~~43.~~ External duct insulation and factory-insulated flexible ducts shall be legibly printed or identified at intervals not longer than 36 inches (914 mm) with the name of the manufacturer, the thermal resistance R-value at the specified installed thickness and the flame spread and smoke-developed indexes of the composite materials. Spray polyurethane foam manufacturers shall provide the same product information and properties, at the nominal installed thickness, to the customer in writing at the time of foam application. All non-reflective duct insulation product R-values shall be based on insulation only, excluding air films, vapor retarders or other duct components, and shall be based on tested C-values at 75°F (24°C) mean temperature at the installed thickness, in accordance with recognized industry procedures. The installed thickness of duct insulation used to determine its R-value shall be determined as follows:
4.1 3.4. For duct board, duct liner and factory-made rigid ducts not normally subjected to compression, the nominal insulation thickness shall be used.

- 4.2.3.2. For ductwrap, the installed thickness shall be assumed to be 75 percent (25-percent compression) of nominal thickness.
- 4.3.3.3. For factory-made flexible air ducts, the installed thickness shall be determined by dividing the difference between the actual outside diameter and nominal inside diameter by two.
- 4.4.3.4. For spray polyurethane foam, the aged R-value per inch measured in accordance with recognized industry standards shall be provided to the customer in writing at the time of foam application. In addition, the total R-value for the nominal application thickness shall be provided.

Add new standard to Chapter 44 as follows:

ASTM

C1668-12 Standard Specification for Externally Applied Reflective Insulation Systems on Rigid Duct in Heating, Ventilation, and Air Conditioning (HVAC) Systems

Reason: The goal of this proposal is to define an existing commonly installed insulation that should be properly included in the ICC Codes. This proposal will provide clear requirements for a duct insulation that has been in the market for many years and has nationwide distribution and installation. This proposal includes the specific requirements for reflective duct insulation.

This proposal improves the codes by providing installers and officials with a clear path on the specifications that pertain to this product, the appropriate definitions and an ASTM reference.

Reflective duct insulation is a well-established type of material/system and it has an ASTM standard specification, namely ASTM C1668 Standard Specification for Externally Applied Reflective Insulation Systems on Rigid Duct in Heating, Ventilation, and Air Conditioning (HVAC) Systems. This standard can be viewed at: <http://reflectixinc.com/literature/securedpdfs/C1668.pdf>

It is the intent of this proposal to provide installers and officials with specific requirements and definitions as they pertain to reflective duct insulation products.

Cost Impact: This proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, [ASTM C1668-12] with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

RM51-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1601.3-RM-LOVELL.DOC

RM52 – 13

M1601.4.1

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

Revise as follows:

M1601.4.1 Joints, seams and connections. All longitudinal and transverse joints, seams and connections in metallic and nonmetallic ducts shall be constructed as specified in SMACNA HVAC Duct Construction Standards—Metal and Flexible and NAIMA Fibrous Glass Duct Construction Standards. All joints, longitudinal and transverse seams, and connections in ductwork shall be securely fastened and sealed with welds, gaskets, mastics (adhesives), mastic-plus-embedded-fabric systems, liquid sealants or tapes. Tapes and mastics used to seal fibrous glass ductwork shall be listed and labeled in accordance with UL 181A and shall be marked "181A-P" for pressure-sensitive tape, "181 A-M" for mastic or "181 A-H" for heat-sensitive tape. ~~Closure systems~~ Tapes and mastics used to seal metallic and flexible air ducts and flexible air connectors shall comply with UL 181B and shall be marked "181 B-FX" for pressure sensitive tape or "181 BM" for mastic. Duct connections to flanges of air distribution system equipment shall be sealed and mechanically fastened. Mechanical fasteners for use with flexible nonmetallic air ducts shall comply with UL 181B and shall be marked 181B-C. Crimp joints for round metallic ducts shall have a contact lap of not less than 1 inch (25.4 mm) and shall be mechanically fastened by means of not less than three sheet-metal screws or rivets equally spaced around the joint. Closure systems used to seal ~~metal~~ all ductwork shall be installed in accordance with the manufacturers' instructions. ~~Round metallic ducts shall be mechanically fastened by means of at least three sheet metal screws or rivets spaced equally around the joint. Unlisted duct tape shall not be permitted as a sealant on any duct.~~

Exceptions:

1. Spray polyurethane foam shall be permitted to be applied without additional joint seals.
2. Where a duct connection is made that is partially inaccessible, three screws or rivets shall be equally spaced on the exposed portion of the joint so as to prevent a hinge effect.
3. Continuously welded and locking type longitudinal joints and seams in ducts operating at static pressures less than 2 inches of water column (500 Pa) pressure classification shall not require additional closure systems.

Reason: This proposal simplifies this section by stating what is meant by "closure systems." Tapes and mastics are addressed in UL181A. There is no closure system listed specifically for metal ducts, but it is appropriate to require sealing products used for metal ducts to be listed to UL181A because if the sealing product is good enough for fibrous glass ducts it is good enough for metal ducts. This is the case in the field, as fibrous glass duct tapes are commonly used with metal ducts. The manufacturer's instructions should apply for all closure systems, not just those for metal ducts. The last sentence is unnecessary because this proposal requires all tapes to be listed, including those used with metal ducts.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Cost Impact: The code change proposal will not increase the cost of construction.

RM52-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1601.4#1-RM-HALL-PMGCAC.DOC

RM53 – 13

M1601.4.1

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org); Vickie Lovell, InterCode Inc., representing DuctMate Industries (Vickie@intercodeinc.com)

Revise as follows:

M1601.4.1 Joints, seams and connections. All longitudinal and transverse joints, seams and connections in metallic and nonmetallic ducts shall be constructed as specified in SMACNA HVAC Duct Construction Standards—Metal and Flexible and NAIMA Fibrous Glass Duct Construction Standards. All joints, longitudinal and transverse seams, and connections in ductwork shall be securely fastened and sealed with welds, gaskets, mastics (adhesives), mastic-plus-embedded-fabric systems or tapes. Closure systems used to seal flexible air ducts and flexible air connectors shall comply with UL 181B and shall be marked “181 B-FX” for pressure sensitive tape or “181 BM” for mastic. Duct connections to flanges of air distribution system equipment shall be sealed and mechanically fastened. Mechanical fasteners for use with flexible nonmetallic air ducts shall comply with UL 181B and shall be marked 181B-C. Crimp joints for round metallic ducts shall have a contact lap of not less than 1 inch (25.4 mm) and shall be mechanically fastened by means of not less than three sheet-metal screws or rivets equally spaced around the joint. Closure systems used to seal metal ductwork shall be installed in accordance with the manufacturers’ instructions. Round metallic ducts shall be mechanically fastened by means of at least three sheet metal screws or rivets spaced equally around the joint. Unlisted duct tape shall not be permitted as a sealant on any duct.

Exceptions:

1. Spray polyurethane foam shall be permitted to be applied without additional joint seals.
2. Where a duct connection is made that is partially inaccessible, three screws or rivets shall be equally spaced on the exposed portion of the joint so as to prevent a hinge effect.
3. ~~Continuously welded and locking type longitudinal joints and seams in ducts operating at static pressures less than 2 inches of water column (500 Pa) pressure classification shall not require additional closure systems.~~ For ducts having a static pressure classification of less than 2 inches of water column (500Pa), additional closure systems shall not be required for continuously welded joints and seams and locking-type joints and seams of other than the snap-lock and button-lock types.

Reason:

(Hall-PMGCAC): Unless sealant or a gasket is used, snap-lock and button-lock type seams will leak significantly. The current exception attempted to prevent unnecessary sealing for joints and seams that leak very little or not at all, but it went too far by including all locking type joints and seams. Some locking joints are leakproof such as mechanically folded seams used for spiral seam duct, but this cannot be said for all locking joints. This text was approved for the 2015 IMC.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

(Lovell): This proposed text is derived from a revision to the International Mechanical Code that was proposed by the PMG Code Action Committee in M151-12 and was approved by the voting membership in Portland for the 2015 IMC. That reason statement is supplied below:

Unless sealant or a gasket is used, snap-lock and button-lock type seams will leak significantly. The current exception attempted to prevent unnecessary sealing for joints and seams that leak very little or not at all, but it went too far by including all locking type joints and seams. Some locking joints are leakproof such as mechanically folded seams used for spiral seam duct, but this cannot be said for all locking joints.

The identical proposal that was approved As Submitted in the Mechanical Code hearings in Portland is being submitted to the 2015 IECC residential requirements for consistency.

Cost Impact:

(Hall-PMGCAC): The code change proposal will not increase the cost of construction.

(Lovell): This proposal reduces the cost of installation.

RM53-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1601.4.1 #2-RM-HALL-LOVELL-PMGCAC

RM54 – 13

M1601.4.10 (New)

Proponent: Josh O'Connor, representing himself

Add new text as follows:

M1601.4.10 Wall Pass-Through. The opening in a concrete or masonry foundation wall through which supply and return air ducts from an HVAC unit are intended to pass shall have a width of not less than 42 inches.

Reason: National homebuilders are making this opening only 32 inches wide. This is not wide enough for the supply and return air ducts to have a straight run through the wall from the supply and return ports on the HVAC unit.

When the air ducts have to veer sharply in one direction after they come off of the port in order to get to the opening in the wall, airflow is restricted inside the duct. NOTE: the ports open straight forward, facing the wall of the house. When the duct veers, it blocks the opening of the port. The ducts need a straight run.

Three (3) photos are attached to this proposal form. (photos were taken at my residence, after rain hood was removed from the HVAC unit)



The opening in the foundation wall is not wide enough for the HVAC unit.



Cost Impact: NONE

RM54-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1601.4.10-RM-O'CONNOR.DOC

RM55 – 13

M1601.4.2 (New)

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

Add new text as follows:

M1601.4.2 Duct lap. Crimp joints for round and oval metal ducts shall be lapped not less than one inch and the male end of the duct shall extend into the adjoining duct in the direction of airflow.

Reason: Section M1601.4.1 states the number of fasteners to be used for the fastening of metal ducts but is silent on the direction of the lap relative to airflow. The current code is also silent on oval ducts which are commonly installed in dwellings. The code should specifically state how much lap there must be for round and oval ducts prior to securing them as stated in Section M1601.4.1.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Cost Impact: The code change proposal will not increase the cost of construction.

RM55-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1601.4.2 (NEW)-RM-HALL-PMGCAC

RM56 – 13

M1601.4.3

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

Revise as follows:

M1601.4.3 Support. ~~Metal ducts shall be supported by 1/2-inch (13 mm) wide 18-gage metal straps or 12-gage galvanized wire at intervals not exceeding 10 feet (3048 mm) or other approved means. Nonmetallic ducts shall be supported in accordance with the manufacturer's installation instructions.~~ Ducts shall be supported in accordance with SMACNA HVAC Duct Construction Standards—Metal and Flexible.

Reason: This section should just reference the SMACNA standards as opposed to specifying a support interval. The 10 foot interval requirement is too broad and is inappropriate for many sizes and types of ducts . Many ducts require closer supports. This text could be easily interpreted as allowing 10 feet maximum support intervals for all ducts. This section is not being enforced since nobody installs 18 gage metal straps to support residential ducts.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Cost Impact: The code change proposal will increase the cost of construction.

RM56-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1601.4.3-RM-HALL-PMGCAC

RM57 – 13

M1602

Proponent: Guy McMann MCP, Jefferson County Colorado representing Colorado Association of Plumbing and Mechanical Officials (CAPMO)

Revise as follows:

~~**M1602.1 Return air** Return air shall be taken from inside the dwelling. Dilution of return air with outdoor air shall be permitted.~~

~~**M1602.2 Prohibited sources.** Outdoor and return air for a forced-air heating or cooling system shall not be taken from the following locations:~~

- ~~1. Closer than 10 feet (3048 mm) to an appliance vent outlet, a vent opening from a plumbing drainage system or the discharge outlet of an exhaust fan, unless the outlet is 3 feet (914 mm) above the outside air inlet.~~
- ~~2. Where flammable vapors are present; or where located less than 10 feet (3048 mm) above the surface of any abutting public way or driveway; or where located at grade level by a sidewalk, street, alley or driveway.~~
- ~~3. A room or space, the volume of which is less than 25 percent of the entire volume served by the system. Where connected by a permanent opening having an area sized in accordance with ACCA Manual D, adjoining rooms or spaces shall be considered as a single room or space for the purpose of determining the volume of the rooms or spaces.~~

~~**Exception:** The minimum volume requirement shall not apply where the amount of return air taken from a room or space is less than or equal to the amount of supply air delivered to the room or space.~~

- ~~4. A closet, bathroom, toilet room, kitchen, garage, mechanical room, boiler room, furnace room, unconditioned attic or other dwelling unit.~~

~~**Exception:** Dedicated forced-air systems serving only a garage shall not be prohibited from obtaining return air from the garage.~~

- ~~5. A room or space containing a fuel-burning appliance where such room or space serves as the sole source of return air.~~

~~**Exceptions:**~~

- ~~1. The fuel-burning appliance is a direct-vent appliance or an appliance not requiring a vent in accordance with Section M1801.1 or Chapter 24.~~
- ~~2. The room or space complies with the following requirements:~~
 - ~~2.1. The return air shall be taken from a room or space having a volume exceeding 1 cubic foot for each 10 Btu/h (9.6 L/W) of combined input rating of all fuel-burning appliances therein.~~
 - ~~2.2. The volume of supply air discharged back into the same space shall be approximately equal to the volume of return air taken from the space.~~
 - ~~2.3. Return-air inlets shall not be located within 10 feet (3048 mm) of any appliance firebox or draft hood in the same room or space.~~
- ~~3. Rooms or spaces containing solid-fuel burning appliances, if return-air inlets are located not less than 10 feet (3048 mm) from the firebox of those appliances.~~
- ~~6. An unconditioned crawl space by means of direct connection to the return side of a forced-air system. Transfer openings in the crawl space enclosure shall not be prohibited.~~

~~M1602.3 Inlet opening protection.~~ Outdoor air inlets shall be covered with screens having openings that are not less than 1/4 inch (6.4 mm) and not greater than 1/2 inch (12.7 mm).

M1602.1 Outdoor air openings. Outdoor intake openings shall be located in accordance with Section R303.4.1. Opening protection shall be in accordance with Section R303.5

M1602.2. Return air openings. Return air openings for heating, ventilation and air conditioning systems shall comply with all of the following:

1. Openings shall not be located less than 10 feet measured in any direction from an open combustion chamber or draft hood of another appliance located in the same room or space.
2. The amount of return air taken from any room or space shall be not greater than the flow rate of supply air delivered to such room or space.
3. Return and transfer openings shall be sized in accordance with the appliance or equipment manufacturers' installation instructions, Manual D or the design of the *registered design professional*.
4. Return air shall not be taken from a closet, bathroom, toilet room, kitchen, garage, mechanical room, boiler room, furnace room or unconditioned attic.

Exceptions:

1. Taking return air from a kitchen is not prohibited where such return air openings serve the kitchen only, and are located not less than 10 feet from the cooking appliances.
2. Dedicated forced air systems serving only the garage shall not be prohibited from obtaining return air from the garage.
5. Taking return air from a crawl space shall not be accomplished through a direct connection to the return side of a forced air furnace. Transfer openings in the crawl space enclosure shall not be prohibited.
6. Return air from one dwelling unit shall not be discharged into another dwelling unit.

Reason: This was approved by the IMC committee and will be published. This is an attempt to reorganize and delete language in this section that contains outdated legacy code language. This Section is much more complicated than it needs to be as the foremost concern regarding return air is to keep contaminants out of the openings and air stream. This section is long over-due for an overhaul the intent in which is to simplify the matter.

- Existing item 1 and 2 deal primarily with outdoor opening which can be referenced in R303.4.1. This Section is addressing return air, not outdoor air.
- Existing item 3 will literally prevent a return air opening in most bedrooms as they are usually less than 25% of the area served. There is no technical justification for this benchmark. What significance would there be between 25% and 26% that will impact the return air system? There is no need for such an arbitrary benchmark. What's really important is not to take too much air out of a room as noted in the new #3.
- The size of any transfer should be according to design, not arbitrary, outdated numbers as in the existing #3
- Language in existing #4 is revised.
- Existing Item 5 and its exceptions have many problems and has been deleted in its entirety. It's a tortured approach as it attempts to describe a furnace in an enclosure with no return air duct along side a water heater all the while using the enclosure as a plenum utilizing louvered doors or openings to bring air back to the unit. This is not current practice and is prohibited. It calls for volume which is twice as much as current combustion requirements and is very difficult to explain the picture it attempts to deliver.
- M1602.3 has been deleted and reference made to R303.5 as the heading of this section is Return air, not inclusive of outdoor air.

All the usual requirements that can affect the quality and installation of return air openings are contained here as there are no new requirements.

Cost Impact: None

RM57-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1602.1-RM-MCMANN

RM58 – 13

M1602.4 (New), M1602.4.1 (New)

Proponent: Jeff Sonne, Florida Solar Energy Center, representing the Florida Solar Energy Center, (jeff@fsec.ucf.edu)

Add new text as follows:

M1602.4 Balanced return air. Provisions shall be made to prevent unbalanced air flows and pressure differentials caused by restricted return air flow. Pressure differentials caused by air distribution systems across individually closed interior doors, where return air intakes are centrally located, shall be limited to 0.01 inch WC (2.5 pascals). Pressure differentials across fire walls and other partitions within ceiling space plenums shall be limited to 0.01 inch WC (2.5 pascals) by providing air duct pathways or air transfer pathways from the high pressure zone to the low pressure zone.

M1602.4.1 Prescriptive alternatives. The following are alternatives to the requirements of Section M1602.4 and apply only to habitable rooms.

1. Transfer ducts or other transfer pathways shall be provided and shall have an area that is not less than 1½ times the cross sectional area of the supply duct or supply ducts serving the room or space. In addition, the room entry door shall have an unrestricted 1 inch (25.4 mm) or greater undercut.
2. Transfer grilles shall be provided and shall have an area of not less than 0.50 square inches for each 1 cfm of supply air. In addition, the room entry door shall have an unrestricted 1 inch (25.4 mm) or greater undercut.

Reason: Restricted return air affects building pressures and increases air infiltration which in turn increases energy use and can cause comfort, building durability, and health and safety issues. A similar balanced return air requirement is already in the Florida Building Code for these reasons.

Supporting publication: Cummings, J., C. Withers, "Balanced Return Air, Duct Airtightness, and Combustion/Dilution Air Code Compliance in 40 Central Florida Homes" Florida Solar Energy Center, FSEC-CR-1789-06, Nov. 29, 2006. (<http://www.fsec.ucf.edu/en/publications/pdf/FSEC-CR-1789-06.pdf>)

Cost Impact: The code change proposal will increase the cost of construction. A Florida HVAC contractor indicates the extra material cost for a three bedroom home is \$60 and 1.5 hours of labor. In his opinion, a very small price for the extra comfort and avoidance of problems.

RM58-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1602.4 (NEW)-RM-SONNE.DOC

RM59 – 13

M1804.4 (New)

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee
(dave.hall@georgetown.org)

Add new text as follows:

M1804.4 Door swing. Appliance and equipment vent terminals shall be located such that doors cannot swing within 12 inches (305 mm) horizontally of the vent terminals. Door stops or closures shall not be installed to obtain this clearance.

Reason: This new language was approved for the 2015 IMC. Any appliance vent can be subject to damage as a result of a door swing even when the vent has been installed in accordance with the manufacturer's instructions. Most manufacturers do not address proximity to doors on a different plane. Even if the door doesn't come in contact with the vent terminal, the door could be left too close to the vent when the appliance is operating and possibly overheating the door and/or interfering with the operation of the vent terminal.

Cost Impact: None

RM59-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1804.4 (NEW)-RM-HALL-PMGCAC

RM60 – 13

M1806 (New), M1805.4 through M1805.4.4 (New)

Proponent: Guy McMann, Jefferson County Co. representing Colorado Association of Plumbing and Mechanical Officials (CAPMO) (gmcman@jeffco.us)

Add new text as follows:

1805.4 Listing. Factory-built chimneys shall be listed and labeled and shall be installed and terminated in accordance with the manufacturer's installation instructions.

1805.4.1 Solid fuel appliances. Factory-built chimneys installed in dwelling units with solid fuel-burning appliances shall comply with the Type HT requirements of UL 103 and shall be marked "Type HT" and "Residential Type and Building Heating Appliance Chimney."

Exception: Chimneys for use with open combustion chamber fireplaces shall comply with the requirements of UL 103 and shall be marked "Residential Type and Building Heating Appliance Chimney."

1805.4.2 Factory-built chimney offsets. Where a factory-built chimney assembly incorporates offsets, no part of the chimney shall be at an angle of more than 30 degrees (0.52 rad) from vertical at any point in the assembly and the chimney assembly shall not include more than four elbows.

1805.4.3 Support. Where factory-built chimneys are supported by structural members, such as joists and rafters, such members shall be designed to support the additional load.

1805.4.4 Medium-heat appliances. Factory-built chimneys for medium-heat appliances producing flue gases having a temperature above 1,000°F (538°C), measured at the entrance to the chimney, shall comply with UL 959.

Reason: The title of this section includes Factory Built Chimneys but doesn't really speak to the subject matter and is therefore incomplete. These requirements are extracted from the IMC and are applicable in dwellings. Inspectors need to have this information in hand to determine proper installations.

Cost Impact: None

RM60-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1805.4 (NEW)-RM-MCMANN.DOC

RM61 – 13

M1901.3

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

Delete without substitution:

~~M1901.3 Prohibited location.~~ ~~Cooking appliances designed, tested, listed and labeled for use in commercial occupancies shall not be installed within dwelling units or within any area where domestic cooking operations occur.~~

Reason: Section M1901.3 is redundant with Section M1901.2 and there may be appliances that are listed for both domestic and commercial use and such appliances would be prohibited by current text. Current Section M1901.2 captures the entire intent and is all that is needed. The same deletion was approved for the 2015 IMC.

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Cost Impact: The code change proposal will not increase the cost of construction.

RM61-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M1901.3-RM-HALL-PMGCAC

RM62 – 13

M2001.1

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

Revise as follows:

M2001.1 Standards. ~~Packaged oil-fired boilers and their control systems shall be listed and labeled in accordance with UL 726. Packaged electric boilers and their control systems shall be listed and labeled in accordance with UL 834. Solid-fuel-fired boilers shall be listed and labeled in accordance with UL 2523. Boilers shall be designed, and constructed and certified in accordance with the requirements of ASME CSD-1 and as applicable, the ASME *Boiler and Pressure Vessel Code*, Section I or IV. Controls and safety devices for boilers with fuel input ratings of 12,500,000 Btu/hr (3 663 388 watts) or less shall meet the requirements of ASME CSD-1.~~ Gas fired boilers shall conform to the requirements listed in Chapter 24.

Reason: This revised language was approved for the 2015 IMC. Current wording is not correct since ASME CSD-1 is not a construction standard. The proposed wording starts with the vessel construction requirements and continues with the acceptable standards for complete appliances. The proposed wording is no change from the intent of the previous wording.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Cost Impact: The code change proposal will not increase the cost of construction.

RM62-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M2001.1-RM-HALL-PMGCAC

RM63 – 13

M2002.5, M2002.6 (New)

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

Revise as follows:

M2002.5 Boiler low-water cutoff. All steam and hot water boilers shall be protected with a low-water cutoff control. ~~The low-water cutoff shall automatically stop the combustion operation of the appliance when the water level drops below the lowest safe water level as established by the manufacturer.~~

Exception: A low-water cutoff is not required for coil-type and water-tube-type boilers that require forced circulation of water through the boiler and that are protected with a flow sensing control.

M2002.6 Operation. Low-water cutoff controls and flow sensing controls required by Section M2002.5 shall automatically stop the combustion operation of the appliance when the water level drops below the lowest safe water level as established by the manufacturer or when the water circulation flow is less than that required for safe operation of the appliance, respectively.

Reason: There is no exception to Section M2002.5 for coil-type hot water supply boilers that require forced circulation and use flow switches to stop combustion when water flow is lost or reduced. Flow switches that monitor forced circulation through a water tube- or coil-type boiler provide the same function as a low-water cutoff and should be recognized as an alternative to a low-water cutoff. The recognition of flow sensing controls was approved for the 2015 IMC.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Cost Impact: The code change proposal will not increase the cost of construction.

RM63-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M2002.5-RM-HALL-PMGCAC

RM64 – 13

M2005.1

Proponent: Bob Eugene, representing UL LLC (Robert.Eugene@ul.com)

Revise as follows:

M2005.1 General. Water heaters shall be installed in accordance with Chapter 28, the manufacturer's instructions and the requirements of this code. Water heaters installed in an *attic* shall comply with the requirements of Section M1305.1.3. Gas-fired water heaters shall comply with the requirements in Chapter 24. Domestic electric water heaters shall comply with UL 174. Oiled-fired water heaters shall comply with UL 732. Thermal solar water heaters shall comply with Chapter 23 and UL 174. Solid-fuel-fired water heaters shall comply with UL 2523.

Reason: Chapter 28 provides specific additional details for the installation of water heaters. This also correlates with the reference found in P2801.2.

Cost Impact: None

RM64-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M2005.1-RM-EUGENE.DOC

RM65 – 13

TABLE M2101.1, Chapter 44

Proponent: Michael Cudahy, Plastic Pipe and Fittings Association, representing Plastic Pipe and Fittings Association (mikec@cmservnet.com)

Revise as follows:

**TABLE M2101.1
HYDRONIC PIPING MATERIALS**

MATERIAL	USE CODE^a	STANDARD^b	JOINTS	NOTES
<u>Acrylonitrile butadiene styrene (ABS) plastic pipe</u>	<u>1,5</u>	<u>ASTM D1527; ASTM F2806; ASTM F2969</u>	<u>Solvent cement joints</u>	

(Portions of table not shown remain unchanged)

a. Use code:

1. Above ground.
2. Embedded in radiant systems.
3. Temperatures below 180°F only.
4. Low temperature (below 130°F) applications only.
5. Temperatures below 160°F only.

b. Standards as listed in Chapter 44.

Add new standards to Chapter 44 as follows:

ASTM F2806-10

Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe (Metric SDR-PR)

ASTM F2969-12

Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) IPS Dimensioned Pressure Pipe

Reason: There are ASTM standards for pressure rated ABS piping products that could be utilized in hydronic systems. In fact, the IMC already contains ABS pipe in Table 1202.4.

ASTM D1527 - 99(2005) Standard Specification for Acrylonitrile Butadiene Styrene (ABS) Plastic Pipe, Schedules 40 and 80

ASTM F2806 - 10e1 Standard Specification for Acrylonitrile Butadiene Styrene (ABS) Plastic Pipe (Metric SDR PR)

ASTM F2969 - 12 Standard Specification for Acrylonitrile Butadiene Styrene (ABS) IPS Dimensioned Pressure Pipe

Note: ASTM D 2282 was not added as it is a previously withdrawn ABS pipe standard found in earlier versions of the IMC.

Cost Impact: None

Analysis: A review of the standards proposed for inclusion in the code, [ASTM F2806-10 and ASTM F2969-12] with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013.

RM65-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M2101.1T #1-RM-CUDAHY.DOC

RM66 – 13

Table M2101.1, M2101.10, M2104, M2105, M2106 thru M2110 (New), Chapter 44

Proponent: Michael Cudahy, Plastic Pipe and Fittings Association, representing Plastic Pipe and Fittings Association (mikec@cmservnet.com)

Revise as follows:

**TABLE M2101.1
HYDRONIC PIPING MATERIALS**

MATERIAL	USE CODE ^a	STANDARD ^b	JOINTS	NOTES
Polyethylene (PE) pipe, tubing and fittings (for ground source heat pump loop systems)	1,2,4	ASTM D 2513; ASTM D 3035; ASTM D 2447; ASTM D 2683; ASTM F 1055; ASTM D 2837; ASTM D 3350; ASTM D 1693	Heat fusion	

(Portions of table not shown remain unchanged)

M2101.10 Tests. Hydronic piping systems shall be tested hydrostatically at a pressure of one and one-half times the maximum system design pressure, but not less than 100 psi (689 kPa). The duration of each test shall be not less than 15 minutes, but not more than 20 minutes.

M2104.2.1 Polyethylene plastic pipe and tubing for ground source heat pump loop systems. Joints between polyethylene plastic pipe and tubing or fittings for ground source heat pump loop systems shall be heat fusion joints conforming to Section M2104.2.1.1, electrofusion joints conforming to Section M2104.2.1.2, or stab-type insertion joints conforming to Section M2104.2.1.3.

M2104.2.1.1 Heat fusion joints. Joints shall be of the socket fusion, saddle fusion or butt fusion type, joined in accordance with ASTM D 2657. Joint surfaces shall be clean and free of moisture. Joint surfaces shall be heated to melt temperatures and joined. The joint shall be undisturbed until cool. Fittings shall be manufactured in accordance with ASTM D 2683 or ASTM D 3261.

M2104.2.1.2 Electrofusion joints. Joints shall be of the electrofusion type. Joint surfaces shall be clean and free of moisture, and scoured to expose virgin resin. Joint surfaces shall be heated to melt temperatures for the period of time specified by the manufacturer. The joint shall be undisturbed until cool. Fittings shall be manufactured in accordance with ASTM F 1055.

M2104.2.1.3 Stab-type insert fittings. Joint surfaces shall be clean and free of moisture. Pipe ends shall be chamfered and inserted into the fittings to full depth. Fittings shall be manufactured in accordance with ASTM F 1924.

SECTION M2105 PLASTIC PIPE GROUND-SOURCE HEAT PUMP LOOP SYSTEMS

M2105.1 Testing. The assembled loop system shall be tested with water at 100 psi (689 kPa) for 30 minutes with no observed leaks. Flow rates and pressure drops shall be compared to calculated values. If actual flow rate or pressure drop values differ from calculated design values by more than 10 percent, the problem shall be identified and corrected.

M2105.1 Plastic Ground-Source Heat Pump-Loop Water Piping. Plastic ground-source heat pump ground loop-piping and tubing material for water-based systems shall conform to the standards cited in this section.

M2105.2 Used materials. Reused pipe, fittings, valves, and other materials shall not be permitted in ground-source heat pump loop systems.

M2105.3 Material rating. Pipe and tubing shall be rated for the operating temperature and pressure of the ground source heat pump-loop system. Fittings shall be suitable for the pressure applications and recommended by the manufacturer for installation with the pipe and tubing material installed. Where used underground, materials shall be suitable for burial.

M2105.4 Piping and tubing materials standards. Ground-source heat pump ground-loop pipe and tubing shall conform to the standards listed in Table M2105.4.

TABLE M2105.4
GROUND-SOURCE LOOP PIPE

<u>MATERIAL</u>	<u>STANDARD</u>
Chlorinated polyvinyl chloride (CPVC)	ASTM D2846; ASTM F441; ASTM F442; CSA B137.6
Cross-linked polyethylene (PEX)	ASTM F876; ASTM F877 CSA B137.5
Polyethylene/aluminum/polyethylene (PE-AL-PE) pressure pipe	ASTM F1282; CSA B137.9; AWWA C903
High Density Polyethylene (HDPE)	ASTM D2737; ASTM D3035; ASTM F714; AWWA C901; CSA B137.1; CSA C448; NSF 358-1
Polypropylene (PP-R)	ASTM F2389; CSA B137.11
Polyvinyl chloride (PVC)	ASTM D1785; ASTM D2241; CSA 137.3
Raised temperature polyethylene (PE-RT)	ASTM F2623

M2105.5 Fittings. Ground-source heat pump pipe fittings shall be approved for installation with the piping materials to be installed, shall conform to the standards listed in Table M2105.5 and if installed underground, shall be suitable for burial.

TABLE M2105.5
GROUND-SOURCE LOOP PIPE FITTINGS

<u>PIPE MATERIAL</u>	<u>STANDARD</u>
Chlorinated polyvinyl chloride (CPVC)	ASTM D2846; ASTM F437; ASTM F438; ASTM F439; ASTM F1970 CSA B137.6
Cross-linked polyethylene (PEX)	ASTM F 877; ASTM F1807; ASTM F1960; ASTM F2080; ASTM F2159; ASTM F2434; CSA B137.5
Polyethylene/aluminum/polyethylene (PE-AL-PE)	ASTM F2434; ASTM F1282, CSA B137.9
High Density Polyethylene (HDPE)	ASTM D2683; ASTM D3261; ASTM F1055; CSA B137.1; CSA C448, NSF 358-1
Polypropylene (PP-R)	ASTM F2389; CSA B137.11
Polyvinyl chloride (PVC)	ASTM D2464; ASTM D2466; ASTM D2467; ASTM F1970 CSA B137.3
Raised temperature polyethylene (PE-RT)	ASTM D3261; ASTM F1807; ASTM F2159; B137.1

SECTION M2106 **JOINTS AND CONNECTIONS**

M2106.1 Approval. Joints and connections shall be of an approved type. Joints and connections shall be tight for the pressure of the ground-source loop system. Joints used underground shall be approved for buried applications.

M2106.1.1 Joints between different piping materials. Joints between different piping materials shall be made with approved transition fittings.

M2106.2 Preparation of pipe ends. Pipe shall be cut square, reamed, and shall be free of burrs and obstructions. CPVC, PE, and PVC pipe shall be chamfered. Pipe ends shall have full-bore openings and shall not be undercut.

M2106.3 Joint preparation and installation. Where required by Sections M2106.4 through M2106.6, the preparation and installation of mechanical and thermoplastic-welded joints shall comply with Sections M2106.3.1 and M2016.3.2.

M2106.3.1 Mechanical joints. Mechanical joints shall be installed in accordance with the manufacturer's instructions.

M2106.3.2 Thermoplastic-welded joints. Joint surfaces for thermo plastic-welded joints shall be cleaned by an approved procedure. Joints shall be welded in accordance with the manufacturer's instructions.

M2106.4 CPVC plastic pipe. Joints between CPVC plastic pipe or fittings shall be solvent-cemented in accordance with Section P2905.9.1.2. Threaded joints between fittings and CPVC plastic pipe shall be in accordance with Section M2106.4.1.

M1206.4.1 Threaded joints. Threads shall conform to ASME B1.20.1. Schedule 80 or heavier plastic pipe shall be threaded with dies specifically designed for plastic pipe. Thread lubricant, pipe-joint compound or tape shall be applied on the male threads only and shall be *approved* for application on the piping material.

M2106.5 Cross-linked polyethylene (PEX) plastic tubing. Joints between cross-linked polyethylene plastic tubing and fittings shall comply with Sections M2106.5.1 and M2106.5.2. Mechanical joints shall comply with Section M2106.3.1.

M2106.5.1 Compression-type fittings. Where compression- type fittings include inserts and ferrules or O-rings, the fittings shall be installed without omitting the inserts and ferrules or O-rings.

M2106.5.2 Plastic-to-metal connections. Solder joints in a metal pipe shall not occur within 18 inches of a transition from such metal pipe to plastic pipe or tubing.

M2106.6 Polyethylene plastic pipe and tubing for ground source heat pump loop systems. Joints between polyethylene plastic pipe and tubing or fittings for ground source heat pump loop systems shall be heat fusion joints complying with Section M2106.6.1, electrofusion joints complying with Section M2106.6.2, or stab-type insertion joints complying with Section M2106.6.3.

M2106.6.1 Heat-fusion joints. Joints shall be of the socket-fusion, saddle-fusion or butt-fusion type, joined in accordance with ASTM D 2657. Joint surfaces shall be clean and free of moisture. Joint surfaces shall be heated to melt temperatures and joined. The joint shall be undisturbed until cool. Fittings shall be manufactured in accordance with ASTM D 2683 or ASTM D 3261.

M2106.6.2 Electrofusion joints. Joints shall be of the electrofusion type. Joint surfaces shall be clean and free of moisture, and scoured to expose virgin resin. Joint surfaces shall be heated to melt

temperatures for the period of time specified by the manufacturer. The joint shall be undisturbed until cool. Fittings shall be manufactured in accordance with ASTM F 1055.

M2106.6.3 Stab-type insert fittings. Joint surfaces shall be clean and free of moisture. Pipe ends shall be chamfered and inserted into the fittings to full depth. Fittings shall be manufactured in accordance with ASTM F 1924.

M2106.7 Polypropylene (PP) plastic. Joints between PP plastic pipe and fittings shall comply with Sections M2106.7.1 and M2106.7.2.

M2106.7.1 Heat-fusion joints. Heat-fusion joints for polypropylene (PP) pipe and tubing joints shall be installed with socket-type heat-fused polypropylene fittings, electrofusion polypropylene fittings or by butt fusion. Joint surfaces shall be clean and free from moisture. The joint shall be undisturbed until cool. Joints shall be made in accordance with ASTM F 2389.

M2106.7.2 Mechanical and compression sleeve joints. Mechanical and compression sleeve joints shall be installed in accordance with the manufacturer's instructions.

M2106.8 Raised temperature polyethylene (PE-RT) plastic tubing. Joints between raised temperature polyethylene tubing and fittings shall comply with Sections M2106.8.1 and M2106.8.2. Mechanical joints shall comply with Section M2106.3.1.

M2106.8.1 Compression-type fittings. Where compression-type fittings include inserts and ferrules or O-rings, the fittings shall be installed without omitting the inserts and ferrules or O-rings.

M2106.8.2 PE-RT-to-metal connections. Solder joints in a metal pipe shall not occur within 18 inches (457 mm) of a transition from such metal pipe to PE-RT pipe.

M2106.9 PVC plastic pipe. Joints between PVC plastic pipe or fittings shall be solvent-cemented in accordance with Section P2905.9.1.3. Threaded joints between fittings and PVC plastic pipe shall be in accordance with Section M2106.4.1.

SECTION M2107 **VALVES**

M2107.1 Where required. Shutoff valves shall be installed in ground source-loop piping systems in the locations indicated in Sections M2107.1.1 through M2107.1.6.

M2107.1.1 Heat exchangers. Shutoff valves shall be installed on the supply and return side of a heat exchanger.

Exception: Shutoff valves shall not be required where heat exchangers are integral with a boiler or are a component of a manufacturer's boiler and heat exchanger packaged unit and are capable of being isolated from the hydronic system by the supply and return valves required by Section M2001.3.

M2107.1.2 Central systems. Shutoff valves shall be installed on the building supply and return of a central utility system.

M2107.1.3 Pressure vessels. Shutoff valves shall be installed on the connection to any pressure vessel.

M2107.1.4 Pressure-reducing valves. Shutoff valves shall be installed on both sides of a pressure-reducing valve.

M2107.1.5 Equipment and appliances. Shutoff valves shall be installed on connections to mechanical *equipment* and appliances. This requirement does not apply to components of a ground-source loop system such as pumps, air separators, metering devices, and similar *equipment*.

M2107.1.6 Expansion tanks. Shutoff valves shall be installed at connections to nondiaphragm-type expansion tanks.

M2107.2 Reduced pressure. A pressure relief valve shall be installed on the low-pressure side of a hydronic piping system that has been reduced in pressure. The relief valve shall be set at the maximum pressure of the system design. The valve shall be installed in accordance with Section M2002.

SECTION M2108 **PIPING INSTALLATION**

M2108.1 General. Piping, valves, fittings, and connections shall be installed in accordance with the manufacturer's instructions.

M2108.3 Protection of potable water. Where ground-source heat pump ground loop systems have a connection to a potable water supply, the potable water system shall be protected from backflow in accordance with Section P2902.

M2108.4 Pipe penetrations. Openings for pipe penetrations in walls, floors and ceilings shall be larger than the penetrating pipe. Openings through concrete or masonry building elements shall be sleeved. The annular space surrounding pipe penetrations shall be protected in accordance with Section P2606.1.

M2108.5 Clearance from combustibles. A pipe in a ground source heat pump piping system having an exterior surface temperature exceeding 250°F (121°C) shall have a *clearance* of not less than 1 inch (25 mm) from combustible materials.

M2108.6 Contact with building material. A ground-source heat pump ground-loop piping system shall not be in direct contact with building materials that cause the piping or fitting material to degrade or corrode, or that interfere with the operation of the system.

M2108.7 Strains and stresses. Piping shall be installed so as to prevent detrimental strains and stresses in the pipe. Provisions shall be made to protect piping from damage resulting from expansion, contraction and structural settlement. Piping shall be installed so as to avoid structural stresses or strains within building components.

M2108.7.1 Flood hazard. Piping located in a flood hazard area shall be capable of resisting hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to the *design flood elevation*.

M2108.8 Pipe support. Pipe shall be supported in accordance with Section M2101.9.

M2108.9 Velocities. Ground-source heat pump ground-loop systems shall be designed so that the flow velocities do not exceed the maximum flow velocity recommended by the pipe and fittings manufacturer. Flow velocities shall be controlled to reduce the possibility of water hammer.

M2108.10 Labeling and Marking. Ground-source heat pump ground-loop system piping shall be marked with tape, metal tags or other methods where it enters a building. The marking shall indicate the following words: "GROUND SOURCE HEAT PUMP-LOOP SYSTEM". The marking shall indicate any antifreeze used in the system by name and concentration.

M2108.11 Chemical Compatibility. Antifreeze and other materials used in the system shall be chemically compatible with the pipe, tubing, fittings, and mechanical systems.

SECTION M2109
WORKING FLUID

M2109.1 Makeup water. The transfer fluid shall be compatible with the makeup water supplied to the system.

SECTION M2109
TESTS

M2109.1 Ground-source heat pump loop systems. Before connection header trenches are backfilled, the assembled loop system shall be pressure tested with water at 100 psi (689 kPa) for 15 minutes with no observed leaks. Flow and pressure loss testing shall be performed and the actual flow rates and pressure drops shall be compared to the calculated design values. If actual flow rate or pressure drop values differ from calculated design values by more than 10 percent, the cause shall be identified and corrective action taken.

SECTION M2110
EMBEDDED PIPING

M2110.1 Pressurizing during installation. Ground-source heat pump ground loop piping to be embedded in concrete shall be pressure tested prior to pouring concrete. During pouring, the pipe shall be maintained at the proposed operating pressure.

Add new standards to Chapter 44 as follows:

ASTM

D3261-03 Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing

F1970-12 Standard Specification for Special Engineered Fittings, Appurtenances or Valves for Use in Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Systems

AWWA

C903-05 Polyethylene-Aluminum- Polyethylene & Crosslinked Polyethylene Composite Pressure Pipes, ½ in (12mm) through 2 in (50mm), for Water Service

CSA

CSA C448 SERIES-02-CAN/CSA-2002
Design and Installation of Earth Energy Systems - First Edition; Update 2: October 2009; Consolidated Reprint 10/2009

NSF

NSF 358-1 2011
Polyethylene Pipe and Fittings for Water-Based Ground-Source 'Geothermal' Heat Pump Systems

Reason: This revised language, new sections and standards were approved for the 2015 IMC. Water based geothermal PE piping is currently listed in the hydronics section where it doesn't quite fit. This special and growing application should have its own section, and it should cover other materials that could potentially be used. Green building rating systems are promoting geothermal ground loop heating and cooling systems, in both commercial and residential construction, and the IRC should also have more information. While HDPE dominates the water based technology with an expected 95% of the

systems, other piping materials can be utilized. Copper is used in direct expansion systems that do not run on water, but use refrigerants directly. The only minor modifications from the IMC language are in the following sections:

M2108.1 General. Piping, valves, fittings, and connections shall be installed in accordance with *the manufacturer's instructions.*, as some were concerned by *the language, "conditions of the approval."*

CSA B137.6, AWWA C903, and CSA B137.3 were added where appropriate to Table M2105.4

ASTM F1970 Standard Specification for Special Engineered Fittings, Appurtenances or valves for PVC and CPVC was added to table M2105.5.

Cost Impact: None

Analysis: A review of the standards proposed for inclusion in the code, [ASTM D3261-03, ASTM F1970-12; AWWA C903-05; CSA C448 Series-02-CAN/CSA-2002; NSF 358-1 2011] with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013.

RM_-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M2101.1T #2-RM-CUDAHY.DOC

RM67 – 13

Table M2101.1, M2104.2.1 thru M2104.2.1.3, M2101.10, M2105, M2106 (New), M2107 (New), M2108 (New), M2109 (New), M2110 (New), Chapter 44

Proponent: Jeremy Brown, representing NSF International

Revise as follows:

TABLE M2101.1
HYDRONIC PIPING MATERIALS

MATERIAL	USE CODE ^a	STANDARD ^b	JOINTS	NOTES
Polyethylene (PE) pipe, tubing and fittings (for ground source heat pump loop systems)	1,2,4	ASTM D 2513; ASTM D 3035; ASTM D 2447; ASTM D 2683; ASTM F 1055; ASTM D 2837; ASTM D 3350; ASTM D 1693	Heat fusion	

(Portions of table not shown remain unchanged)

M2101.10 Tests. Hydronic piping systems shall be tested hydrostatically at a pressure of one and one-half times the maximum system design pressure, but not less than 100 psi(689kPa). ~~For a duration of not less than 75 minutes.~~ The duration of each test shall be not less than 15 minutes, and not more than 20 minutes.

~~**M2104.2.1 Polyethylene plastic pipe and tubing for ground source heat pump loop systems.** Joints between polyethylene plastic pipe and tubing or fittings for ground source heat pump loop systems shall be heat fusion joints conforming to Section M2104.2.1.1, electrofusion joints conforming to Section M2104.2.1.2 or stab-type insertion joints conforming to Section M2104.2.1.3.~~

~~**M2104.2.1.1 Heat fusion joints.** Joints shall be of the socket fusion, saddle fusion or butt fusion type, fabricated in accordance with the piping manufacturer's instructions. Joint surfaces shall be clean and free of moisture. Joint surfaces shall be heated to melt temperatures and joined. The joint shall be undisturbed until cool. Fittings shall be manufactured in accordance with ASTM D 2683.~~

~~**M2104.2.1.2 Electrofusion joints.** Joint surfaces shall be clean and free of moisture, and scoured to expose virgin resin. Joint surfaces shall be heated to melt temperatures for the period of time specified by the manufacturer. The joint shall be undisturbed until cool. Fittings shall be manufactured in accordance with ASTM F 1055.~~

~~**M2104.2.1.3 Stab-type insert fittings.** Joint surfaces shall be clean and free of moisture. Pipe ends shall be chamfered and inserted into the fitting to full depth. Fittings shall be manufactured in accordance with ASTM D 2513.~~

SECTION M2105 PLASTIC PIPE GROUND-SOURCE HEAT PUMP LOOP SYSTEMS

~~**M2105.1 Testing.** The assembled loop system shall be pressure tested with water at 100 psi (690 kPa) for 30 minutes with no observed leaks before connection (header) trenches are backfilled. Flow rates and pressure drops shall be compared to calculated values. If actual flow rate or pressure drop figures differ from calculated values by more than 10 percent, the problem shall be identified and corrected.~~

M2105.1 Plastic Ground-Source Heat Pump-Loop Water Piping. Plastic ground-source heat pump ground- loop piping and tubing material for water-based systems shall conform to the standards specified in this section.

M2105.2 Used materials. Reused pipe, fittings, valves, and other materials shall not be used in ground-source heat pump loop systems.

M2105.3 Material rating. Pipe and tubing shall be rated for the operating temperature and pressure of the ground source heat pump loop system. Fittings shall be suitable for the pressure applications and recommended by the manufacturer for installation with the pipe and tubing material installed. Where used underground, materials shall be suitable for burial.

M2105.4 Piping and tubing materials standards. Ground-source heat pump ground-loop pipe and tubing shall conform to the standards listed in Table M2105.4.

M2105.5 Fittings. Ground-source heat pump pipe fittings shall be approved for installation with the piping materials to be installed, shall conform to the standards listed in Table M2105.5 and where installed underground shall be suitable for burial.

TABLE M2105.5
GROUND SOURCE LOOP PIPE FITTINGS

PIPE MATERIAL	STANDARD
Chlorinated polyvinyl chloride (CPVC)	ASTM D 2846; ASTM F437; ASTM F438; ASTM F439; CSA B137.6
Cross-linked polyethylene (PEX)	ASTM F 877; ASTM F1807; ASTM F 1960; ASTM F 2080; ASTM F2159; ASTM F2434; CSA B137.5
Polyethylene/aluminum/polyethylene (PE-AL-PE)	ASTM F 2434; ASTM F1282, CSA B137.9
High Density Polyethylene (HDPE)	ASTM D2683; ASTM D3261; ASTM F1055; CSA B137.1; CSA C448, NSF 358-1
Polypropylene (PP-R)	ASTM F2389; CSA B137.11, NSF 358-2
Polyvinyl chloride (PVC)	ASTM D2464; ASTM D2466; ASTM D2467; CSA B137.2; CSA B137.3
Raised temperature polyethylene (PE-RT)	ASTM D3261; ASTM F1807; ASTM F2159; B137.1

TABLE M2105.4
GROUND SOURCE LOOP PIPE

MATERIAL	STANDARD
Chlorinated polyvinyl chloride (CPVC)	ASTM D2846; ASTM F441; ASTM F442
Cross-linked polyethylene (PEX)	ASTM F876; ASTM F877 CSA B137.5
Polyethylene/aluminum/polyethylene (PE-AL-PE) pressure pipe	ASTM F1282; CSA B137.9
High Density Polyethylene (HDPE)	ASTM D2737; ASTM D3035; ASTM F714; AWWA C901; CSA B137.1; CSA C448; NSF 358-1
Polypropylene (PP-R)	ASTM F2389; CSA B137.11, NSF 358-2
Polyvinyl chloride (PVC)	ASTM D1785; ASTM D2241
Raised temperature polyethylene (PE-RT)	ASTM F2623

SECTION M2106
JOINTS AND CONNECTIONS

M2106.1 Approval. Joints and connections shall be of an approved type. Joints and connections shall be tight for the pressure of the ground-source loop system. Joints used underground shall be approved for such applications.

M2106.1.1 Joints between different piping materials. Joints between different piping materials shall be made with approved transition fittings.

M2106.2 Preparation of pipe ends. Pipe shall be cut square, reamed, and shall be free of burrs and obstructions. CPVC, PE, and PVC pipe shall be chamfered. Pipe ends shall have full-bore openings and shall not be undercut.

M2106.3 Joint preparation and installation. Where required by Sections M2106.4 through M2106.6, the preparation and installation of mechanical and thermoplastic-welded joints shall comply with Sections M2106.3.1 and M2016.3.2.

M2106.3.1 Mechanical joints. Mechanical joints shall be installed in accordance with the manufacturer's instructions.

M2106.3.2 Thermoplastic-welded joints. Joint surfaces for thermo plastic-welded joints shall be cleaned by an approved procedure. Joints shall be welded in accordance with the manufacturer's instructions.

M2106.4 CPVC plastic pipe. Joints between CPVC plastic pipe or fittings shall be solvent-cemented in accordance with Section P2905.9.1.2. Threaded joints between fittings and CPVC plastic pipe shall be in accordance with Section M2106.4.1.

M1206.4.1 Threaded joints. Threads shall conform to ASME B1.20.1. The pipe shall be Schedule 80 or heavier and shall be threaded with dies specifically designed for plastic pipe. Thread lubricant, pipe-joint compound or tape shall be applied on the male threads only and shall be *approved* for application on the piping material.

M2106.5 Cross-linked polyethylene (PEX) plastic tubing. Joints between cross-linked polyethylene plastic tubing and fittings shall comply with Sections M2106.5.1 and M2106.5.2. Mechanical joints shall comply with Section M2106.3.1.

M2106.5.1 Compression-type fittings. Where compression-type fittings include inserts and ferrules or O-rings, the fittings shall be installed without omitting the inserts and ferrules or O-rings.

M2106.5.2 Plastic-to-metal connections. Solder joints in a metal pipe shall not occur within 18 inches of a transition from such metal pipe to plastic pipe or tubing.

M2106.6 Polyethylene plastic pipe and tubing for ground source heat pump loop systems. Joints between polyethylene plastic pipe and tubing or fittings for ground-source heat pump loop systems shall be heat fusion joints complying with Section M2106.6.1, electrofusion joints complying with Section M2106.6.2, or stab-type insertion joints complying with Section M2106.6.3.

M2106.6.1 Heat-fusion joints. Joints shall be of the socket-fusion, saddle-fusion or butt-fusion type, and joined in accordance with ASTM D 2657. Joint surfaces shall be clean and free of moisture. Joint surfaces shall be heated to melt temperatures and joined. The joint shall be undisturbed until cool. Fittings shall be manufactured in accordance with ASTM D 2683 or ASTM D 3261.

M2106.6.2 Electrofusion joints. Joints shall be of the electrofusion type. Joint surfaces shall be clean and free of moisture, and scoured to expose virgin resin. Joint surfaces shall be heated to melt temperatures for the period of time specified by the manufacturer. The joint shall be undisturbed until cool. Fittings shall be manufactured in accordance with ASTM F 1055.

M2106.6.3 Stab-type insert fittings. Joint surfaces shall be clean and free of moisture. Pipe ends shall be chamfered and inserted into the fittings to full depth. Fittings shall be manufactured in accordance with ASTM F 1924.

M2106.7 Polypropylene (PP) plastic. Joints between PP plastic pipe and fittings shall comply with Sections M2106.7.1 and M2106.7.2.

M2106.7.1 Heat-fusion joints. Heat-fusion joints for polypropylene (PP) pipe and tubing joints shall be installed with socket-type heat-fused polypropylene fittings, electrofusion polypropylene fittings or by butt fusion. Joint surfaces shall be clean and free from moisture. The joint shall be undisturbed until cool. Joints shall be made in accordance with ASTM F 2389.

M2106.7.2 Mechanical and compression sleeve joints. Mechanical and compression sleeve joints shall be installed in accordance with the manufacturer's instructions.

M2106.8 Raised temperature polyethylene (PE-RT) plastic tubing. Joints between raised temperature polyethylene tubing and fittings shall comply with Sections M2106.8.1 and M2106.8.2. Mechanical joints shall comply with Section M2106.3.1.

M2106.8.1 Compression-type fittings. Where compression-type fittings include inserts and ferrules or O-rings, the fittings shall be installed without omitting the inserts and ferrules or O-rings.

M2106.8.2 PE-RT-to-metal connections. Solder joints in a metal pipe shall not occur within 18 inches of a transition from such metal pipe to plastic pipe or tubing.

M2106.9 PVC plastic pipe. Joints between PVC plastic pipe or fittings shall be solvent-cemented in accordance with Section P2905.9.1.3. Threaded joints between fittings and PVC plastic pipe shall be in accordance with Section M2106.4.1.

SECTION M2107 **VALVES**

M2107.1 Where required. Shutoff valves shall be installed in ground-source loop piping systems in the locations indicated in Sections M2107.1.1 through M2107.1.6.

M2107.1.1 Heat exchangers. Shutoff valves shall be installed on the supply and return side of a heat exchanger.

Exception: Shutoff valves shall not be required where heat exchangers are integral with a boiler or are a component of a manufacturer's boiler and heat exchanger packaged unit and are capable of being isolated from the hydronic system by the supply and return valves required by Section M2001.3.

M2107.1.2 Central systems. Shutoff valves shall be installed on the building supply and return of a central utility system.

M2107.1.3 Pressure vessels. Shutoff valves shall be installed on the connection to any pressure vessel.

M2107.1.4 Pressure-reducing valves. Shutoff valves shall be installed on both sides of a pressure-reducing valve.

M2107.1.5 Equipment and appliances. Shutoff valves shall be installed on connections to mechanical equipment and appliances. This requirement does not apply to components of a ground-source loop system such as pumps, air separators, metering devices, and similar equipment.

M2107.1.6 Expansion tanks. Shutoff valves shall be installed at connections to nondiaphragm-type expansion tanks.

M2107.2 Reduced pressure. A pressure relief valve shall be installed on the low-pressure side of a hydronic piping system that has been reduced in pressure. The relief valve shall be set at the

maximum pressure of the system design. The valve shall be installed in accordance with Section M2002.

SECTION M2108 **PIPING INSTALLATION**

M2108.1 General. Piping, valves, fittings, and connections shall be installed in accordance with the manufacturer's instructions.

M2108.3 Protection of potable water. Where ground-source heat pump ground-loop systems have a connection to a potable water supply, the potable water system shall be protected from backflow in accordance with Section P2902.

M2108.4 Pipe penetrations. Openings for pipe penetrations in walls, floors and ceilings shall be larger than the penetrating pipe. Openings through concrete and masonry building elements shall be sleeved. The annular space surrounding pipe penetrations shall be protected in accordance with Section P2606.1.

M2108.5 Clearance from combustibles. A pipe in a ground source heat pump piping system having an exterior surface temperature exceeding 250°F (121°C) shall have a *clearance* of not less than 1 inch (25 mm) from combustible materials.

M2108.6 Contact with building material. A ground-source heat pump ground-loop piping system shall not be in direct contact with building materials that cause the piping or fitting material to degrade or corrode, or that interfere with the operation of the system.

M2108.7 Strains and stresses. Piping shall be installed so as to prevent detrimental strains and stresses in the pipe. Provisions shall be made to protect piping from damage resulting from expansion, contraction and structural settlement. Piping shall be installed so as to avoid structural stresses or strains within building components.

M2108.7.1 Flood hazard. Piping located in a flood hazard area shall be capable of resisting hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to the *design flood elevation*.

M2108.8 Pipe support. Pipe shall be supported in accordance with Section M2101.9.

M2108.9 Velocities. Ground-source heat pump ground-loop systems shall be designed so that the flow velocities do not exceed the maximum flow velocity recommended by the pipe and fittings manufacturer. Flow velocities shall be controlled to reduce the possibility of water hammer.

M2108.10 Labeling and Marking. Ground-source heat pump ground-loop system piping shall be marked with tape, metal tags or other methods where it enters a building. The marking shall state the following words: "GROUND-SOURCE HEAT PUMP LOOP SYSTEM". The marking shall indicate if antifreezes used in the system and shall indicate the chemicals by name and concentration.

M2108.11 Chemical Compatibility. Antifreeze and other materials used in the system shall be chemically compatible with the pipe, tubing, fittings, and mechanical systems.

SECTION M2109 **WORKING FLUID**

M2109.1 Makeup water. The transfer fluid in ground-source heat pump systems shall be compatible with the makeup water supplied to the system.

SECTION M2110 **TESTS**

M2109.1 Testing. Before connection header trenches are backfilled, the assembled loop system shall be pressure tested with water at 100 psi (689 kPa) for 15 minutes with no observed leaks. Flow and pressure loss testing shall be performed and the actual flow rates and pressure drops shall be compared to the calculated design values. If actual flow rate or pressure drop values differ from calculated design values by more than 10 percent, the cause shall be identified and corrective action taken.

SECTION M2111 **EMBEDDED PIPING**

M2110.1 Pressurizing during installation. Ground-source heat pump ground-loop piping to be embedded in concrete shall be pressure tested prior to pouring concrete. During pouring, the pipe shall be maintained at the proposed operating pressure.

Add new standards to Chapter 44 as follows:

ASTM

ASTM D3261 -03 Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing

ASTM F1924-05 Standard Specification for Plastic Mechanical Fittings for Use on Outside Diameter Controlled Polyethylene Gas Distribution Pipe and Tubing

CSA

CSA C448 SERIES-02-CAN/CSA-2002 Design and Installation of Earth Energy Systems -First Edition; Update 2: October 2009; Consolidated Reprint 10/2009

NSF

NSF 358-1 2011 Polyethylene Pipe and Fittings for Water-Based Ground-Source 'Geothermal' Heat Pump Systems

NSF 358-2 2012 Polypropylene Pipe and Fittings for Water-Based Ground-Source 'Geothermal' Heat Pump Systems.

Reason: This revised language, new sections and standards were approved for the 2015 IMC. A companion Code change has been submitted by PPFA. My only change to their proposal is to add one additional standard NSF 358-2, which at the time of submittal of this code change was not published yet. This standard is expected to be published in February 2013 and made available for free by contacting the proponent at brown@nsf.org for consideration of this code change.

Cost Impact: This will not increase the cost of construction.

Analysis: A review of the standards proposed for inclusion in the code, [ASTM D3261-03, F1924-05; CSA C448 Series-02-CAN/CSA-2002; NSF 358-1 2011, and 358-2 2012] with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28, will be posted on the ICC website on or before April 1, 2013.

RM67-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M2101.1T-RM-BROWN.DOC

RM68 – 13

Table M2101.9

Proponent: Larry Gill, P. Eng. IPEX USA LLC (larry.gill@ipexna.com)

Revise as follows:

TABLE M2101.9
HANGAR SPACING INTERVALS

PIPING MATERIAL	MAXIMUM HORIZONTAL SPACING (feet)	MAXIMUM VERTICAL SPACING (feet)
<u>PE-RT ≤ 1"</u>	<u>2.67</u>	<u>4</u>
<u>PE-RT ≥ 1¼"</u>	<u>4</u>	<u>4</u>

(Portions of table not shown remain unchanged)

Reason: Add support dimensions for polyethylene of raised temperature (PE-RT). PE-RT is already in the International Codes and adding the support spacing will provide additional information for installation. All other dimensions in the table remain unchanged.

Cost Impact: The proposed change will not increase the cost of construction.

RM68-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

M2101.9T-RM-GILL.DOC

RM69 – 13

Table M2101.9

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee
(dave.hall@georgetown.org)

Revise as follows:

**TABLE M2101.9
HANGER SPACING INTERVAL**

PIPING MATERIAL	MAXIMUM HORIZONTAL SPACING (feet)	MAXIMUM VERTICAL SPACING (feet)
ABS	4	10 ^a
CPVC ≤ 1 inch pipe or tubing	3	5 ^a
CPVC ≥ 1 ¼ inches	4	10 ^a
PE-RT ≤ 1 inch	2 ⅔ (32 inches)	10 ^a
PE-RT ≥ 1¼ inches	4	10 ^a
PP ≥ 1 ¼ inches	4	10 ^a
PVC	4	10 ^a

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm

a. For sizes 2 inches and smaller, a guide shall be installed midway between required vertical supports. Such guides shall prevent pipe movement in a direction perpendicular to the axis of the pipe.

(Portions of table not shown remain unchanged.)

Reason: The addition of the PE-RT information to the table was approved for the 2015 IMC. Footnote “a” is added to the table to be in coordination with the same requirement found in IMC Table 305.4. Support dimensions for polyethylene of raised temperature (PE-RT) are added. PE-RT is already in the International Codes and adding the support spacing will provide additional information for installation. All other dimensions in the table remain unchanged.

Cost Impact: The proposed change will not increase the cost of construction.

RM69-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

M2101.9T-RM-HALL-PMGCAC

RM70 – 13

M2103.1

Proponent: Pennie L. Feehan, Pennie L. Feehan Consulting, representing Copper Development Association (penniefeehan@me.com)

Revise as follows:

M2103.1 Piping materials. Piping for embedment in concrete or gypsum materials shall be standard-weight steel pipe, copper and copper alloy pipe and tubing, cross-linked polyethylene/aluminum/crosslinked polyethylene (PEX-AL-PEX) pressure pipe, chlorinated polyvinyl chloride (CPVC), polybutylene, cross-linked polyethylene (PEX) tubing or polypropylene (PP) with a minimum rating of 100 psi at 180°F (690 kPa at 82°C).

Reason: Brass and Bronze are copper alloys and by adding copper alloys this proposal provides the appropriate terminology and correct information to the end user.

Cost Impact: None

RM70-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M2103.1-RM-FEEHAN.DOC

RM71 – 13

M2103.1

Proponent: Larry Gill, P. Eng. IPEX USA LLC (larry.gill@ipexna.com)

Revise as follows:

M2103.1 Piping materials. Piping for embedment in concrete or gypsum materials shall be standard weight steel pipe, copper tubing, cross linked polyethylene aluminum polyethylene (PEX-AL-PEX) pressure pipe, chlorinated polyvinyl chloride (CPVC), polybutylene, cross-linked polyethylene (PEX) tubing, polyethylene of raised temperature (PE-RT) or polypropylene (PP) with a minimum rating of 100psi at 180°F (690kPa at 82°C).

Reason: Add polyethylene of raised temperature (PE-RT) to the piping materials section. PE-RT meets all of the requirements of Chapter 21.

Cost Impact: The proposed change will not increase the cost of construction.

RM71-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M2103.1-RM-GILL.DOC

RM72 – 13

M2103.3, Chapter 44

Proponent: Pennie L. Feehan, Pennie L. Feehan Consulting, representing Copper Development Association (penniefeehan@me.com)

Revise as follows:

M2103.3 Piping joints. Copper and copper alloys systems shall be soldered in accordance with ASTM B828. Fluxes for soldering shall be in accordance with ASTM B813 and shall become noncorrosive and non-toxic after soldering. Brazing fluxes shall be in accordance with AWS A5.31. Piping joints that are embedded shall be installed in accordance with the following requirements:

Add new standard to Chapter 44 as follows:

ANSI/AWS A5.31M/A5.31:2012 Specification for Fluxes for Brazing and Braze Welding Edition: 2nd

Reason: Because hydronic systems are not potable system, inspectors and installers are not following the proper methods of installing copper pipe and tubing. Fluxes used for soldering copper tube and fittings must meet the requirements of ASTM B813.

Cost Impact: None

Analysis: A review of the standard proposed for inclusion in the code, [ANSI/AWS A5.31M/A5.31-2012] with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

RM72-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M2103.3-RM-FEEHAN.DOC

RM73 – 13

M2103.3, Chapter 44

Proponent: Larry Gill, P. Eng. IPEX USA LLC (larry.gill@ipexna.com)

Revise as follows:

M2103.3 Piping joints. Piping joints that are embedded shall be installed in accordance with the following requirements:

1. Steel pipe joints shall be welded.
2. Copper tubing shall be joined with brazing material having a melting point exceeding 1,000°F (538°C).
3. Polybutylene pipe and tubing joints shall be installed with socket-type heat-fused polybutylene fittings.
4. CPVC tubing shall be joined using solvent cement joints.
5. Polypropylene pipe and tubing joints shall be installed with socket-type heat-fused polypropylene fittings.
6. Cross-linked polyethylene (PEX) tubing shall be joined using cold expansion, insert or compression fittings.
7. Raised temperature polyethylene (PE-RT) tubing shall be joined using insert or compression fittings.

TABLE M2101.1
HYDRONIC PIPING MATERIALS

MATERIAL	USE CODE ^a	STANDARD ^b	JOINTS	NOTES
Raised Temperature Polyethylene (PE-RT)	1,2,3	ASTM F 2623 <u>ASTM F 2769</u>	Copper crimp/insert fitting stainless steel clamp, insert fittings	
<u>Raised Temperature Polyethylene (PE-RT) fittings</u>	<u>1,2,3</u>	<u>ASTM F1807</u> <u>ASTM F2159</u> <u>ASTM F2735</u> <u>ASTM F2769</u> <u>ASTM F2098</u>	<u>Copper</u> <u>crimp/insert fitting</u> <u>stainless steel</u> <u>clamp, insert</u> <u>fittings</u>	

Reason: Revise clause M2103.3 to include provisions for Raised Temperature Polyethylene (PE-RT) tubing. Revise Table M2101.1 to add PE-RT system standard ASTM F2769 (ASTM F2769 is a standard for hot and cold water tubing and distribution systems and includes provisions for tubing, fittings, valves and manifolds) for hydronic piping materials. Add the ASTM standards for fittings to be used with PE-RT. All of these standards are consensus based ASTM standards.

Cost Impact: The proposed change will not increase the cost of construction.

RM73-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M2103.3-RM-GILL.DOC

RM74 – 13

M2103.3

Proponent: David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee
(dave.hall@georgetown.org)

Revise as follows:

M2103.3 Piping joints. Piping joints that are embedded shall be installed in accordance with the following requirements:

1. Steel pipe joints shall be welded.
2. Copper tubing shall be joined ~~with~~ by brazing complying with Section P3003.5.1, material having a melting point exceeding 1,000°F (538°C).
3. Polybutylene pipe and tubing joints shall be installed with socket-type heat-fused polybutylene fittings.
4. CPVC tubing shall be joined using solvent cement joints.
5. Polypropylene pipe and tubing joints shall be installed with socket-type heat-fused polypropylene fittings.
6. Cross-linked polyethylene (PEX) tubing shall be joined using cold expansion, insert or compression fittings.

Reason: This revised language was approved for the 2015 IMC. The proposed language refers the end user to the appropriate code section with important language from the applicable standards.

Cost Impact: This code change will not increase the cost of construction.

RM74-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M2103.3-RM-HALL-PMGCAC

RM75 – 13

M2104.2, M2104.3

Proponent: Larry Gill, P.Eng. IPEX USA LLC

Revise as follows:

M2104.2 Piping Joints. Piping joints, other than those in Section M2103.3, that are embedded shall comply with the following requirements:

1. Cross-Linked Polyethylene (PEX) tubing shall be installed in accordance the manufacturer's instructions.
2. Polyethylene tubing shall be installed with heat fusion joints.
3. Polypropylene (PP) shall be installed in accordance with the manufacturer's instructions.
4. Raised temperature polyethylene (PE-RT) shall be installed in accordance with the manufacturer's instructions.

M2104.3 Raised temperature polyethylene (PE-RT) plastic tubing. Joints between raised temperature polyethylene tubing and fittings shall conform to Sections M2104.3.1, ~~and~~ M2104.3.2 and M2104.3.3. Mechanical joints shall be installed in accordance with the manufacturer's instructions.

M2104.3.1 Compression-type fittings. Where compression-type fittings include inserts and ferrules or O rings the fittings shall be installed without omitting such inserts and ferrules or O-rings.

M2104.3.2 PE-RT to metal connections. Solder joints in a metal pipe shall not occur within 18 inches (457 mm) of a transition of such metal pipe to PE-RT pipe.

M2104.3.3 PE-RT insert fittings. PE-RT insert fittings shall be installed in accordance with the manufacturer's instructions.

Reason: Add Polyethylene of Raised Temperature (PE-RT) to sections M2104.2 and M2104.3 to mandate that manufacturers instructions must be adhered to and that insert fittings must be installed in accordance with manufacturers instructions.

Cost Impact: The proposed change will not increase the cost of construction.

R75_-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M2104.2-RM-GILL.doc

RM76 – 13

M2202.1, Chapter 44

Proponent: Pennie L. Feehan, Pennie L. Feehan Consulting representing Copper Development Association (penniefeehan@me.com)

Revise as follows:

M2202.1 Materials. Piping shall consist of steel pipe, copper ~~and copper alloys pipe and~~ tubing or steel tubing conforming to ASTM A539. Aluminum tubing shall not be used between the fuel-oil tank and the burner units.

Add new standard to Chapter 44 as follows:

ANSI/AWS A5.31M/A5.31:2012 Specification for Fluxes for Brazing and Braze Welding Edition: 2nd

Reason: Because special piping systems are not potable system, inspectors and installers are not following the proper methods of installing copper pipe and tubing. Fluxes used for soldering copper tube and fittings must meet the requirements of ASTM B813. This proposal provides the appropriate terminology and correct information to the end user.

Cost Impact: None

Analysis: A review of the standard proposed for inclusion in the code, [ANSI/AWS A5.31M/A5.31-2012] with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

RM76-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M2202.1-RM-FEEHAN.DOC

RM77 – 13

M2301.2.2 (New), M2301.2.2, M2301.2.2.2 (New), Chapter 44

Proponent: David Hall, Vice Chair, Plumbing/Mechanical/Gas Code Action Committee, (dave.hall@georgetown.org) and Brenda A. Thompson, Clark County Building Department, Las Vegas NV, Chair, Sustainability, Energy & High Performance Code Action Committee (bat@ClarkCountyNV.gov)

Revise as follows:

M2301.2.2 Collectors and panels. Solar collectors and panels shall comply with Sections M2301.2.2.1 and M2301.2.2.2.

M2301.2.2.1 ~~M2301.2.2~~ Roof-mounted collectors. The roof shall be constructed to support the loads imposed by roof-mounted solar collectors. Roof-mounted solar collectors that serve as a roof covering shall conform to the requirements for roof coverings in Chapter 9 of this code. Where mounted on or above the roof coverings, the collectors and supporting structure shall be constructed of noncombustible materials or fire-retardant-treated wood equivalent to that required for the roof construction.

M2301.2.2.2 Collector sensors. Collector sensor installation, sensor location and the protection of exposed sensor wires from ultraviolet light shall be in accordance with SRCC 300.

Add new standard to Chapter 44 as follows:

SRCC

Solar Rating & Certification Corporation
400 High Point Drive, Suite 400
Cocoa, Florida 32926

SRCC 300-13 Standard 300 For Solar Water Heating Systems

Reason: This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The PMGCAC and SEHPCAC were established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since their inception in July, 2011, the PMGCAC and SEHPCAC have held multiple open meetings and conference calls and workgroup calls which included members of the PMGCAC and SEHPCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

This proposal revises existing Section M2301.2.2 into a parent section and two subsections. This was done in order to reference requirements related to collector sensors that are contained in SRCC 300. These collector sensor requirements are based on the manner in which the New York State Field Inspection Guidelines for Solar Heating Systems reference the SRCC standards.

Please note that the proponents have also submitted other proposals that are coordinated with this proposal. In the spirit of the IRC as a one stop code for one- and two-family dwellings and townhouses, these proposals enhance, update, clarify and improve the usability of the solar energy provisions of Chapter 23 of the IRC and make it truly comprehensive and much more direct and intuitive. This proposal, however, is intended to stand alone and is not contingent upon the success of other PMGCAC or SEHPCAC proposals.

Cost Impact: Where solar systems are provided, this proposal may increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, [SRCC 300-13] with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013.

RM77-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M2301.2.2 (NEW)-RM-HALL-THOMPSON-SEHPCAC.DOC

RM78– 13

2301 (New)

Proponent: David Hall, Vice Chair, Plumbing/Mechanical/Gas Code Action Committee, (dave.hall@georgetown.org) and Brenda A. Thompson, Clark County Building Department, Las Vegas NV, Chair, Sustainability, Energy & High Performance Code Action Committee (bat@ClarkCountyNV.gov)

Add new text as follows:

SECTION M2301 **GENERAL**

M2301.1 General. This chapter provides for the design, construction, installation, alteration and repair of solar energy systems. Solar thermal systems shall comply with Section M2301 and Section 2302. Photovoltaic solar energy systems shall comply with Section 2301 and Section 2303.

M2301.2 Ground mounted collectors, panels and modules. Ground mounted solar collectors, panels and modules shall be subject to the fire separation distance requirements of Section R302.1.

Reason: This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The PMGCAC and SEHPCAC were established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since their inception in July, 2011, the PMGCAC and SEHPCAC have held multiple open meetings and conference calls and workgroup calls which included members of the PMGCAC and SEHPCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Reasons for this proposal are as follows:

- a. Proposed new Section M2301 creates general provisions which are applicable to both solar thermal and solar photovoltaic systems. Solar system designers and installers, as well as code enforcement officials, are often confused as to what is applicable to solar systems.
- b. Proposed Section M2301.1 sets up a framework for Chapter 3 by requiring that both solar thermal and solar photovoltaic systems comply with the general requirements of proposed new Section M2301. In addition, solar thermal systems must comply with the existing requirements of the code for solar thermal systems, which this proposal rennumbers as Section M2302, and solar photovoltaic systems must comply with the existing requirements of the code for solar photovoltaic systems, which this proposal rennumbers as Section M2303.
- c. Proposed Section M2301.2 ultimately requires that ground mounted solar collectors, panels and modules comply with the requirements of Section R302.1 for fire separation distance. The intent is that the code official use his judgment to require that the portions of ground mounted collectors and their supporting structure be regulated by those portions of Section R302.1 that regulate relatively similar attributes.

Please note that the proponents have also submitted other proposals that are coordinated with this proposal. In the spirit of the IRC as a one stop code for one- and two-family dwellings and townhouses, these proposals enhance, update, clarify and improve the usability of the solar energy provisions of Chapter 23 of the IRC and make it truly comprehensive and much more direct and intuitive. This proposal, however, is intended to stand alone and is not contingent upon the success of other PMGCAC or SEHPCAC proposals.

Cost Impact: Where ground mounted solar systems thermal systems are provided in close proximity to lot lines, this proposal may increase the cost of construction.

RM78-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M2301 (NEW)-RM-HALL-THOMPSON-SEPHCAC.DOC

RM79 – 13

M2301.2

Proponents: David Hall, Vice Chair, Plumbing/Mechanical/Gas Code Action Committee, (dave.hall@georgetown.org) and Brenda A. Thompson, Clark County Building Department, Las Vegas NV, Chair, Sustainability, Energy & High Performance Code Action Committee (bat@ClarkCountyNV.gov)

Revise as follows:

M2301.2 Design and installation. The design and installation of thermal solar energy systems shall comply with Sections M2301.2.1 through M2301.2.9.

Reason: This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The PMGCAC and SEHPCAC were established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since their inception in July, 2011, the PMGCAC and SEHPCAC have held multiple open meetings and conference calls and workgroup calls which included members of the PMGCAC and SEHPCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

This proposal changes existing Section M2301.2 of the 2012 IRC. It is intended to stand alone and is not contingent upon the success of other proposals from the PMGCAC and SEHPCAC related to solar energy

This proposal clarifies that Section M2301.2 also applies to the design of solar energy systems and that this section and its subsections apply specifically to *thermal* solar energy systems (not photovoltaics).

Please note that the proponents have also submitted other proposals that are coordinated with this proposal. In the spirit of the IRC as a one stop code for one- and two-family dwellings and townhouses, these proposals update, clarify and improve the usability of the solar energy provisions of Chapter 23 of the IRC and make it truly comprehensive and much more direct and intuitive.

Cost Impact: This proposal will not increase the cost of construction.

RM79-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M2301.2-RM-HALL-THOMPSON-SEHPCAC.DOC

RM80 – 13

R202, M2301.2.2, M2301.2.7, M2302.2.1, M2302.2.2, M2301 (New)

Proponent: David Hall, Vice Chair, Plumbing/Mechanical/Gas Code Action Committee, (dave.hall@georgetown.org) and Brenda A. Thompson, Clark County Building Department, Las Vegas NV, Chair, Sustainability, Energy & High Performance Code Action Committee (bat@ClarkCountyNV.gov)

Delete as follows:

~~**M2301.2.2 Roof-mounted collectors.** The roof shall be constructed to support the loads imposed by roof-mounted solar collectors. Roof-mounted solar collectors that serve as a roof covering shall conform to the requirements for roof coverings in Chapter 9 of this code. Where mounted on or above the roof coverings, the collectors and supporting structure shall be constructed of noncombustible materials or fire-retardant-treated wood equivalent to that required for the roof construction.~~

~~**M2301.2.7 Roof and wall penetrations.** Roof and wall penetrations shall be flashed and sealed in accordance with Chapter 9 of this code to prevent entry of water, rodents and insects.~~

~~**M2302.2.1 Roof-mounted panels and modules.** Where photovoltaic panels and modules are installed on roofs, the roof shall be constructed to support the loads imposed by such modules. Roof-mounted photovoltaic panels and modules that serve as roof covering shall conform to the requirements for roof coverings in Chapter 9. Where mounted on or above the roof coverings, the photovoltaic panels and modules and supporting structure shall be constructed of noncombustible materials or fire retardant treated wood equivalent to that required for the roof construction.~~

~~**M2302.2.2 Roof and wall penetrations.** Roof and wall penetrations shall be flashed and sealed in accordance with Chapter 9 to prevent entry of water, rodents and insects.~~

Add new definitions as follows:

SECTION R202 DEFINITIONS

BUILDING INTEGRATED PHOTOVOLTAIC PRODUCT. A building product that incorporates photovoltaic modules and functions as a component of the building envelope.

PHOTOVOLTAIC MODULE. A complete, environmentally protected unit consisting of solar cells, optics and other components, exclusive of tracking hardware, designed to generate DC power when exposed to sunlight.

PHOTOVOLTAIC PANEL. A collection of modules mechanically fastened together, wired, and designed to provide a field-installable unit.

PHOTOVOLTAIC PANEL SYSTEM. A system that incorporates discrete photovoltaic panels, that converts solar radiation into electricity, including rack support systems.

PHOTOVOLTAIC SHINGLES. A roof covering resembling shingles that incorporates photovoltaic modules.

SOLAR THERMAL COLLECTOR. A device that incorporates one or more solar thermal absorbers to absorb incident solar radiation, to convert it to thermal energy, and to transfer the thermal energy to a gas or liquid coming in contact with it.

SOLAR THERMAL LOOP. The portion of the solar thermal system that transports a heated gas or liquid to a collector or storage.

SOLAR THERMAL ABSORBER. A component of a solar collector for absorbing radiant energy and transferring that energy as heat into a fluid.

SOLAR THERMAL PANEL. A solar thermal collector individually mounted or mounted to or within a frame, fastened, and designed to provide a field installable unit.

SOLAR THERMAL PANEL SYSTEM. A system that incorporates discrete solar thermal panels that convert solar radiation into solar energy, including structural support systems such as frames or racks.

SOLAR THERMAL SYSTEM. An assembly of components and subsystems that, in combination, convert solar radiant energy into thermal energy and transfer it to a gas or liquid passing through the system. The heated gas or liquid is then stored or used to provide hot water, space heating, or cooling.

Add new text as follows:

SECTION M2301

GENERAL

M2301.1 General. This chapter provides for the design, construction, installation, alteration and repair of solar energy systems. Solar thermal systems shall comply with Sections M2301 and M2302. Photovoltaic solar energy systems shall comply with Sections M2301 and M2303.

M2301.2 Solar energy equipment and appliances. Solar energy system equipment, appliances and components shall be used and installed in accordance with the manufacturer's instructions and the provisions of this code.

M2301.3 Solar energy system structural requirements. Structural requirements for solar energy systems shall be based upon the type, location and configuration of the system.

M2301.3.1 Systems mounted directly to or above the roof covering. Rooftop solar thermal systems, solar thermal panel systems, and photovoltaic panel systems that are mounted above the roof covering shall be designed in accordance with the International Building Code to support the system and withstand applicable loads. The roof upon which these systems are installed shall be constructed to support the loads imposed by such systems in accordance with Chapter 8. Systems mounted directly to or above the roof covering shall be constructed of noncombustible materials or fire-retardant treated wood.

M2301.3.2 Systems that serve as roof coverings. Where solar thermal systems, solar thermal panel systems, and building integrated photovoltaic systems including, photovoltaic shingles, serve as the roof covering, they shall conform to the requirements for roof coverings in Chapter 9.

M2301.3.3 Ground mounted systems. Ground mounted solar thermal systems, solar thermal panel systems, and photovoltaic systems shall conform to Section R301.

M2301.4 Corrosion prevention. Solar equipment and systems shall be designed to inhibit galvanic and other corrosion between dissimilar metals of solar collectors, panels, modules, supports, fasteners and metal roofs. Paints shall not be used as galvanic corrosion protection.

M2301.5 Interference. Solar collectors, panels and modules shall not obstruct or interfere with the function or operation of access hatchways, roof access doorways, standpipe connections, expansion joints, skylights, operable windows, plumbing vents and mechanical equipment.

M2301.6 Roof and wall penetrations. Roof and wall penetrations shall be flashed in accordance with Chapter 9, Section R703.8 and, where required, shall be sealed in accordance with Chapter 11.

M2301.7 Rooftop mounted system fire classification. Rooftop mounted solar systems shall comply with Section 902.1.

Reason: This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The PMGCAC and SEHPCAC were established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since their inception in July, 2011, the PMGCAC and SEHPCAC have held multiple open meetings and conference calls and workgroup calls which included members of the PMGCAC and SEHPCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Reasons for this proposal are as follows:

- a. Proposed new Section M2301 creates general provisions which are applicable to both solar thermal and solar photovoltaic systems. Solar system designers and installers, as well as code enforcement officials, are often confused as to what is applicable to solar systems.
- b. Although it may appear at first glance that existing Sections M2301.2.2 and M2302.2.1 of the 2012 IRC, which address roof-mounted collectors, panels and modules, are being deleted, this proposal moves and clarifies those requirements in proposed new Sections M2301.3 through M2301.3.3.
- c. Although it may appear at first glance that existing Sections M2302.2.2 and M2301.2.7 of the 2012 IRC, which address roof and wall penetrations, are being deleted, this proposal moves and clarifies those requirements in proposed new Section M2301.6. New Section M2301.6 also clarifies where the flashing as sealing requirements are located in the code.
- d. The definitions for the following are based on definitions as they will appear in the 2015 IBC: photovoltaic panel, photovoltaic module, photovoltaic shingle, building integrated photovoltaic product and photovoltaic panel system.
- e. Proposed Section M2301.2 is a modification of Section 1401.4 of the 2012 International Mechanical Code.
- f. Proposed Sections M2301.3 through M2301.3.3 provide requirements related to the structural implications of various types of solar systems as related to the way in which they are mounted, supported and located. ICC ES AC428 and AC365 acceptance criteria may also be valuable in the approval of systems for compliance with this section, subject to the evaluation of the local building official.
- g. Proposed Sections M2301.4, M2301.5 and M2301.6 are derived from the California Solar Permitting Guidebook.
- h. Existing Section M2302.2.2 is revised and renumbered/relocated to proposed Section M2301.6.
- i. Proposed Section M2301.7 is essentially a pointer that alerts manufacturers, designers and contractors to the fact that Section 902.1 may have significant implications on solar systems. In cases where the building is located within 3 feet of lot lines, testing for fire classification is required for rooftop systems.

Please note that the proponents have also submitted other proposals that are coordinated with this proposal. In the spirit of the IRC as a one stop code for one- and two-family dwellings and townhouses, these proposals enhance, update, clarify and improve the usability of the solar energy provisions of Chapter 23 of the IRC and make it truly comprehensive and much more direct and intuitive. This proposal, however, is intended to stand alone and is not contingent upon the success of other PMGCAC or SEHPCAC proposals.

Cost Impact: Where solar systems are provided, this proposal may increase the cost of construction.

RM80-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M2301.2.2-RM-HALL-THOMPSON-SEHPCAC.DOC

RM81 – 13

R202 & M2301.2.2

Proponent: John Smirnow and Joseph H. Cain P.E. representing Solar Energy Industries Association (SEIA)

Add new definitions as follows:

SOLAR THERMAL COLLECTOR. A device that absorbs incident solar radiation, converts it to thermal energy, and transfers thermal energy to a heat transfer medium.

SOLAR THERMAL PANEL. A solar thermal collector mounted within a frame, and designed to provide a field installable unit.

SOLAR THERMAL PANEL SYSTEM. A system that incorporates one or more solar thermal panels that convert incident solar radiation into thermal energy, including structural support systems such as frames or racks.

Revise as follows:

M2301.2.2 Roof-mounted collectors. Rooftop-mounted solar thermal panel systems shall be designed in accordance with the *International Building Code* to support the system and withstand applicable loads. The roof shall be constructed to support the loads imposed by roof-mounted solar collectors and rooftop-mounted solar thermal panel systems in accordance with Chapter 8 of this code or the *International Building Code*. ~~Roof-mounted solar collectors that serve as a roof covering shall conform to the requirements for roof coverings in Chapter 9 of this code. Where mounted on or above the roof coverings, the collectors and supporting structure shall be constructed of noncombustible materials or fire-retardant-treated wood equivalent to that required for the roof construction.~~

Reason: This code change proposal is the result of a consensus process established by the Solar Energy Industries Association's (SEIA) Codes and Standards Working Group. Established in 1974, SEIA is the national trade association of the U.S. solar energy industry. As the voice of the industry, SEIA works with its member companies to make solar a mainstream and significant energy source by expanding markets, removing market barriers, strengthening the industry, and educating the public on the benefits of solar energy.

New definitions are added to provide clarity in requirements for photovoltaic systems. Sections are re-numbered for better flow.

The sentence that references "roof mounted solar collectors that serve as a roof covering" is relocated into its own section and revised to clarify the requirements for Building Integrated Photovoltaic (BIPV) systems.

The sentence that references "noncombustible materials or fire-retardant treated wood" is deleted, as it is obsolete.

Photovoltaic panel systems are constructed entirely of noncombustible components, other than seals between the glass panels and frames.

The first sentence of M2302.3.1 clarifies the system of hardware that becomes the mounting system for rooftop-mounted photovoltaic panel systems must be qualified by methods found in the International Building Code. There are no applicable provisions found in the International Residential Code for these systems of mounting hardware. These mounting systems must be qualified by calculations or physical testing, as prescribed in the IBC. New definitions are needed to provide this clarity.

The second sentence of M2302.3.1 clarifies the roof system must be checked or designed to support the resultant loads imposed on it by the mounting system of the photovoltaic panel system. This check can be accomplished by using appropriate span tables in IRC Chapter 8, or by structural analysis according to IBC provisions.

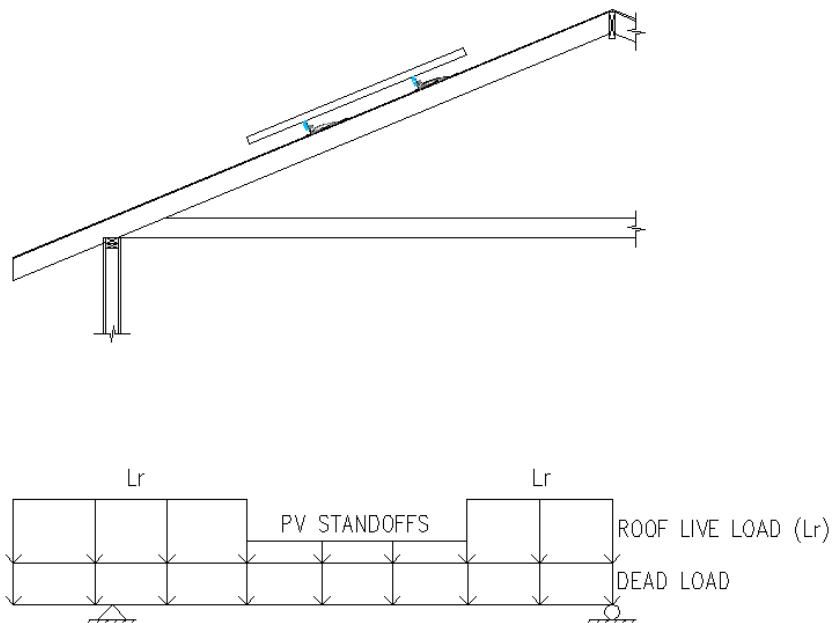
A new section on wind load is added for guidance to appropriate codes and standards where wind design provisions are found. Effective Wind Area is defined in ASCE 7-10 Section 26.2. Effective Wind Area is also referenced in Footnote a of Table R301.2(2) of this code. Effective Wind Area used in design of photovoltaic systems must be consistent with the definition found in ASCE 7 in order to be compatible with the wind design calculation methods found in ASCE 7.

A new section on roof live load is added to clarify provisions already formalized in Final Action for the 2015 IBC, with some modifications as appropriate for one- and two-family dwellings. In one load case, roof live load need not be modeled in the area(s) of the roof covered by PV panels, as nobody will be walking on top of the panels or on the roof area covered by the panels. In another load case for new construction, the code-prescribed roof live load must be modeled as if the photovoltaic panels are not present.

The second sentence of M2302.3.1.2 clarifies that when checking the capacity of the roof structure for the added dead load of photovoltaic panel systems, it is not necessary to consider roof live load to be additive to PV system dead load. Roof live load need not be modeled in the areas covered by PV systems, as there will be no workers, equipment or materials on top of the PV panels nor beneath the PV panels. In these areas, roof live load is completely displaced by the presence of PV panels.

The third sentence of M2302.3.1.2 clarifies that displacement/removal of roof live load does not apply for those portions of the roof structure or structural members that are not covered by PV panels. The resultant structural model will include PV system dead

load where the system exists, and partial roof load only where the PV system does not exist. Roof live load will always apply to that portion of the roof not covered by PV panels. The following graphic shows a typical load diagram with PV system dead load and partial roof live load.



The fourth sentence of M2302.3.1.2 clarifies that although the roof live load may be displaced and set equal to zero for that portion of roof covered by the PV system (that is, PV system dead load and roof live load are not additive), the intent to install solar PV systems on new construction does not eliminate the requirement to design new buildings for code-prescribed roof live load.

The section on ground-mounted systems is revised to clarify that design provisions applicable to ground mount installations are found in the IBC and not found within the IRC.

Cost Impact: This proposal will reduce construction costs.

RM81-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M2301.2.2-RM-CAIN-SMIRNOW.DOC

RM82 – 13

R202, M2301.2.3, Chapter 44

Proponents: David Hall, Vice Chair, Plumbing/Mechanical/Gas Code Action Committee, (dave.hall@georgetown.org) and Brenda A. Thompson, Clark County Building Department, Las Vegas NV, Chair, Sustainability, Energy & High Performance Code Action Committee (bat@ClarkCountyNV.gov)

Add new definitions as follows:

SECTION R202 DEFINITIONS

DIRECT SYSTEM. A solar thermal system in which the gas or liquid in the solar collector loop is not separated from the load.

INDIRECT SYSTEM. A solar thermal system in which the gas or liquid in the solar collector loop circulates between the solar collector and a heat exchanger and such gas or liquid is not drained from the system or supplied to the load during normal operation.

Revise as follows:

M2301.2.3 Relief valves and system components. System components containing fluids shall be protected with ~~temperature and pressure and temperature~~ relief valves ~~or pressure relief valves~~. Relief devices shall be installed in sections of the system so that a section cannot be valved off or isolated from a relief device. Direct systems and the potable water portion of indirect systems shall be equipped with a relief valve in accordance with Section P2803. For indirect systems, pressure relief valves in solar loops shall comply with SRCC 300. System components shall have a working pressure rating of not less than the setting of the pressure relief device.

Add new standard to Chapter 44 as follows:

SRCC

Solar Rating & Certification Corporation
400 High Point Drive, Suite 400
Cocoa, Florida 32926

SRCC 300-13 Standard 300 For Solar Water Heating Systems

Reason: This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The PMGCAC and SEHPCAC were established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since their inception in July, 2011, the PMGCAC and SEHPCAC have held multiple open meetings and conference calls and workgroup calls which included members of the PMGCAC and SEHPCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

This proposal revises existing Section M2301.2.3 or the 2012 IRC based on criteria in the New York State Field Inspection Guidelines for Solar Heating Systems. It clarifies when temperature and pressure relief valves or pressure relief valves are required and refers to Section P2803 and SRCC 300 for additional requirements. It also requires that system components have a pressure rating that is not less than that of the setting of the pressure relief device.

Please note that the proponents have also submitted other proposals that are coordinated with this proposal. In the spirit of the IRC as a one stop code for one- and two-family dwellings and townhouses, these proposals enhance, update, clarify and improve the usability of the solar energy provisions of Chapter 23 of the IRC and make it truly comprehensive and much more direct and intuitive. This proposal, however, is intended to stand alone and is not contingent upon the success of other PMGCAC or SEHPCAC proposals.

Cost Impact: Where solar systems are provided, this proposal may increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, [SRCC 300-13] with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013.

RM82-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M2301.2.3-RM-HALL-THOMPSON-SEPHCAC.DOC

RM83 – 13

M2301.2.3 (New)

Proponents: David Hall, Vice Chair, Plumbing/Mechanical/Gas Code Action Committee, (dave.hall@georgetown.org) and Brenda A. Thompson, Clark County Building Department, Las Vegas NV, Chair, Sustainability, Energy & High Performance Code Action Committee (bat@ClarkCountyNV.gov)

Add new text as follows:

M2301.2.3 Plastic glazing. The use of plastic glazing in solar thermal collectors and panels shall be limited to those plastics meeting the requirements for light transmitting plastics in Chapter 26 of the International Building Code.

Reason: This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The PMGCAC and SEHPCAC were established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since their inception in July, 2011, the PMGCAC and SEHPCAC have held multiple open meetings and conference calls and workgroup calls which included members of the PMGCAC and SEHPCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Reasons for this proposal are as follows:

The language in the proposed new section is similar to the exception to Section 1402.4, Roof-mounted collectors, of the 2012 International Mechanical Code. This language is necessary to properly address plastic solar collector covers, which are essentially prohibited by the 2012 IRC, but are not prohibited by 2012 International Mechanical Code.

Please note that the proponents have also submitted other proposals that are coordinated with this proposal. In the spirit of the IRC as a one stop code for one- and two-family dwellings and townhouses, these proposals enhance, update, clarify and improve the usability of the solar energy provisions of Chapter 23 of the IRC and make it truly comprehensive and much more direct and intuitive. This proposal, however, is intended to stand alone and is not contingent upon the success of other PMGCAC or SEHPCAC proposals.

Cost Impact: Where solar systems are provided, this proposal may increase the cost of construction.

RM83-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M2301.2.3 (NEW)-RM-HALL-THOMPSON-SEHPCAC.DOC

RM84 – 13

M2301.2.5 (New)

Proponent: David Hall, Vice Chair, Plumbing/Mechanical/Gas Code Action Committee, (dave.hall@georgetown.org) and Brenda A. Thompson, Clark County Building Department, Las Vegas NV, Chair, Sustainability, Energy & High Performance Code Action Committee (bat@ClarkCountyNV.gov)

Add new text as follows:

M2301.2.5 Piping insulation. Piping shall be insulated in accordance with the requirements of Chapter 11. Exterior insulation shall be protected from ultraviolet degradation. The entire solar loop shall be insulated. Where split-style insulation is used, the seam shall be sealed. Fittings shall be fully insulated.

Exceptions:

1. Those portions of the piping that are used to help prevent the system from overheating shall not be required to be insulated.
2. Those portions of piping that are exposed to solar radiation, made of the same material as the solar collector absorber plate and are covered in the same manner as the solar collector absorber, or that are used to collect additional solar energy shall not be required to be insulated
3. Piping in thermal solar systems using unglazed solar collectors to heat a swimming pool shall not be required to be insulated.

Reason: This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The PMGCAC and SEHPCAC were established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since their inception in July, 2011, the PMGCAC and SEHPCAC have held multiple open meetings and conference calls and workgroup calls which included members of the PMGCAC and SEHPCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

This proposal adds new requirements for piping insulation used in solar systems to the thermal solar provisions of the 2012 IRC. It is based on criteria in the New York State Field Inspection Guidelines for Solar (thermal) Heating Systems.

Please note that the proponents have also submitted other proposals that are coordinated with this proposal. In the spirit of the IRC as a one stop code for one- and two-family dwellings and townhouses, these proposals enhance, update, clarify and improve the usability of the solar energy provisions of Chapter 23 of the IRC and make it truly comprehensive and much more direct and intuitive. This proposal, however, is intended to stand alone and is not contingent upon the success of other PMGCAC or SEHPCAC proposals.

Cost Impact: Where solar systems are provided, this proposal may increase the cost of construction.

RM84-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M2301.2.5 (NEW)-RM-HALL-THOMPSON-SEHPCAC.DOC

RM85 – 13

Section R202, M2301.2.6, Chapter 44

Proponents: David Hall, Vice Chair, Plumbing/Mechanical/Gas Code Action Committee, (dave.hall@georgetown.org) and Brenda A. Thompson, Clark County Building Department, Las Vegas NV, Chair, Sustainability, Energy & High Performance Code Action Committee (bat@ClarkCountyNV.gov)

Add new definition as follows:

DRAIN-BACK SYSTEM. A solar thermal system in which the fluid in the solar collector loop is drained from the collector into a holding tank under prescribed circumstances.

Revise as follows:

M2301.2.6 Expansion tanks. Expansion tanks in solar energy systems shall be installed in accordance with Section M2003 in ~~closed fluid~~ solar collector loops that contain pressurized heat transfer fluid. Where expansion tanks are used, the system shall be designed in accordance with SRCC 300 to provide an expansion tank that is sized to withstand the maximum operating pressure of the system.

Exception: Expansion tanks shall not be required in *drain-back systems*.

Add new standard to Chapter 44 as follows:

SRCC

Solar Rating & Certification Corporation
400 High Point Drive, Suite 400
Cocoa, Florida 32926

SRCC 300-13 Standard 300 For Solar Water Heating Systems

Reason: This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The PMGCAC and SEHPCAC were established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since their inception in July, 2011, the PMGCAC and SEHPCAC have held multiple open meetings and conference calls and workgroup calls which included members of the PMGCAC and SEHPCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

This proposal revises existing Section M2301.2.6 of the 2012 IRC based on criteria in the New York State Field Inspection Guidelines for Solar Heating Systems that reference SRCC 300 and are applicable to solar thermal systems.

Please note that the proponents have also submitted other proposals that are coordinated with this proposal. In the spirit of the IRC as a one stop code for one- and two-family dwellings and townhouses, these proposals enhance, update, clarify and improve the usability of the solar energy provisions of Chapter 23 of the IRC and make it truly comprehensive and much more direct and intuitive. This proposal, however, is intended to stand alone and is not contingent upon the success of other PMGCAC or SEHPCAC proposals.

Cost Impact: Where solar systems are provided, this proposal may increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, [SRCC 300-13] with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013.

RM85-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M2301.2.6-RM-HALL-THOMPSON-SEHPCAC.DOC

RM86 – 13

M2301.2.6 (New), Chapter 44

Proponents: David Hall, Vice Chair, Plumbing/Mechanical/Gas Code Action Committee, (dave.hall@georgetown.org) and Brenda A. Thompson, Clark County Building Department, Las Vegas NV, Chair, Sustainability, Energy & High Performance Code Action Committee (bat@ClarkCountyNV.gov)

Add new text as follows:

M2301.2.6 Storage tank sensors. Storage tank sensors shall comply with SRCC 300.

Add new standard to Chapter 44 as follows:

SRCC

Solar Rating & Certification Corporation
400 High Point Drive, Suite 400
Cocoa, Florida 32926

SRCC 300-13 Standard 300 For Solar Water Heating Systems

Reason: This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The PMGCAC and SEHPCAC were established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since their inception in July, 2011, the PMGCAC and SEHPCAC have held multiple open meetings and conference calls and workgroup calls which included members of the PMGCAC and SEHPCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

This proposal is based on criteria in the New York State Field Inspection Guidelines for Solar Heating Systems that are relative to storage tank sensors.

Please note that the proponents have also submitted other proposals that are coordinated with this proposal. In the spirit of the IRC as a one stop code for one- and two-family dwellings and townhouses, these proposals enhance, update, clarify and improve the usability of the solar energy provisions of Chapter 23 of the IRC and make it truly comprehensive and much more direct and intuitive. This proposal, however, is intended to stand alone and is not contingent upon the success of other PMGCAC or SEHPCAC proposals.

Cost Impact: Where solar systems are provided, this proposal may increase the cost of construction

Analysis: A review of the standard proposed for inclusion in the code, [SRCC 300-13] with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

RM86-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M2301.2.6 (NEW) #1-RM-HALL-THOMPSON-SEPHCAC.DOC

RM87 – 13

M2301.2.6 (New), M2301.2.7 (New)

Proponents: David Hall, Vice Chair, Plumbing/Mechanical/Gas Code Action Committee, (dave.hall@georgetown.org) and Brenda A. Thompson, Clark County Building Department, Las Vegas NV, Chair, Sustainability, Energy & High Performance Code Action Committee (bat@ClarkCountyNV.gov)

Add new text as follows:

M2301.2.6 Mixing valves. Where heated water is discharged from a solar thermal system to a hot water distribution system, a thermostatic mixing valve complying with ASSE 1017 shall be installed to temper the water to a temperature of not greater than 140°F. Solar thermal systems supplying hot water for both space heating and domestic uses shall comply with Section P2802.2. A temperature indicating device shall be installed to indicate the temperature of the water discharged from the outlet of the mixing valve. The thermostatic mixing valve required by this section shall not be a substitute for water temperature limiting devices required by Chapter 27 for specific fixtures.

M2301.2.7 Isolation valves. Isolation valves shall be provided on the cold water feed to the water heater. Isolation valves and associated piping shall be provided to bypass solar storage tanks where the system contains multiple storage tanks.

Reason: This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The PMGCAC and SEHPCAC were established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since their inception in July, 2011, the PMGCAC and SEHPCAC have held multiple open meetings and conference calls and workgroup calls which included members of the PMGCAC and SEHPCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

These proposed new sections address mixing valves and isolation valves in solar thermal systems. They are based on Section P2803.3 of the 2012 IRC and criteria in the New York State Field Inspection Guidelines for Solar (thermal) Heating Systems.

Please note that the proponents have also submitted other proposals that are coordinated with this proposal. In the spirit of the IRC as a one stop code for one- and two-family dwellings and townhouses, these proposals enhance, update, clarify and improve the usability of the solar energy provisions of Chapter 23 of the IRC and make it truly comprehensive and much more direct and intuitive. This proposal, however, is intended to stand alone and is not contingent upon the success of other PMGCAC or SEHPCAC proposals.

Cost Impact: Where solar systems are provided, this proposal may increase the cost of construction.

RM87-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M2301.2.6 (NEW) #2-RM-HALL-THOMPSON-SEHPCAC.DOC

RM88 – 13

M2301.2.8 (New), M2301.2.9 (New), M2301.9.1, M2301.2.9.2 (New), Chapter 44

Proponents: David Hall, Vice Chair, Plumbing/Mechanical/Gas Code Action Committee, (dave.hall@georgetown.org) and Brenda A. Thompson, Clark County Building Department, Las Vegas NV, Chair, Sustainability, Energy & High Performance Code Action Committee (bat@ClarkCountyNV.gov)

Revise as follows:

M2301.2.8 Description and warning labels. Solar thermal systems shall comply with description label and warning label requirements of Section M2301.2.9.2 and SRCC 300.

M2301.2.9 Solar loop. Solar loops shall be in accordance with Sections M2301.2.8.1 and M2301.2.8.2.

M2301.9.1 M2301.2.8 Solar loop isolation. Valves shall be installed to allow the solar collectors to be isolated from the remainder of the system. ~~Each isolation valve shall be labeled with the open and closed position.~~

M2301.2.9.2 Drain and fill valve labels and caps. Drain and fill valves shall be labeled with a description and warning that identifies the fluid in the solar loop and a warning that the fluid might be discharged at high temperature and pressure. Drain caps shall be installed at drain and fill valves.

Add new standard to Chapter 44 as follows:

SRCC

Solar Rating & Certification Corporation
400 High Point Drive, Suite 400
Cocoa, Florida 32926

SRCC 300-13 Standard 300 For Solar Water Heating Systems

Reason: This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The PMGCAC and SEHPCAC were established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since their inception in July, 2011, the PMGCAC and SEHPCAC have held multiple open meetings and conference calls and workgroup calls which included members of the PMGCAC and SEHPCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

This proposal expands existing Section M2301.2.8 of the 2012 IRC, which pertains to solar loops, and adds a new section to the solar thermal provisions of the IRC. These changes are based on criteria in the New York State Field Inspection Guidelines for Solar (thermal) Heating Systems.

Proposed new Section M2301.2.8 references SRCC 300 for label, sign and marking requirements. (These are not listing and labeling requirements that require third party testing. These labels identify system components and provide safety warnings.

SRCC 300 Includes references to labeling requirements under:

- 6.1.1.2 Solar Systems Isolation
- 6.1.1.4 Auxiliary Water Heating Equipment
- 6.2.5 Freeze Protection
- 6.1.5.2 Control System Override
- 6.3.7 Fluid Safety Labeling
- 6.4.3 Tanks

SRCC 300 includes references to warning label requirements:

- 6.3.17 Heated Components (warning label)
- 6.6.7 Hazards (warning label)

Section M2309.1, former Section M2301.2.8, is revised to eliminate redundant labeling requirements with the SRCC 300 reference added in proposed new Section M2301.2.8.

Proposed new Section M2301.9.2 specifically addresses drain and fill valve labels and caps.

These changes are based on criteria in the New York State Field Inspection Guidelines for Solar (thermal) Heating Systems and the manner in which it references SRCC 300.

Please note that the proponents have also submitted other proposals that are coordinated with this proposal. In the spirit of the IRC as a one stop code for one- and two-family dwellings and townhouses, these proposals enhance, update, clarify and improve the usability of the solar energy provisions of Chapter 23 of the IRC and make it truly comprehensive and much more direct and intuitive. This proposal, however, is intended to stand alone and is not contingent upon the success of other PMGCAC or SEHPCAC proposals.

Cost Impact: Where solar systems are provided, this proposal may increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, [SRCC 300-13] with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013.

RM88-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M2301.2.8 (NEW)-HALL-THOMPSON-SEHPCAC.DOC

RM89 – 13

M2301.3.1, Chapter 44

Proponents: David Hall, Vice Chair, Plumbing/Mechanical/Gas Code Action Committee(dave.hall@georgetown.org) and Brenda A. Thompson, Clark County Building Department, Las Vegas NV, Chair, Sustainability, Energy & High Performance Code Action Committee (bat@ClarkCountyNV.gov)

Revise as follows:

M2301.3.1 Collectors and panels. Solar thermal collectors and panels shall be listed and labeled in accordance with SRCC 100 or SRCC 600. Collectors and panels shall be listed and labeled to show the manufacturer's name, model number, serial number, collector weight, collector maximum allowable temperatures and pressures, and the type of heat transfer fluids that are compatible with the collector or panel. The label shall clarify that these specifications apply only to the collector or panel.

Add new standards to Chapter 44 as follows:

SRCC

Solar Rating & Certification Corporation
400 High Point Drive, Suite 400
Cocoa, Florida 32926

SRCC 100-13 Standard 100 For Solar Collectors

SRCC 600-13 Standard 600 For Solar Concentrating Collectors

Reason: This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The PMGCAC and SEHPCAC were established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since their inception in July, 2011, the PMGCAC and SEHPCAC have held multiple open meetings and conference calls and workgroup calls which included members of the PMGCAC and SEHPCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

This proposal revises existing Section M2301.3.1 of the 2012 IRC to require that solar thermal system collectors and panels be listed and labeled in accordance with the requirements of SRCC 100 or SRCC 600.

These revisions are based on criteria in the New York State Field Inspection Guidelines for Solar Heating Systems and the manner in which it addresses the SRCC standards.

This proposal is intended to stand alone and is not contingent upon the success of other proposals from the PMGCAC and SEHPCAC related to solar energy,

Please note that the proponents have also submitted other proposals that are coordinated with this proposal. In the spirit of the IRC as a one stop code for one- and two-family dwellings and townhouses, these proposals enhance, update, clarify and improve the usability of the solar energy provisions of Chapter 23 of the IRC and make it truly comprehensive and much more direct and intuitive.

Cost Impact: Where solar systems are provided, this proposal may increase the cost of construction.

Analysis: A review of the standards proposed for inclusion in the code, [SRCC 100-13 and 600-13] with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013.

RM89-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M2301.3.1-RM-HALL-THOMPSON-SEHPCAC.DOC

RM90 – 13

Section M2301.4, Chapter 44

Proponents: David Hall, Vice Chair, Plumbing/Mechanical/Gas Code Action Committee, (dave.hall@georgetown.org) and Brenda A. Thompson, Clark County Building Department, Las Vegas NV, Chair, Sustainability, Energy & High Performance Code Action Committee (bat@ClarkCountyNV.gov)

Revise as follows:

M2301.4 Heat transfer gasses or liquids and heat exchangers. ~~Prohibited heat transfer fluids.~~

Flammable gases and liquids shall not be used as heat transfer fluids. Heat transfer gasses and liquids shall be rated to withstand the system's maximum design temperature under operating conditions without degradation. Heat exchangers used in solar thermal systems shall comply with Section P2902.5.2 and SRCC 300.

Add new standard to Chapter 44 as follows:

SRCC

Solar Rating & Certification Corporation
400 High Point Drive, Suite 400
Cocoa, Florida 32926

SRCC 300-13 Standard 300 For Solar Water Heating Systems

Reason: This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The PMGCAC and SEHPCAC were established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since their inception in July, 2011, the PMGCAC and SEHPCAC have held multiple open meetings and conference calls and workgroup calls which included members of the PMGCAC and SEHPCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

This proposal revises existing Section M2301.4 of the 2012 IRC based on criteria in the New York State Field Inspection Guidelines for Solar (thermal) Heating Systems.

Please note that the proponents have also submitted other proposals that are coordinated with this proposal. In the spirit of the IRC as a one stop code for one- and two-family dwellings and townhouses, these proposals enhance, update, clarify and improve the usability of the solar energy provisions of Chapter 23 of the IRC and make it truly comprehensive and much more direct and intuitive. This proposal, however, is intended to stand alone and is not contingent upon the success of other PMGCAC or SEHPCAC proposals.

Cost Impact: Where solar systems are provided, this proposal may increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, [SRCC 300-13] with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013.

RM90-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M2301.4 #2-RM-HALL-THOMPSON-SEHPCAC.DOC

RM91 – 13

M2301.4, Chapter 44

Proponents: David Hall, Vice Chair, Plumbing/Mechanical/Gas Code Action Committee, (dave.hall@georgetown.org) and Brenda A. Thompson, Clark County Building Department, Las Vegas NV, Chair, Sustainability, Energy & High Performance Code Action Committee (bat@ClarkCountyNV.gov)

Revise as follows:

M2301.4 Prohibited Heat transfer fluids. Essentially toxic transfer fluids, ethylene glycol, flammable gases, and flammable liquids shall not be used as heat transfer fluids. Heat transfer fluids shall be in accordance with SRCC 300. The flash point of the heat transfer fluids utilized in solar thermal systems shall be not less than 50°F (28°C) above the design maximum non-operating or no-flow temperature attained by the fluid in the collector.

Add new standard to Chapter 44 as follows:

SRCC

Solar Rating & Certification Corporation
400 High Point Drive, Suite 400
Cocoa, Florida 32926

SRCC 300-13 Standard 300 For Solar Water Heating Systems

Reason: This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The PMGCAC and SEHPCAC were established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since their inception in July, 2011, the PMGCAC and SEHPCAC have held multiple open meetings and conference calls and workgroup calls which included members of the PMGCAC and SEHPCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Reasons for this proposal are as follows: The first sentence of this proposal revises existing Section 2301.4 of the 2012 IRC to align with Section 1403, Heat Transfer Fluids, of the 2012 International Mechanical Code. It also specifically prohibits the use of ethylene glycol so as to eliminate any confusion regarding its use. The proposed new second sentence requires heat transfer fluids to be in accordance with SRCC 300. The proposed new last sentence limits the flash point of heat transfer fluids in solar thermal systems.

Please note that the proponents have also submitted other proposals that are coordinated with this proposal. In the spirit of the IRC as a one stop code for one- and two-family dwellings and townhouses, these proposals enhance, update, clarify and improve the usability of the solar energy provisions of Chapter 23 of the IRC and make it truly comprehensive and much more direct and intuitive. This proposal, however, is intended to stand alone and is not contingent upon the success of other PMGCAC or SEHPCAC proposals.

Cost Impact: Where solar systems are provided, this proposal may increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, [SRCC 300-13] with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013.

RM91-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M2301.4#1 RM-HALL-THOMPSON-SEHPCAC.DOC

RM92 – 13

M2301.6 (New)

Proponents: David Hall, Vice Chair, Plumbing/Mechanical/Gas Code Action Committee, (dave.hall@georgetown.org) and Brenda A. Thompson, Clark County Building Department, Las Vegas NV, Chair, Sustainability, Energy & High Performance Code Action Committee (bat@ClarkCountyNV.gov)

Add new text as follows:

M2301.6 Filtering. Air provided to occupied spaces through rock or other dust-producing materials shall be filtered for particulates at the outlet of the heat storage system.

Exception: Filters shall not be required where air movement is by means of natural convection.

Reason: This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The PMGCAC and SEHPCAC were established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since their inception in July, 2011, the PMGCAC and SEHPCAC have held multiple open meetings and conference calls and workgroup calls which included members of the PMGCAC and SEHPCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Reasons for this proposal are as follows: This proposed new section is similar to Section 1402.7 of the 2012 International Mechanical Code. It requires filtering in order to remove dust and particulates from mechanically forced air that has passed through a thermal storage area containing materials such as, but not limited to, pebbles or rock. A filter is not required for passive systems because the air velocity is typically not sufficient to carry particulates. Furthermore, a filter in a passive system could greatly impede natural convective airflow.

Please note that the proponents have also submitted other proposals that are coordinated with this proposal. In the spirit of the IRC as a one stop code for one- and two-family dwellings and townhouses, these proposals enhance, update, clarify and improve the usability of the solar energy provisions of Chapter 23 of the IRC and make it truly comprehensive and much more direct and intuitive. This proposal, however, is intended to stand alone and is not contingent upon the success of other PMGCAC or SEHPCAC proposals.

Cost Impact: Where rock based or dust-producing heat storage systems are provided, this proposal may increase the cost of construction.

RM92-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M2301.6 (NEW) #1-RM-HALL-THOMPSON-SEHPCAC.DOC

RM93 – 13

M2301.6 (New), M2301.6.1 (New), M2301.6.2 (New), P2902.5.5

Proponents: David Hall, Vice Chair, Plumbing/Mechanical/Gas Code Action Committee, (dave.hall@georgetown.org) and Brenda A. Thompson, Clark County Building Department, Las Vegas NV, Chair, Sustainability, Energy & High Performance Code Action Committee (bat@ClarkCountyNV.gov)

Add new text as follows:

M2301.6 Solar systems for heating potable water. Where a solar energy system heats potable water to supply a potable hot water distribution system, the solar energy system shall be in accordance with Sections M2301.6.1, M2301.6.2 and P2902.5.5.

M2301.6.1 Indirect systems. Heat exchangers that are components of indirect heating systems shall comply with Section P2902.5.2.

M2301.6.2 Direct systems. Where potable water is directly heated, the pipe, fittings and valves between the solar collectors and the hot water storage tanks shall comply with NSF 61.

Revise as follows:

P2902.5.5 Solar systems. ~~The potable water supply to a solar system shall be equipped with a backflow preventer with intermediate atmospheric vent complying with ASSE 1012 or a reduced pressure principle backflow preventer complying with ASSE 1013. Where chemicals are used, the potable water supply shall be protected by a reduced pressure principle backflow preventer.~~ Where a potable water supply is connected to the solar collector circulation loop piping of an indirect solar water heating system and chemicals are not used in the circulation loop piping, a backflow preventer in accordance with ASSE 1012 shall be installed between the potable water system and the circulation loop piping. Where chemicals are used in the solar collector circulation loop piping, such backflow preventer shall be in accordance with ASSE 1013.

Exception: ~~Where all solar system piping is a part of the potable water distribution system, in accordance with the requirements of the *International Plumbing Code*, and all components of the piping system are listed for potable water use, cross-connection protection measures shall not be required.~~

Reason: This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The PMGCAC and SEHPCAC were established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since their inception in July, 2011, the PMGCAC and SEHPCAC have held multiple open meetings and conference calls and workgroup calls which included members of the PMGCAC and SEHPCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Reasons for this proposal are as follows:

Chapter 23 should include Sections M2301.6, M2301.6.1 and M2301.6.2 in order to address specific requirements for solar energy systems where they are used to heat potable water for supply to a potable hot water distribution system. Section M2301.6.1 is a pointer to a section that covers heat exchangers in the plumbing code section of the IRC:

P2902.5.2 Heat exchangers. Heat exchangers using an essentially toxic transfer fluid shall be separated from the potable water by double-wall construction. An air gap open to the atmosphere shall be provided between the two walls. Heat exchangers utilizing an essentially nontoxic transfer fluid shall be permitted to be of single-wall construction.

This section would apply where potable water was indirectly heated by the solar energy system. Section M2301.6.2 requires NSF 61 compliance for pipe, fittings and valves in a system that directly heats potable water as this is the same requirement for pipe, fittings and valves that the plumbing code requires for the hot water distribution system.

Section P2902.5.5 is modified as the section has been unclear for many cycles. Some have interpreted the existing section to require a backflow preventer on the cold water supply to any water heater that has a solar energy water heating system connected to the water heater. This makes no sense for a system that directly heats the water for distribution to the potable hot water distribution system. The section is modified to make the language address where the backflow preventer is needed (only for connections to solar collector circulation loop piping of indirect heating systems).

Please note that the proponents have also submitted other proposals that are coordinated with this proposal. In the spirit of the IRC as a one stop code for one- and two-family dwellings and townhouses, these proposals enhance, update, clarify and improve

the usability of the solar energy provisions of Chapter 23 of the IRC and make it truly comprehensive and much more direct and intuitive. This proposal, however, is intended to stand alone and is not contingent upon the success of other PMGCAC or SEHPCAC proposals.

Cost Impact: Where solar water heating systems are provided, this proposal may increase the cost of construction.

RM93-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

2301.6 (NEW) #2-RM-HALL-THOMPSON-SEPHCAC.DOC

RM94 – 13

Sections M2302.2, M2302.2.3, M2302.5 (New), M2302.6 (New), M2302.7 (New), M2302.6.1 (New), M2302.6.2 (New), M2302.6.3 (New), M2302.6.4 (New), M2302.6.5 (New)

Proponents: David Hall, Vice Chair, Plumbing/Mechanical/Gas Code Action Committee, (dave.hall@georgetown.org) and Brenda A. Thompson, Clark County Building Department, Las Vegas NV, Chair, Sustainability, Energy & High Performance Code Action Committee; Adolf Zubia, Chair, Fire Code Action Committee (bat@ClarkCountyNV.gov)

Revise as follows:

M2302.2 Requirements. The installation, inspection, maintenance, repair and replacement of photovoltaic systems and all system components shall comply with the manufacturer's instructions, Sections M2302.2.1 through ~~M2302.2.3~~ M2302.7 and NFPA 70.

~~M2302.7~~ ~~M2302.2.3~~ Ground-mounted photovoltaic panel systems and modules. Ground-mounted photovoltaic panel systems shall be installed in accordance with the manufacturer's instructions. ~~Fire separation distance requirements shall not apply to ground-mounted, free-standing photovoltaic arrays. A clear, brush-free area of 10 feet (3048 mm) shall be required for ground-mounted photovoltaic arrays.~~

M2302.5 Size of solar photovoltaic array. Each photovoltaic array shall be not greater than 150 feet (45 720 mm) by 150 feet (45 720 mm). Multiple arrays shall be separated by a clear access pathway not less than 3-feet (914 mm) in width.

M2302.6 Access and pathways. Roof access, pathways, and spacing requirements shall be provided in accordance with this section and Sections M2302.6.1 through M2302.6.5.

Exception: Detached garages and accessory structures to one- and two-family dwellings and townhouses such as parking shade structures, carports, solar trellises and similar structures.

M2302.6.1 Roof access points. Roof access points shall be located in areas where it will not be necessary to place ground ladders over openings such as windows or doors, and shall be located at strong points of building construction in locations where the access point does not conflict with overhead obstructions such as tree limbs, wires and signs.

M2302.6.2 Hip roof layouts. Panels and modules installed on residential buildings with hip roof layouts shall be located in a manner that provides two clear access pathways not less than 3-feet (914 mm) in width from the eave to the ridge on each roof slope where panels and modules are located. The access pathways shall be located in areas where the building is capable of supporting the live load of fire fighters accessing the roof.

Exception: These requirements shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) or less.

M2302.6.3 Single ridge roofs. Panels and modules installed on buildings with a single ridge shall be located in a manner that provides two access pathways not less than 3 feet (914mm) in width from the eave to the ridge on each roof slope where panels and modules are located.

Exception: This requirement shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) or less.

M2302.6.4 Roofs with hips and valleys. Panels and modules installed on buildings with roof hips and valleys shall not be located within 18 inches (457 mm) of a hip or a valley where panels or modules are placed on both sides of the hip or valley.

Exception: These requirements shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) or less.

M2302.6.5 Allowance for smoke ventilation operations. Panels and modules installed on buildings shall not be located within 3 feet (914 mm) of the ridge to allow for fire department smoke ventilation operations.

Exception: Where an alternative ventilation method approved by the building official has been provided or where the building official has determined that vertical ventilation techniques will not be employed.

Reason: This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC), the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC) and the ICC Fire Code Action Committee (FCAC). The PMGCAC, SEHPCAC and FCAC were established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. The PMGCAC, SEHPCAC and FCAC have held multiple open meetings and conference calls and workgroup calls which included members of the PMGCAC, SEHPCAC and FCAC, respectively. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Reasons for this proposal are as follows: This proposal imports all of the criteria that is applicable to IRC buildings from Section 605.11 of the International Fire Code (Solar photovoltaic power systems) and its subsections.

This proposal does not address "electrical requirements," though it may require markings on some electrical components that are utilized a solar system. The only "electrical" requirement in Chapter 23 is the requirement to comply with NFPA 70 in existing Section M2302.1 of the 2012 IRC.

Please note that the proponents have also submitted other proposals that are coordinated with this proposal. In the spirit of the IRC as a one stop code for one- and two-family dwellings and townhouses, these proposals enhance, update, clarify and improve the usability of the solar energy provisions of Chapter 23 of the IRC and make it truly comprehensive and much more direct and intuitive. This proposal, however, is intended to stand alone and is not contingent upon the success of other PMGCAC or SEHPCAC proposals.

Cost Impact: Where photovoltaic solar systems are provided, this proposal may increase the cost of construction.

RM94-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M2302.2-RM-HALL-THOMPSON-SEHPCAC.DOC

RM95 – 13

M2302.2, M2302.2.1, M2302.2.2 thru M2302.2.2s.2.5 (New), M2302.2.2 thru M2302.4

Proponent: Adria Smith, Fountain Valley Fire Department, Representing the California Fire Chiefs Association; Kevin Reinertson, Division Chief, Representing the California State Fire Marshal's Office (adria.smith@fountainvalley.org)

Revise as follows:

M2302.2 Requirements. The installation, inspection, maintenance, repair and replacement of photovoltaic systems and all system components shall comply with the manufacturer's instructions, Sections M2302.21 through ~~M2302.2.3~~ M2302.2.7 and NFPA 70.

M2302.2.1 Roof-mounted panels and modules. Where photovoltaic panels and modules are installed on roofs, the roof shall be constructed to support the loads imposed by such modules. Roof-mounted photovoltaic panels and modules that serve as roof covering shall conform to the requirements for roof coverings in Chapter 9. Where mounted on or above the roof coverings, the photovoltaic panels and modules and supporting structure shall be constructed of noncombustible materials or fire-retardant treated wood equivalent to that required for the roof construction.

Exception: Detached, nonhabitable structures including, but not limited to, parking shade structures, carports, solar trellises and similar structures shall not be subject to the requirements of this section.

M2302.2.2 Access and pathways. Roof access, pathways, and spacing requirements shall be provided in accordance with Sections M2302.2.2.1 through M2302.2.2.2.5.

M2302.2.2.1 Roof access points. Roof access points shall be located in areas that do not require the placement of ground ladders over openings such as windows or doors, and located at strong points of building construction in locations where the access point does not conflict with overhead obstructions such as tree limbs, wires, or signs.

M2302.2.2.2 Solar photovoltaic systems. Solar photovoltaic systems for shall comply with Sections M2302.2.2.2.1 through M2302.2.2.2.5.

M2302.2.2.2.1 Size of solar photovoltaic array. Each photovoltaic array shall be limited to 150 feet (45 720 mm) by 150 feet (45 720 mm). Multiple arrays shall be separated by a clear access pathway not less than 3 feet in width.

M2302.2.2.2.2 Hip roof layouts. Panels and modules installed on dwellings with hip roof layouts shall be located in a manner that provides a clear access pathway not less than 3 feet in width from the eave to the ridge on each roof slope where panels and modules are located. The access pathway shall be located at a structurally strong location on the building capable of supporting the live load of fire fighters accessing the roof.

Exception: These requirements shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) and less.

M2302.2.2.2.3 Single ridge roofs. Panels and modules installed on dwellings with a single ridge shall be located in a manner that provides two, 3-foot-wide (914 mm) access pathways from the eave to the ridge on each roof slope where panels or modules are located.

Exception: This requirement shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) and less.

M2302.2.2.2.4 Roofs with hips and valleys. Panels and modules installed on dwellings with roof hips or valleys shall be located not closer than 18 inches (457 mm) to a hip or valley where panels or modules

are to be placed on both sides of a hip or valley. Where panels are to be located on one side only of a hip or valley that is of equal length, the 18 inch clearance does not apply.

Exception: These requirements shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) and less.

M2302.2.2.5 Allowance for smoke ventilation operations. Panels and modules installed on dwellings shall be located not less than 3 feet (914 mm) below the roof ridge to allow for fire department smoke ventilation operations.

Exception: Where an alternative ventilation method approved by the code official has been provided or where the code official has determined that vertical ventilation techniques will not be employed, clearance from the roof ridge is not required.

~~M2302.2.2~~**M2302.2.3 Roof and wall penetrations.** Roof and wall penetrations shall be flashed and sealed in accordance with Chapter 9 to prevent entry of water, rodents, and insects.

~~M2302.2.3~~**M2302.2.4 Ground-mounted panels and modules.** Ground-mounted panels and modules shall be installed in accordance with Sections M2302.2.2 through M2302.2.3 and the manufacturer's instructions.

~~M2302.3~~**M2302.2.5 Photovoltaic panels and modules.** Photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703.

~~M2302.4~~**M2302.2.6 Inverters.** Inverters shall be listed and labeled in accordance with UL 1741. Systems connected to the utility grid shall use inverters listed for utility interaction.

Reason: We propose to reproduce the applicable provisions of International Fire Code 605.11 into the International Residential Code to provide for uniform design and enforcement. Many jurisdictions currently provide enforcement of the solar photovoltaic power systems guidelines in International Fire Code Section 605.11, or other locally adopted provisions through the building department/official which typically do not enforce the International Fire Code. Furthermore, the intent to have these provisions reproduced into the International Residential Code is to afford local communities the ability to provide adequate enforcement without the reference to a different code or standard. (IFC 605.11.3.3 through 605.11.3.3.3 are not reproduced, such provisions are not applicable to one- and two-family dwellings or townhouses).

Cost Impact: This proposal will not increase the cost of construction; these provisions are currently contained in the IFC.

RM95-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M2302.2-RM-SMITH-REINERTSON.DOC

RM96 – 13

IFC 605.11.3.2; IRC M2302.2.2 through M2302.2.2.4 (New)

Proponent: Michael E. Dell'Orfano, South Metro Fire Rescue Authority, representing Fire Marshal's Association of Colorado (mike.dellorfano@southmetro.org)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE INTERNATIONAL FIRE CODE COMMITTEE; PART II WILL BE HEARD BY THE IRC-PLUMBING/MECHANICAL COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR BOTH COMMITTEES.

PART I – INTERNATIONAL FIRE CODE

Revise as follows:

IFC 605.11.3.2 Residential systems for one- and two-family dwellings. Access to residential systems for one- and two-family dwellings shall be provided in accordance with Sections 605.11.3.2.1 through 605.11.3.2.4.

Exception: These requirements shall not apply to structures designed and constructed in accordance with the International Residential Code.

PART II – IRC-MECHANICAL

Add new text as follows:

IRC M2302.2.2 Fire department access to roof-mounted panels and modules. Access to photovoltaic panels and modules installed on roofs shall be provided in accordance with Sections M2302.2.2.1 through M2302.2.2.4.

IRC M2302.2.2.1 Residential buildings with hip roof layouts. Panels and modules installed on residential buildings with hip roof layouts shall be located in a manner that provides a clear access pathway not less 3 feet in width from the eave to the ridge on each roof slope where panels or modules are located. The access pathway shall be located at a structurally strong location on the building capable of supporting the live load of fire fighters accessing the roof.

Exception: These requirements shall not apply to roofs having slopes of two units vertical in 12 units horizontal (2:12) or less.

IRC M2302.2.2.2 Residential buildings with a single ridge. Panels and modules installed on residential buildings with a single ridge shall be located in a manner that provides not less than two access pathways not less than 3 feet in width from the eave to the ridge on each roof slope where panels or modules are located.

Exception: This requirement shall not apply to roofs having slopes of two units vertical in 12 units horizontal (2:12) or less.

IRC M2302.2.2.3 Residential buildings with roof hips and valleys. Panels and modules installed on residential buildings with roof hips or valleys shall be located not closer than 18 inches (457 mm) to a hip or valley where panels and modules are to be placed on both sides of a hip or valley. Where panels are to be located on only one side of a hip or valley that is of equal length, the 18 inch clearance does not apply.

Exception: These requirements shall not apply to roofs having slopes of two units vertical in 12 units horizontal (2:12) or less.

IRC M2302.2.2.4 Residential building smoke ventilation. Panels and modules installed on residential buildings shall be located not higher than 3 feet (914 mm) below the ridge to allow for fire department smoke ventilation operations.

Reason: According to the 2012 IFC Code and Commentary, the requirements of IFC Section 605.11.3.2 are considered construction requirements and, therefore, do not apply to structures built in accordance with the IRC. This has been the source of some confusion, so the exception to Section 605.11.3.2 is proposed to make its applicability clear. Additionally, this proposal adds the language of IFC Section 605.11.3.2 to the IRC so that those structures will also have photovoltaic systems installed with fire department ventilation practices in mind. These requirements are important for effective ventilation techniques as well as firefighter safety.

Cost Impact: The code change proposal will not increase the cost of construction. It only places restrictions on the layout of the rooftop installations.

RM96-13

PART I – INTERNATIONAL FIRE CODE

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IRC-MECHANICAL CODE

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M2302.2.2 (NEW)-RM-DELL'ORFANO.DOC

RM97 – 13

R202 & M2302

Proponents: John Smirnow and Joseph H. Cain P.E. representing Solar Energy Industries Association (SEIA) (jsmirnow@seia.org)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY IRC-PLUMBING/MECHANICAL COMMITTEE; PART II WILL BE HEARD BY IRC-RESIDENTIAL/BUILDING COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I – IRC- MECHANICAL

Add new definitions as follows:

BUILDING INTEGRATED PHOTOVOLTAIC (BIPV) PRODUCT. A building product that incorporates photovoltaic modules and functions as a component of the building envelope.

PHOTOVOLTAIC MODULE. A complete, environmentally protected unit consisting of solar cells, optics and other components, designed to generate DC power when exposed to sunlight.

PHOTOVOLTAIC PANEL. A collection of modules mechanically fastened together, wired, and designed to provide a field-installable unit.

PHOTOVOLTAIC PANEL SYSTEM. A system that incorporates discrete photovoltaic panels, that converts solar radiation into electricity, including rack support systems.

Revise as follows:

PHOTOVOLTAIC MODULES/SHINGLES. A roof covering composed of flat-plate photovoltaic modules fabricated into shingles, that resembles shingles and that incorporates photovoltaic modules.

PART II – IRC- BUILDING

Revise as follows:

SECTION M2302 PHOTOVOLTAIC SOLAR ENERGY SYSTEMS

M2302.1 General. This section provides for the design, construction, installation, alteration, and repair of photovoltaic equipment and systems.

M2302.2 General Requirements. The installation, inspection, maintenance, repair and replacement of photovoltaic systems and all system components shall comply with the manufacturer's instructions, Sections ~~M2302.2.1~~ M2302.3 through ~~M2302.2.3~~ M2302.8 and NFPA 70.

~~M2302.2.1~~ M2302.3 Roof-mounted panels and modules photovoltaic panel systems. Rooftop-mounted photovoltaic panel systems shall be designed in accordance with this section. ~~The roof shall be constructed to support the loads imposed by roof-mounted solar collectors. Roof-mounted solar collectors that serve as a roof covering shall conform to the requirements for roof coverings in Chapter 9 of this code. Where mounted on or above the roof coverings, the collectors and supporting structure shall be constructed of noncombustible materials or fire-retardant-treated wood equivalent to that required for the roof construction.~~

M2302.3.1 Structural requirements. Rooftop-mounted photovoltaic panel systems shall be designed in accordance with the *International Building Code* to support the system and withstand applicable loads.

The roof shall be constructed to support the loads imposed by rooftop-mounted photovoltaic panel systems in accordance with Chapter 8 of this code or the *International Building Code*.

M2302.3.1.1 Wind load. Rooftop-mounted photovoltaic panel systems shall be designed for wind load in accordance with the *International Building Code* and ASCE 7, using an effective wind area in accordance with ASCE 7.

M2302.3.1.2 Roof live load. Roof structures that provide support for photovoltaic panel systems shall be designed for applicable roof live load. The design of roof structures need not include roof live load in the areas covered by photovoltaic panel systems. Portions of roof structures not covered by photovoltaic panels shall be designed for roof live load. Roof structures that provide support for photovoltaic panel systems shall be designed for live load L_R for the load case when the photovoltaic panel system is not present.

M2302.4 Building integrated photovoltaic systems. Building integrated photovoltaic systems that serve as roof coverings shall be designed and installed in accordance with Section R905.16.

~~**M2302.2.2 M2302.5 Roof and wall penetrations.** Roof and wall penetrations shall be flashed and sealed in accordance with Chapter 9, to prevent entry of water, rodents, and insects.~~

~~**M2302.2.3 M2302.6 Ground-mounted panels and modules.**~~ **photovoltaic panel systems.** Ground-mounted panels and modules photovoltaic panel systems shall be designed in accordance with the *International Building Code* and installed in accordance with the manufacturer's instructions.

~~**M2302.3 M2302.7 Photovoltaic panels and modules.**~~ Photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703.

~~**M2302.4 M2302.8 Inverters.**~~ Inverters shall be listed and labeled in accordance with UL 1741. Systems connected to the utility grid shall use inverters listed for utility interaction.

Reason: This code change proposal is the result of a consensus process established by the Solar Energy Industries Association's (SEIA) Codes and Standards Working Group. Established in 1974, SEIA is the national trade association of the U.S. solar energy industry. As the voice of the industry, SEIA works with its member companies to make solar a mainstream and significant energy source by expanding markets, removing market barriers, strengthening the industry, and educating the public on the benefits of solar energy.

New definitions are added to provide clarity in requirements for photovoltaic systems.

Sections are re-numbered for better flow.

The sentence that references "roof mounted solar collectors that serve as a roof covering" is relocated into its own section and revised to clarify the requirements for Building Integrated Photovoltaic (BIPV) systems.

The sentence that references "noncombustible materials or fire-retardant treated wood" is deleted, as it is obsolete.

Photovoltaic panel systems are constructed entirely of noncombustible components, other than seals between the glass panels and frames.

The first sentence of M2302.3.1 clarifies the system of hardware that becomes the mounting system for rooftop-mounted photovoltaic panel systems must be qualified by methods found in the International Building Code. There are no applicable provisions found in the International Residential Code for these systems of mounting hardware. These mounting systems must be qualified by calculations or physical testing, as prescribed in the IBC. New definitions are needed to provide this clarity.

The second sentence of M2302.3.1 clarifies the roof system must be checked or designed to support the resultant loads imposed on it by the mounting system of the photovoltaic panel system. This check can be accomplished by using appropriate span tables in IRC Chapter 8, or by structural analysis according to IBC provisions.

A new section on wind load is added for guidance to appropriate codes and standards where wind design provisions are found. Effective Wind Area is defined in ASCE 7-10 Section 26.2. Effective Wind Area is also referenced in Footnote a of Table R301.2(2) of this code. Effective Wind Area used in design of photovoltaic systems must be consistent with the definition found in ASCE 7 in order to be compatible with the wind design calculation methods found in ASCE 7.

A new section on roof live load is added to clarify provisions already formalized in Final Action for the 2015 IBC, with some modifications as appropriate for one- and two-family dwellings. In one load case, roof live load need not be modeled in the area(s) of the roof covered by PV panels, as nobody will be walking on top of the panels or on the roof area covered by the panels. In another load case for new construction, the code-prescribed roof live load must be modeled as if the photovoltaic panels are not present.

The section on ground-mounted systems is revised to clarify that design provisions applicable to ground mount installations are found in the IBC and not found within the IRC.

Cost Impact: This proposal will reduce construction costs.

RM97-13

PART I – IRC-PLUMBING/MECHANICAL COMMITTEE

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – IRC-RESIDENTIAL/BUILDING COMMITTEE

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M2302.2-RM-CAIN-SMIRNOW.DOC

RM98– 13

202, M2302, R902, R905, R908 (New)

Proponent: Lorraine Ross, Intech Consulting Inc., representing The Dow Chemical Company

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IRC-PLUMBING/MECHANICAL COMMITTEE; PART II WILL BE HEARD BY THE IRC-RESIDENTIAL/BUILDING COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I - IRC- MECHANICAL

Add new definitions as follows:

SECTION 202 DEFINITIONS

BUILDING INTEGRATED PHOTOVOLTAIC PRODUCT. A building product that incorporates photovoltaic modules, and functions as a component of the building envelope.

PHOTOVOLTAIC MODULE. A complete, environmentally protected unit consisting of solar cells, optics and other components, exclusive of a tracker, designed to generate DC power when exposed to sunlight.

PHOTOVOLTAIC PANEL. A collection of photovoltaic modules mechanically fastened together, wired, and designed to provide a field-installable unit.

PHOTOVOLTAIC PANEL SYSTEM. A system that incorporates discrete photovoltaic panels, that convert solar radiation into electricity, including rack support systems.

Revise as follows:

PHOTOVOLTAIC MODULES/SHINGLES. A roof covering composed of flat plate photovoltaic modules fabricated into resembles shingles and that incorporates photovoltaic modules.

CHAPTER 23 SOLAR THERMAL ENERGY SYSTEMS

Delete without substitution:

~~SECTION M2302 PHOTOVOLTAIC SOLAR ENERGY SYSTEMS~~

~~SECTION M2302 PHOTOVOLTAIC SOLAR ENERGY SYSTEMS~~

~~M2302.1 General.~~ This section provides for the design, construction, installation, alteration, and repair of photovoltaic equipment and systems.

~~M2302.2 Requirements.~~ The installation, inspection, maintenance, repair and replacement of photovoltaic systems and all system components shall comply with the manufacturer's instructions, Sections M2302.2.1 through M2302.2.3 and NFPA 70.

~~M2302.2.1 Roof-mounted panels and modules.~~ Where photovoltaic panels and modules are installed on roofs, the roof shall be constructed to support the loads imposed by such modules. Roof-mounted photovoltaic panels and modules that serve as roof covering shall conform to the requirements for roof

coverings in Chapter 9. Where mounted on or above the roof coverings, the photovoltaic panels and modules and supporting structure shall be constructed of noncombustible materials or fire-retardant treated wood equivalent to that required for the roof construction.

~~M2302.2.2 Roof and wall penetrations.~~ Roof and wall penetrations shall be flashed and sealed in accordance with Chapter 9 to prevent entry of water, rodents, and insects.

~~M2302.2.3 Ground-mounted panels and modules.~~ Ground-mounted panels and modules shall be installed in accordance with the manufacturer's instructions.

~~M2302.3 Photovoltaic panels and modules.~~ Photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703.

~~M2302.4 Inverters.~~ Inverters shall be listed and labeled in accordance with UL 1741. Systems connected to the utility grid shall use inverters listed for utility interaction.

PART II – IRC- BUILDING

SECTION R902 ROOF FIRE CLASSIFICATION

Revise as follows:

R902.1 Roofing covering materials. Roofs shall be covered with materials as set forth in Sections R904 and R905. Class A, B or C roofing shall be installed in areas jurisdictions designated by law as requiring their use or where the edge of the roof is less than 3 feet (914 mm) from a lot line. Classes A, B and C roofing required by this section to be listed shall be tested in accordance with UL 790 or ASTM E 108.

Exceptions:

1. Class A roof assemblies include those with coverings of brick, masonry and exposed concrete roof deck.
2. Class A roof assemblies also include ferrous or copper shingles or sheets, metal sheets and shingles, clay or concrete roof tile, or slate installed on noncombustible decks.
3. Class A roof assemblies include minimum 16 oz/ft² copper sheets installed over combustible decks.

R902.3 Building integrated photovoltaic product. Building integrated photovoltaic products installed as the roof covering shall be tested, listed and labeled for fire classification in accordance with Section R902.1.

R902.4 Rooftop mounted photovoltaic panels and modules. Rooftop mounted photovoltaic panels and modules installed on or above the roof covering shall be tested, listed and identified with a fire classification in accordance with UL 1703. Class A, B or C photovoltaic panels and modules shall be installed in jurisdictions designated by law as requiring their use or where the edge of the roof is less than 3 feet (914 mm) from a lot line.

SECTION R905 REQUIREMENTS FOR ROOF COVERINGS

R905.16 Photovoltaic modules/shingles. The installation of photovoltaic ~~modules~~/shingles shall comply with the provisions of this section.

R905.16.1 Material standards. Photovoltaic ~~modules~~/shingles shall be listed and labeled in accordance with UL 1703.

R905.16.2 Attachment. Photovoltaic ~~modules~~/shingles shall be attached in accordance with the manufacturer's installation instructions.

R905.16.3 Wind resistance. Photovoltaic modules/shingles shall be tested in accordance with procedures and acceptance criteria in ASTM D 3161. Photovoltaic modules/shingles shall comply with the classification requirements of Table R905.2.4.1(2) for the appropriate maximum basic wind speed. Photovoltaic modules/shingle packaging shall bear a label to indicate compliance with the procedures in ASTM D 3161 and the required classification from Table R905.2.4.1(2).

SECTION R908

ROOFTOP MOUNTED PHOTOVOLTAIC PANEL SYSTEMS

R908.1 General. The installation of photovoltaic panel systems that are mounted on or above the roof covering shall comply with the provisions of this code, the *International Fire Code* and *NFPA 70*.

R908.1.1 Material standards. Photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703.

R908.1.2 Structural requirements. Rooftop mounted photovoltaic panel systems shall be designed to structurally support the system and withstand applicable loads in accordance with Chapter 3. The roof upon which these systems are installed shall be constructed to support the loads imposed by such systems in accordance with Chapter 8.

R908.1.3 Installation. Rooftop mounted photovoltaic systems shall be installed in accordance with the manufacturer's instructions. Roof penetrations shall be flashed and sealed in accordance with this chapter.

Reason: Currently, provisions for solar energy systems are sprinkled throughout the International Residential Code. Furthermore, there are also significant gaps, many of which were debated and approved in the 2015 *International Building Code* development process. This proposed change consolidates and organizes these provisions, with necessary section revisions, and section additions, in an easily used format that also sets the stage for easy integration of code requirements for new solar energy technology and applications as they emerge in the market. The following is an explanation of each new and revised section pertinent to the newly proposed Section R324 Solar Energy Systems:

1. Chapter 2 New Definitions Section R202:

Four definitions are added for BUILDING INTEGRATED PHOTOVOLTAIC (BIPV) PRODUCT, PHOTOVOLTAIC MODULE, PHOTOVOLTAIC PANEL and PHOTOVOLTAIC PANEL SYSTEM. All of these definitions are necessary and were approved for inclusion in the 2015 *International Building Code*.

2. Chapter 2 Revised Definition Section R202:

A revised definition for PHOTOVOLTAIC SHINGLES is proposed, which was also approved for inclusion in the 2015 *International Building Code*.

3. Add new SECTION R324 SOLAR ENERGY SYSTEMS:

Chapter 3 is entitled Building Planning and therefore is an appropriate place to list the general provisions for installation of solar energy systems on buildings within the scope of the *International Residential Code*. Newly proposed Section 324 contains general provisions for solar energy systems and then, with subsections, serves as pointers to specific code requirements for solar energy systems based on type and location. This section is based upon requirements generally found in Chapter 23 which this proposal also revises. See below for details.

Setting up this section will also allow easy inclusion for new solar energy system types and locations. For example, if there are building integrated photovoltaic wall systems, a new subsection can be created, with an appropriate reference to Chapter 7.

4. Revise Section R902 Roof Classification:

This section has been renamed Fire Classification in order to clarify the subject of the section. Two new sections have been added to clearly identify the fire classification requirements for both building integrated photovoltaic products that serve as the roof covering and rooftop mounted photovoltaic panel systems. There is also a change to clarify Section 902.1, where the word "area" was changed to "jurisdiction" because there has been interpretation that the word "area" referred to is a place on the roof itself rather than a geographic area, such as the Urban Wildfire Interface Zone or other jurisdictional requirements for fire classified roofs. Section 902 is in place to prevent fire from spreading from rooftop to rooftop.

5. Revise Section R902.16 Photovoltaic Shingles:

This section, along with the revised definition for photovoltaic shingles, has been editorially revised to match comparable changes approved in the 2015 *International Building Code*.

6. Add new section R908 ROOFTOP MOUNTED PHOTOVOLTAIC PANEL SYSTEMS:

This new section outlines specific requirements for rooftop photovoltaic panel systems installed on or above roof coverings. As shown, material standards, structural requirements and installation details for these systems is detailed.

7. Revise CHAPTER 23 and delete Section M2302 PHOTOVOLTAIC SOLAR ENERGY SYSTEMS:

Chapter 23 is renamed as SOLAR THERMAL ENERGY SYSTEMS which limits the chapter to solar thermal energy systems only as identified in newly proposed R324.

8. Delete Section M2302 PHOTOVOLTAIC SOLAR ENERGY SYSTEMS:

As shown in Item 7, Chapter 23 is limited to solar thermal energy systems only. Therefore, Section M2302 PHOTOVOLTAIC SOLAR ENERGY SYSTEMS is deleted. Photovoltaic energy systems are electrical in nature. Placing requirements for these systems in the Mechanical part of the code is illogical and was only added in the 2012 International Residential Code because there was no other available place. This proposal sets up a new section R324 in Chapter 3 Building Planning for all solar energy systems with pointers to the type of system that will be used on the building. Provisions for photovoltaic energy systems currently in Section M2302 have been moved as appropriate to the newly proposed R324 SOLAR ENERGY SYSTEMS.

Cost Impact: This code change does not increase the cost of construction.

RM98-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

M2302-RM-ROSS.DOC

TENTATIVE ORDER OF DISCUSSION 2013 PROPOSED CHANGES TO THE INTERNATIONAL RESIDENTIAL CODE – PLUMBING

The following is the tentative order in which the proposed changes to the code will be discussed at the public hearings. Proposed changes which impact the same subject have been grouped to permit consideration in consecutive changes.

Proposed change numbers that are indented are those which are being heard out of numerical order. Indentation **does not** necessarily indicate that one change is related to another. Proposed changes may be grouped for purposes of discussion at the hearing at the discretion of the chair. Note that some IRC code change proposals may not be included on this list, as they are being heard by other committees. Please consult the Cross Index of Proposed Changes.

RB28-13	RP52-13	RP95-13	RP147-13
RP1-13	RP53-13	RP96-13	RP148-13
RP2-13	RP54-13	RP97-13	RP149-13
RP3-13	RP55-13	RP98-13	RP150-13
RP4-13	RP56-13	RP99-13	RP151-13
RP5-13	RP57-13	RP100-13	RP152-13
RP6-13	RP58-13	RP101-13	RP153-13
RP7-13	RP59-13	RP102-13	RB472-13
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RP35-13	RP84-13	RP130-13	
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RP38-13	RP87-13	RP133-13	
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RP41-13	RP90-13	RP136-13	
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RP43-13	RP92-13	RP138-13	
RP44-13	RP93-13	RP139-13	
RP45-13	CE283-13, Part III	RP140-13	
RP46-13	RE125-13, Part III	RP141-13	
RP47-13	RE136-13, Part III	RP142-13	
RP48-13	RE137-13, Part II	RP143-13	
RP49-13	RE138-13, Part II	RP144-13	
RP50-13	RE129-13, Part III	RP145-13	
RP51-13	RP94-13	RP146-13	

RP1 – 13

P2502.1

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2502.1 Existing building sewers and building drains. ~~Existing *building sewers* and drains shall be used in connection with new systems when found by examination and/or test to conform to the requirements prescribed by this document. Where the entire sanitary drainage system of an existing building is replaced, existing building drains under concrete slabs and existing building sewers that will serve the new system shall be internally examined to verify that the piping is sloping in the correct direction, is not broken, is not obstructed and is sized for the drainage load of the new plumbing drainage system to be installed.~~

Reason: Before the technical reasons for the changes in this section are provided, the PMGCAC wants to readers of PMGCAC proposals to understand that many of our proposals for changing the IRC are focused on language improvements and intent clarity that do not change the meaning of what the 2012 IRC (and earlier editions) have required. Much of the existing language in the plumbing chapters came from the old CABO codes. "Seasoned" code officials knew what this language intended and inspected based upon a wealth of knowledge gathered over the many years of development of those older codes. Our concern is for the newer code officials and inspectors who do not have this experience and more often than not, are being required to enforce the code just as it is written. If the code is not clear, a variety of interpretations result and all users of the code suffer the consequences. The code needs to actually state the intent in clear terms. Even though many people already "know" what is intended by a particular code section and don't think it necessary to make any changes, the development of the codes needs to consider all people who use the codes whether they are experienced or a newcomer. We hope that the readers of the PMGCAC proposals will carefully consider and approve our "editorial proposals" towards making a better code for the future.

Technical reason for Section P2502.1:

Use of "and/or" and "when" in code text is undesirable code format. What kind of "test"? The phrase "requirements prescribed by this document" is vague. Overall, the application of this section is unclear. The revised language provides clear, prescriptive requirements.

Consider a few situations that happen to houses. 1) A slab-on grade house burns down or is wind damaged such that only the remaining slab foundation will be used to re-construct a new building. Re-use of the building drain would be desirable to avoid extensive slab rework. 2) A house is completely razed or the entire plumbing drainage system of a house needs replaced such that only the building sewer remains. Re-use of the building sewer would be desirable to avoid extensive costs and possible complications for replacing the sewer (such as crossing a public street to connect to the public sewer). Why tear out good, serviceable building drains and building sewers for the sake of replacing with new material? The only way to know if existing building drains and existing building sewers are serviceable is to internally examine the piping for problems.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 11 on the PMGCAC IRC-P list. For PMGCAC member reference, this was item no.1 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP1-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2502.1-RP-HALL-PMGCAC

RP2 – 13

P2502.2

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2502.2 Additions, alterations or repairs. Additions, *alterations*, renovations or repairs to ~~any~~ plumbing systems shall conform to that required for a new plumbing system without requiring the existing plumbing systems to comply with all the requirements of this code. Additions, *alterations* or repairs shall not cause an existing system to become unsafe, insanitary or overloaded.

Minor additions, minor alterations, minor renovations ~~and or minor repairs to an existing plumbing systems shall be permitted that are performed~~ in the same manner and arrangement as in the existing system but do not comply with this code, shall not create a hazardous condition and shall require approval by the building official. ~~, provided that such repairs or replacement are not hazardous and are approved.~~

Reason: "Shall be permitted" is not mandatory code language. The existing second paragraph is really an exception to allow "old methods and arrangements", not compliant with the current code, to be used in certain situations that are determined to be not hazardous. For example, a drum trap on a bathtub is not allowed by current code. It's old technology but drum traps are not known to create a hazardous condition. Changing a defective drum trap over to a standard trap arrangement might prove to be very difficult and unnecessarily costly when a replacement with a new drum trap will work. An S-trap arrangement for an existing pedestal lavatory might be the only economical way to provide for a replacement trap to the lavatory because of the physical constraints. The previous S-trap installation worked successfully and is not a hazardous condition. The second sentence in this section provides appropriate relief for repair situations instead of forcing an extensive and costly event for what started off as a simple repair project. The revised language makes the intent clear.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 11 on the PMGCAC IRC-P list. For PMGCAC member reference, this was item no.2 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP2-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2502.2-RP-HALL-PMGCAC

RP3 – 13

P2503.4, P2503.4.1 (New), P2503.4.2 (New)

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Delete and substitute as follows:

P2503.4 Building sewer testing. ~~The building sewer shall be tested by insertion of a test plug at the point of connection with the public sewer and filling the building sewer with water, testing with not less than a 10 foot (3048 mm) head of water and be able to maintain such pressure for 15 minutes.~~

P2503.4 Gravity-flow building sewer test. Gravity-flow *building sewer* piping shall be tested in accordance with Section P2503.4.1 or P2503.4.2. Plastic piping shall not be tested using air or gas.

P2503.4.1 Water test. The piping shall be filled with water. Additional water shall be forced into the piping to increase the pressure in the piping by not less than 10 feet of water column (4.3 psi) (30 kPa). The source of pressure shall be isolated and disconnected from the piping except where a standpipe is used to generate the test pressure. Where a standpipe is used to generate the test pressure, water shall not be added to the standpipe during the test observation period. The test shall be successful where there is not any change in pressure gauge indication during an observation period of 15 minutes. The pressure gauge shall comply with the requirements of Section P2503.9.

P2503.4.2 Air test. The piping shall be pressurized with air to not less than 4.3 psi (30 kPa). The air pressure shall be retained in the piping and the air pressure source shall be disconnected from the piping. The test shall be successful where there is not any change in pressure gauge indication during an observation period of 15 minutes. The pressure gauge shall comply with the requirements of Section P2503.9.

Reason: This section needs to apply *only* to gravity flow sewers to distinguish it from the testing requirements for forced flow sewers (another proposal by the PMGCAC. The testing requirements between the two types are vastly different.

Code language should not, in general, include unnecessary "instructions" for the performance of the work. For example, "insertion of a test plug at the point of connection to the..." is unnecessary as the requirement for pressurizing the piping automatically requires that the contractor make the necessary arrangements (such as plugging and capping) to be able to pressurize the piping. To the "public sewer" is inaccurate as a building sewer could terminate at a septic tank, a private sewer or a private waste treatment plant.

The existing code language requires that the "piping maintain the test pressure". This is archaic language because the piping doesn't "maintain" anything. What is intended is that the test pressure in the piping not decrease during the observation period. The code language is revised to more clearly state the condition for a successful test.

A common method for water testing is to attach a standpipe to the piping being tested and filling the piping and the standpipe with water so that the water in the standpipe produces the required test pressure in the piping. The test pressure is easily verified by measuring the height of the standpipe. A "loss of pressure" (indicating a leak) in the system *could* be determined by observing the water level in the standpipe. However, in many cases, observing the water level in the standpipe might require the inspector to climb a ladder to visually see the water level at the top of the standpipe. The inspector is now challenged as to how much of a drop in water level in the standpipe constitutes a test failure? At first, it might be easy to say "none". However, if a pressure gauge is connected to the system to determine pressure loss, the minimum "readability" of the gauge for this pressure range allows for *some* pressure loss (or drop in standpipe water level). For example, Section P2503.9 requires that the pressure gauge have increments of 0.1 psi. Therefore, the gauge can be read to an accuracy of half of the increment or 0.05 psi. In other words, where using a reasonably sized, typical dial pressure gauge, it would be very difficult to observe that the pressure gauge needle moved by an increment less than 0.05 psi. So, by reading a pressure gauge, the amount of pressure drop allowed in the system under test is 0.05 psi. This pressure converts to 1.4 inches of water column. So, theoretically, to be fair and equivalent to the reading of a pressure gauge (such as used for an air test), the water level in the test standpipe could drop 1.4 inches and still be considered acceptable. Some code officials will fail a water test on piping because of a *change in shape of the water meniscus in the standpipe!* This is not realistic, is unnecessarily restrictive and is not what is intended by the code. By requiring that a gauge be used for determining the success of a water test allows for the code official to remain in a safe location (not having to climb ladders) and provides for a reasonable allowance for leakage of a system that essentially experiences no pressure while in service.

Another way to pressurize the piping with water is to force water into the piping with a hydrostatic pump (usually a small hand pump). The current language doesn't seem to consider this method and some code officials might balk at this method just because they think the language requires a 10 foot standpipe full of water to generate the test pressure. The revised language is now open to allow for water pressurization by a pump (typically a hand pump) instead of a standpipe.

A new section for *air testing* of gravity flow sewers is added as there is no technical reason why air cannot be used as a test medium provided that the piping is not of plastic material. Note that the test pressure is 4.3 psi to be the pressure equivalent to 10 feet head of water. In other sections of the current code, air test pressures are stated as 5 psi. As test gauges are required (see Section P2903.9) to have increments of 0.1 psi, there is no need to 'round' the test pressure up to 5 psi so that the pressure can be read on a gauge. For other code sections that use the 5 psi for air testing, other proposals are being offered to change the test pressure to 4.3 psi. There is no need (and it doesn't make sense) to air test at 5 psi when water testing is only required at 4.3 psi (10 feet of water head).

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 11 on the PMGCAC IRC-P list. For PMGCAC member reference, this was item no. 3 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP3-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2503.4-RP-HALL-PMGCAC

RP4 – 13

P2503.4

Proponent: Gary Kozan, CPD, Ridgeway Plumbing, representing Florida Association of Plumbing Heating Cooling Contractors (garyk@ridgewayplumbing.com)

Revise as follows:

P2503.4 Building sewer testing. The building sewer shall be tested by insertion of a test plug at the point of connection with the public sewer and filling the building sewer with water to the highest point thereof, testing with not less than a 10-foot (3048) head of water and be able to maintain such pressure for 15 minutes. The building sewer shall be watertight at all points. Forced sewer tests shall consist of pressurizing the piping to a pressure of not less than 5 psi (34.5 kPa) greater than the pump rating and maintaining such pressure for not less than 15 minutes. The forced sewer shall be watertight at all points.

Reason: Subjecting a gravity house sewer to a 10-foot head is both unnecessary and impractical. By the time the building sewer is able to be connected, the plumbing fixtures have often already been installed. That means that both ends of the sewer line must be plugged off in order to prevent the house from flooding. Leaks on house sewers are rare, considering that most are constructed with plastic pipe, are typically short, and contain few fittings and joints. Public sewer mains and branch laterals are not similarly tested.

This revised text is identical to that found in the other model plumbing code (UPC). It acknowledges the difficulties associated with pressure testing house sewers. It would be appropriate for the IRC to adopt this proven method.

This proposal also adds language for testing forced sewers, identical to that found in the IPC.

Cost Impact: This code change proposal will not increase the cost of construction.

RP4-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2503.14-RP-KOZAN.DOC

RP5 – 13

P2503.5 (New), P2503.5.1 (New), P2503.5.2 (New)

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Add new text as follows:

P2503.5 Forced-flow building sewer test. A forced-flow *building sewer* shall be tested in accordance with Section P2503.5.1 or P2503.5.1.2. Plastic piping shall not be tested using air or gas.

P2503.5.1 Water test. The piping shall be filled with water and the outlet of the piping plugged. The sewage pump shall be operated, the pump discharge valve shall be closed and the pump shall be stopped. The pressure shall be retained in the piping. The test shall be successful where there is not any change in pressure gauge indication during an observation period of 15 minutes. The pressure gauge shall comply with the requirements of Section P2503.9.

P2503.5.2 Air test. The piping shall be pressurized with air to not less than the maximum discharge pressure of the sewage pump. The air pressure shall be retained in the piping and the source of air shall be disconnected from the piping. The test shall be successful where there is not any change in pressure gauge indication during an observation period of 15 minutes. The pressure gauge shall comply with the requirements of Section P2503.9.

(Renumber subsequent sections)

Reason: The code is silent about the testing of forced-flow building sewers and needs to have this new section to provide direction to installers and code officials. Some people might say “Why use a gauge for water testing? You can see if the piping has leaks” Consider a muddy trench and its raining – how are you going to tell if there are leaks? Using a gauge solves the problems. This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 11 on the PMGCAC IRC-P list. For PMGCAC member reference, this was item no. 4 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP5-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2503.5 (NEW)-RP-HALL-PMGCAC

RP6 – 13

P2503.5

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2503.5 ~~DWW~~ Drain, waste and vent systems testing. Rough-in and finished plumbing installations of drain, waste and vent systems shall be tested in accordance with Sections P2503.5.1 and P2503.5.2.

Reason: The use of acronyms in code text is undesirable. The section language needs to state what plumbing system requires testing because the section title is not code language. This is a simple editorial cleanup that doesn't change the intent or meaning of this section.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 11 on the PMGCAC IRC-P list. For PMGCAC member reference, this was item no. 5 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP6-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2503.5-RP-HALL-PMGCAC

RP7 – 13

P2503.5.1, P2503.5.1.1 (New), P2503.5.1.2 (New)

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2503.5.1 Rough-in test plumbing. ~~DWV The rough-in piping for the drain, waste and vent systems shall be tested on completion of the rough piping installation by in accordance with Section P2503.5.1.1 or P2503.5.1.2 . Plastic piping shall not be tested using air or gas. water or for piping systems other than plastic, by air with no evidence of leakage. Either test shall be applied to the drainage system in its entirety or in sections after rough piping has been installed, as follows:~~

- ~~1. Water test. Each section shall be filled with water to a point not less than 10 feet (3048 mm) above the highest fitting connection in that section, or the highest point in the completed system. Water shall be held in the section under test for a period of 15 minutes. The system shall prove leak free by visual inspection.~~
- ~~2. Air test. The portion under test shall be maintained at a gauge pressure of 5 pounds per square inch (psi) (34 kPa) or 10 inches of mercury column (34 kPa). This pressure shall be held without introduction of additional air for a period of 15 minutes.~~

P2503.5.1.1 Water test. The piping shall be filled with water. Additional water shall be forced into the piping to increase the pressure in the piping by not less than 10 feet (3048 mm) of water column (4.3 psi) (30 kPa). The source of pressure shall be isolated and disconnected from the piping except where a standpipe is used to generate the test pressure. Where a standpipe is used to generate the test pressure, water shall not be added to the standpipe during the test observation period. The test shall be successful where there is not any change in pressure gauge indication during an observation period of 15 minutes. The pressure gauge shall comply with the requirements of Section P2503.9.

Exception: Vent piping that is within 10 feet (3048) below the elevation of the termination of the vent piping above a roof shall only be required to be filled with water and shall not be required to be pressurized by 10 feet (3048 mm) of water column (4.3 psi) (30 kPa).

P2503.5.1.2 Air test. The piping shall be pressurized with not less than 4.3 psi (30 kPa) of air. The air pressure shall be retained and the source of air pressure shall be disconnected from the piping. The portion under test shall be maintained at a gauge pressure of 5 pounds per square inch (psi) (34 kPa) or 10 inches of mercury column (34 kPa). This shall be held without introduction of additional air for a period of 15 minutes. The test shall be successful where there is not any change in pressure gauge indication during an observation period of 15 minutes. The pressure gauge shall comply with the requirements of Section P2503.9.

Exception: The highest vent piping joint in a completed drain waste and vent system and the pipe above such point in the vent system shall not be required to be tested.

Reason: The existing section language has some convoluted language regarding a personnel safety-related prohibition, appears to allow testing using gases other than air which is equally dangerous to personnel, uses an acronym in the code language (an undesirable practice), has archaic terminology, fails to consider certain DWV piping arrangements that are now allowed by the code and, depending on a code official's interpretation, puts onerous and perhaps impossible demands on the inspector to visually inspect all of the pipe, fittings and connections for water leaks.

Water testing:

A common method for water testing is to attach a standpipe to the piping being tested and filling the piping and the standpipe with water so that the water in the standpipe produces the required test pressure in the piping. The test pressure is easily verified by measuring the height of the standpipe. A "loss of pressure" (indicating a leak) in the system *could* be determined by observing the water level in the standpipe. However, in many cases, observing the water level in the standpipe might require the inspector to climb a ladder to visually see the water level at the top of the standpipe. The inspector is now challenged as to

how much of a drop in water level in the standpipe constitutes a test failure? At first, it might be easy to say “none”. However, if a pressure gauge is connected to the system to determine pressure loss, the minimum “readability” of the gauge for this pressure range allows for *some* pressure loss (or drop in standpipe water level). For example, Section P2503.9 requires that the pressure gauge have increments of 0.1 psi. Therefore, the gauge can be read to an accuracy of half of the increment or 0.05 psi. In other words, where using a reasonably sized, typical dial pressure gauge, it would be very difficult to observe that the pressure gauge needle moved by an increment less than 0.05 psi. So, by reading a pressure gauge, the amount of pressure drop allowed in the system under test is 0.05 psi. This pressure converts to 1.4 inches of water column. So, theoretically, to be fair and equivalent to the reading of a pressure gauge (such as used for an air test), the water level in the test standpipe could drop 1.4 inches and still be considered acceptable. Some code officials will fail a water test on piping because of a *change in shape of the water meniscus in the standpipe!* This is not realistic, is unnecessarily restrictive and is not what is intended by the code. By requiring that a gauge be used for determining the success of a water test allows for the code official to remain in a safe location (not having to climb ladders) and provides for a reasonable allowance for leakage of a system that essentially experiences no pressure while in service.

Another way to pressurize the piping with water is to force water into the piping with a hydrostatic pump (usually a small hand pump). The current language doesn't seem to consider this method and some code officials might balk at this method just because they think the language requires a 10 foot standpipe full of water to generate the test pressure. The revised language is now open to allow for water pressurization by a pump (typically a hand pump) instead of a standpipe.

The exception for P2503.5.1.1 is provided to accommodate the age old method of just filling the completed piping system to the overflow point at the vent terminal above the roof. (This is the same allowance that is in the current section language). Vent piping, especially so near to the opening to the outdoors, experiences negligible pressure in actual service so testing at not less than “10 feet of water column” is not critical. Simply filling this section of vent piping with water is good enough as it has been for decades.

Air testing:

This proposal adds the prohibition of the use of gas for testing plastic piping systems as someone could claim that they were not using air for testing but gas (such as nitrogen or carbon dioxide) for testing--the hazard (explosion of the piping) is still the same.

The test pressure of “5 psi of air” was changed to 4.3 psi to be equivalent to 10 feet head of water as it doesn't make sense to “penalize a system” with a higher test pressure just because of the test method chosen. The 5 psi air pressure was originally chosen because in the past, gauges with 1 psi increments were commonly used. Now, the code requires (Section P2503.9) that the pressure gauge have 0.1 psi increments so it is easily possible to pressurize with accuracy to 4.3 psi. There is no need (and it doesn't make sense) to air test at 5 psi when water testing is only required at 4.3 psi (10 feet of water head).

Test instruments using mercury are rarely, if ever anymore, used for plumbing system testing. Because of the environmental issues associated with a mercury spill from such test instruments, references to this type of test apparatus should be eliminated. The exception to Section P2503.5.1.2 is provided so that contractors will not have to climb roofs (sometimes very steep and slick) to “cap off” a vent pipe for a test and then return to the roof to uncap the vent pipe after the test. Such work can be easily and safely performed in an attic space. In actual service, the vent system experiences negligible pressure at this point so testing of this final connection isn't critical. Let's not make the plumbers do something that we know is dangerous (accessing roofs).

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 11 on the PMGCAC IRC-P list. For PMGCAC member reference, this was item no. 6 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP7-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2503.5.1-RP-HALL-PMGCAC

RP8 – 13

P2503.5.1

Proponent: Gary Kozan, CPD, Ridgeway Plumbing, representing Florida Association of Plumbing Heating Cooling Contractors (garyk@ridgewayplumbing.com)

Revise as follows:

P2503.5.1 Rough plumbing. DWV systems shall be tested on completion of the rough piping installation by water or for piping systems other than plastic, by air with no evidence of leakage. Either test shall be applied to the drainage system in its entirety or in sections after rough piping has been installed, as follows:

1. Water test. Each section shall be filled with water to a point not less than ~~40~~ 5 feet (~~3048~~ 1524 mm) above the highest fitting connection in that section, or to the highest point in the completed system. Water shall be held in the section under test for a period of 15 minutes. The system shall prove leak free by visual inspection.
2. Air test. The portion under test shall be maintained at a gauge pressure of 5 pounds per square inch (psi) (34 KPa) or 10 inches of mercury column (34 KPa). This pressure shall be held without introduction of additional air for a period of 15 minutes.

Reason: When testing a DWV system, the actual head pressure is not nearly as critical as the visual nature of the test. 10-foot head tests are commonly verified by the inspector "shaking the stack." If water splashes out, the system is considered to be watertight. Mirrors and ladders are seldom used. Lowering the fill stack to 5 feet enables both the installer and the inspector to put eyeballs on the water level inside the pipe. Seeing is believing.

There is nothing magical about a 10-foot head. The reality is a 10-foot (4.34 psi) head test is unlikely to reveal any leaks or defects that would not be detected by a 5-foot (2.17 psi) head test. Many jurisdictions favor the 5-foot head test as superior overall to a 10-foot head test. Florida, for example, adopted the 5-foot head test statewide more than ten years ago. It is time for the IRC to recognize this common sense approach.

Cost Impact: This code change proposal will not increase the cost of construction.

RP8-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2503.5.1-RP-KOZAN.DOC

RP9 – 13

P2503.5.2, P2503.5.2.1 (New), P2503.5.2.2 (New), P2503.5.2.2.1 (New)

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2503.5.2 Finished test plumbing. After the plumbing fixtures ~~have been~~ are set installed, and their traps filled with water and any air admittance valves installed, a test in accordance with Section P2503.5.2.1 shall be performed. Where required by the building official, one or more tests in accordance with P2503.5.2.2 shall be performed. ~~their connections shall be tested and proved gas tight and/or water tight as follows:~~

P2503.5.2.1 Water leakage tightness. ~~Each-Fixtures shall be operated while exposed piping, fixture and faucet connections are observed for leaks. The test shall be successful where there is not any evidence of water leakage, filled and then drained. Traps and fixture connections shall be proven water tight by visual inspection. This section shall not be construed as requiring the building official to witness the operation of all fixtures.~~

P2503.5.2.2 Gas leakage tightness. ~~Only when required by the local administrative authority building official, testing in accordance with Section P2503.5.2.2.1 or P2503.5.2.2.2 shall be performed. a final test for gas tightness of the DWV system shall be made by the smoke or peppermint test as follows:~~

P2503.5.2.2.1 Smoke test. ~~Introduce-A pungent, thick smoke into the system shall be forced into the drainage, waste and vent system, on the downstream side of traps, using a pressure of 1 inch water column (249 Pa) or less. When After the smoke appears at the outdoor vent terminals, such the terminals shall be temporarily sealed to prevent smoke leakage and the piping shall be pressurized to 1-inch water column (249 Pa) by a continuous source of air, and a pressure equivalent to a 1-inch water column (249 Pa) shall be applied and maintained for a test period of not less than 15 minutes. The test shall be successful where there is not any smoke observed inside the building during an observation period of 15 minutes. Smoke generating materials such as bombs, canisters and flares shall not be placed into the drain, waste and vent system piping.~~

P2503.5.2.2.2 Peppermint test. ~~All but one outdoor vent terminal of the piping shall be temporarily sealed to prevent odor leakage. Two Introduce 2 ounces (59 mL) of oil of peppermint shall be poured into the open outdoor vent terminal followed by into the system. Add 10 quarts (9464 mL) of hot water. and seal all vent terminals. The vent terminal shall be temporarily sealed gas tight. The test shall be successful where the odor of peppermint is not detected in the building during an observation period of 15 minutes. The odor of peppermint shall not be detected at any trap or other point in the system. Persons who have performed the addition of oil and hot water to the system shall not enter the building until after the observation period.~~

Reason: This section has some convoluted language, some archaic terminology and fails to address certain important specifics of the test methods such as making sure air admittance valves are installed. The revised language makes the intent clear. The last sentence of Section P2503.5.2.1 allows the building official to randomly select (or select none) of the fixtures to operate during inspection so as to not waste precious time for inspection. The plumbing installer should have already performed a final leak test of all fixtures before inspection. The plumbing installer is responsible for finding and resolving any leaks before and after inspection. This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 11 on the PMGCAC IRC-P list. For PMGCAC member reference, this was item no. 7 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP9-13

Public Hearing: Committee: AS AM D
 Assembly: ASF AMF DF

P2503.5.2-RP-HALL-PMGCAC

RP10 – 13

P2503.7, P2503.7.1 (New), P2503.7.2 (New)

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2503.7 Water-supply service and distribution systems testing. ~~Upon completion of The water service piping system and water distribution piping system -supply system or section of it, system or portion completed shall be tested and proved tight under a water pressure of not less than the working pressure of the system or, for piping systems other than plastic, by an air test of not less than 50 psi (345 kPa) in accordance with Section P2503.7.1 or P2503.7.2. This pressure shall be held for not less than 15 minutes. The water used for tests shall be obtained from a potable water source. Plastic piping shall not be tested using air or gas.~~

P2503.7.1 Water test. The piping shall be filled with potable water. The water in the piping system shall be pressurized to not less than the working pressure of the system. The pressure shall be retained and the source of pressure shall be isolated from the piping being tested. The test shall be successful where there is not any change in pressure gauge indication during an observation period of 15 minutes. The pressure gauge shall comply with requirements of Section P2503.9.

P2503.7.2 Air test. The piping shall be pressurized with not less than 50 psi (345 kPa) of air. The pressure shall be retained in the piping and the source of air pressure shall be disconnected from the piping. The test shall be successful where there is not any change in pressure gauge indication during an observation period of 15 minutes. The pressure gauge shall comply with requirements of Section P2503.9.

Reason: This section has some convoluted language, some archaic terminology and fails to address certain important specifics of the test methods. The revised language makes the intent clear. Compressed gas was added to the plastic piping prohibition because someone could claim that they were not using air. Some people might say "Why have a pressure gauge to check for leaks when testing with water? You'll be able to see the leaks". Consider a water service line in a muddy trench. Or it starts to rain on the trench. Or the water distribution system of a large multi-story house. Or the house is not rain tight and there is rainwater dripping everywhere. Does the building official want to go around checking for drips? That's the plumbers responsibility if the system doesn't hold pressure. The pressure gauge method for inspection provides a single point for building official to look at.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 11 on the PMGCAC IRC-P list. For PMGCAC member reference, this was item no. 8 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP10-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2507.5.7-RP-HALL-PMGCAC

RP11 – 13

P2601.2

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2601.2 Connections to drainage system. Plumbing fixtures, drains, appurtenances and appliances used to receive or discharge liquid wastes or sewage shall be directly connected to the sanitary drainage system of the building or premises, in accordance with the requirements of this code. This section shall not be construed to prevent indirect waste connections where required by the code. ~~waste systems.~~

Exception: Bathtubs, showers, lavatories, clothes washers and laundry trays shall not be required to discharge to the sanitary drainage system where such fixtures discharge to an approved gray water systems complying with Section P3009. ~~for flushing of water closets and urinals or for subsurface landscape irrigation.~~

Reason: It is unclear what an "indirect waste system" is. The intent is to have all connections be direct connections except where the code requires an indirect connection. The last part of the text in the exception is unnecessary – the gray water recycling system section covers what to do with the gray water after it is captured.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 11 on the PMGCAC IRC-P list. For PMGCAC member reference, this was item no. 9 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP11-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2601.2-RP-HALL-PMGCAC

RP12 – 13

P2602.1, P2602.2, Chapter 14

Proponent: Dan Buuck, National Association of Home Builders (NAHB); David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

SECTION P2602 INDIVIDUAL WATER SUPPLY AND SEWAGE DISPOSAL

P2602.1 General. The water-distribution and drainage system of any building or premises where plumbing fixtures are installed shall be connected to a public water supply or sewer system, respectively, if available. When either a public water supply or sewer system, or both, are not available, or connection to them is not feasible, an individual water supply or individual (private) sewage-disposal system, or both, shall be provided. Individual water supplies shall be constructed in accordance with state and local laws or in accordance with ANSI/NGWA-01-07.

P2602.2 Flood-resistant installation. In flood hazard areas as established by Table R301.2(1):

1. Water supply systems shall be designed and constructed to prevent infiltration of floodwaters.
2. Pipes for sewage disposal systems shall be designed and constructed to prevent infiltration of floodwaters into the systems and discharges from the systems into floodwaters.

Add new standard to Chapter 14 as follows:

National Ground Water Association
601 Dempsey Road
Westerville, OH 43081-8978

NGWA

ANSI/NGWA-01-07 Water Well Construction Standard

Reason: The IRC currently refers the user to the IPC for requirements regarding well construction, as it does for all plumbing not addressed in the IRC (P2601.1). Does it make sense to have code language regarding wells when many states and counties have laws that regulate their construction? The provisions for wells in the IPC are also incomplete and spread out through several sections of the code making tracking difficult. This proposal is a simple change that clarifies where to go for well construction requirements—either your local regulations or an ANSI standard.

The Water Well Construction Standard is expected to complete the ANSI process and be published by the end of summer 2013.

Cost Impact: The code change proposal will not increase the cost of construction.

RP12-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2602.1-RP-BUUCK-HALL-PMGCAC

RP13 – 13

P2603.2.1, P2603.2.1.1 (New), P2603.2.1.2 (New), P2603.2.1.3 (New)

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2603.2.1 Protection against physical damage. ~~In concealed locations where piping, other than cast iron or galvanized steel, is installed through holes or notches in studs, joists, rafters or similar members less than 1 1/2 inches (38 mm) from the nearest edge of the member, the pipe shall be protected by steel shield plates. Such shield plates shall have a thickness of not less than 0.0575 inch (1.463 mm) (No. 16 gage). Such plates shall cover the area of the pipe where the member is notched or bored and shall extend not less than 2 inches (51 mm) above sole plates and below top plates. Where piping will be concealed within light-frame construction assemblies, the piping shall be protected against penetration by fasteners in accordance with Sections P2603.2.1.1 through P2603.2.1.3.~~

Exception: Cast iron piping and galvanized steel piping shall not be required to be protected.

P2603.2.1.1 Piping through bored holes or notches. Where piping is installed through holes or notches in framing members and the piping is located less than 1 1/2 inches (38 mm) from the framing member face to which wall, ceiling or floor membranes will be attached, the pipe shall be protected by shield plates that cover the width of the pipe and the framing member and that extend 2 inches (51 mm) to each side of the framing member. Where the framing member that the piping passes through is a bottom plate, bottom track, top plate or top track, the shield plates shall cover the framing member and extend 2 inches (51 mm) above the bottom framing member and 2 inches (51 mm) below the top framing member.

P2603.2.1.2 Piping in other locations. Where the piping is located within a framing member and is less than 1 1/2 inches (38 mm) from the framing member face to which wall, ceiling or floor membranes will be attached, the piping shall be protected by shield plates that cover the width and length of the piping. Where the piping is located outside of a framing member and is located less than 1 1/2 inches (38 mm) from the nearest edge of the face of the framing member to which the membrane will be attached, the piping shall be protected by shield plates that cover the width and length of the piping.

P2603.2.1.3 Shield plates. Shield plates shall be of steel material having a thickness of not less than 0.0575 inch (1.463 mm) (No. 16 gage).

Reason: This proposal provides clear requirements of where shield plates are needed. Section P2603.2.1 uses the term "light frame construction assemblies" to describe wall, floor and roof assemblies that can be made up from either wood members or light frame, cold formed steel members.

Section P2603.2.1.1 covers applications where piping runs perpendicular to a framing member and passes through a bored hole or notch in the framing member. This text is nearly the same as what is currently in the IRC. If the piping is within 1 1/2 inches of the face of the member where wall ceiling or floor membranes will be attached, then the piping is required to be protected by a shield plate that covers the width of the piping by the width of the framing member plus 2 inches on either side of the framing member. Protection of the piping on either side of the framing member is needed because it is too easy for a membrane/fastener installer to miss the framing member's fastening face or penetrate the member at an angle and hit the piping that is just outside of the framing member.

Section P2603.2.1.1 also covers the application where piping runs perpendicular to and penetrates top and bottom plates, or top and bottom tracks. Protection of the piping above the bottom framing member (or below the top framing member) is needed because it is too easy for a membrane/fastener installer to miss the framing member's fastening face or penetrate the member at an angle and hit the piping just outside of the framing member. The code fails to address the situation where piping is run within the C-channel of a metal stud or joist and it also fails to address piping run parallel to a framing member.

Section P2603.2.1.2 covers applications where the piping runs alongside of a framing member or in the case of a light frame, cold formed steel framing member, piping that runs parallel to the length of and within the framing member (in other words, within the channel section). If the piping is within 1 1/2 inches of the face of the member where wall, ceiling or floor membranes will be attached, then the piping is required to be protected by a shield plate that covers the width of the piping by the length of piping that is within the 1 1/2 inch proximity of the framing member's fastening face. Piping that is located behind the fastening face of the member and within 1 1/2 inches of the fastening face of the member obviously needs protection from fastener penetration. Piping that is

located adjacent to and within 1 ½ inches of the fastening face of the member needs protection because it is too easy for a membrane/fastener installer to miss the framing member's fastening face or penetrate the member at an angle and hit the piping that is just outside of the framing member.

The opposition to this proposal for the IPC was related to the requirement to protect the length of piping that is run parallel to a framing member and within 1 ½ inches from the member face to which wall board will be screwed or nailed. The concern was expressed that it would be difficult to protect the pipe for its full length, making the assumption that the pipe ran from the bottom plate up through the top plate in walls. First of all, it is unlikely that an installer would install piping from plate to plate that close to the stud, since it would be nearly impossible to drill holes that close to the stud. Secondly, the obvious way to avoid installing protection for the pipe is to simply keep it at least 1 ½ inches away from the framing member. With a little planning, the installation of pipe protection could be easily avoided.

This proposal was approved for the 2015 IFGC.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 11 on the PMGCAC IRC-P list. For PMGCAC member reference, this was item no. 11 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will increase the cost of construction.

RP13-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2603.2.1-RP-HALL-PMGCAC

RP14 – 13

P2603.2.1

Proponent: Gary Kozan, CPD, Ridgeway Plumbing, representing Florida Association of Plumbing Heating Cooling Contractors (garyk@ridgewayplumbing.com)

Revise as follows:

P2603.2.1 Protection against physical damage. In concealed locations, where piping, other than cast-iron or galvanized steel, is installed through holes or notches in studs, joists, rafters or similar members less than ~~4-1/2~~ 1-1/4 inches (~~38~~ 31.8 mm) from the nearest edge of the member, the pipe shall be protected by steel shield plates. Such shield plates shall have a thickness of not less than 0.0575 inch (1.463 mm) (No. 16 gage). Such plates shall cover the area of the pipe where the member is notched or bored, and shall extend not less than 2 inches (51 mm) above sole plates and below top plates.

Reason: The safest place to run water piping is in the middle of the wall. But in a typical 3-1/2 inch stud wall, even a 1/2-inch pipe (5/8-inch o.d.) ends up nearer than the requisite 1-1/2 inch setback from either edge. Inspectors often want to see stud guards on *both* sides of the stud. This makes no sense. By reducing the distance from 1-1/2 inches to 1-1/4 inches, both 1/2 and 3/4-inch water lines can be safely installed in the center of the wall without the need for stud guards on either side. This encourages quality workmanship instead of penalizing it.

This proposal is consistent with the National Electrical Code, which also specifies a 1-1/4-inch setback from the edge of a stud. The Uniform Plumbing Code specifies only a 1-inch setback.

Cost Impact: This code change proposal will not increase the cost of construction.

RP14-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2603.2.1-RP-KOZAN.DOC

RP15 – 13

P2603.3

Proponent: Richard Grace/Fairfax County/Virginia Plumbing and Mechanical Inspectors Association and Virginia Building and Code Officials Association (Richard.Grace@fairfaxcounty.gov)

Revise as follows:

P2603.3 Breakage and corrosion. ~~Pipes passing through concrete or cinder walls and floors, cold-formed steel framing or other corrosive material shall be protected against external corrosion by a protective sheathing or wrapping or other means that will withstand any reaction from lime and acid of concrete, cinder or other corrosive material.~~ Piping, other than cast iron and ductile iron, shall not be installed in direct contact with concrete, masonry or cold-formed steel framing. Metallic piping shall not be installed in direct contact with corrosive soil. Where plastic sheathing is used to prevent direct contact with concrete, masonry, or cold-formed steel framing, the wall thickness of the sheathing shall be not less than 0.006 inches (6 mil) (0.152 mm). Sheathing or wrapping shall allow for movement including expansion and contraction of piping. The wall thickness of material shall be not less than 0.025 inch (0.64 mm).

Reason: The intent of the code is to protect piping from direct contact with concrete, masonry, cold formed steel framing, and corrosive soils. This proposal is a cleanup action to clarify that intent. The commonly used plastic sheathing for pipe protection has a wall thickness of only 0.004 inches or 0.006 inches thick. The 0.025 inch thick material is really unnecessary and beyond the minimum standard practice used to protect the piping system. The thinner material has been used for years with satisfactory results.

Cost Impact: This code change will not increase the cost of construction.

RP15-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2603.3-RP-GRACE.DOC

RP16 – 13

P2603.3

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Delete and substitute as follows:

~~P2603.3 Breakage and corrosion.~~ Pipes passing through concrete or cinder walls and floors, cold-formed steel framing or other corrosive material shall be protected against external corrosion by a protective sheathing or wrapping or other means that will withstand any reaction from lime and acid of concrete, cinder or other corrosive material. Sheathing or wrapping shall allow for movement including expansion and contraction of piping. The wall thickness of material shall be not less than 0.025 inch (0.64 mm).

P2603.3 Protection against corrosion. Metallic piping, except for cast iron, ductile iron and galvanized steel, shall not be placed in direct contact with steel framing members, concrete or masonry. Metallic piping shall not be placed in direct contact with corrosive soil. Where sheathing is used to prevent direct contact, the sheathing material thickness shall be not less than 0.008 inch (8 mil) (0.203 mm) and shall be made of plastic. Where sheathing protects piping that penetrates concrete or masonry walls or floors, the sheathing shall be installed in a manner that allows movement of the piping within the sheathing.

Reason: One clear intent of this code section is to protect metallic piping from direct contact with concrete, masonry, corrosive soils and cold formed steel framing members as direct contact could cause exterior corrosion of the piping. However, it is not clear exactly what the sentence "Sheathing or wrapping shall allow for movement including expansion and contraction of piping" is intended to mean. Committee comments from the 2012 IPC hearings on a similar proposal seem to indicate that where sheathing or wrapping (presumably with plastic materials) are used to protect a pipe passing through concrete (such as a pipe below a slab coming up through and cast in the slab), the sheathing must allow for some "give" between the pipe and the concrete or masonry.

The wall thickness of the sheathing material is in question. To our knowledge, no one is using this thick of material and jurisdictions are not enforcing the requirement for 0.025 inch (25 mils) thick material. Much thinner plastic sheathing materials are commonly being used across the country for decades without any reported adverse effects. Cast iron and ductile iron manufacturers recommend, for corrosive soil conditions, the use of either 0.008 inch thick low density polyethylene sheathing or 0.004 inch thick, high strength cross laminated polyethylene sheathing for corrosive soil conditions. For small metallic pipes such as copper tubing (1/2" to 1 1/4") passing through concrete or masonry, plumbing supply houses normally stock 0.004 and .006 inch thick low density "flat tube" plastic sheathing materials and that is what is being used. To make it easy, requiring 0.008 inch thick material for all types of metallic piping is reasonable.

The revised language improves understanding what the code intends.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 11 on the PMGCAC IRC-P list. For PMGCAC member reference, this was item no. 10 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP16-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2603.3-RP-HALL-PMGCAC

RP17 – 13

P2604.2

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

P2604.2 Common Water service and building sewer in same trench. Where the water service piping and building sewer piping is installed in same trench, the installation shall be in accordance with See Section P2905.4.2.

Reason: This existing section is poor code format and the current section has no information as to what this section really concerns. The revision makes a complete statement about what is intended.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 11 on the PMGCAC IRC-P list. For PMGCAC member reference, this was item no. 13 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP17-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2604.2-RP-HALL-PMGCAC

RP18 – 13

P2604.4

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Delete and substitute as follows:

~~P2604.4 Protection of footings.~~ ~~Trenching installed parallel to footings shall not extend below the 45-degree (0.79 rad) bearing plane of the footing or wall (See Figure P2604.4).~~

P2604.4 Protection of footings. Trenching installed parallel to footings and walls shall not extend into the bearing plane of a footing or wall. The upper boundary of the bearing plane is a line that extends downward, at an angle of 45 degrees from horizontal, from the outside bottom edge of the footing or wall.

Reason: The proposed language was approved for the 2015 IPC. The current language is not especially clear and is easily misunderstood. The proposed text is explicit and captures the intent of this provision.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. X6 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP18-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2604.4-RP-HALL-PMGCAC

RP19 – 13

P2605.1

Proponent: Michael Cudahy, Plastic Pipe and Fittings Association representing the Plastic Pipe and Fittings Association (mikec@cmservnet.com)

Revise as follows:

**TABLE P2605.1
PIPING SUPPORT**

PIPING MATERIAL	MAXIMUM HORIZONTAL SPACING (feet)	MAXIMUM VERTICAL SPACING (feet)
Cross-linked polyethylene (PEX) pipe, <u>1 inch and smaller</u>	2.67 (32 inches)	10b
Cross-linked polyethylene (PEX) pipe, <u>1 ¼ inch and larger</u>	<u>4</u>	<u>10^b</u>

(Portions of table and footnotes not shown remain unchanged)

Reason: PEX tubing, like other materials currently in the table, is being made in larger diameters that are stiffer and require less support.

Cost Impact: None

RP19-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

P2605.1-RP-CUDAHY.DOC

RP20 – 13

Table P2605.1

Proponent: Pennie L. Feehan, Pennie L. Feehan Consulting representing the Copper Development Association (penniefeehan@me.com)

Revise as follows:

**TABLE P2605.1
PIPING SUPPORT**

PIPING MATERIAL	MAXIMUM HORIZONTAL SPACING (feet)	MAXIMUM VERTICAL SPACING
Brass Pipe	40	40

(Portions of table not shown remain unchanged)

Reason: Brass and Bronze are copper alloys and are covered under the copper and copper alloys listed elsewhere in the table. This proposal eliminates outdated language and provides the appropriate terminology and correct information to the end user.

Cost Impact: The code change proposal will not increase the cost of construction.

RP20-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

P2605.1T-RP-FEEHAN.DOC

RP21 – 13

Table P2605.1

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

TABLE P2605.1 PIPING SUPPORT

(Portions of table not shown remain unchanged)

- a. The maximum horizontal spacing of cast iron pipe hangers shall be increased to 10 feet where 10 foot lengths of pipe are installed.
- b. ~~Mid-story guide~~ For sizes 2 inches and smaller, a guide shall be installed midway between required vertical supports. Such guides shall prevent pipe movement in a direction perpendicular to the axis of the pipe.

Reason: What constitutes a “mid-story guide” and what is supposed to do? The revised language provides the necessary information to make this footnote clear. This same proposal for the 2015 IPC was approved as submitted.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 14 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP21-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2605.1T-RP-HALL-PMGCAC

RP22 – 13

P2603.5 (New)

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Add new text:

P2603.5 Pipes through footings. Piping shall not pass through a building footing except where a registered design professional has reviewed the design of the altered footing. Piping through footings shall be provided with a pipe sleeve built or cast into the footing except where holes for piping are drilled through concrete footings already cast. Pipe sleeves or drilled holes in footings shall be not less than two pipe sizes greater than the pipe passing through the footing.

(Renumber subsequent sections)

Reason: In rare circumstances, it is sometimes necessary for a pipe to pass through a footing. For example, the slope of a building drain might not be able to be changed resulting in the drainage pipe needing to pass through the footing. Any footing to be altered should be reviewed by a design professional to determine what footing design changes might be necessary to maintain the required footing strength. The need for protecting pipes passing through footings is no different than for pipes passing through foundation walls thus a pipe sleeve is necessary. Where holes are drilled in footings after concrete footings are cast in place, pipe sleeves are not necessary (it's an obvious statement but it needs to be said).

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 11 on the PMGCAC IRC-P list. For PMGCAC member reference, this was item no. 12 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP22-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2605.3 (NEW)-RP-HALL-PMGCAC

RP23 – 13

P2607.1, P2607.2 (New)

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2607.1 General Pipes penetrating roofs. Where a pipe penetrates a roof, a flashing of lead, copper, galvanized steel or an *approved* elastomeric material shall be installed in manner that prevents water entry into the building. Counterflashing into the opening of pipe serving as a vent terminal shall not restrict reduce the required internal cross-sectional area of the vent pipe to less than the internal cross-sectional area of one pipe size smaller, any vent, and exterior wall penetrations shall be made water tight. Joints at the roof, around vent pipes, shall be made water tight by the use of lead, copper or galvanized iron flashings or an *approved* elastomeric material.

Add new text as follows:

P2607.2 Pipes penetrating exterior walls. Where a pipe penetrates an exterior wall, a waterproof sealant shall be applied at the joint between the wall and the pipe, on the exterior of the wall.

Reason: The phrase “made water tight” is archaic language. The existing section needs to be broken into two sections for clarity. Additional wording makes the intent clear. Counterflashing will *always* reduce the inside cross-sectional area of the vent pipe so the issue is how much reduction is acceptable. An area that is not less than one pipe smaller seems reasonable.

The new section just separates the wall sealing requirement out of the previous section and makes the language clear.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 15 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP23-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2607.1-RP-HALL-PMGCAC

RP24-13

P2609.1

Proponent: Pennie L. Feehan, Pennie L. Feehan Consulting representing the Copper Development Association (penniefeehan@me.com)

Revise as follows:

P2609.1 Identification. Each length of pipe and each pipe fitting, trap, fixture, material and device utilized in a plumbing system shall bear the identification of the manufacturer and any markings required by the applicable referenced standards. Nipples created from the cutting and threading of approved pipe shall not be required to be identified.

Reason: The identification section is restrictive and does not take into consideration nipples created from pipe.

Cost Impact: The code change proposal will not increase the cost of construction.

RP24-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2609.1-RP-FEEHAN.DOC

RP25-13

P2609.1

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2609.1 Identification. Each length of pipe and each pipe fitting, trap, fixture, material and device utilized in a plumbing system shall bear the identification of the manufacturer and any markings required by the applicable referenced standards.

Exception: Where the manufacturer identification cannot be marked on pipe fittings and pipe nipples because of the small size of such fittings, the identification shall be printed on the item packaging or on documentation provided with the item.

Reason: Some items are too small to apply the manufacturer's identification on the item. The exception allows for packaging or provided documentation to verify the identity of the item.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 16 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP25-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2609.1-RP-HALL-PMGCAC

RP26-13

P2609.3

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2609.3 Plastic pipe, fittings and components. All plastic pipe, fittings and components, including brass fittings, shall be third-party certified as conforming to NSF 14.

Reason: Testing and certification requirements were added to NSF 14 to provided dezincification resistant brass fittings for plastic piping systems. NSF 14 was changed to reflect these requirements as a result of widespread failure of brass fittings and a large number of law suits across the United States. This proposed change to the IRC is required to update the language in the code to be consistent with changes to NSF 14. The current language could be interpreted to mean that only plastic fittings need comply with NSF 14, which the CAC does not believe is the intent.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 76 (added after 15DEC2012) on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP26-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2609.3-RP-HALL-PMGCAC

RP27-13

P2609.4

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2609.4 Third-party certification. All Plumbing products and materials required by the code to be in compliance with a referenced standard shall be listed by a third-party certification agency as complying with the referenced standards. Products and materials shall be identified in accordance with Section P2609.1.

Reason: The existing language implies that everything must have a standard. However, there are many common items used in the plumbing industry that are not made to a standard or if they are made to a standard, that standard is not referenced by the code. For example, metal hanger strap, thread sealing tape, pipe thread sealant, nails, bolts, nuts, screws, pipe support hangers and pipe clamps. These types of items are not intended to have a listing by a third party certification agency.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 17 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP27-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2609.4-RP-HALL-PMGCAC

RP28 – 13

P2701.1

Proponent: Bob Eugene representing UL LLC (Robert.Eugene@ul.com)

Revise as follows:

P2701.1 Quality of fixtures. Plumbing fixtures, faucets and fixture fittings shall be constructed of *approved* materials, shall have smooth impervious surfaces, shall be free from defects and concealed fouling surfaces, and shall conform to the standards cited in Table P2701.1 and elsewhere in this code. Plumbing fixtures shall be provided with an adequate supply of potable water to flush and keep the fixtures in a clean and sanitary condition without danger of backflow or cross connection.

Reason: Add a clear reference to Table P2701.1. Currently, the only references to this table identify only specific standards: ASTM F 409 (P2702.3); ASME 112.18.1/CSA B125.1 (P2722.1).

Cost Impact: None

RP28-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2701.1-RP-EUGENE.DOC

RP29 – 13

R202, P2707.1, P2716, P2716.1, P2716.2, P2717.3, TABLE P2903.6, TABLE P3004.1, TABLE P3005.4.2, P3111.1, P3112.1, TABLE P3201.7

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

PLUMBING APPLIANCE. An energized household *appliance* with plumbing connections, such as a dishwasher, food waste ~~grinder~~ disposer, clothes washer or water heater.

P2707.1 Directional fitting required. *Approved* directional-type branch fittings shall be installed in fixture tailpieces receiving the discharge from food waste ~~disposal~~ disposer units or dishwashers.

SECTION P2716 FOOD WASTE ~~GRINDER~~ DISPOSER

P2716.1 Food waste ~~grinder~~ disposer waste outlets. Food waste ~~grinder~~ disposer shall be connected to a drain of not less than 1-1/2 inches (38 mm) in diameter.

P2716.2 Water supply required. Food waste ~~grinder~~ disposer shall be provided with an adequate supply of water at a sufficient flow rate to ensure proper functioning of the unit.

P2717.3 Sink, dishwasher and food-waste ~~grinder~~ disposer. The combined discharge from a sink, dishwasher, and food waste ~~grinder~~ disposer is permitted to discharge through a single 1-1/2 inch (38 mm) trap. The discharge pipe from the dishwasher shall be increased to not less than 3/4 inch (19 mm) in diameter and shall connect with a wye fitting between the discharge of the food-waste ~~grinder~~ disposer and the trap inlet or to the head of the food waste ~~grinder~~ disposer. The dishwasher waste line shall rise and be securely fastened to the underside of the counter before connecting to the sink tail piece or the food waste ~~grinder~~ disposer.

**TABLE P2903.6
WATER-SUPPLY FIXTURE-UNIT VALUES FOR VARIOUS PLUMBING FIXTURES AND FIXTURE GROUPS**

TYPE OF FIXTURES OR GROUP OF FIXTURES	WATER-SUPPLY FIXTURE-UNIT VALUE (w.s.f.u.)		
Kitchen group (dishwasher and sink with/without garbage grinder <u>food waste disposer</u>)	1.9	1.0	2.5

(Portions of table not shown remain unchanged.)

**TABLE P3004.1
DRAINAGE FIXTURE UNIT (d.f.u.) VALUES FOR VARIOUS PLUMBING FIXTURES**

TYPE OF FIXTURE OR GROUP OF FIXTURES	DRAINAGE FIXTURE UNIT VALUE (d.f.u.) ^a
Kitchen group (dishwasher and sink with or without garbage grinder <u>food waste disposer</u>)	2

(Portions of table not shown remain unchanged.)

**TABLE P3005.4.2
MAXIMUM NUMBER OF FIXTURE UNITS ALLOWED
TO BE CONNECTED TO THE BUILDING DRAIN,
BUILDING DRAIN BRANCHES OR THE BUILDING SEWER**

DIAMETER OF PIPE (inches)	SLOPE PER FOOT		
	1/8 inch	1/4 inch	1/2 inch

(Portions of table not shown remain unchanged.)

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

- a. 1-1/2 inch pipe size limited to a building drain branch serving not more than two waste fixtures, or not more than one waste fixture if serving a pumped discharge fixture or ~~garbage grinder~~ food waste disposer discharge.
- b. No water closets.

P3111.1 Type of fixtures. A combination waste and vent system shall not serve fixtures other than floor drains, sinks and lavatories. A combination waste and vent system shall not receive the discharge of a food waste ~~grinder~~ disposer.

P3112.1 Limitation. Island fixture venting shall not be permitted for fixtures other than sinks and lavatories. Kitchen sinks with a dishwasher waste connection, a food waste ~~grinder~~ disposer, or both, in combination with the kitchen sink waste, shall be permitted to be vented in accordance with this section.

**TABLE P3201.7
SIZE OF TRAPS AND TRAP ARMS FOR PLUMBING FIXTURES**

PLUMBING FIXTURE	TRAP SIZE MINIMUM (inches)
Kitchen sink (one or two traps, with or without dishwasher and garbage grinder <u>food waste disposer</u>)	1 1/2

(Portions of table not shown remain unchanged.)

Reason: The proposed language was approved for the 2015 IPC. The proper term used in the plumbing profession is food waste disposers, not food waste grinders. This will correct the language in the code to the proper terminology for this type of plumbing appliance.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. X7 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP29-13

Public Hearing: Committee: AS AM D
 Assembly: ASF AMF DF

P2701.1-RP-HALL-PMGCAC

RP30 – 13

Table P2701.1, Chapter 44

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

**TABLE P2701.1
PLUMBING FIXTURES, FAUCETS AND FIXTURE FITTINGS**

MATERIAL	STANDARD
Plastic bathtub units	ANSI Z124.1.2, ASME A112.19.2/CSA B45.1
Plastic shower receptors and shower stall	ANSI Z124.1.2, CSA B45.5

(Portions of table not shown remain unchanged)

Add standard to Chapter 43 as follows:

ANSI
Z124.1.2-2005 Plastic Bathtub and Shower Units.

Reason: ANSI standards Z124.1 and Z124.2 were combined into a single standard, ANSI Z124.1.2 in 2005. The code needs to reflect the current standard for these products. The 2012 IPC already reflects this change.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 75 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP30-13

Public Hearing: Committee: AS AM D
 Assembly: ASF AMF DF

P2701.1T-RP-HALL-PMGCAC

RP31 – 13

P2701.2 (New), P2705.1, P2705.1.1 (New), P2705.1.2 (New), P2705.1.3 (New), P2705.1.4 (New), P2705.1.5 (New), P2705.1.6 (New)

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2701.2 Fixture fitting mounting surfaces. Integral fixture-fitting mounting surfaces on manufactured plumbing fixtures or plumbing fixtures constructed on site shall meet the design requirements of ASME A112.19.2/CSA B45.1 or ASME A112.19.3/CSA B45.1.

P2705.1 General. The installation of fixtures shall conform ~~be in accordance with Sections P2705.1.1 through P2705.1.6.~~ to the following:

P2705.1.1 Floor-outlet and floor-mounted fixtures. ~~4. Floor-mounted or and floor-outlet fixtures shall be secured to the drainage connection and fastened to the floor or fastened to a water closet flange that is fastened to the floor, where so designed, by screws, bolts, washers, nuts and similar fasteners of copper, brass or other corrosion-resistant material. Fasteners shall be of corrosion-resistant material and shall be screws or bolts.~~

P2705.1.2 Wall-hung fixtures. ~~2. Wall-hung fixtures shall be rigidly supported by the wall or where a fixture carrier is provided, supported by the carrier. The piping connected to the fixture shall not provide support for the fixture. so that strain is not transmitted to the plumbing system.~~

P2705.1.3 Sealing required. ~~3. Where fixtures come in contact with walls and floors, the contact area shall be water tight. Joints formed where fixtures come in contact with walls or floors shall be sealed water tight.~~

~~4. Plumbing fixtures shall be usable.~~

P2705.1.4 Clearances. ~~5. Water closets, lavatories and bidets.~~ A water closet, lavatory or bidet shall not be set closer than 15 inches (381 mm) from its center to any side wall, partition or vanity or closer than 30 inches (762 mm) center-to-center between adjacent fixtures. ~~There shall be~~ A clearance of not less than a 21-inches (533 mm) shall be provided in front of a water closet, lavatory or bidet to any wall, fixture or closed door.

P2705.1.5 Interference with doors and windows. ~~6. The location of plumbing piping, plumbing fixtures or plumbing equipment shall not interfere with the operation of doors or and windows.~~

P2705.1.6 Flood hazard areas. ~~7. In flood hazard areas as established by Table R301.2(1), plumbing fixtures shall be located or installed in accordance with Section R322.1.7.~~

~~8. Integral fixture-fitting mounting surfaces on manufactured plumbing fixtures or plumbing fixtures constructed on site, shall meet the design requirements of ASME A112.19.2/CSA B45.1 or ASME A112.19.3/CSA B45.1.~~

Reason: The items in this section are a mixture of subjects and should be separated into separate sections. Numerous clarifications have been added to make the each section clearer. The term "rigidly" is vague and unenforceable. Item 4 is covered by the requirements in P2705.1.4 and elsewhere in the code. Item number 8 doesn't belong under installation and should be located in Section P2701 (that is why new Section P2701.2 has been added).

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and

conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 21 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP31-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2701.2 (NEW)-RP-HALL-PMGCAC

RP32 – 13

R202, P2702.1, P2706.1, P2706.1.1 (New), P2706.2, P2706.2.1

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee

Add new definition to Chapter 2 as follows:

WASTE RECEPTOR. A floor sink, standpipe, hub drain or a floor drain that receives the discharge of one or more indirect waste pipes.

Revise as follows:

P2702.1 Plumbing fixtures. Plumbing fixtures, other than water closets, shall be provided with *approved* strainers.

Exception: Hub drains receiving only clear water waste and standpipes shall not require strainers.

P2706.1 General. ~~Waste receptors shall be of an approved type. Plumbing fixtures or other receptors receiving the discharge of indirect waste pipes shall be shaped and have a capacity to prevent splashing or flooding and shall be readily accessible for inspection and cleaning. Waste receptors and standpipes shall be trapped and vented and shall connect to the building drainage system. For other than hub drains that receive only clear-water waste and standpipes, a removable strainer or basket shall cover the waste outlet of waste receptors. Waste receptors shall not be installed in ventilated concealed spaces. Waste receptors shall not be installed in bathrooms, plenums, attics, crawl spaces or interstitial spaces above ceilings and below floors or in any inaccessible or unventilated space such as a closet. Ready access shall be provided to Waste receptors shall be readily accessible.~~

Exceptions:

- ~~1. Open hub waste receptors shall be permitted in the form of a hub or pipe extending not less than 1 inch (25 mm) above a water-impervious floor, and are not required to have a strainer.~~
- ~~2. Clothes washer standpipes shall not be prohibited in bathrooms.~~

P2706.1.1 Hub drains. Hub drains shall be in the form of a hub or a pipe that extends not less than 1 inch (25mm) above a water- impervious floor.

P2706.1.2 Standpipes. Standpipes shall extend not less than ~~of~~ 18 inches (457 mm) and but not greater than 42 inches (1067 mm) above the trap weir. ~~Access shall be provided to all standpipe traps and drains for rodding.~~

P2706.1.2.1 Laundry tray connection to standpipe. ~~Where a laundry tray waste line is permitted to connect into a standpipe for the an automatic clothes washer drain, the standpipe shall extend not less than 30 inches (762 mm) above the standpipe trap weir and shall extend above the flood level rim of the laundry tray. The outlet of the laundry tray shall be not greater than 30 inches (762 mm) horizontally distance from the standpipe trap.~~

(Renumber subsequent section)

Reason: A definition for "waste receptor" is needed. The term is found in the code 11 times with no exact description. The definition identifies exactly what constitutes an "approved type" of waste receptor. The exception of Section P2706.1 was revised to allow the absence of a strainer on hub drains that receive clear water waste as Section P2706.1 is being revised with this allowance. The first 3 sentences of P2706.1 was deleted as they are redundant – Section P2601.2 already covers where waste receptors must be connected and P3201.6 covers the requirement for traps for each fixture. The last line of Section P2601.1 was revised so that the defined term "*readily accessible*" could be used. The IRC does not have a definition for ready access.

The code fails to provide guidance as to what is a ventilated space so the language was changed to prevent waste receptors from being installed in a concealed space. There is no logical reason for waste receptors not to be installed in a bathroom. It is not unusual for a clothes washing machine (requiring a standpipe) to be placed in a bathroom in a residential occupancy. Waste receptors (typically hub drains) are frequently needed in closets or storerooms where appliances discharge condensate or relief discharges. The term "open hub waste receptor" is redundant and unclear and was eliminated in favor of the more common term "hub drain". As a hub drain is a waste receptor, a strainer is required except where the hub drain receives only clear water wastes. Standpipes are waste receptors and should be included as a subsection under the waste receptor section. The sentence "Access shall be provided to standpipe traps and drains for rodding." is unnecessary as P2706.1 already requires waste receptors to be readily accessible.

A similar proposal for the 2015 IPC was Approved as Submitted.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 19 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP32-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2702.1-RP-HALL-PMGCAC

RP33 – 13

P2702.2

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2702.2 Waste fittings. Waste fittings shall conform to ASME A112.18.2/CSA B125.2, ASTM F 409 or shall be made from pipe and pipe fittings complying with any of the standards indicated in Tables P3002.1(1) and P3002.3. ~~to one of the standards listed in Table P3002.1(1) for above-ground drainage and vent pipe and fittings.~~

Reason: There is no need to state the title of the table along with the table number in code text. The added wording improves what is intended by the code which is that waste fittings can be made up from pipe and fittings.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 20 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP33-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2702.2-RP-HALL-PMGCAC

RP34 – 13

P2705.1

Proponent: Pennie L. Feehan, Pennie L. Feehan Consulting representing the Copper Development Association (penniefeehan@me.com)

Revise as follows:

P2705.1 General. The installation of fixtures shall conform to the following:

1. Floor-outlet or floor-mounted fixtures shall be secured to the drainage connection and to the floor, where so designed, by screws, bolts, washers, nuts and similar fasteners of copper, ~~brass~~ copper alloy or other corrosion-resistant material.
- 2 through 8 *(No change to current text)*

Reason: This proposal eliminates outdated language and provides the appropriate terminology and correct information to the end user.

Cost Impact: The code change proposal will not increase the cost of construction.

RP34-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2705.1-RP-FEEHAN.DOC

RP35 – 13

P2706.1

Proponent: Richard Grace, Fairfax County, representing Virginia Plumbing and Mechanical Inspectors Association and Virginia Building and Code Officials Association (Richard.Grace@fairfaxcounty.gov)

Revise as follows:

P2706.1 General. ~~Waste receptors shall be of an approved type.~~ Plumbing fixtures or other receptors receiving the discharge of indirect waste pipes shall be shaped and have a capacity to prevent splashing or flooding and shall be readily accessible for inspection and cleaning. Waste receptors and standpipes shall be trapped and vented and shall connect to the building drainage system. For other than standpipes and hub drains, a removable strainer or basket shall cover the waste outlet of waste receptors. Waste receptors shall not be installed in ~~ventilated concealed~~ spaces. Waste receptors shall not be installed in ~~bathrooms, attics, crawl spaces, interstitial spaces above ceilings and below floors or in any inaccessible or unventilated space such as a closet.~~ Ready access shall be provided to waste receptors.

Exceptions:

1. Open hub waste receptors shall be permitted in the form of a hub or pipe extending not less than 1 inch (25 mm) above a water-impervious floor, ~~and are not required to have a strainer.~~
- ~~2. Clothes washer standpipes shall not be prohibited in bathrooms.~~

Reason: This is a companion proposal with a newly added definition of waste receptor. We have attempted to identify exactly what constitutes an 'approved type' of waste receptor. The code fails to provide guidance as to what is a ventilated space, so we suggest removing the terms. This proposal takes the provisions in the direction of clear mandatory language that provides the user with terminology that clearly explains where a waste receptor is not permitted to be located. Further, there is no real problem associated with having a hub drain in a closet or storeroom where items such as water heaters and condensate producing appliances are located so that text has been removed. The last sentence of the main paragraph in regard to ready access has been struck as this is clearly stated in the second sentence of the existing paragraph. The last portion of exception #1 in regard to the strainer not being required for a hub drain is now struck as the new text in the main paragraph now clearly allows this type of drain without a strainer. Exception #2 is now struck as the main paragraph now allows waste receptors, including standpipes as now defined, in bathrooms.

Cost Impact: This code change will not increase the cost of construction.

RP35-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2601.1-RP-GRACE.DOC

RP36 – 13

P2701.1

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2701.1 Quality of fixtures. Plumbing fixtures, faucets and fixture fittings ~~shall be constructed of approved materials,~~ shall have smooth impervious surfaces; shall be free from defects and shall not have concealed fouling surfaces.; ~~and shall conform to the standards cited in this code.~~ Plumbing fixtures shall ~~be provided with an adequate supply of potable water to flush and keep the fixtures in a clean and sanitary condition without danger of backflow or cross connection.~~

Reason: The current code text is very old and comes from a time where there were not many standards existed for plumbing fixtures and fittings. According to the first sentence of this section, the code official must approve materials, even those that are in compliance with the standards referenced in the code. The first sentence is revised to make a general statement about the quality of fixtures. The last sentence has nothing to do with quality of fixtures. The subject matter is covered adequately elsewhere in the code so this sentence needs removed.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 18 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP36-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2701.1-RP-HALL-PMGCAC

RP37 – 13

P2708.3

Proponent: Edward R. Osann, Natural Resources Defense Council, representing self.
(eosann@nrdc.org)

Revise as follows:

P2708.3 Shower control valves. Individual shower and tub/shower combination valves shall be equipped with control valves of the pressure-balance, thermostatic-mixing or combination pressure-balance/thermostatic-mixing valve types with a high limit stop in accordance with ASSE 1016 or ASME A112.18.1/CSA B125.1. Shower control valves shall provide thermal shock protection for the rated flow rate of the installed showerhead or a flow rate of 1.5 gpm \pm 0.1 gpm (5.75 L/m \pm 0.35 L/m), whichever is less. The high limit stop shall be set to limit the water temperature to not greater than 120°F (49°C). Each valve shall be factory marked with the manufacturer's minimum rated flow, and such marking shall be in an accessible position so as to make inspection readily possible following installation. In-line thermostatic valves shall not be used for compliance with this section.

Reason: The thermal protection afforded by shower valves can be compromised if the flow rate of the showerhead is less than the flow rate for which the protective components of the valve have been designed. As noted by Martin and Johnson (2008) (as cited in Codes and Standards Enhancement Initiative (CASE), "Multi-Head Showers and Lower-Flow Shower Heads," 2013 *California Building Energy Efficiency Standards*, California Utilities Statewide Codes and Standards Team, September 2011), combinations of valves and shower heads were tested to determine whether pressure-compensating valves and thermostatic valves rated for 2.5gpm would perform adequately at lower flow rates. The tests included 22 shower valves from six manufacturers, and the valves were assessed on their ability to maintain water temperature within certain bounds for a given time after a change in pressure event, as described by the ASSE 1016-2005 standard for shower valves. The results indicated that a significant share of shower valves rated for 2.5 gpm failed to provide the thermal protection specified by ASSE 1016 when tested at lower flow rates. As summarized in the CASE report (p. 15): "These results indicate that shower valve temperature maintenance is strongly affected by flow rate, and that new showers with lower-flow shower heads would have to be installed with valves that are designed for 2.0 and lower flow rates."

Showerheads with maximum flow rates below 2.5 gpm are widely available on the market today, and simple replacement of a showerhead is typically not subject to code. Since shower valve components are located behind finished walls, replacement of showerheads is likely to be more frequent than replacement of shower valves. This proposed change seeks to reduce the likelihood that consumers replacing a showerhead will compromise the thermal protection offered by a building subject to this code by ensuring that shower valves can fully accommodate showerheads with lower flow rates than the current maximum federal standard of 2.5 gpm. The current EPA WaterSense specification for showerheads has a maximum flow rate of 2.0 gpm, and many showerheads are already available with flow rates between 2.0 and 1.5 gpm. As manufacturers continue to innovate with more water- and energy-efficient showerheads, the code change proposed here will help ensure that new buildings built to this code can safely accommodate showerheads with lower flow rates that may be selected by building occupants in future years.

Note that this language does not require that the showerhead itself have a flow rate of 1.5 gpm, but simply that the shower valve provide the thermal protection called for under the recognized standard when tested at a flow rate as low as 1.5 gpm. In the event that the showerhead selected for initial installation has a flow rate of less than 1.5 gpm, the minimum rated flow of the shower valve must match the flow rate of the showerhead.

The marking requirement is necessary to facilitate inspection. To the extent that the mark is permanent, it will provide a point of reference for building occupants to consider when changing showerheads in future years.

Cost Impact: Conforming products are on the market today without a significant cost premium. The code change proposal will not increase the cost of construction.

RP37-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2708.3-RP-OSANN.DOC

RP38 – 13

P2709.2, P2709.2.3

Proponent: Richard Grace, Fairfax County, representing Virginia Plumbing and Mechanical Inspectors Association and Virginia Building and Code Officials Association (Richard.Grace@fairfaxcounty.gov); Roger Harper, Jr, Louisa County VA representing, the Virginia Plumbing and Mechanical Inspectors Association and The Virginia Building Code Officials Association and ICC Region 7 (sharper@louisa.org)

Revise as follows:

P2709.2 Lining required. The adjoining walls and floor framing enclosing on-site built-up shower receptors shall be lined with one of the following materials:

1. Sheet lead;
2. Sheet copper;
3. Plastic liner material that complies with ASTM D 4068 or ASTM D 4551; or
4. ~~Hot mopping in accordance with Section P2709.2.3; or~~
- 5-4. Sheet-applied load-bearing, bonded waterproof membranes that comply with ANSI A118.10.

(Remainder of section not shown remains unchanged)

~~**P2709.2.3 Hot mopping.** Shower receptors lined by hot mopping shall be built up with not less than three layers of standard grade Type 15 asphalt impregnated roofing felt. The bottom layer shall be fitted to the formed subbase and each succeeding layer thoroughly hot mopped to that below. All corners shall be carefully fitted and shall be made strong and water tight by folding or lapping, and each corner shall be reinforced with suitable webbing hotmopped in place. All folds, laps and reinforcing webbing shall extend not less than 4 inches (102 mm) in all directions from the corner and all webbing shall be of approved type and mesh, producing a tensile strength of not less than 50 pounds per inch (893 kg/m) in either direction.~~

(Renumber subsequent sections)

Reason: The 2012 code incorporated approved liquid bonded systems complying with ANSI A118.10, made specifically for shower applications in Section 2709.2.4. The hot mopped system is an antiquated method that is not commonly used anymore. The products put together to make a hot mopped shower liner are not certified to any standard and are not intended to serve the specific shower use.

Cost Impact: This code change proposal will not increase the cost of construction.

RP38-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2709.2-RP-GRACE.DOC

RP39 – 13

P2710.1

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2710.1 Bathtub and shower spaces. Walls in shower compartments ~~walls~~ and walls above bathtubs that have wall-mounted showerheads shall be finished in accordance with Section R307.2.

Reason: The title infers that the section is about bathtub and shower spaces but the section only addresses showers. The code intent is to cover walls whether they are in showers or above bathtubs having showerheads.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 23 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP39-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2710.1 (NEW)-RP-HALL-PMGCAC

RP40 – 13

P2712.1, Chapter 44

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2712.1 Approval. Water closets shall conform to the water consumption requirements of Section P2903.2 and shall conform to Z124.4, ASME A112.19.2/CSA B45.1, ASME A112.19.3/CSA B45.4 or CSA B45.5. Water closets shall conform to the hydraulic performance requirements of ASME A112.19.2/CSA B45.1. Water closet tanks shall conform to ANSI Z124.4, ASME A112.19.2/CSA B45.1, ASME A112.19.3/CSA B45.4 or CSA B45.5. Water closets that have an invisible seal and unventilated space or walls that are not thoroughly washed at each discharge shall be prohibited. Water closets that permit backflow of the contents of the bowl into the flush tank shall be prohibited. Water closets equipped with a dual flushing device shall comply with ASME A112.19.14.

Add new standard to Chapter 44 as follows:

ASME

A112.19.14–2006(R2011) Six-Liter Water Closets Equipped with a Dual Flushing Device

Reason: This revised language and addition of standard was approved for the 2015 IPC. Dual flush water closets which consist of a full flush of 1.6 gpf and a reduce flush of less than 1.1 gpf do exist and should be required to comply with some performance requirements. This is a National standard (ANSI) which covers the performance requirements for these types of systems.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. X9 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, ASME A112.19.14-2006(R2011) with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

RP40-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2712.1-RP-HALL-PMGCAC

RP41 – 13

P2712.1.1 (New)

Proponent: Christopher Salazar, Penguin Toilets LLC., representing Penguin Toilets LLC.

Add new text as follows:

P2712.1.1 Overflow protection. Where a water closet is installed in a location where an overflow of the water closet will cause damage to the building, the building shall be protected from water damage by one of the following:

1. A water closet listed to provide overflow protection.
2. A floor drain installed within same area as the water closet.
3. A method of protection *approved* by the building official.

Reason: To be in compliance with IRC section 101 .3: (to provide minimum standards to safeguard life or limb, health, property and public welfare) Toilet overflow (BLACKWATER spill) has not been addressed in the current code. Different from a grey water spill, a black water spill pose an unhealthy environment and is a very expensive event to mediate/repair. Adding this section into the code provides an additional safeguard to health, property and public welfare thus improving this code.

Cost Impact: Code change proposal will not increase the cost of construction. Cost impact is none too little depending on method of protection.

RP41-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2712.1.1 (NEW)-RP-SALAZAR.DOC

RP42 – 13

P2716.2

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2716.2 Water supply required. A sink equipped with a food waste grinder shall be provided with a faucet. ~~be provided with an adequate supply of water at a sufficient flow rate to ensure proper functioning of the unit.~~

Reason: What is “adequate”? What is a “sufficient flow rate”? What is “proper functioning of the unit”? All these terms are unenforceable code language and need to be removed. Requiring a faucet for the sink with a disposal unit is adequate coverage. It is up to the user to turn the faucet on when using the food waste grinder.

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Cost Impact: The code change proposal will not increase the cost of construction.

RP42-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2716.2-RP-HALL-PMGCAC

RP43 – 13

P2717.1

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2717.1 Protection of water supply. ~~The water supply for dishwashers shall be protected by an air gap or integral backflow preventer.~~ The water supply to a dishwasher shall be protected against backflow by an *air gap* complying with ASME A112.1.3 or A112.1.2 that is installed integrally within the machine or a backflow preventer in accordance with Section P2902.

Reason: The requirement for dishwashing machines to comply with ASSE 1006 (covering the requirement for an internal air gap on the water supply) was removed from the 2012 code because DW manufacturers are no longer certifying their machines to ASSE 1006. Standards that they do comply with, ASME A112.1.3 or A112.1.2 are being included in this section so that inspectors are able to verify that the DWs have an integral backflow protection. A similar proposal to the 2015 IPC was Approved as Submitted. This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 26 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP43-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2717.1-RP-HALL-PMGCAC

RP44 – 13

P2717.2, P2717.3

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2717.2 Sink and dishwasher. ~~The combined discharge from a sink and dishwasher shall be served by are permitted to discharge through a single trap of not less than 1 1/2 inches (38 mm) in nominal diameter trap.~~ The discharge pipe from the dishwasher shall be increased in size to not less than 3/4 inch (19 mm) inside diameter and before shall be connected ing with to a wye fitting in to the sink tailpiece. The waste discharge pipe from the dishwasher waste line shall rise and be securely fastened or held in a position to at the underside of the counter before connecting to the wye ~~sink tailpiece~~.

P2717.3 Sink, dishwasher and food waste grinder. The combined discharge from a sink, dishwasher, and food waste grinder shall be served by a single trap of not less than ~~is permitted to discharge through a single 1 1/2 inch (38 mm) in nominal diameter trap.~~ The discharge pipe from the dishwasher shall be increased in size to not less than 3/4 inch (19 mm) inside diameter and shall before connecting with to a wye fitting between the discharge of the food-waste grinder and the trap inlet. Alternatively, the discharge pipe from the dishwasher shall connect or to the head of the food waste grinder. The dishwasher discharge pipe waste line shall rise and be securely fastened or held in a position to at the underside of the counter before connecting to the wye sink tailpiece or the head of the food waste grinder.

Reason: The term "is permitted" is not mandatory code language. The proper term for a food grinder is a food waste grinder. The term "securely" is unenforceable. The term "or held in a position" was added primarily because the existing language seems to imply that the discharge pipe *has to be fastened* to the underside of the counter. This is a problem with granite countertops. The intent is that the piping be routed to the underside of the countertop and be held in some manner at that point. A common way to accomplish this is to drill a hole in the cabinet wall between the dishwasher and the sink cabinet, at the top of the cabinet wall (if the cabinet wall goes up to the underside of the countertop. Sometimes, the cabinet wall is not as tall and there a small gap. Then route the dishwasher discharge pipe through the hole or over the top of the cabinet wall. No fastening is needed (as it is very difficult to get into the cabinet and reach up between the sink and the cabinet wall to install a "fastener"). Intelligent routing is all that is necessary. This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 27 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP44-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2717.2-RP-HALL-PMGCAC

RP45 – 13

P2718.2 (New)

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Add new text as follows:

P2718.2 Water connection. The water supply to an automatic clothes washer shall be protected against backflow by an air gap complying with ASME A112.1.3 or A112.1.2 that is installed integrally within the machine or a backflow preventer in accordance with Section P2902.

Reason: The requirement for automatic clothes washing machines to comply with ASSE 1007 (covering the requirement for an internal air gap on the water supply) was removed from the 2012 code because ACW manufacturers are no longer certifying their machines to ASSE 1007. Standards that they do comply with, ASME A112.1.3 or A112.1.2 are being included in this section so that inspectors are able to verify that the ACWs have an integral backflow protection. A similar proposal to the IPC was Approved as Submitted.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 28 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP45-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2718.2 (NEW)-RP-HALL-PMGCAC

RP46 – 13

P2722.2

Proponent: Len Swatkowski, Plumbing Manufacturers International (PMI), representing Plumbing Manufacturers International (lswatkowski@pmihome.org)

Revise as follows:

P2722.2 Operation for hot water. Faucets and bath tub mixing valves having two separate control handles for hot and cold water shall be installed with the left-hand handle controlling the hot water flow. Left-hand orientation shall be determined from the position of the user when using the plumbing fixture or in the case of a bathtub, the position of the user when in the tub. Fixture fittings supplied with both hot and cold water shall be installed and adjusted so that the left hand side of the water temperature control represents the flow of hot water when facing the outlet. Shower and tub/shower mixing valves conforming to ASSE 1016 or ASME A112.18.1/CSA B125.1 shall have markings on the device that indicate the handle position for hot water flow.

~~**Exception:** Shower and tub/shower mixing valves conforming to ASSE 1016 or ASME A112.18.1/CSA B125.1, where the water temperature control corresponds to the markings on the device.~~

Reason: There have been calls from a number of code officials about how to apply this code section to these “side control” faucets. Technically, because the control does not have a left side and does not cause hot water to flow when moving a lever to the left, some code officials are calling this a non-compliant faucet. This language will correct the misinterpretation.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: The proponent indicated in his proposal submission that the standards shown in this code section, ASSE 1016 and ASME A112.18.1/CSA B125.1 have been recently harmonized into standard ASSE 1016-2011/ASME A112.1016-2011/CSA B125.16-11. The proponent's request for updating the standard for this section has been processed and will be included in a proposal for all standard updates that will be heard by the ADMIN committee in proposal ADM 62-13.

RP46-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2722.2-RP-SWATKOWSKI.DOC

RP47 – 13

P2725 (New), P2725.1 (New)

Proponent: Jeremy Brown, NSF International (brown@nsf.org)

Add new text as follows:

SECTION P2725 **NON-LIQUID SATURATED TREATMENT SYSTEMS**

P2725.1 General. Materials, design, construction and performance of non-liquid saturated treatment systems shall comply with NSF 41.

Add new standard to Chapter 44:

NSF

NSF 41-11 **Non-Liquid Saturated Treatment Systems**

Reason: NSF/ANSI-41 *Non-liquid Saturated Treatment Systems* is the American National Standard for the materials, design, construction and performance of composting toilets treating residential black water. Composting Toilets are a viable alternative are a viable alternative to traditional water closets and offer advantages of low water consumption. NSF/ANSI 41 is currently required in the IGCC.

Cost Impact: This code change proposal will not increase the cost of construction.

Analysis: A review of the standards proposed for inclusion in the code, CSA 22.2 No. 130 and UL 515 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1 2013.

RP47-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2725(NEW)-RP-BROWN.DOC

RP48 – 13

P2801.1

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2801.1 Hot water required. ~~Each dwelling~~ Hot water shall have an ~~approved automatic water heater or other type of domestic water heating system sufficient to supply hot water to~~ be supplied to plumbing fixtures and appliances intended for bathing, washing or culinary purposes. Hot water shall be supplied by an approved automatic water heater or other type of approved domestic water-heating system. Storage water heaters and hot water storage tanks shall be constructed of ~~noncorrosive~~ corrosion-resistant metal or shall be lined with ~~noncorrosive~~ corrosion-resistant material.

Reason: The existing language seems to imply that every dwelling unit must have its own water heater. What about a duplex building with a central water heater? We believe that the code only intends for hot water to be supplied to the plumbing fixtures of the dwelling(s) and not that each dwelling unit have a water heater. The existing language also implies that only automatic water heaters are required to be *approved*. Other types of domestic water heating systems do not appear to require approval. The new language corrects this. The word "sufficient" is ambiguous and is not enforceable. The existing text required that storage tanks be noncorrosive. What storage tanks? "Storage water heaters and hot water" was added to "storage tanks" to make the intent clear. Tanks are constructed of (or lined with) corrosion-resistant material, not noncorrosive material.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 30 on the PMGCAC IRC-P list.

Cost impact: The code change proposal will not increase the cost of construction.

RP48-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2801.1-RP-HALL-PMGCAC

RP49 – 13

P2801.2 (New)

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Add new text as follows:

P2801.2 Drain valves. Drain valves for emptying shall be installed at the bottom of each tank-type water heater and hot water storage tank. The drain valve inlet shall be a ¾ inch nominal iron pipe size and the outlet shall be provided with a male garden hose thread.

(Renumber subsequent sections)

Reason: The new language proposed provides for minimum requirements for water heater drain valves. Drain valves are necessary for draining water (and sediment) out of the tank. Yes, we know that it would be rare for a storage water heater or hot water storage tank to not be provided with a drain valve BUT if the code doesn't require it, the manufacturers (or installers) could save costs by eliminating the valve (they could claim that the tank could be drained by pumping from the inlet or outlet of the tank.) The IPC has had the valve requirement for a long time. The IRC needs to have the same coverage. A similar proposal to the 2015 IPC was Approved as Submitted.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 29 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP49-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2801.2 (NEW)-RP-HALL-PMGCAC

RP50 – 13

P2801.5

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2801.5 Required pan. Where a storage tank-type water heater or a hot water storage tank is installed in a location where water leakage from the tank will cause damage, the tank shall be installed in a galvanized steel pan having a material thickness of not less than 0.0236 inch (0.6010 mm) (No. 24 gage), or other pans approved for such use. ~~Listed pans shall comply with CSA LC3.~~

Reason: The language was struck because no such product exists that complies with the standard. The product that the standard covered was a thermoplastic combination water heater pan/elevation stand. Although the product met the requirements of the standard, in use it was determined that such products would weaken and cause the water heater to tip or collapse the stand. The product was pulled from the marketplace many years ago. CSA withdrew the standard in November 2011. The standard needs to be deleted from the code.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 31 on the PMGCAC IRC-P list.

Cost impact: The code change proposal will not increase the cost of construction.

RP50-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2801.5-RP-HALL-PMGCAC

RP51 – 13

P2801.5

Proponent: Jim Whitehead, IPS Corporation.

Revise as follows:

P2801.5 Required pan. Where a storage tank-type water heater or hot water storage tank is installed in a location where water leakage from the tank will cause damage, the tank shall be installed in a pan constructed of one of the following:

1. galvanized steel pan having a material thickness of not less than 0.0236 inch (0.6010 mm) (No. 24) gage or a lesser gage number,
2. aluminum not less than 0.030 inch (0.8 mm) in thickness,
3. plastic not less than 0.036 inch (0.9 mm) in thickness
4. ~~other pans approved materials for such use.~~

~~Listed pans shall comply with CSA LC3. A plastic pan shall not be installed beneath a gas-fired water~~
~~water.~~

Reason: Aluminum and plastic water heater pans are frequently and commonly installed all across the United States even though the code doesn't currently include these materials as an option. I know this is a fact because IPS and other manufacturers produce and sell *tens of thousands* of aluminum and plastic water heater pans every year. In most areas, building officials really don't care what material the pan is made of, just as long as there is a pan. So why not make the code match what is current practice for many areas? Let's face it-a galvanized steel pan is ugly. It eventually gets rusty looking. The top edges, if not hemmed, are sharp (a cutting hazard) and the square corners are hard to seal. The top of the square corners can puncture things (like human flesh and the bottoms of jugs). THEN you want to require that galvanized steel pan to be installed in a finished area like a indoor utility room or a laundry room in a home? The home owner just doesn't want it.

Yes, the existing section currently says "or other pans approved for such use". But does the building official really need to be spending the time approving "other pans" for use on a job-by-job basis? In reality, when the building official shows up to inspect, the pan is in place (beneath a water heater that is plumbed and filled with water). Is that the time for the building official to be making a decision about whether the pan material is *approved*? This proposal will eliminate the questions and free up building official time in order to deal with more important issues.

So if aluminum pans and plastic pans are being *approved* (and again we know that they must be as *tens of thousands* of these pans are sold every year), then there needs to be some criteria for these types of pans. The thicknesses indicated for aluminum and plastic materials have been determined to be at least equivalent to the galvanized steel with regard to deflection (of the sides of the pan) and puncture resistance. NOT ALL MANUFACTURERS OF ALUMINUM AND PLASTIC PANS HAVE CONSIDERED THIS IN THEIR SELECTION OF MATERIAL THICKNESSES. And we are positive that some building officials have developed a bad opinion about allowing the use of aluminum and plastic because of their experiences with competitor's products that use lighter weight materials than what is proposed. There are at least a few of us responsible manufacturers who produce quality aluminum and plastic pans that meet the proposed requirements. Based upon our field surveys of our pans in use, these thicknesses provide for a durable product that remains serviceable, corrosion free and good looking for the life of a typical water heater if not two water heater lives.

"Listed pans shall comply with CSA LC3" is being deleted because there is not any pan produced in the United States that complies with that standard. When this standard was introduced into to the code, there was a product, available to the market, that met this standard. The standard was actually developed around this pan/stand design. Furthermore this standard was developed using the stand/pan in combination. Most pans are placed directly on the floor and not elevated on a stand. Also, the product was discontinued because of design problems. (The product was a combination elevation stand and pan assembly). CSA withdrew the standard in November 2011. There is not a need to have this standard in the code any longer and we don't want someone trying to bring a product to the market that meets this standard. Obviously, the standard isn't up to snuff because the products made to the standard didn't work out. The standard needs to be deleted from the code.

The last line about prohibiting the use of a plastic pan under a gas fired water heater is simple common sense. Although we have not heard of any problems with the use of our plastic pans for gas water heaters, the radiant heat coming from the bottom of a gas fired water heater could make a plastic pan more susceptible to puncturing (such as might be caused by the legs of a water heater). The Uniform Plumbing Code has this prohibition so the same prohibition in the I-codes seems appropriate.

Cost Impact: The code change proposal will not increase the cost of construction. In fact, factory-made aluminum and plastic water heater pans are, by far, much more economical than a galvanized steel pan that is made in a local sheet metal shop.

RP51-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2801.5-RP-WHITEHEAD

RP52 – 13

P2801.5.1

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2801.5.1 Pan size and drain. The pan shall be not less than 1½ inches (38 mm) deep and shall be not less than 3 inches (76 mm) greater in diameter than the diameter of the water heater or hot water storage tank, be of sufficient size and shape to receive all dripping or condensate from the tank or water heater. The pan shall be drained by an indirect waste drain pipe connected to the pan. The drain pipe shall be of not less than ¾ inch (19 mm) nominal diameter. Piping for safety pan drains and shall be of any of the ~~those materials listed~~ indicated in Table P2905.5. Pipe fittings for the drain pipe shall be in accordance with Section P2905.6 except that insert-type fittings shall not be installed in the drain piping.

Reason: This section needs to include the horizontal dimension of the pan with respect to the water heater. Some installations have been observed where the pan exactly fits the bottom of the water heater. This does not allow any space for water in the pan to flow to the pan drain on the side of the pan. The drain is now specifically required to be on the side of the pan so that it is less likely to become blocked. The improved wording also prevents a water heater from being located in the pan where the water heater blocks the drain outlet on the side of the pan. The 3 inches over sizing was based on the same pan requirement in the mechanical code for HVAC units. The struck language in the first sentence is archaic and vague. The existing language also failed to identify what fittings should be used for drain piping. The new language corrects this omission. While the existing language specifies the type of pipe to be used, it doesn't specify the fittings. The last sentence is added to clarify the fittings that must be used. Note the restriction against using insert fittings...the ¾ inches minimum size is already small enough without putting insert fittings in the piping to further reduce the diameter. Such reductions in internal diameter could catch lint and rust particles that could easily block flow.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 32 on the PMGCAC IRC-P list.

Cost impact: The code change proposal will not increase the cost of construction.

RP52-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2801.5.1-RP-HALL-PMGCAC

RP53 – 13

P2801.5.2

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2801.5.2 Pan drain termination. The pan drain shall extend full-size and terminate over a suitably located indirect waste receptor or shall extend to the exterior of the building and terminate not less than 6 inches (152 mm) and not more than 24 inches (610 mm) above the adjacent ground surface. Where a pan drain was not previously installed, a pan drain shall not be required for a replacement water heater installation.

Reason: The replacement of an existing water heater must be installed to the current code as if it was a new installation. If the original water heater installation did not require a pan, then in many cases, there is not a suitable disposal point for a pan drain. However, if the installation requires a pan, the current code requires that the pan have a pan drain. Many times, there is not a way to provide for a suitable disposal point for the pan drain. For example, consider a slab-on-grade building where the water heater is located in the center of the building where there is not a floor drain or waste receptor. When that water heater is replaced, the current code requires that the water heater have a pan and that the pan have a pan drain (that runs to a suitable disposal point). How is this to be accomplished in this existing building? There is not a solution. Therefore, the proposed language provides an exception for replacement water heaters to not be required to have a pan drain, if the installation requires a pan. This same proposal to the 2015 IPC was Approved as Submitted.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 33 on the PMGCAC IRC-P list.

Cost impact: The code change proposal will not increase the cost of construction.

RP53-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2801.5.2-RP-HALL-PMGCAC

RP54 – 13

P2803.1, P2803.2 (New)

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2803.1 Relief valves required. ~~Storage water heaters and hot water storage tanks. Appliances and equipment used for heating water or storing hot water shall be protected against over-pressure and over-temperature conditions by one of the following methods:~~

1. A separate pressure-relief valve and a separate temperature-relief valve ;~~or~~
2. A combination pressure- and temperature-relief valve.

P2803.2 Instantaneous fuel-gas fired water heater relief valve. A fuel-gas fired instantaneous water heater shall be protected against over-pressure conditions by a pressure relief valve. The valve shall be located on the cold water inlet piping to the heater at a point that is downstream of all external valves except where the heater manufacturer's instructions require the valve be located elsewhere.

(Renumber subsequent sections)

Reason: In Section P2803.1, the terms “appliances and equipment” is not specific to the coverage that is intended by the code. Chapter 28 is about water heaters. Example: an electric hot drinking-water unit (under a kitchen sink) is an appliance that heats and stores water. The section never says what the heaters or tanks are being protected against. Adding “over-pressure” and “over temperature” clarifies this.

A question that is often asked is whether existing Section P2803.1 applied to instantaneous (“tankless”) water heaters as it is impossible to install a temperature relief valve (in accordance with Section P2803.4) as there is no tank! A new section is added to cover gas instantaneous (“tankless”) water heaters. The fuel gas-fired instantaneous water heater industry is waffling about whether a pressure relief valve is required and most have in their instructions “it’s up to the local code official or jurisdiction”. Many questions come up about this and code officials are not sure what to do. We need to settle the debate by simply requiring the pressure relief valve at least for the gas-fired tankless water heaters. Note that electric instantaneous water heaters are exempt from having a PRV by the UL listing for those products. While the code *could* be written to require PRVs for electric tankless water heaters, it is impractical to install PRVs for the small electric units (think of the one fixture, under the cabinet type) and then the issue is where to route the discharge pipe. Generally, the gas instantaneous (“tankless”) water heaters are for the whole building and are installed in a basement, garage or other location (outside) where routing of the PRV pipe is no more difficult than it is for a storage tank water heater.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 34 on the PMGCAC IRC-P list.

Cost impact: The code change proposal will not increase the cost of construction.

RP54-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2803.1-RP-HALL-PMGCAC

RP55 – 13

2803.6.1

Proponent: Richard Grace, Fairfax County, representing Virginia Plumbing and Mechanical Inspectors Association and Virginia Building and Code Officials Association (Richard.Grace@fairfaxcounty.gov); Roger Harper, Jr, Louisa County VA representing, the Virginia Plumbing and Mechanical Inspectors Association and The Virginia Building Code Officials Association (sharper@louisa.org)

Revise as follows:

2803.6.1 Requirements for discharge piping. The discharge piping serving a pressure relief valve, temperature relief valve or combination thereof shall:

(Items 1-9 remain unchanged)

10. ~~Not~~ Terminate not more than 6 inches (152 mm) and not less than two times the discharge pipe diameter above the floor or waste receptor flood level rim.

Reason: This is consistent language proposed to the IPC. A minimum distance is not stated. Typically, the minimum air gap would be two nominal pipe diameters as stated in the IPC Section 802.2.1 for indirect wastes pipe.

Cost Impact: This code change proposal will not increase the cost of construction.

RP55-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2803.6.1-RP-GRACE.DOC

RP56 – 13

P2803.6.1

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2803.6.1 Requirements for discharge pipe. The discharge piping serving a pressure-relief valve, temperature relief valve or combination valve shall:

1. Not be directly connected to the drainage system.
2. Discharge through an air gap located in the same room as the water heater.
3. Not be smaller than the diameter of the outlet of the valve served and shall discharge full size to the air gap.
4. Serve a single relief device and shall not connect to piping serving any other relief device or equipment.
5. Discharge to the floor, to a waste receptor or to the pan serving the water heater or storage tank or to the outdoors.
6. Discharge in a manner that does not cause personal injury or structural damage.
7. Discharge to a termination point that is readily observable by the building occupants.
8. Not be trapped.
9. Be installed to flow by gravity.
10. Not terminate more than 6 inches (152 mm) above the floor or waste receptor.
11. Not have a threaded connection at the end of the piping.
12. Not have valves or tee fittings.
13. Be constructed of those materials listed in Section P2905.5 or materials tested, rated and *approved* for such use in accordance with ASME A112.4.1.
14. Be one nominal size larger than the size of the relief valve outlet, where the relief valve discharge piping is constructed of PEX or PE-RT tubing. The outlet end of such tubing shall be fastened in place.

Reason: PEX and PE-RT tubing use insert fittings for connections. The bore size for a ¾ inch male adapter fitting is very small such that there is concern that the discharge from a T & P valve could be restricted and be a safety concern. The new language requires that PEX and PE-RT tubing used for relief valve discharge piping be one size larger so that the insert fitting has a larger bore and less of a safety concern.

PEX and PE-RT tubing is very flexible and where supplied from a coil, the tubing has a memory to stay in a coil shape. This flexibility and memory to a coil shape can present installation problems of keeping the discharge end of the tubing in its proper location. Therefore, new language is being added to require that the outlet end of the tubing be fastened in place. This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 35 on the PMGCAC IRC-P list.

Cost impact: The code change proposal will increase the cost of construction.

RP56-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2803.6.1-RP-HALL-PMGCAC

RP57 – 13

P2901.1, P2901.2 (New), P2901.2.1 (New), P2901.2.2 (New), P2901.2.3 (New)

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2901.1 Potable water required. Potable water shall be supplied to plumbing fixtures and plumbing appliances in dwelling units shall be supplied with potable water in the amounts and pressures specified in this chapter except where treated rainwater, treated gray water or municipal reclaimed water is supplied to water closets, urinals and trap primers. Where a nonpotable water distribution system is installed, the nonpotable system shall be identified by color marking, metal tags or other appropriate method. Where color is used for marking, purple shall be used to identify municipally reclaimed water, rainwater and graywater distribution systems. Nonpotable water outlets that could inadvertently be used for drinking or domestic purposes shall be posted.

P2901.2 Identification of nonpotable water systems. Where nonpotable water systems are installed, the piping conveying the nonpotable water shall be identified either by color marking, metal tags or tape in accordance with Sections P2901.2.1 through P2901.2.2.3.

P2901.2.1 Signage Required. All nonpotable water outlets such as hose connections, open ended pipes, and faucets shall be identified with signage that reads as follows: "Non-potable water is utilized for [application name]. Caution: non-potable water. DO NOT DRINK." The words shall be legibly and indelibly printed on a tag or sign constructed of corrosion-resistant waterproof material or shall be indelibly printed on the fixture. The letters of the words shall be not less than 0.5 inches in height and in colors in contrast to the background on which they are applied. In addition to the required wordage, the pictograph shown in Figure P2901.2.1 shall appear on the signage required by this section.



FIGURE P2901.2.1
Pictograph – DO NOT DRINK

P2901.2.2 Distribution Pipe Labeling and Marking. Non-potable distribution piping shall be of the color purple and shall be embossed or integrally stamped or marked with the words: "CAUTION: NONPOTABLE WATER – DO NOT DRINK" or shall be installed with a purple identification tape or wrap. Pipe identification shall include the contents of the piping system and an arrow indicating the direction of flow. Hazardous piping systems shall also contain information addressing the nature of the hazard. Pipe identification shall be repeated at intervals not exceeding 25 feet (7620 mm) and at each point where the piping passes through a wall, floor or roof. Lettering shall be readily observable within the room or space where the piping is located.

P2901.2.2.1 Color. The color of the pipe identification shall be discernable and consistent throughout the building. The color purple shall be used to identify reclaimed, rain and gray water distribution systems.

P2901.2.2 .2 Lettering Size. The size of the background color field and lettering shall comply with Table P2901.2.2.2.

TABLE P2901.2.2 .2
SIZE OF PIPE IDENTIFICATION

<u>PIPE DIAMETER</u> <u>(inches)</u>	<u>LENGTH BACKGROUND</u> <u>COLOR FIELD</u> <u>(inches)</u>	<u>SIZE OF LETTERS</u> <u>(inches)</u>
<u>¾ to 1 ¼</u>	<u>8</u>	<u>0.5</u>
<u>1 ½ to 2</u>	<u>8</u>	<u>0.75</u>
<u>2 ½ to 6</u>	<u>12</u>	<u>1.25</u>
<u>8 to 10</u>	<u>2</u>	<u>2.5</u>
<u>over 10</u>	<u>32</u>	<u>3.5</u>

For SI: 1 inch = 25.4 mm.

P2901.2.2 .3 Identification Tape. Where used, identification tape shall be at least 3 inches wide and have white or black lettering on purple field stating “CAUTION: NON-POTABLE WATER – DO NOT DRINK”. Identification tape shall be installed on top of non-potable rainwater distribution pipes, fastened at least every 10 feet to each pipe length and run continuously the entire length of the pipe.

Reason: The phrase “in *dwelling units* shall be supplied with water in the amounts and pressures specified in this chapter” is not necessary because the code already spells out the requirements in other sections.

Water distribution systems of other than potable water are being installed in buildings and the code needs to require marking of the piping and signage for the outlets for safety reasons. The basis for this new language is text from the IgCC and is written to be in alignment with the IgCC requirements. A similar proposal to the 2015 IPC was Approved as Modified by Public Comment. This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 36 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will increase the cost of construction

RP57-13

Public Hearing: Committee: AS AM D
 Assembly: ASF AMF DF

P2901.1-RP-HALL-PMGCAC

RP58 – 13

P2902.1

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2902.1 General. A potable water supply system shall be designed and installed as to prevent contamination from nonpotable liquids, solids or gases being introduced into the potable water supply. Connections shall not be made to a potable water supply in a manner that could contaminate the water supply or provide a cross-connection between the supply and a source of contamination except where approved backflow prevention assemblies, backflow prevention devices or other means or methods are installed to protect the potable water supply. Cross-connections between an individual water supply and a potable public water supply shall be prohibited.

Reason: This same language addition was Approved as Submitted for the 2015 IPC. “Methods” are not defined in the definitions. The term from Chapter 2 is “Backflow Preventer. The definition of methods would be complete and precise with a change to: “BACKFLOW PREVENTER. A backflow prevention assembly, a backflow prevention device or other means or method to prevent backflow into the potable water supply.”

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. X19 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP58-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2902.1-RP-HALL-PMGCAC

RP59 – 13

P2902.1

Proponent: Michael S. Moss, representing American Backflow Prevention Association
(msmoss@utah.gov)

Revise as follows:

P2902.1 General. A potable water supply system shall be designed and installed so as to prevent contamination from nonpotable liquids, solids or gases being introduced into the potable water supply. Connections shall not be made to a potable water supply in a manner that could contaminate the water supply or provide a cross-connection between the supply and a source of contamination except where approved ~~methods~~ backflow preventers are installed to protect the potable water supply. Cross-connections between an individual water supply and a potable public water supply shall be prohibited.

Reason: "Methods" are not defined in the definitions. The term from Chapter 2 is "Backflow Preventer. The definition of methods would be complete and precise with a change to: "BACKFLOW PREVENTER. A backflow prevention assembly, a backflow prevention device or other means or method to prevent backflow into the potable water supply."

Cost Impact: The code change proposal will not increase the cost of construction.

RP59-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2902.1-RP-MOSS

RP60 – 13

P2902.2

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2902.2 Plumbing fixtures. ~~The supply lines and fittings for every plumbing fixture shall be installed so as to prevent backflow.~~ At the points of interconnection between the hot and cold water supply piping systems and the individual fixtures, appliances or devices, provisions shall be made to prevent flow between such piping systems. Plumbing fixture fittings shall provide for backflow protection in accordance with ASME A112.18.1/CSA B125.1.

Reason: The struck sentence doesn't seem to make sense. We believe the intent is what is stated in IPC Section 604.2 about prohibiting interconnections between hot and cold supply piping systems. The IPC language has been added to the section. The original intent of the IPC language was to prevent interconnection between the hot and cold so that the hot water in water heater would not be depleted by cold water draws from cold water outlets on the system. For example, consider a "wye hose" connected to a single outlet laundry faucet (left open) and the two outlets connected to the hot and cold of a clothes washer. Such arrangements cause havoc in the water system. However, in later years, this language takes on more importance when requirements were put in the code for some components of the water system to be NSF 61 compliant. (NSF 61 ensures that components used in water systems will not impart unsafe things to water intended for human consumption). Hot water storage tanks are not NSF 61 compliant which is okay because the general consensus of the drinking water authorities is that rarely do people drink hot water from the tap (well, at least not on a regular basis). The connections in a water distribution system shouldn't allow cross flow between cold and hot so that people are not drinking water that came from a water heater (they might not ever know it as hot water cools down after some time before a draw is made from a cold water tap).

Recent Federal legislation requires after Jan 2014, that drinking and cooking water must not be exposed to water system components that has a lead content of greater than 0.25 percent in the wetted surfaces of the components. There is another proposal submitted by PMGCAC that adds this requirement to the code. (This "low lead" requirement was Approved as Submitted for the 2015 IPC). Now this revised language of P2902.2 takes on even greater importance, that being to not allow water that has been exposed to the hot water system to enter the cold water system where water is drawn from for drinking and cooking. Hot water system components are not required to be "low lead" so allowing water in the hot water system to flow into the cold water system is a violation of Federal law. The revision of this section is necessary to prevent the installation of plumbing that would cause "high lead" water to be drawn from a cold drinking water outlet.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 37 on the PMGCAC IRC-P list.

Cost impact: The code change proposal will not increase the cost of construction.

RP60-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2902.2-RP-HALL-PMGCAC

RP61 – 13

P2902.3.1

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2902.3.1 Air gaps. Air gaps shall comply with ASME A112.1.2 and air gap fittings shall comply with ASME A112.1.3. ~~The minimum~~ An air gap shall be measured vertically from the lowest end of a water supply-outlet to the flood level rim of the fixture or receptor into which ~~such potable~~ the water outlets discharges or to the floor. The ~~minimum~~ required air gap shall be not less than twice the diameter of the effective opening of the outlet, ~~but in no case~~ and not less than the values specified in Table P2902.3.1. ~~An air gap is required at the discharge point of a relief valve or piping. Air gap devices shall be incorporated in dishwashing and clothes washing appliances.~~

Reason: The second to the last sentence of the section is redundant with Section P2803.6.1, Item 2 and should be deleted. The last sentence is redundant with Section P2717.1 for dishwashers. A new section is being proposed in another proposal to cover clothes washers in the same manner as dishwashers were covered. The remaining changes to the section are to clean up the wording. This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 38 on the PMGCAC IRC-P list.

Cost impact: The code change proposal will not increase the cost of construction.

RP61-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2902.3.1-RP-HALL-PMGCAC

RP62 – 13

P2902.3.2

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2902.3.2 Atmospheric-type vacuum breakers. ~~Pipe-applied~~ Atmospheric-type vacuum breakers shall conform to ASSE 1001 or CSA B64.1.1. Hose-connection vacuum breakers shall conform to ASSE 1011, ASSE 1019, ASSE 1035, ASSE 1052, CSA B64.2, CSA B64.2.1, CSA B64.2.1.1, CSA B64.2.2 or CSA B64.7. Both types of vacuum breakers shall be installed such with the outlet continuously open to the atmosphere. ~~These devices shall operate under normal atmospheric pressure when the critical level is installed at the required height.~~

Reason: The last sentence of this section doesn't make a lot of sense. The new language explains the outlet conditions that must be met for these types of backflow devices.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 39 on the PMGCAC IRC-P list.

Cost impact: The code change proposal will not increase the cost of construction.

RP62-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2902.3.2-RP-HALL-PMGCAC

RP63 – 13

P2902.3.2

Proponent: Michael S. Moss, representing American Backflow Prevention Association
(msmoss@utah.gov)

Revise as follows:

P2902.3.2 Atmospheric-type vacuum breakers. ~~Pipe applied~~ Atmospheric-type vacuum breakers shall conform to ASSE 1001 or CSA B64.1.1. Hose-connection vacuum breakers shall conform to ASSE 1011, ASSE 1019, ASSE 1035, ASSE 1052, CSA B64.2, CSA B64.2.1, CSA B64.2.1.1, CSA B64.2.2 or CSA B64.7. These ~~devices~~ vacuum breakers shall operate under normal atmospheric pressure when the critical level is installed at the required height. The critical level of the atmospheric vacuum breaker shall be set at not less than 6 inches (152 mm) above the highest elevation of downstream piping and the flood level rim of the fixture or device.

Reason: Installation of vacuum breakers needs to be compliant with published manufacturer installation instructions. The information is the minimum standard for industry. This installation criterion provides adequate protection of the water supply and ensures protection of public health.

Cost Impact: The code change proposal will not increase the cost of construction.

RP63-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2902.3.2-RP-MOSS

RP64 – 13

P2902.3.3

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2902.3.3 Backflow preventer with intermediate atmospheric vent. Backflow preventers with intermediate atmospheric vents shall conform to ASSE 1012 or CSA B64.3. These devices shall be designed for the outlet to be ~~permitted to be installed where~~ subject to continuous pressure conditions. The relief opening shall discharge by air gap and shall be prevented from being submerged.

Reason: The term “shall be permitted” is not mandatory code language. The section was reworded to eliminate the term. This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 40 on the PMGCAC IRC-P list.

Cost impact: The code change proposal will not increase the cost of construction.

RP64-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2902.3.3-RP-HALL-PMGCAC

RP65 – 13

P2902.3.3

Proponent: Michael S. Moss, representing American Backflow Prevention Association
(msmoss@utah.gov)

Revise as follows:

P2902.3.3 Backflow preventer with intermediate atmospheric vent. Backflow with intermediate atmospheric vents shall conform to ASSE 1012 or CSA B64.3. These devices shall be permitted to be installed where subject to continuous pressure conditions. These devices shall be prohibited as a means of protection where any chemical additives are introduced downstream of the device. The relief opening shall discharge by air gap and shall be prevented from being submerged.

Reason: These backflow preventers are designed and sold for non-health hazard installations according to manufacturer specification sheets. They are inadequate for chemical additions or injections. Their use should be limited to potable water systems within a residential system only. Reference Sections P2902.5.4.1 and Section P2902.5.1.

Cost Impact: The code change proposal will not increase the cost of construction.

RP65-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2902.3.3-RP-MOSS

RP66 – 13

P2902.3.4

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2902.3.4 Pressure vacuum breaker assemblies. Pressure vacuum breaker assemblies shall conform to ASSE 1020 or CSA B64.1.2. Spill-resistant vacuum breaker assemblies shall comply with ASSE 1056. These assemblies ~~are~~ shall be designed ~~for the outlet to be subject to installation under continuous pressure conditions. where the critical level is installed at the required height.~~ Pressure vacuum breaker assemblies shall not be installed in locations where ~~spillage~~ leakage of water from the assembly could cause damage to the structure.

Reason: The third sentence is in non-mandatory language and the critical height has nothing to do with the assembly's capability to accept pressure on the outlet of the assembly. The term "spillage" is vague (spillage of what?) and doesn't truly say what the intent is.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 41 on the PMGCAC IRC-P list.

Cost impact: The code change proposal will not increase the cost of construction.

RP66-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2902.3.4-RP-HALL-PMGCAC

RP67 – 13

P2902.3.4

Proponent: Michael S. Moss, representing American Backflow Prevention Association
(msmoss@utah.gov)

Revise as follows:

P2902.3.4 Pressure vacuum breaker assemblies. Pressure vacuum breaker assemblies shall conform to ASSE 1020 or CSA B64.1.2. Spill-resistant vacuum breaker assemblies shall comply with ASSE 1056. These assemblies are designed for installation under continuous pressure conditions where the critical level is installed at the required height. The critical level of a pressure vacuum breaker and a spill resistant vacuum breaker assembly shall be set at not less than 12 inches (304 mm) above the highest elevation of downstream piping and the flood level rim of the fixture or device. Pressure vacuum breaker assemblies shall not be installed in locations where spillage could cause damage to the structure.

Reason: Installation of different types of vacuum breakers within this section conflicts with published manufacturer installation instructions. Manufacturer literature recommends 12 inch installation above downstream piping and outlets for PVB's and SVB's for most conditions. This provides adequate protection of the water supply and ensures protection of public health.

Cost Impact: The code change proposal will not increase the cost of construction.

RP67-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2902.3.4-RP-MOSS

RP68 – 13

P2902.3.5

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2902.3.5 Reduced pressure principle backflow prevention assemblies. Reduced pressure principle backflow prevention assemblies and reduced pressure principle fire protection backflow prevention assemblies shall conform to ASSE 1013, AWWA C511, CSA B64.4 or CSA B64.4.1. Reduced pressure detector fire protection backflow prevention assemblies shall conform to ASSE 1047. These devices assemblies shall be designed for the outlet to be permitted to be installed where subject to continuous pressure conditions. The relief opening shall discharge by air gap and shall be prevented from being submerged.

Reason: The term “shall be permitted” is not mandatory code language. The language was revised to make the intent clear. This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 42 on the PMGCAC IRC-P list.

Cost impact: The code change proposal will not increase the cost of construction.

RP68-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2902.3.5-RP-HALL-PMGCAC

RP69 – 13

P2902.3.6

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2902.3.6 Double check-valve assemblies. Double check-valve assemblies shall conform to ASSE 1015, CSA B64.5, CSA B64.5.1 or AWWA C510. Double detector check-valve assemblies shall conform to ASSE 1048. These ~~devices-assemblies~~ shall be designed for the outlet to be subject to ~~capable of operating under~~ continuous pressure conditions.

Reason: The last sentence doesn't really say what is intended. The revision corrects the problem.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 43 on the PMGCAC IRC-P list.

Cost impact: The code change proposal will not increase the cost of construction.

RP69-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2902.3.6-RP-HALL-PMGCAC

RP70 – 13

P2902.3.6

Proponent: Michael S. Moss, representing American Backflow Prevention Association
(msmoss@utah.gov)

Revise as follows:

P2902.3.6 Double check-valve backflow prevention assemblies. Double check-valve backflow prevention assemblies shall conform to ASSE 1015, CSA B64.5, CSA B64.5.1 or AWWA C510. Double-detector check-valve detector fire protection backflow prevention assemblies shall conform to ASSE 1048. These devices assemblies shall be capable of operating under continuous pressure conditions.

Reason: To provide consistent terminology throughout the code for reference and comparison.

Cost Impact: The code change proposal will not increase the cost of construction.

RP70-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2902.3.6-RP-MOSS

RP71 – 13

Table P2902.3

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org); Michael S. Moss, representing American Backflow Prevention Association (msmoss@utah.gov)

Revise as follows:

TABLE P2902.3
APPLICATION OF BACKFLOW PREVENTERS

DEVICE	DEGREE OF HAZARD ^a	APPLICATION ^b	APPLICABLE STANDARDS
<u>BACKFLOW PREVENTION ASSEMBLIES:</u>			
Double check backflow prevention assembly and double check fire protection backflow prevention assembly	Low hazard	Backpressure or backsiphonage Sizes 3/8" - 16"	ASSE 1015, AWWA C510, CSA B64.5, CSA B64.5.1
Double check detector fire protection backflow prevention assemblies	Low hazard	Backpressure or backsiphonage Sizes 3/8" - 16"	ASSE 1048
Pressure vacuum breaker assembly	High or low hazard	Backsiphonage only Sizes 1/2" - 2"	ASSE 1020, CSA B64.1.2
Reduced pressure principle backflow prevention assembly and reduced pressure principle fire protection backflow assembly	High or low hazard	Backpressure or backsiphonage Sizes 3/8" – 16 "	ASSE 1013, AWWA C511, CSA B64.4, CSA B64.4.1
Reduced pressure detector fire protection backflow prevention assemblies	High or low hazard	Backpressure or backsiphonage (Fire Sprinkler Systems)	ASSE 1047
Spill-resistant vacuum breaker assembly	High or low hazard	Backsiphonage only Sizes 1/2" - 2"	ASSE 1056
<u>BACKFLOW PREVENTER PLUMBING DEVICES:</u>			
Antisiphon-type fill valves for gravity water closet flush tanks	High hazard	Backsiphonage only	ASSE 1002, CSA B125.3
Backflow preventer for carbonated beverage machines	Low hazard	Backpressure or backsiphonage Sizes 1/4" – 3/8"	ASSE 1022
Backflow preventer with intermediate atmospheric vents	Low hazard	Backpressure or backsiphonage Sizes 1/4" – 3/8"	ASSE 1012, CSA B64.3
Dual check valve type backflow preventers	Low hazard	Backpressure or backsiphonage Sizes 1/4"-1"	ASSE 1024, CSA B64.6
Hose connection backflow preventer	High or low hazard	Low head backpressure, rated working pressure, backpressure or backsiphonage Sizes 1/2"- 1"	ASSE 1052, CSA B64.2, B64.2.1

DEVICE	DEGREE OF HAZARD ^a	APPLICATION ^b	APPLICABLE STANDARDS
Hose connection vacuum breaker	High or low hazard	Low head backpressure or backsiphonage only Sizes 1/2", 3/4", 1"	ASSE 1011, CAN/CSA B64.1.1
Laboratory Faucet Backflow Preventer	High or low hazard	Low head backpressure and backsiphonage	ASSE 1035, CSA B64.7
Atmospheric type vacuum breaker	High or low hazard	Backsiphonage only Sizes 1/2" - 4"	ASSE 1001, CSA B64.1.1
Vacuum breaker wall hydrants, frost resistant, automatic draining type	High or low hazard	Low head backpressure and backsiphonage Sizes 3/4", 1"	ASSE 1019, CSA B64.2.2
<u>OTHER MEANS or METHODS:</u>			
Air gap	High or low hazard	Backsiphonage only	ASME A112.1.2
Air gap fittings for use with plumbing fixtures, appliances and appurtenances	High or low hazard	Backpressure or backsiphonage	ASME A112.1.3
Barometric loop	High or low hazard	Backsiphonage only	(See Section 608.13.4)

For SI: 1 inch = 25.4 mm

a. Low Hazard - See Pollution (Section 202), High Hazard - See Contamination (Section 202)

b. See Backpressure (Section 202), See Backpressure, low head (Section 202), See Backsiphonage (Section 202)

Reasons:

[Hall-PMGCAC] This same proposal was Approved as Submitted for the 2015 IPC. There is much confusion concerning protection provided by any 'backflow preventer'. Reorganizing this table would better identify proper and correct applications for code users by identifying the different protection methods: assemblies, backflow prevention devices and other means or methods. The existing table gives the mistaken understanding that "any of the above provides adequate protection for any job". This is not true. Adequate protection is based on hazard classification, application and proper installation. Backflow prevention assemblies are specifically recognized and accepted as separate and distinct units based on Section P2503.8 because of their requirement for periodic testing to ensure proper and reliable operation in order to protect public health.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. X18 on the PMGCAC IRC-P list.

[MOSS] There is much confusion concerning protection provided by any 'backflow preventer'. Reorganizing this table would better identify proper and correct applications for code users by identifying the different protection methods: assemblies, backflow prevention devices and other means or methods. The existing table gives the mistaken understanding that "any of the above provides adequate protection for any job". This is not true. Adequate protection is based on hazard classification, application and proper installation. Backflow prevention assemblies are specifically recognized and accepted as separate and distinct units based on Section P2503.8 because of their requirement for periodic testing to ensure proper and reliable operation in order to protect public health.

Cost Impact: The code change proposal will not increase the cost of construction.

RP71-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

P2902.3T-RP-HALL-PMGCAC

RP72 – 13

P2902.4

Proponent: Michael S. Moss, representing American Backflow Prevention Association
(msmoss@utah.gov)

Revise as follows:

P2902.4 Protection of potable water outlets. Potable water openings and outlets shall be protected by an air gap, ~~a reduced pressure principle backflow preventer or an assembly with atmospheric vent, an atmospheric-type vacuum breaker, a pressure-type vacuum breaker assembly or a hose connection backflow preventer.~~

Reason: To provide consistent terminology throughout the code for reference and comparison.

Cost Impact: The code change proposal will not increase the cost of construction.

RP72-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2902.4-RP-MOSS

RP73 – 13

P2902.4.1

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2902.4.1 Fill valves. Flush tanks shall be equipped with an antisiphon fill valve conforming to ASSE 1002 or CSA B125.3. The critical level of the fill valve ~~backflow preventer~~ shall be located not less than 1 inch (25 mm) above the ~~full opening top~~ of the flush tank overflow pipe.

Reason: The current wording is sloppy and incomplete. The revision cleans up the text and makes the intent clear. This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 44 on the PMGCAC IRC-P list.

Cost impact: The code change proposal will not increase the cost of construction.

RP73-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2902.4.1-RP-HALL-PMGCAC

RP74 – 13

P2902.4.3

Proponent: Michael S. Moss, representing American Backflow Prevention Association
(msmoss@utah.gov)

Revise as follows:

P2902.4.3 Hose connection. Sillcocks, hose bibbs, wall hydrants and other openings with a hose connection shall be protected by an atmospheric-type vacuum breaker, a pressure-type vacuum breaker assembly or a permanently attached hose connection vacuum breaker.

Exceptions:

1. This section shall not apply to water heater and boiler drain valves that are provided with hose connection threads and that are intended only for tank or vessel draining.
2. This section shall not apply to water supply valves intended for connection of clothes washing machines where backflow prevention is otherwise provided or is integral with the machine.

Reason: To provide consistent terminology throughout the code for reference and comparison.

Cost Impact: The code change proposal will not increase the cost of construction.

RP74-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2902.4.3-RP-MOSS

RP75 – 13

P2902.5.1

Proponent: Michael S. Moss, representing American Backflow Prevention Association
(msmoss@utah.gov)

Revise as follows:

P2902.5.1 Connections to boilers. ~~The potable supply to the boiler shall be equipped with a backflow preventer with an intermediate atmospheric vent complying with ASSE 1012 or CSA B64.3. Where conditioning chemicals are introduced into the system,~~ The potable water connection to a boiler shall be protected by an *air gap* or a reduced pressure principle backflow preventer on assembly complying with ASSE 1013, CSA B64.4 or AWWA C511.

Reason: These assemblies are designed and sold for high-health hazard installations according to manufacturer specification sheets. They are adequate for chemical additions or injections. Reduced pressure principle backflow *preventer* corrected to reduced pressure principle backflow prevention assembly to provide consistent terminology throughout the code for reference and comparison.

Cost Impact: The code change proposal will not increase the cost of construction.

RP75-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2902.5.1-RP-MOSS

RP76 – 13

P2902.5.2

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2902.5.2 Heat exchangers. Heat exchangers using an *essentially toxic transfer fluid* shall be separated from the potable water by double-wall construction. An air gap open to the atmosphere shall be provided between the two walls. Single-wall construction heat exchangers shall be used only where an *essentially nontoxic transfer fluid* is utilized~~ing is an essentially nontoxic. transfer fluid shall be permitted to be of single-wall construction.~~

Reason: The term “shall be permitted” is not mandatory code language. The revised language corrects this problem. This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 45 on the PMGCAC IRC-P list.

Cost impact: The code change proposal will not increase the cost of construction.

RP76-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2902.5.2-RP-HALL-PMGCAC

RP77 – 13

P2902.5.5

Proponent: Michael S. Moss, representing American Backflow Prevention Association
(msmoss@utah.gov)

Revise as follows:

P2902.5.5 Solar systems. The potable water supply to a solar system shall be equipped with a backflow preventer with intermediate atmospheric vent complying with ASSE 1012 or a reduced pressure principle backflow preventer on assembly complying with ASSE 1013. Where chemicals are used, the potable water supply shall be protected by a reduced pressure principle backflow preventer on assembly.

Exception: Where all solar system piping is a part of the potable water distribution system, in accordance with the requirements of the *International Plumbing Code*, and all components of the piping system are listed for potable water use, ~~cross-connection protection measures~~ backflow protection shall not be required.

Reason: To provide consistent terminology throughout the code for reference and comparison.

Cost Impact: The code change proposal will not increase the cost of construction.

RP77-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2902.5.5-RP-MOSS

RP78 – 13

P2902.5.6 (New)

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Add new text as follows:

P2902.5.6 Yard hydrants. The potable water supply to a frost proof yard hydrant having a stop-and-waste valve located underground or below grade shall be protected against backflow by a reduced pressure principle backflow prevention assembly.

Reason: There is no way to know what type of health hazard the stop and waste opening of a yard hydrant will be exposed to. The contaminants could include lawn fertilizer, animal wastes, garden fertilizer or septic tank effluent. The code currently lacks coverage for what type of backflow protection is necessary for this application which has some code officials choosing simple a dual check valve which is only suitable for low hazard. This is an accident waiting to happen.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 53 on the PMGCAC IRC-P list.

Cost impact: The code change proposal will increase the cost of construction.

RP78-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2902.5.6 (NEW)-RP-HALL-PMGCAC

RP79 – 13

Table P2903.1

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

TABLE P2903.1
REQUIRED CAPACITIES AT POINT OF OUTLET DISCHARGE

FIXTURE SUPPLY OUTLET SERVING	FLOW RATE (gpm)	FLOW PRESSURE (psi)
Bathtub, pressure balanced <u>balanced-pressure or,</u> thermostatic <u>or combination balanced-pressure/</u> <u>thermostatic</u> mixing valve	4	20
Bidet, <u>thermostatic mixing valve</u>	2	20
Dishwasher	2.75	8
Laundry tub <u>tray</u>	4	8
Lavatory	2 <u>0.8</u>	8
Shower, pressure balanced <u>balanced-pressure or,</u> thermostatic <u>or combination balanced-pressure/</u> <u>thermostatic</u> mixing valve	3 <u>2.5^a</u>	20
Sillcock, hose bibb	5	8
Sink	2.5 <u>1.75</u>	8
Water closet, flushometer tank	1.6	20
Water closet, tank, close coupled	3	20
Water closet, tank, one piece	6	20

For SI: 1 pound per square inch = 6.895 kPa, 1 gallon per minute = 3.785 L/m.

a. Where the shower mixing valve manufacturer indicates a lower flow rating for the mixing valve, the lower value shall be applied.

Reason: This revised numbers in the table were approved for the 2015 IPC.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. X11 on the PMGCAC IRC-P list.

Cost Impact: This code change proposal will not increase the cost of construction.

RP79-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

P2903.1T-RP-HALL-PMGCAC

RP80 – 13

Table P2903.1

Proponent: Edward R. Osann, Natural Resources Defense Council, representing himself.
(eosann@nrdc.org)

Revise as follows:

TABLE P2903.1
REQUIRED CAPACITIES AT POINT OF OUTLET DISCHARGE

FIXTURE AT POINT OF OUTLET	FLOW RATE (gpm)	FLOW PRESSURE (psi)
Bathtub, pressure-balanced or thermostatic mixing valve	4	20
Bidet, thermostatic mixing	2	20
Dishwasher	2.75	8
Laundry tub	4	8
Lavatory	2 0.8	8
Shower, pressure-balancing or thermostatic mixing valve	3 2.5 ^a	20
Sillcock, hose bibb	5	8
Sink	2.5 1.75	8
Water closet, flushometer tank	1.6	20
Water closet, tank, close coupled	3	20
Water closet, tank, one-piece	6	20

For SI: 1 gallon per minute = 3.785 L/m, 1 pound per square inch = 6.895 kPa.

a. Where the minimum rated flow of the specific mixing valve to be used is lower than 2.5 gpm, the minimum rated flow of the mixing valve shall be the required capacity for this table.

Reason: TABLE P2903.1 “REQUIRED CAPACITIES AT POINT OF OUTLET DISCHARGE” requires plumbing distribution system design to achieve flow rates of *at least* 3 gpm for showers, 2.5 gpm for sinks, and 2 gpm for lavatories, all of which are excessive as minimum requirements. The *minimum* flow rate for a shower is above the allowable *maximum* flow rate for a showerhead as specified by Table P2903.2 of this code and by the nationwide standard that has been in effect for nearly 20 years. Similarly, the *minimum* flow rate for sinks other than laundry sinks is again set higher than the *maximum* flow rate allowable for a sink faucet under Table P2903.2. For building sites that are at the low end of the acceptable range of water pressure, these excessive minimum flow values tend to encourage the oversizing of pipes leading to fixture outlets, leaving a larger volume of cooled hot water to purge before use, and thus exacerbating the problem of the energy and water lost while waiting for actual hot water to arrive at the fixture. In some installations, these excessive minimum values may require water pressure booster systems that might otherwise be unnecessary.

Under this proposal, the minimum flow rates for lavatory, sink, and shower supply pipes would be adjusted downward. Minimum flow rates for pipes supplying showers would be set at 2.5 gpm, or such lower flow rate as would match the manufacturer’s minimum rated flow for the mixing valve to provide the level of thermal protection prescribed by the industry standard. The minimum flow rate for pipe supplying a sink other than a laundry sink would be set at 1.75 gpm, which is 80 percent of the value of the maximum flow rate allowed for a sink faucet by this code under Table P2903.2. The minimum flow rate for pipe supplying a lavatory would be set at 0.8 gpm, which is the same as the minimum flow rate prescribed for private lavatory faucets by the US EPA’s WaterSense specification (version 1.0, October 2007).

Note: Each change proposed here for Table P2903.1 has been accepted for Table 604.3 in the 2015 version of the International Plumbing Code.

Cost Impact: This proposal will have the effect of reducing the diameter of pipe that is allowed to serve lavatories and showers in some installations, and may also eliminate the need for water pressure booster systems in some applications. This code change proposal will not increase the cost of construction.

RP80-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2903.1T-RP-OSANN.DOC

RP81 – 13

Table P2903.2

Proponent: Edward R. Osann, Natural Resources Defense Council, representing himself (eosann@nrdc.org)

Revise as follows:

**TABLE P2903.2
MAXIMUM FLOW RATES AND CONSUMPTION
FOR PLUMBING FIXTURES AND FIXTURE FITTINGS^b**

PLUMBING FIXTURE OR FIXTURE FITTING	PLUMBING FIXTURE OR FIXTURE FITTING MAXIMUM FLOW RATE OR QUANTITY
Lavatory faucet	2.2 <u>1.5</u> gpm at 60 psi
Shower head ^a	2.5 <u>2.0</u> gpm at 80 psi
Sink faucet	2.2 gpm at 60 psi
Water closet	4.6 <u>1.3</u> gallons per flushing cycle ^c

For SI: 1 gallon = 3.785 L, 1 gallon per minute = 3.785 L/m, 1 pound per square inch = 6.895 kPa.

a. A hand-held shower spray is also a shower head.

b. Consumption tolerances shall be determined from referenced standards.

c. The effective flush volume for a dual-flush water closet is defined as the composite, average flush volume of two reduced flushes and one full flush.

Reason: The maximum flow rates and water consumption levels in the current Table P2903.2 for water closets, shower heads, and lavatory faucets equate to nationwide standards enacted nearly 20 years ago. In December, 2010, the US Department of Energy determined that states were no longer preempted from adopting more stringent efficiency standards for these products. (*Federal Register*, Vol. 75, No. 245, December 22, 2010, p. 80289; this document is attached).

Today, fixtures and fittings that perform well at flush volumes and flow rates lower than the values in Table P2903.2 are widely available. Since 2006, the establishment of the WaterSense voluntary labeling program for water efficient products and services by the Environmental Protection Agency has provided a framework for the recognition of products that are substantially more efficient than minimum federal requirements while maintaining full functionality and customer satisfaction. WaterSense criteria were established for tank-type toilets (1.28 gpf) in 2007; lavatory faucets (1.5 gpm @ 60 psi) in 2007; and showerheads (2.0 gpm @ 80 psi) in 2010. Manufacturers have responded by bringing large numbers of models to market that meet or exceed WaterSense specifications. Based on the most recent reports by WaterSense partners, the following figures regarding the number of WaterSense labeled models available as of December 2012 indicate the widespread availability and commercial viability of plumbing products that are more efficient than the federal minimum standards shown in the current Table P2903.2:

- Tank-type water closets 1,475 models from 87 brands
- Lavatory faucets and accessories 5,207 models from 134 brands
- Showerheads 808 models from 45 brands

With the pace of introduction of new models that meet WaterSense specifications, it is reasonable to expect that these figures will be substantially larger by 2015.

Improving the water efficiency of water closets, shower heads, and lavatory faucets in new residential construction will save future building owners money and reduce the likelihood of municipal water and wastewater capacity constraints that can lead to moratoria on new connections.

NRDC estimates that nationwide adoption of the values in this proposal in all newly constructed single-family homes, effective 2016, can be expected to yield substantial additional savings of resources and dollars, as follows:

- 110 million gallons of water per day in 2030;
- 3,200 1,644 Gigawatt-hours of electricity per year in 2030;
- 118 million therms of natural gas per year in 2030; and
- Cumulative savings for consumers of \$632 million through 2030.

Cost Impact: While the costs of plumbing fixtures and fittings vary greatly due to style, trim, colors, and materials, the incremental cost of greater efficiency alone for products meeting the flush volumes and flow rates contained in this proposal is negligible. This code change proposal will not increase the cost of construction.

RP81-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2903.2T-RP-OSANN.DOC

RP82 – 13

P2903.3

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2903.3 Minimum pressure. ~~The static water pressure (as determined by the local water authority) at the building entrance for either public or private water service shall be not less than 40 psi (276 kPa).~~ Where the water pressure supplied by the public water main or an individual water supply system is insufficient to provide for the minimum pressures and quantities for the plumbing fixtures in the building, the pressure shall be increased by means of an elevated water tank, a hydro-pneumatic pressure booster system or a water pressure booster pump.

Reason: The IPC doesn't require a minimum static pressure at the building entrance so why should the IRC? We believe this requirement came from long ago and before the code required minimum pressures and flow rates at fixtures. It does not matter what the pressure is at the building entrance just as long as the pressures at the fixtures are satisfied. If the plumber has to install a booster pump, an elevated water tank, or a hydro-pneumatic pressure booster system to meet the demands of the building, then the code will be satisfied. The new language basically comes from the IPC.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 46 on the PMGCAC IRC-P list.

Cost impact: The code change proposal will not increase the cost of construction.

RP82-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2903.3-RP-HALL-PMGCAC

RP83 – 13

P2903.4, P2903.4.1, P2903.4.2

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2903.4 Thermal expansion control. ~~A means for controlling increased pressure caused by thermal expansion shall be installed where required in accordance with Sections P2903.4.1 and P2903.4.2.~~ Where a storage water heater is supplied with cold water that passes through a check valve, pressure reducing valve or backflow preventer, a thermal expansion tank shall be connected to the water heater cold water supply pipe at a point that is downstream of all check valves, pressure reducing valves and backflow preventers. Thermal expansion tanks shall be sized in accordance with the tank manufacturer's instructions and shall be sized such that the pressure in the water distribution system shall not exceed that required by Section P2903.3.1.

~~**P2903.4.1 Pressure-reducing valve.** For water service system sizes up to and including 2 inches (51 mm), a device for controlling pressure shall be installed where, because of thermal expansion, the pressure on the downstream side of a pressure-reducing valve exceeds the pressure-reducing valve setting.~~

~~**P2903.4.2 Backflow prevention device or check valve.** Where a backflow prevention device, check valve or other device is installed on a water supply system using storage water heating equipment such that thermal expansion causes an increase in pressure, a device for controlling pressure shall be installed.~~

Reason: Any location there is a pressure reducing device, a check valve or a backflow preventer in the cold water piping to a storage-type water heater, a means to compensate for thermal expansion must be installed. This is typically accomplished with an expansion tank. Other methods for relieving thermal expansion pressure, such additional relief valves, waste water for the life of the system. Thermal expansion tanks are required by most storage water heater manufacturers to protect the water heater. Expansion tank manufacturers typically size their tanks so that the water distribution system pressure will remain just shy of the pressure required to open a 150 psi water heater relief valve. This will allow the system pressure to exceed the maximum pressure intended by Section P2903.3.1, which is unacceptable. A similar proposal for the 2015 IPC was Approved as Submitted.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 47 on the PMGCAC IRC-P list.

Cost impact: The code change proposal will increase the cost of construction.

RP83-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2903.4-RP-HALL-PMGCAC

RP84 – 13

P2903.7

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2903.7 Size of water-service mains, branch mains and risers. The size of the water service pipe shall be not less than 3/4 inch (19 mm) diameter. The size of water service mains, branch mains and risers shall be determined according to water supply demand [gpm (L/m)], available water pressure [psi (kPa)] and friction loss caused by the water meter and *developed length* of pipe [feet (m)], including *equivalent length* of fittings. The sizes of piping in of each a water distribution system shall be determined according to by design methods conforming to ~~acceptable~~ accepted engineering practice, ~~such as those methods in Appendix P and shall~~ Such methods shall be approved. by the code official.

Reason: The code should never direct or refer the reader to an appendix. What is “acceptable” ? What is intended is “accepted”. See definition for *accepted engineering practice* in the IPC. The material in the appendix is not normally adopted and in many cases, does not exist in the adopted code of a jurisdiction. The reference needs to be deleted. “Approved by the building official” is redundant. *Approved* already means approval by the building official.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 48 on the PMGCAC IRC-P list.

Cost impact: The code change proposal will not increase the cost of construction.

RP84-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2903.7-RP-HALL-PMGCAC

RP85 – 13

P2903.8

Proponent: Gary Klein, Affiliated International Management, LLC, representing self,
gary@aim4sustainability.com

Revise as follows:

P2903.8 Gridded and parallel water distribution systems. Hot water and cold water manifolds installed with ~~gridded or parallel-connected individual distribution lines~~ and cold water manifolds installed with gridded distribution lines to each fixture or fixture fittings shall be designed in accordance with Sections P2903.8.1 through P2903.8.6. Gridded systems for hot water distribution systems shall be prohibited.

Reason: A gridded distribution system has two or more water paths to each fixture supply pipe.

If a gridded system were installed on the hot water distribution piping, the hot water would take multiple paths to the fixture being used, only one of which would be the most direct route. This would serve to slow down the flow of hot water and exacerbate already long delivery times and dramatically increase the heat loss and energy wasted in the hot water delivery system.

Cost Impact: The code change proposal will not increase the cost of construction.

RP85-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2903.8-RP-KLEIN

RP86 – 13

P2903.8.2

Proponent: Gary Klein, Affiliated International Management, LLC, representing self,
gary@aim4sustainability.com

Revise as follows:

P2903.8.2 Minimum Size. When the developed length of the distribution line is ~~60 feet (18 288 mm)~~ 50 feet (15 240 mm) or less, and the available pressure at the meter is not less than 40 pounds per square inch (276 kPA), the size of individual distribution lines shall be not less than 3/8 inch (10 mm) diameter. Certain fixtures such as one-piece water closets and whirlpool bathtubs shall require a larger size where specified by the manufacturer. If a water heater is fed from the end of a cold water manifold, the manifold shall be one size larger than the water heater feed. The maximum developed length between the source of heated water and the plumbing fixtures and plumbing appliances shall be 50 feet (1270 mm).

Reason: The piping cannot tell what occupancy it is in so it makes sense to limit the developed length for heated water in the IRC to 50 feet. This will correlate the various I-codes that cover heated water piping.

Enabling smaller diameter tubing is important to energy efficiency because it reduces the volume in the fixture supply, which reduces the temperature drop during the use periods and the energy that is lost when the water in the piping cools down. It also has the benefit of reducing the time it takes for hot water to arrive.

As plumbing fixture and appliance flow rates get lower, as long as the maximum flow rate is selected properly, the physics clearly indicates that there will be no pressure loss or velocity problems if smaller diameter tubing is allowed. Calculations were performed using the same formula used by plumbing engineers to design hot water distribution systems to determine the combinations of flow rates and diameters shown in the table. In order to ensure that a piping system will work properly for heated water with a limit of 50 feet of developed length, the maximum developed length was capped at 50 feet for the analysis done to support this code change. The pressure drop was limited to 5 psi and the velocity was limited to 4 feet per second. PEX, CPVC and copper Types K, L, and M were evaluated. In order to make it simple to inspect, the maximum flow rate for each nominal diameter was chosen so that the worst performing material still met the criteria.

Cost Impact: The code change proposal will not increase the cost of construction.

RP86-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2903.8.2-RP-KLEIN

RP87 – 13

P2903.8.3

Proponent: Gary Klein, Affiliated International Management, LLC, representing self,
gary@aim4sustainability.com

Revise as follows:

P2903.8.3 Orientation. The installation orientation of manifolds shall not be limited ~~be permitted to be~~
~~installed in a horizontal or~~ and vertical orientations.

Reason: While horizontal and vertical are the most common orientations, the current language seems to prohibit installation in any other orientations, for example on a diagonal. If diagonal will give the best performance or reduce the cost of installation, it should be allowed. The sentence was reworded to eliminate the non-mandatory language of “shall be permitted”.

If the committee prefers, it would be acceptable to delete the entire section.

Cost Impact: The code change proposal will not increase the cost of construction.

RP87-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2903.8.3-RP-KLEIN

RP88 – 13

P2903.9.1

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2903.9.1 Service Main water valves. Each *dwelling unit* shall be provided with an accessible, full-open main water shutoff valve near within 18 inches (457 mm) the entrance of where the water service pipe enters the structure at a foundation wall or where the water service extends above the floor of a concrete slab-on-grade. The valve shall be of a full open type having nominal restriction to flow, with provision for drainage such as a bleed orifice or installation of a separate drain valve. Additionally, Where the supply of water for the structure is from a public water main, a valve shall be provided between the end of the utility-owned water supply pipe and the beginning of the water service pipe. shall be valved at the curb or lot line in accordance with local requirements.

Reason: The terms “near” and “nominal restriction” are vague and unenforceable. The term “bleed orifice” and “valved” are slang terminology. The word “additionally” is unnecessary.

The industry seems to understand what constitutes a “full open” valve. The dimension of 18 inches for the location of the valve is offered to the Development Committee as a starting point for specifying the proximity of the valve to the entrance into the structure. The Committee can easily change this dimension if it chooses. The point in specifying a distance is to provide better guidance and more leeway than simply stating “at” the entrance.

A “bleed orifice” on a main water shut off valve is used so rarely that if it did get used many years after installation, the orifice is frequently useless because it is clogged and corroded. It is wishful thinking to believe that a modern water distribution system can be completely drained through a “bleed orifice” (or a drain valve) at the main water valve. Many jurisdictions have not enforced this feature for many years. The IPC contains no such requirement.

The last line is revised to remove slang terminology (“valved”).

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Cost impact: The code change proposal will not increase the cost of construction.

RP88-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2903.9.1-RP-HALL-PMGCAC

RP89 – 13

P2903.9.2

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2903.9.2 Water heater valve. A *readily accessible* full open valve shall be installed in the cold-water supply pipe to each water heater. ~~at or near~~ Such valve shall be within 18 inches (457 mm) of the water heater.

Reason: The term “near” is vague and unenforceable. The term “at” is too restrictive. The dimension of 18 inches for the location of the valve is offered to the Development Committee as a starting point for specifying the proximity of the valve to the water heater. The Committee can easily change this dimension if it chooses. The point in specifying a distance is to provide better guidance and more leeway than simply stating “at” or “near” the entrance.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 50 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP89-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2903.9.2-RP-HALL-PMGCAC

RP90 – 13

P2903.9.3

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2903.9.3 Fixture valves and access. ~~An individual~~ Shutoff valves shall be required on ~~the~~ each fixture supply pipe to each plumbing appliance and to each plumbing fixture other than bathtubs and showers. Valves serving individual plumbing fixtures, plumbing appliances, risers and branches shall be ~~provided~~ with accessible.

Reason: The first sentence was moved to be the last sentence as it makes more sense in the context of the subjects. Access is not a defined term in the IRC but *accessible* is defined (and does not mean "suitable for persons having disabilities"). This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 51 on the PMGCAC IRC-P list.

Cost impact: The code change proposal will not increase the cost of construction.

RP90-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2903.9.3-RP-HALL-PMGCAC

RP91 – 13

P2903.9.4

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2903.9.4 Valve requirements. Valves shall be of an approved type and compatible with the type of piping material installed in the system. ~~Ball valves, gate valves, butterfly valves, globe valves and plug.~~ Valves intended to supply drinking water shall meet the requirements of NSF 61.

Reason: This revised language was approved for the 2015 IPC.. NSF/ANSI Standard 61 Drinking Water System Components-Health Effects addresses crucial aspects of drinking water system components: whether contaminants that leach or migrate from the product/material into the drinking water are above acceptable levels in finished waters. Requiring NSF 61 will help protect the drinking water supply from the leaching of contaminants. The IPC and IRC already requires conformance to NSF 61 for pipes, fittings, faucets and valves intended to supply drinking water. (Sections 424.1, 605.3, 605.4, 605.5, 605.7 of IPC).

The current list of valves in Section P2903.9.4 which require NSF-61 was a concession during previous code change cycles to allow manufacturers time to bring product lines into compliance with this standard. The requirement should apply to all valves intended to supply drinking water. The Uniform Plumbing Code currently requires all valves to conform to NSF 61.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. X16 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP91-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2903.9.4#1-RP-HALL-PMGCAC

RP92 – 13

P2903.9.4, Table P2903.9.4 (New), Chapter 44

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2903.9.4 Valves. Valves shall be of an approved type and compatible with the type of piping material installed in the system. Valves shall conform to one of the standards listed in Table 605.7 or shall be approved. Ball valves, gate valves, globe valves and plug valves intended to supply drinking water shall meet the requirements of NSF 61.

TABLE P2903.9.4
VALVES

<u>MATERIAL</u>	<u>STANDARD</u>
<u>Chlorinated polyvinyl chloride (CPVC) plastic</u>	<u>ASME A112.4.14, ASME A112.18.1/CSA B125.1, ASTM F 1970, CSA B125.3</u>
<u>Copper or copper alloy</u>	<u>ASME A112.4.14, ASME A112.18.1/CSA B125.1, ASME B16.34, CSA B125.3, MSS SP-67, MSS SP-80, MSS SP-10</u>
<u>Gray and ductile Iron</u>	<u>ASTM A126, AWWA C500, AWWA C504, AWWA C507, MSS SP-67, MSS SP-70, MSS SP-71, MSS SP-72, MSS SP-78</u>
<u>Cross-linked polyethylene (PEX) plastic</u>	<u>ASME A112.4.14, ASME A112.18.1, CSA B125.3, NSF 359</u>
<u>Polypropylene (PP) plastic</u>	<u>ASME A112.4.14, ASTM F 2389,</u>
<u>Polyvinyl chloride (PVC) plastic</u>	<u>ASME A112.4.14, ASTM F 1970</u>

Add new standards to Chapter 44 as follows:

ASME

A112.4.14 – 2004 Manually Operated, Quarter-Turn Shutoff Valves for Use in Plumbing Systems
B16.34 – 2009 Valves Flanged, Threaded and Welding End

ASTM

A126-04(2009) Gray Iron Castings for Valves, Flanges, and Pipe Fittings
F1970 - 05 Special Engineered Fittings, Appurtenances or Valves for use in Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Systems

AWWA

C500-09 AWWA Standard for Metal-Seated Gate Valves for Water Supply Service
C504-10 AWWA Standard for Rubber-Seated Butterfly Valves
C507-11 AWWA Standard for Ball Valves, 6 In. Through 60 In.

MSS

Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.
127 Park Street, N.E.
Vienna, VA 22180

SP-42-2009 Corrosion Resistant Gate, Globe, Angle and Check Valves with Flanged and Butt Weld Ends (Classes 150, 300 & 600)

SP-67-2011 Butterfly Valves

<u>SP-70-2011</u>	<u>Gray Iron Gate Valves, Flanged and Threaded Ends</u>
<u>SP-71-2011</u>	<u>Grey Iron Swing Check Valves, Flanged and Threaded Ends</u>
<u>SP-72-2010</u>	<u>Ball Valves with Flanged or Butt-Welding Ends for General Service</u>
<u>SP-78-2011</u>	<u>Cast Iron Plug Valves, Flanged and Threaded Ends</u>
<u>SP-80-2008</u>	<u>Bronze Gate, Globe, Angle and Check Valves</u>
<u>SP-110-2010</u>	<u>Ball Valves, Threaded, Socket Welded, Solder Joint, Grooved and Flared Ends</u>

NSF

<u>359-2011</u>	<u>Valves for Crosslinked Polyethylene (PEX) Water Distribution Tubing Systems</u>
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Reason: This revised language was approved for the 2015 IPC. Currently the code requires valves to be approved but does not contain requirements for which performance standards are acceptable for use. While a number of valve standards have been created over the years, they have not been included in the code. The intent of this code change is to create a table to identify appropriate standards for valves. This list is not all inclusive of all material types and in some cases there are not national standards for every type of valve and material used. For this reason, the language "shall be approved or conform to . . ."

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Cost Impact: The code change proposal will not increase the cost of construction..

Analysis: A review of the standards proposed for inclusion in the code, ASME A112.4.14-2004 , ASME B16.34-2009 , ASTM A126-04(2009), ASTM F1970-05, AWWA C500-09, AWWA C504-10, AWWA C507-11, MSS SP-42-2009, MSS SP-67-2011, MSS SP-70-2011, MSS SP-71-2011, MSS SP-72-2010, MSS SP-78-2011, MSS SP-80-2008, MSS SP-100-2010 and NSF 359-2011 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

RP92-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2903.9.4#2-RP-HALL-PMGCAC

RP93 – 13

P2903.9.5

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2903.9.5 Outlets and stop-and-waste valves prohibited below grade. Potable water outlets and ~~combination~~ stop-and-waste valves shall not be installed underground or below grade. Freezeproof yard hydrants that drain the riser into the ground ~~are~~ shall be considered to be stop-and-waste valves.

Exception: Installation of freezeproof yard hydrants that drain the riser into the ground shall be permitted provided that ~~if~~ the potable water supply to such hydrants is protected upstream of the hydrants in accordance with Section P2902.5.6 and the hydrants are permanently identified as nonpotable outlets by approved signage that reads as having the following words: ~~that reads as having the followings words:~~ “CAUTION, NONPOTABLE WATER. DO NOT DRINK.”

Reason: The term “combination” is not needed and confuses the intent of the section. The plumbing industry knows what a stop and waste valve is. Use of the phrase “shall be permitted” in the exception is frequently not acceptable but in this situation, it does work because specific conditions are required for such hydrant use. The term “if” needs to be changed to “provided that” in order to format the remainder of the statement as the conditions of installation. The last line is revised to because signs don’t “read”, they only have words printed on them.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 54 on the PMGCAC IRC-P list.

Cost impact: The code change proposal will increase the cost of construction.

RP93-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2903.9.5-RP-HALL-PMGCAC

RP94 – 13

P2903.10

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Delete and substitute as follows:

~~P2903.10 Hose bibb shut off valve.~~ ~~Hose bibbs subject to freezing, including the “frost-proof” type, shall be equipped with an accessible stop-and-waste-type valve inside the building so that they can be controlled and drained during cold periods.~~

~~Exception:~~ ~~Frostproof hose bibbs installed such that the stem extends through the building insulation into an open heated or semiconditioned space need not be separately valved (see Figure P2903.10).~~

P2903.10 Outdoor hose connection faucets. Hose-connection faucets such as hose bibbs, sillcocks and lawn faucets that are located on the building and exposed to the outdoors shall have a stop-and-waste valve installed on the fixture supply pipe to the faucet. The stop-and-waste valve shall be accessible and shall be located in an area of the building where the valve is not subject to freezing.

Exceptions:

1. The stop-and-waste valve shall not be required where the winter design temperature indicated in Table R301.2.(1) is greater than 32°F (0° C).
2. The stop-and-waste valve shall not be required where the valve seat of the hose connection faucet is located in an area of the building that is not subject to freezing temperatures (see Figure P2903.10).

Reason: The hose bibb is not “equipped” with a stop-and-waste valve; the water supply pipe to the hose bibb is to have the stop and waste valve. Are hose bibbs really “controlled”? “Valved” is slang terminology. What is a “semiconditioned” space? The revised text eliminates improper language and makes the intent clear.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 55 on the PMGCAC IRC-P list.

Cost impact: The code change proposal will increase the cost of construction.

RP94-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2903.10-RP-HALL-PMGCAC

RP95 – 13

P2903.11(NEW), P2903.11.1 (New), Table P2903.11.1 (New)

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Add new text as follows:

P2903.11 Hot water supply to fixtures. The piping from the source of hot water to the end of the fixture supply pipe to the fixture shall contain not more than 75 fluid ounces of water. Recirculating system piping and heat-traced piping shall be considered to be sources of hot water.

P2903.11.1 Pipe volumes. Table P2903.11.1 shall be used to determine the water volume in piping.

TABLE P2903.11.1
PIPING VOLUME

<u>Size</u> <u>Nominal(Inches)</u>	<u>Copper</u> <u>Type M</u>	<u>Copper</u> <u>Type L</u>	<u>Copper</u> <u>Type K</u>	<u>CPVC</u> <u>CTS</u> <u>SDR</u> <u>11</u>	<u>CPVC</u> <u>SCH 40</u>	<u>CPVC</u> <u>SCH 80</u>	<u>PE-RT</u> <u>SDR 9</u>	<u>Composite</u> <u>ASTM F</u> <u>1281</u>	<u>PEX CTS</u> <u>SDR 9</u>
<u>FLUID OUNCES OF WATER PER FOOT OF TUBE</u>									
<u>3/8"</u>	<u>1.06</u>	<u>0.97</u>	<u>0.84</u>	<u>N/A</u>	<u>1.17</u>	<u>N/A</u>	<u>0.64</u>	<u>0.63</u>	<u>0.64</u>
<u>1/2"</u>	<u>1.69</u>	<u>1.55</u>	<u>1.45</u>	<u>1.25</u>	<u>1.89</u>	<u>1.46</u>	<u>1.18</u>	<u>1.31</u>	<u>1.18</u>
<u>3/4"</u>	<u>3.43</u>	<u>3.22</u>	<u>2.90</u>	<u>2.67</u>	<u>3.38</u>	<u>2.74</u>	<u>2.35</u>	<u>3.39</u>	<u>2.35</u>
<u>1"</u>	<u>5.81</u>	<u>5.49</u>	<u>5.17</u>	<u>4.43</u>	<u>5.53</u>	<u>4.57</u>	<u>3.91</u>	<u>5.56</u>	<u>3.91</u>
<u>1 1/4</u>	<u>8.70</u>	<u>8.36</u>	<u>8.09</u>	<u>6.61</u>	<u>9.66</u>	<u>8.24</u>	<u>5.81</u>	<u>8.49</u>	<u>5.81</u>
<u>1 1/2</u>	<u>12.18</u>	<u>11.83</u>	<u>11.45</u>	<u>9.22</u>	<u>13.20</u>	<u>11.38</u>	<u>8.09</u>	<u>13.88</u>	<u>8.09</u>
<u>2"</u>	<u>21.08</u>	<u>20.58</u>	<u>20.04</u>	<u>15.79</u>	<u>21.88</u>	<u>19.11</u>	<u>13.86</u>	<u>21.48</u>	<u>13.86</u>

Reason: The IgCC, however, limits hot water line length based on the volume in the pipe, therefore the maximum length is different for different sizes of pipe. The IRC should be revised to correspond with the IgCC.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 56 on the PMGCAC IRC-P list.

Cost impact: The code change proposal will increase the cost of construction.

R95-13

Public Hearing: Committee: AS AM D
 Assembly: ASF AMF DF

P2903.11 (NEW)-RP-HALL-PMGCAC

RP96 – 13

P2903.11 (New), Table P2903.11 (New)

Proponent: Gary Klein, Affiliated International Management, LLC, representing self,
gary@aim4sustainability.com

Add new text as follows:

P2903.11 Fixture supply piping size. The size of fixture supply piping to fixture fittings and appliances shall be in accordance with Table P2903.11. The maximum developed length of such fixture supply piping shall be 50 feet (1270 mm). Both the heated water fixture supply piping and the cold water fixture supply piping to a fixture or appliance shall be the same nominal size. For flow rates not shown in Table P2903.11, the maximum developed length of such piping and tubing between the source of heated water and fixture fittings or appliances shall be 50 feet (1270 mm).

TABLE P2903.11
FIXTURE SUPPLY PIPING SIZE

<u>FLOW RATE</u> <u>(gpm)</u>	<u>NOMINAL PIPING OR TUBING SIZE</u> <u>(inches)</u>
≤ 0.5	$\frac{1}{4}$
>0.5 to ≤ 1.0	$\frac{5}{16}$
>1.0 to ≤ 1.5	$\frac{3}{8}$

For SI: 1 gallon per minute = 3.785 L/m, 1 inch = 25.4 mm

Reason: The purpose of this code change is to ensure that the minimum diameter of the tubing on a fixture supply is safely (low pressure drop and low velocity) matched to the flow rate of the fixture or appliance to which it is connected.

Enabling smaller diameter tubing is important to energy efficiency because it reduces the volume in the fixture supply, which reduces the temperature drop during the use periods and the energy that is lost when the water in the piping cools down. It also has the benefit of reducing the time it takes for hot water to arrive.

As plumbing fixture and appliance flow rates get lower, as long as the maximum flow rate is selected properly, the physics clearly indicates that there will be no pressure loss or velocity problems if smaller diameter tubing is allowed. Calculations were performed using the same formula used by plumbing engineers to design hot water distribution systems to determine the combinations of flow rates and diameters shown in the table. In order to ensure that a piping system will work properly for heated water with a limit of 50 feet of developed length, the maximum developed length was capped at 50 feet for the analysis done to support this code change. The pressure drop was limited to 5 psi and the velocity was limited to 4 feet per second. PEX, CPVC and copper Types K, L, and M were evaluated. In order to make it simple to inspect, the maximum flow rate for each nominal diameter was chosen so that the worst performing material still met the criteria.

Cost impact: The code change proposal will not increase the cost of construction.

RP96-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

P2903.11 (NEW)-RP-Klein

RP97 – 13

P2904 (New), P2904.1 (New), Table P2904.1 (New)

Proponent: Edward R. Osann, Natural Resources Defense Council, representing himself.
(eosann@nrdc.org)

Add new text as follows:

SECTION P2904 **HOT WATER DISTRIBUTION SYSTEMS**

P2904.1 Hot water pipe volume. The volume in the piping between the end of a *hot water fixture supply* and the piping connection to a *hot water source* shall not exceed 0.5 gallon (1.9 liters). The hot water source shall be a recirculating system pipe, a heat-traced pipe or a water heater. The volume in the piping shall be calculated using the values in Table P2904.1.

TABLE P2904.1
INTERNAL VOLUME OF VARIOUS WATER DISTRIBUTION PIPING

<u>LIQUID OUNCES OF WATER PER FOOT LENGTH OF HOT WATER TUBING</u>								
<u>Nominal Size (Inches)</u>	<u>Copper Type M</u>	<u>Copper Type L</u>	<u>Copper Type K</u>	<u>CPVC CTS SDR 11</u>	<u>CPVC SCH 40</u>	<u>PEX-AL-PEX ASTM F 1281</u>	<u>PE- AL-PE</u>	<u>PEX CTS SDR 9</u>
$\frac{3}{8}$	1.06	0.97	0.84	N/A	1.17	0.63	0.63	0.64
$\frac{1}{2}$	1.69	1.55	1.45	1.25	1.89	1.31	1.31	1.18
$\frac{5}{8}$	2.49	2.31	2.22	N/A	N/A	2.12	2.12	1.72
$\frac{3}{4}$	3.43	3.22	2.90	2.67	3.38	3.39	3.39	2.35
1	5.81	5.49	5.17	4.43	5.53	5.56	5.56	3.91
1 $\frac{1}{4}$	8.70	8.36	8.09	6.61	9.66	8.49	8.49	5.81
1 $\frac{1}{2}$	12.18	11.83	11.45	9.22	13.20	13.88	13.88	8.09
2	21.08	20.58	20.04	15.79	21.88	21.48	21.48	13.86

For SI: 1 inch = 25.4 mm, 1 liquid ounce = 0.0296 liters, 1.0 ounce = 0.00781 gallons,
0.5 gallon (1.9 liters) = 64.0 liquid ounces

Reason: Cold or tepid water in the initial draw from a hot water outlet is often unusable for its intended purpose, and is frequently purged, resulting in a waste of water, energy, and time for building occupants. Pipe insulation significantly reduces heat loss and helps to ensure that hot water gets to the user sooner. However, a complementary strategy is to reduce the volume of water contained in the hot water distribution system in the first place.

This proposal, which is comparable to the criteria adopted by the US EPA WaterSense for New Homes specification in 2009, establishes a maximum volume of 0.5 gallons for water in a hot water supply line, based on internal volumes specific to the piping material. By allowing the volume limitation to be computed from runs from recirculation loops, this provision allows designers additional flexibility in larger homes while effectively limiting the amount of cooled down water to be purged to ½ gallon per draw.

Cost Impact: This code change proposal is a design requirement that will not increase the cost of construction.

RP97-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

P2904 (NEW) #1-RP-OSANN.DOC

RP98 – 13

P2904 (New), P2904.1 (New)

Proponent: Edward R. Osann, Natural Resources Defense Council, representing himself.
(eosann@nrdc.org)

Add new text as follows:

P2904

HOT WATER DISTRIBUTION SYSTEMS

2904.1 Hot or tempered water supply to fixtures. The developed length of hot water piping and tempered water piping from the end of a hot or tempered water *fixture supply* to the piping connection to a hot or tempered water source shall not exceed 50 feet (15 240 mm). The hot or tempered water source shall be a recirculating system pipe, a heat-traced pipe or a water heater.

Reason: This proposal sets a maximum length of 50 feet for hot (or tempered) water supply piping running from a heat source to any fixture. The language the first sentence is identical to Section 607.2 of the International Plumbing Code, which typically applies to much larger buildings than one- and two-family homes. Excessively long hot water piping results in excessive amounts of cooled water that must be purged before use, especially for showers and wash basins. For example, 70 feet of ¾ inch pipe contains nearly 2 gallons of water. At an average shower flow rate of 2.2 gallons per minute, a shower served by such a long pipe run would be running for over 50 seconds just to purge cold water from the hot water supply line, plus the additional time needed to warm the pipe between the heat source and the shower – all water, energy, and time wasted. A 50 foot limit will encourage money-saving choices about the placement of water heaters and hot water outlets in the design of large homes. This provision makes sense in the IPC and will make sense in the IRC as well.

The last line of the section simply ensures that when either recirculating systems or heat-traced piping are present, they are to be considered sources of hot or tempered water.

Cost Impact: This code change proposal is a design requirement that will not increase the cost of construction.

RP98-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2904 (NEW) #2-RP-OSANN.DOC

RP99 – 13

P2904.1

Proponent: Barry Pines, CPO, representing the Code Study & Development Group of SE Michigan

Revise as follows:

P2904.1 General. The design and installation of residential fire sprinkler systems shall be in accordance with NFPA 13D or Section P2904, which shall be considered equivalent to NFPA 13D. Partial residential sprinkler systems shall be permitted to be installed only in buildings not required to be equipped with a residential sprinkler system. Section P2904 shall apply to ~~stand-alone and~~ multipurpose wet-pipe sprinkler systems that do not include the use of antifreeze. A multipurpose fire sprinkler system shall provide domestic water to both fire sprinklers and plumbing fixtures. ~~A stand-alone sprinkler system shall be separate and independent from the water distribution system. A backflow preventer shall not be required to separate a stand-alone sprinkler system from the water distribution system.~~

Reason: This section was originally meant for a multipurpose system. The insertion of "Stand alone" is creating major conflicts in the industry in terms of who can install these systems. They were originally meant to be installed by Plumbers as a combined system. The stand alone system is meant to be installed by Fire suppression contractors and this is causing a conflict with the Jurisdictions and they are not adopting this section of the code. Also the fact that it does not require a backflow preventer is causing a problem due to the fact that with a standalone system you have a stagnant piping system that will breed bacteria and contaminate the potable water.

Cost Impact: This will not create any cost Impact.

RP99-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2904.1-RP-PINES.DOC

RP100 – 13

P2904.1.1

Proponent: Wesley Walters, Clark County Nevada Development Services, representing self

Revise as follows:

P2904.1.1 Required sprinkler locations. Sprinklers shall be installed to protect all areas of a dwelling unit.

Exceptions:

1. Attics, crawl spaces and normally unoccupied concealed spaces that do not contain fuel-fired appliances do not require sprinklers. In attics, crawl spaces and normally unoccupied concealed spaces that contain fuel-fired equipment, a sprinkler shall be installed above the equipment; however, sprinklers shall not be required in the remainder of the space.
2. Clothes closets, linen closets and pantries not exceeding 24 square feet (2.2 m²) in area, with the smallest dimension not greater than 3 feet (915 mm) and having wall and ceiling surfaces of gypsum board.
3. Bathrooms not more than ~~55 (5.1 m²)~~ 40 square feet (3.7 m²) in area.
4. Garages; carports; exterior porches; unheated entry areas, such as mud rooms, that are adjacent to an exterior door; and similar areas.

Reason: NFPA 13D handbook lists bathroom fires make up 3 % of all fires. With all the electrical appliances used within bathrooms the potential for fire damage is great. The average bathroom is 40-45 square feet in area. This is exception is too large for not providing protection where it is needed.

Cost Impact: The code change proposal will increase the cost of construction.

RP100-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2904.1.1-RP-WALTERS.DOC

RP101 – 13

P2904.3

Proponent: Jeffrey M. Hugo, CBO, National Fire Sprinkler Association, representing the National Fire Sprinkler Association (hugo@nfsa.org)

Revise as follows:

P2904.3 Sprinkler piping system. Sprinkler piping shall be supported in accordance with the ~~requirements for cold water distribution piping manufacturer's and sprinkler manufacturer's installation~~ instructions. Sprinkler piping shall comply with all requirements for cold water distribution piping. For multipurpose piping systems, the sprinkler piping shall connect to and be a part of the cold water distribution piping system.

Reason: Section P2904.3 and the pre-concealment inspection requirements of Section P2904.8.1 conflict. Section P2904.3 states that the piping shall be supported like all other cold water piping (Table P2605.1) but Section P2904.8.1 states that piping supports shall be inspected according to the manufacturers installation instructions. Some piping manufacturers, such as CPVC, have different spacing requirements. Sprinkler piping support can also have different spacing for the hangers for in-line drop tee's and end-line drop elbows.

Designers, installers and code officials should be using all the same documents for fire sprinkler installations.

Cost Impact: Will not increase the cost of construction.

RP101-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2904.3-RP-HUGO.DOC

RP102 – 13

P2905.2, P2905.2.1 (New), Chapter 44

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org); Jeremy Brown, NSF International, (brown@nsf.org)

Revise as follows:

P2905.2 Lead content. The lead content in pipe and fittings used in the water supply system shall be ~~have lead content of not greater than 8 percent lead.~~

Add new text as follows:

P2905.2.1 Lead content of drinking water pipe and fittings. Pipe, pipe fittings, joints, valves, faucets, and fixture fittings utilized to supply water for drinking or cooking purposes shall comply with NSF 372 and shall have a weighted average lead content of 0.25 percent lead or less.

Add new standard to Chapter 14 as follows:

NSF

372-2010 Drinking Water System Components - Lead Content

Reason: Section P2505.2 is reworded to state the 8 percent limitation of lead content. The existing language *requires* lead content to be not greater than 8 percent. A subtle change but more correct as revised.

The new Section P2905.2.1 coordinates the IRC with Federal legislation limiting the amount of lead in pipe, pipe fittings, joints, valves, faucets, and fixture fittings that can be used to supply *drinking water*. Section P2905.2 is still necessary since remaining components in a potable water distribution system must still be limited to 8 percent lead. The Federal legislation only applies to drinking water components. There are other components that have a greater quantity of lead than 0.25 percent and they are permitted to by Federal law. This is identical language that was approved for the 2015 IPC.

NSF 372 is the new standard used to evaluate the weighted average of lead in drinking water components. This standard allows manufacturers to perform a mathematical analysis of their product to determine the weighted average of lead. NSF 372 is consistent with the Federal legislation. This standard was approved for addition to the 2015 IPC.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 57 on the PMGCAC IRC-P list.

Cost impact: The code change proposal will not increase the cost of construction.

RP102-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2905.2-RP-HALL-PMGCAC

RP103 – 13

P2905.4.1

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

~~P2905.4.1~~ P2905.3.7 Dual check-valve-type backflow preventer. ~~Where a Dual check-valve backflow preventer is installed on the water supply system, it shall comply~~ conform with ASSE 1024 or CSA B64.6.

Reason: This same language was Approved as Modified for addition to 2015 IPC. The term “valve” is not in the title of the ASSE standard. The section is being moved to the correct location with all other backflow preventers for continuity (and similarity to how the IPC groups all of the backflow preventers). The IRC does not require a backflow preventer on water supply systems so this section should not be within Section P2905.4.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 2X0 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP103-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2905.4.1-RP-HALL-PMGCAC

RP104 – 13

P2905.4.2

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org); Richard Grace, Fairfax County, representing Virginia Plumbing and Mechanical Inspectors Association and Virginia Building and Code Officials Association (Richard.Grace@fairfaxcounty.gov)

Delete and substitute as follows:

P2905.4.2 Water service installation. ~~Trenching, pipe installation and backfilling shall be in accordance with Section P2604. Water service pipe is permitted to be located in the same trench with a *building sewer* provided such sewer is constructed of materials listed for underground use within a building in Section P3002.1. If the *building sewer* is not constructed of materials listed in Section P3002.1, the water service pipe shall be separated from the *building sewer* by not less than 5 feet (1524 mm), measured horizontally, of undisturbed or compacted earth or placed on a solid ledge not less than 12 inches (305 mm) above and to one side of the highest point in the sewer line.~~

~~**Exception:** The required separation distance shall not apply where a water service pipe crosses a sewer pipe, provided that the water service pipe is sleeved not less than 5 feet (1524 mm), horizontally from the sewer pipe centerline, on both sides of the crossing with pipe materials listed in Tables P2905.4, P3002.1(1), P3002.1(2) or P3002.2.~~

P2905.4.2 Separation of water service and building sewer. Trenching, pipe installation and backfilling shall be in accordance with Section P2604. Where water service piping is located in the same trench with the building sewer, such sewer shall be constructed of materials listed in Table P3002.1(2). Where the building sewer piping is not constructed of materials listed in Table P3002.1(2), the water service pipe and the building sewer shall be horizontally separated by not less than 5 feet (1524 mm) of undisturbed or compacted earth. The required separation distance shall not apply where a water service pipe crosses a sewer pipe, provided the water service is sleeved to a point not less than 5 feet (1524 mm) horizontally from the sewer pipe centerline on both sides of such crossing. The sleeve shall be of pipe materials listed in Table P2905.4, P3002.1(2) or P3002.2. The required separation distance shall not apply where the bottom of the water service pipe located within 5 feet (1524 mm) of the sewer is not less than 12 inches (305 mm) above the highest point of the top of the building sewer.

Reason:

[GRACE] This proposal is consistent with IPC change that was approved and was to further update the IPC with language that was in the IRC. When this new section was written for the IPC it was found that there were further updates that could be done to the IRC section. Note none of these updates change the requirement of the existing section but just reformat it in code language without the use of the exception and further clarify the initial intent of the section in a more user friendly format. With the approval of the above language both the IRC and IPC will have the exact same language in regard to the separation of water services and building sewers.

[HALL-PMGCAC] Reason: This revised language was approved for the 2015 IPC. There is no reason for the language to be different between the IRC and the IPC.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. X10 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP104-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2905.4.2-RP-HALL-PMGCAC

Table P2905.4, P3004.3, TABLE P3302.1

Revise as follows:

MATERIAL	STANDARD
Asbestos-cement pipe	ASTM C296

~~P3003.4 Asbestos-cement.~~ Joints between asbestos-cement pipe or fittings shall be made with a sleeve coupling of the same composition as the pipe, sealed with an elastomeric ring conforming to ASTM D 1869.

MATERIAL	STANDARD
Asbestos-cement pipe	ASTM C508

Reason: Asbestos cement pipe is no longer manufactured in North America. The potential health issues associated with asbestos make this piping material unsuitable for use. The material needs to be removed from the code. A similar proposal to the 2015 IPC was Approved as Submitted.

Cost impact: The code change proposal will not increase the cost of construction.

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

P2905.4T #1-RP-HALL-PMGCAC

RP106-13
Table P2905.4

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee
(Dave.Hall@georgetown.org)

Revise as follows:

TABLE P2905.4
WATER SERVICE PIPE

MATERIAL	STANDARD
Polypropylene (PP) plastic tubing	ASTM F 2389; CSA B137.11

(Portions of table not shown are unchanged)

Reason: The IPC shows this material to be suitable for water service applications and the material is also indicated in Table P2905.5 as water distribution piping. There's no technical justification for not allowing it to be used for water service piping. This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 59 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP106-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

P2905.4T #2-RP-HALL-PMGCAC

RP107 – 13

Table P2905.4, Table P2905.5, P2905.9.1.3 (New), Chapter 44

Proponent: David W. Ash, Lubrizol Advanced Materials Inc

Revise as follows:

**TABLE P2905.4
WATER SERVICE PIPE**

MATERIAL	STANDARD
Chlorinated polyvinyl chloride/aluminum/chlorinated polyvinyl chloride (CPVC/AL/CPVC)	ASTM F 2855

(Portions of table not shown are unchanged)

**TABLE P2905.5
WATER DISTRIBUTION PIPE**

MATERIAL	STANDARD
Chlorinated polyvinyl chloride/aluminum/chlorinated polyvinyl chloride (CPVC/AL/CPVC)	ASTM F 2855

(Portions of table not shown are unchanged)

P2905.9.1.3 CPVC/AL/CPVC pipe. Joint surfaces shall be clean and free from moisture, and an approved primer shall be applied. Solvent cement, orange in color and conforming to ASTM F493, shall be applied to all joint surfaces. The joint shall be made while the cement is wet, and in accordance with ASTM D2846 or ASTM F493. Solvent-cement joints shall be installed above or below ground.

Exception: A primer shall not be required where all of the following conditions apply:

1. The solvent cement used is third-party certified as conforming to ASTM F493.
2. The solvent cement used is yellow in color.
3. The solvent cement is used only for joining ½ inch (12.7 mm) through 1 inch (25.4 mm) diameter CPVC/AL/CPVC pipe and CPVC fittings.
4. The CPVC fittings are manufactured in accordance with ASTM D 2846.

Add new standard to Chapter 44 as follows:

ASTM

F2855-11 Specifications for Chlorinated Poly (Vinyl Chloride)/Aluminum/Chlorinated Poly (Vinyl Chloride) (CPVC-AL-CPVC) Composite Pressure Tubing

Reason: CPVC/AL/CPVC pipe has been developed that is suitable for use as potable water piping, both as water service pipe and water distribution pipe. This product has been used successfully on a limited basis since 2007 based on NSF Standard 61 listing and a special engineered standard (SE) from NSF International. Including this product in the IRC will recognize another plumbing pipe option for installers.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standards proposed for inclusion in the code, CSA 22.2 No. 130 and UL 515 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1 2013.

RP107-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2905.4T-RP-ASH

RP108 – 13

Table P2905.4, Table P2905.5, Table P2905.6

Proponent: Pennie L. Feehan, Pennie L. Feehan Consulting representing the Copper Development Association (penniefeehan@me.com)

Revise as follows:

**TABLE P2905.4
WATER DISTRIBUTION PIPE**

MATERIAL	STANDARD
Brass pipe	ASTM B 43
Copper or copper-alloy pipe	ASTM B 42; <u>ASTM B 43</u> ; ASTM B 302

(Portions of table not shown are unchanged)

**TABLE P2905.5
WATER SERVICE PIPE**

MATERIAL	STANDARD
Brass pipe	ASTM B 43
Copper or copper-alloy pipe	ASTM B 42; <u>ASTM B 43</u> ; ASTM B 302

(Portions of table not shown are unchanged)

**TABLE P2905.6
PIPE FITTINGS**

MATERIAL	STANDARD
Brass pipe	ASTM F1974

(Portions of table not shown are unchanged)

Reason: Brass and Bronze are copper alloys. Moving the standards under the applicable heading eliminates outdated language and provides the appropriate terminology and correct information to the end user.

Standard ASTM F1974 is a metal insert fitting for Polyethylene/aluminum/polyethylene (PE-AL-PE) and cross-linked polyethylene/aluminum/polyethylene (PEX-AL-PEX) and is already shown with the appropriate material.

Cost Impact: The code change proposal will not increase the cost of construction.

RP108-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

P2905.4T-RP-FEEHAN.DOC

RP109 – 13

Table P2905.6, Chapter 44

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org); Curtis Dady, Viega, LLC representing Viega, LLC (curtis.dady@viega.com)

Revise as follows:

**TABLE P2905.6
PIPE FITTINGS**

MATERIALS	STANDARDS
Copper or copper alloy	ASME B16.15; ASME B16.18; ASME B16.22; ASME B16.23; ASME 16.26; ASME B16.29; ASME B16.51, ASSE 1061

Add new standard to Chapter 44 as follows:

ASME

B16.51-2011 Copper and Copper Alloy Press-Connect Pressure Fittings

Reason:

[HALL-PMCAC]: The addition of the new standard was approved for the 2015 IPC. There is no reason to not include it in the IRC.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. X12 on the PMGCAC IRC-P list.

[DADY]: Harmonization with IPC and IMC proposals "Approved as Submitted" in the 2012 Final Action Hearings. Ref: P97-12; P98-12; M195-12; M198-12; M211-12

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, ASME B16.51-2011, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

RP109-13

Public Hearing: Committee: AS AM D
 Assembly: ASF AMF DF

P2905.6T #1-RP-HALL-PMGCAC

RP110 – 13

Table P2905.6

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

**TABLE P2905.6
PIPE FITTINGS**

MATERIAL	STANDARD
Copper or copper alloy	ASSE 1061; ASME B16.15; ASME B16.18; ASME B16.22; ASME B16.23 ; ASME B16.26; ASME B16.29

Reason: This deletion was approved for the 2015 IPC. The above proposal removes DWV fittings from Potable Water table to benefit the end user. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings - DWV and ASME B 16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings – DWV are designed with short cup depth and ¼ inch per foot slope.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. X13 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction..

RP110-13

Public Hearing: Committee: AS AM D
 Assembly: ASF AMF DF

P2905.6T #2-RP-HALL-PMGCAC

RP111 – 13

Table P2905.6

Proponent: Larry Gill, IPEX USA LLC (larry.gill@ipexna.com)

Revise as follows:

**TABLE P2905.6
PIPE FITINGS**

MATERIAL	STANDARD
Fittings for polyethylene of raised temperature (PE-RT) plastic tubing	ASTM F 1807; ASTM F 2098; ASTM F 2159; ASTM F 2735; <u>ASTM F 2769</u>

(Portions of table not shown remain unchanged)

Reason: Add ASTM F2769 as a fittings standard for polyethylene of raised temperature (PE-RT). ASTM F2769 is a standard for hot and cold water tubing and distribution systems and includes provisions for tubing, fittings, valves and manifolds.

Cost Impact: The code change proposal will not increase the cost of construction

Analysis: Standard ASTM F 2769 is in the 2012 IRC.

RP111-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2905.6T-RP-GILL

RP112 – 13

Table P2905.5

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

**TABLE P2905.6
PIPE FITTINGS**

MATERIAL	STANDARD
Cast-iron	ASME B16.4; ASME B16.12

(Portions of table not shown are unchanged)

Reason: ASME B16.12 is for threaded *drainage* fittings and is inappropriate to be listed in a water distribution pipe fitting table. A similar proposal submitted to the 2015 IPC was Approved as Submitted.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 60 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP112-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

P2905.6T-RP-HALL-PMGCAC

RP113 – 13

P2905.9.1.2

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2905.9.1.2 CPVC plastic pipe. Joint surfaces shall be clean and free from moisture. Joints shall be made in accordance with the pipe manufacturer's installation instructions. Where such instructions require and that an approved primer be used, the primer shall be applied to the joint surfaces and a solvent cement, orange in color and conforming to ASTM F 493, shall be applied to the joint surfaces. Where such instructions allow for a one step solvent cement, yellow in color and conforming to ASTM F 493, to be used, the joint surfaces shall not require application of a primer before the solvent cement is applied. The joint shall be made while the cement is wet and in accordance with ASTM D 2846 or ASTM F 493. Solvent cemented joints shall be ~~permitted~~ installed above or below ground.

Exception: ~~A primer is not required where all of the following conditions apply:~~

- ~~1. The solvent cement used is third-party certified as conforming to ASTM F 493.~~
- ~~2. The solvent cement used is yellow in color.~~
- ~~3. The solvent cement is used only for joining ½ inch (12.7 mm) through 2 inch (51 mm) diameter CPVC pipe and fittings.~~
- ~~4. The CPVC pipe and fittings are manufactured in accordance with ASTM D 2846.~~

Reason: This revised language was approved for the 2015 IPC.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. X15 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction..

RP113-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2905.9.1.2-RP-HALL-PMGCAC

RP114 – 13

P2905.14, Chapter 44

Proponent: Pennie L. Feehan, Pennie L. Feehan Consulting representing the Copper Development Association (penniefeehan@me.com)

Revise as follows:

P2905.14 Soldered and brazed joints. Soldered joints in copper and copper alloy tubing shall be made with fittings approved for water piping and shall conform to ASTM B 828. Surfaces to be soldered shall be cleaned bright. Fluxes for soldering shall be in accordance with ASTM B813 and shall become noncorrosive and non-toxic after soldering. Brazing fluxes shall be in accordance with AWS A5.31. ~~The joints shall be properly fluxed and made with approved solder.~~ Solders and fluxes used in potable water-supply systems shall have a lead content of not greater than 0.2 percent. ~~Fluxes shall conform to ASTM B 813.~~

Add standard to Chapter 44 as follows:

AWS

A5.31-2012 Specification for Fluxes for Brazing and Braze Welding

Reason: This proposal relocated existing sections, ensures copper and copper alloy systems are installed correctly and removes redundant language to aid the end user.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standards proposed for inclusion in the code, ASME A112.18.8 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1 2013.

RP114-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2905.14-RP-FEEHAN.DOC

RP115 – 13

P2905.17.1

Proponent: Pennie L. Feehan, Pennie L. Feehan Consulting representing the Copper Development Association (penniefeehan@me.com)

Revise as follows:

P2905.17.1 Copper or copper-alloy tubing to galvanized steel pipe. Joints between copper or copper-alloy tubing and galvanized steel pipe shall be made with a ~~brass~~ copper alloy fitting or dielectric fitting. The copper tubing shall be joined to the fitting in an approved manner, and the fitting shall be screwed to the threaded pipe.

Reason: This proposal eliminates outdated language and provides the appropriate terminology and correct information to the end user.

Cost Impact: The code change proposal will not increase the cost of construction.

RP115-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2905.17.1-RP-FEEHAN.DOC

RP116 – 13

P2905.18

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P2905.18 Press connect joints. Press-connect joints shall conform to one of the standards indicated in Table P2905.6. Press-type mechanical joints in copper tubing shall be made in accordance with the manufacturer's instructions. Cut tube ends shall be reamed to the full inside diameter of the tube end. Joint surfaces shall be cleaned. The tube shall be fully inserted into the press connect fitting. Press connect joints shall be pressed with a tool certified by the manufacturer. ~~using approved tools which affix the copper fitting with integral O-ring to the tubing.~~

Reason: This revised language was approved for the 2015 IPC. This change coordinates with the change to add the press connect fitting standard to Table P2905.6. The proposed new text identifies the method of joining copper tube by press connect. The tube must be cut square and reamed. The tool must be certified by the manufacturer to assure that the proper press connection is made.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. X14 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP116-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2905.18-RP-HALL-PMGCAC

RP117 – 13

P2905.19

Proponent: Michael Cudahy, Plastic Pipe and Fittings Association, representing Plastic Pipe and Fittings Association (mikec@cmservnet.com)

Revise as follows:

P2905.19 Polyethylene of raised temperature plastic. Joints between polyethylene of raised temperature plastic tubing and fittings shall be in accordance with Section P2905.19.1 ~~and Section P2905.19.2.~~

~~**P2905.19.1 Flared joints.** Flared pipe ends shall be made by a tool designed for that operation.~~

(Renumber subsequent sections)

Reason: This revision was approved for the 2015 IMC. PPFA is not aware of a tool for this purpose.

Cost Impact: None

RP117-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P2905.19-RP-CUDAHY.DOC

RP118 – 13

P2905.19.1

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

~~P2905.19.1 Flared joints.~~ ~~Flared pipe ends shall be made by a tool designed for that operation.~~

(Renumber subsequent section)

Reason: Manufacturers of PE-RT tubing indicate that the tubing cannot be flared and that a tool for flaring this type of tubing does not exist. A similar proposal submitted to the 2015 IPC was Approved as Submitted.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 61 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP118-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2905.19.1-RP-HALL-PMGCAC

RP119 – 13

P2909 (New)

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Add new section and text as follows:

P2909 BRASS FITTINGS AND VALVES

P2909.1 Brass fittings and brass valves for plastic piping systems. Where used as components of plastic piping systems and where made from copper alloys, brass fittings and brass valves shall comply with NSF14.

Reason: Dezincification of yellow brass fittings and valves has become an expensive and widespread problem. In Las Vegas alone there are 32,000 houses that are being re-piped at a cost in excess of \$300 million because of dezincification of brass fittings in PEX domestic water systems. Other parts of the country, e.g. southern California, Minnesota and Hawaii are also experiencing these failures. Failure of imported brass valves was experienced 20 years ago but corrective action taken at the time eliminated the problem. However, increasing use of imports by many companies and the deteriorating water quality in parts of the US has resulted in a 10 to 100-fold recurrence of this problem.

Since ASTM standards allow multiple copper alloys and the codes do not specifically define acceptable alloys for applications, some manufacturers choose an alloy based on cost. Brass valves and fittings made from these low-cost materials may be suitable for domestic water lines in Chicago, or drain lines, air lines or condenser water line in Las Vegas or San Diego but may fail in short order in a domestic water line in Las Vegas, San Diego or Honolulu and yet meet current codes.

This proposal provides a solution by clearly requiring compliance of all brass fittings and valves used in plastic piping systems to comply with the dezincification requirements of NSF 14. The dezincification test in NSF 14 has been accepted and used world-wide for over 30 years. The test is an effective, simple and inexpensive method for fitting and valve producers to sort corrosion-prone from corrosion-resistant alloys. Use of the dezincification performance standard in NSF 14 was developed and accepted by a broad base of fitting and valve producers and sellers. It provides a method to achieve the minimum material requirement necessary to prevent a repeat of the recent field failures that have resulted in class-action lawsuits.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 62 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: This code change proposal references NSF Standard 14, which is already referenced in the code. However, the proposed change to code text is written to correlate with a new edition of the standard NSF Standard 14-2010a, rather than the edition presently referenced in the code, which is the 2008e edition. The update to this standard will be considered by the Administrative Code Committee during the 2013 Code Development Cycle. Should this code change proposal be approved, but the update to the standard not be approved, the code text will revert to the text as it appears in the 2012 Edition of the Code.

RP119-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P2909 #1 (NEW)-RP-HALL-PMGCAC

RP120 – 13

202, P2909 (New), P2910 (New), P2911 (New), P2912 (New), P3009

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Add new definitions to Chapter 2 as follows:

RECLAIMED WATER. Nonpotable water that has been derived from the treatment of wastewater by a facility or system licensed or permitted to produce water meeting the jurisdiction's water requirements for its intended uses. Also known as "Recycled Water."

ONSITE NONPOTABLE WATER REUSE SYSTEMS. Water systems for the collection, treatment, storage, distribution, and reuse of nonpotable water generated onsite, including but not limited to graywater systems. This definition does not include rainwater harvesting systems.

COLLECTION PIPE. Unpressurized pipe used within the collection system that drains onsite non-potable water or rainwater to a storage tank by gravity.

Add new Section and new text:

SECTION P2909 **NONPOTABLE WATER SYSTEMS**

P2909.1 Scope. The provisions of this shall govern the materials, design, construction and installation of systems for the collection, storage, treatment, and distribution of non-potable water. The use and application of nonpotable water shall comply with laws, rules and ordinances applicable in the jurisdiction.

P2909.2 Water quality. Nonpotable water for each end use application shall meet the minimum water quality requirements as established for the intended application by the laws, rules and ordinances applicable in the jurisdiction. Where nonpotable water from different sources is combined in a system, the system shall comply with the most stringent of the requirements of this code that are applicable to such sources.

P2909.2.1 Residual disinfectants. Where chlorine is used for disinfection, the nonpotable water shall contain not more than 4 mg/L of chloramines or free chlorine. Where ozone is used for disinfection, the nonpotable water shall not contain gas bubbles having elevated levels of ozone at the point of use.

Exception: Reclaimed water sources shall not be required to comply with the requirements of this section.

P2909.2.2 Filtration required. Nonpotable water utilized for water closet and urinal flushing applications shall be filtered by a 100 micron or finer filter.

Exception: Reclaimed water sources shall not be required to comply with the requirements of this section.

P2909.3 Signage required. Nonpotable water outlets such as hose connections, open ended pipes, and faucets shall be identified at the point of use for each outlet with signage that reads as follows: "Nonpotable water is utilized for [application name]. Caution: Nonpotable water. DO NOT DRINK." The words shall be legibly and indelibly printed on a tag or sign constructed of corrosion-resistant, waterproof material or shall be indelibly printed on the fixture. The letters of the words shall be not less than 0.5 inches in height and in colors in contrast to the background on which they are applied. In addition to the required wordage, the pictograph shown in Figure P2909.3 shall appear on the signage required by this section.



Figure P2909.3
Pictograph DO NOT DRINK

P2909.4 Permits. Permits shall be required for the construction, installation, alteration, and repair of nonpotable water systems. Construction documents, engineering calculations, diagrams, and other such data pertaining to the non-potable water system shall be submitted with each application for permit.

P2909.5 Potable water connections. Where a potable system is connected to a nonpotable water system, the potable water supply shall be protected against backflow in accordance with Section P2902.

P2909.6 Approved components and materials. Piping, plumbing components, and materials used in the collection and conveyance systems shall be manufactured of material approved for the intended application and compatible with any disinfection and treatment systems used.

P2909.7 Insect and vermin control. The system shall be protected to prevent the entrance of insects and vermin into storage tanks and piping systems. Screen materials shall be compatible with contacting system components and shall not accelerate corrosion of system components.

P2909.8 Freeze protection. Where sustained freezing temperatures occur, provisions shall be made to keep storage tanks and the related piping from freezing.

P2909.9 Nonpotable water storage tanks. Nonpotable water storage tanks shall comply with Sections P2909.9.1 through P2909.9.11.

P2909.9.1 Sizing. The holding capacity of the storage tank shall be sized in accordance with the anticipated demand.

P2909.9.2 Location. Storage tanks shall be installed above or below grade. Above-grade storage tanks shall be protected from direct sunlight and shall be constructed using opaque, UV resistant, materials such as, but not limited to, heavily tinted plastic, lined metal, concrete, wood, or painted to prevent algae growth, or shall have specially constructed sun barriers including but not limited to installation in garages, crawlspaces, or sheds. Storage tanks and their manholes shall not be located directly under any soil piping, waste piping or any source of contamination.

P2909.9.3 Materials. Where collected onsite, water shall be collected in an approved tank constructed of durable, nonabsorbent and corrosion-resistant materials. The storage tank shall be constructed of materials compatible with any disinfection systems used to treat water upstream of the tank and with any systems used to maintain water quality within the tank. Wooden storage tanks that are not equipped with a makeup water source shall be provided with a flexible liner.

P2909.9.4 Foundation and supports. Storage tanks shall be supported on a firm base capable of withstanding the weight of the storage tank when filled to capacity. Storage tanks shall be supported in accordance with this code.

P2909.9.4.1 Ballast. Where the soil can become saturated, an underground storage tank shall be ballasted, or otherwise secured, to prevent the tank from floating out of the ground when empty. The combined weight of the tank and hold down ballast shall meet or exceed the buoyancy force of the tank. Where the installation requires a foundation, the foundation shall be flat and shall be designed to support the storage tank weight when full, consistent with the bearing capability of adjacent soil.

P2909.9.4.2 Structural support. Where installed below grade, storage tank installations shall be designed to withstand earth and surface structural loads without damage and with minimal deformation when empty or filled with water.

P2909.9.5 Makeup water. Where an uninterrupted nonpotable water supply is required for the intended application, potable or reclaimed water shall be provided as a source of makeup water for the storage tank. The makeup water supply shall be protected against backflow by means of an air gap not less than 4 inches (102 mm) above the overflow or an approved backflow device in accordance with Section P2902. A full-open valve located on the makeup water supply line to the storage tank shall be provided. Inlets to storage tank shall be controlled by fill valves or other automatic supply valves installed so as to prevent the tank from overflowing and to prevent the water level from dropping below a predetermined point. Where makeup water is provided, the water level shall be prohibited from dropping below the source water inlet or the intake of any attached pump.

P2909.9.5.1 Inlet control valve alarm. Make-up water systems shall be fitted with a warning mechanism that alerts the user to a failure of the inlet control valve to close correctly. The alarm shall activate before the water within the storage tank begins to discharge into the overflow system.

P2909.9.6 Overflow. The storage tank shall be equipped with an overflow pipe having a diameter not less than that shown in Table P2909.9.6. The overflow outlet shall discharge at a point not less than 6 inches (152 mm) above the roof or roof drain; floor or floor drain; or over an open water-supplied fixture. The overflow outlet shall be covered with a corrosion-resistant screen of not less than 16 by 20 mesh per inch (630 by 787 mesh per m) and by 1/4-inch (6.4 mm) hardware cloth or shall terminate in a horizontal angle seat check valve. Drainage from overflow pipes shall be directed so as not to freeze on roof walks. The overflow drain shall not be equipped with a shutoff valve. Not less than one cleanout shall be provided on each overflow pipe in accordance with Section P3005.2.

TABLE P2909.9.6
SIZE OF DRAIN PIPES FOR WATER TANKS

<u>TANK CAPACITY (gallons)</u>	<u>DRAIN PIPE (inches)</u>
Up to 750	1
751 to 1500	1 1/2
1501 to 3000	2
3001 to 5000	2 1/2
5001 to 7500	3
Over 7500	4

For SI: 1 gallon = 3.875 liters; 1 inch = 25.4 mm

P2909.9.7 Access. Not less than one access opening shall be provided to allow inspection and cleaning of the tank interior. Access openings shall have an approved locking device or other approved method of securing access. Below grade storage tanks, located outside of the building, shall be provided with either a manhole not less than 24 inches (610 mm) square or a manhole with an inside diameter not less than 24 inches (610 mm). Manholes shall extend not less than 4 inches (102 mm) above ground or shall be designed to as to prevent water infiltration. Finished grade shall be sloped away from the manhole to divert surface water from the manhole. Manhole covers shall be secured to prevent unauthorized access. Service ports in manhole covers shall be not less than 8 inches (203 mm) in diameter and shall be not less than 4 inches (102 mm) above the finished grade level. The service port shall be secured to prevent unauthorized access.

Exception: Storage tanks under 800 gallons (3028 l) in volume installed below grade shall not be required to be equipped with a manhole, but shall have a service port not less than 8 inches (203 mm) in diameter.

P2909.9.8 Venting. Storage tanks shall be provided with a vent sized in accordance with Chapter 31 and based on the aggregate diameter of all tank influent pipes. The reservoir vent shall not be connected to sanitary drainage system vents. Vents shall be protected from contamination by means of an approved cap or a U-bend installed with the opening directed downward. Vent outlets shall extend not less than 4 inches (102 mm) above grade, or as necessary to prevent surface water from entering the storage tank. Vent openings shall be protected against the entrance of vermin and insects in accordance with the requirements of Section P2902.7.

P2909.9.9 Drain. A drain shall be located at the lowest point of the storage tank. The tank drain pipe shall discharge as required for overflow pipes and shall not be smaller in size than specified in Table P209.9.6. Not less than one cleanout shall be provided on each drain pipe in accordance with Section P3005.2.

P2909.10 Marking and signage. Each nonpotable water storage tank shall be labeled with its rated capacity. The contents of storage tanks shall be identified with the words "CAUTION: NON-POTABLE WATER – DO NOT DRINK." Where an opening is provided that could allow the entry of personnel, the opening shall be marked with the words, "DANGER – CONFINED SPACE." Markings shall be indelibly printed on the tank, or on a tag or sign constructed of corrosion-resistant waterproof material that is mounted on the tank. The letters of the words shall be not less than 0.5 inches in height and shall be of a color in contrast with the background on which they are applied.

P2909.9.11 Storage tank tests. Storage tanks shall be tested in accordance with the following:

1. Storage tanks shall be filled with water to the overflow line prior to and during inspection. All seams and joints shall be left exposed and the tank shall remain water tight without leakage for a period of 24 hours.
2. After 24 hours, supplemental water shall be introduced for a period of 15 minutes to verify proper drainage of the overflow system and verify that there are no leaks.
3. Following a successful test of the overflow, the water level in the tank shall be reduced to a level that is at 2 inches (51 mm) below the makeup water trigger point by using the tank drain. The tank drain shall be observed for proper operation. The makeup water system shall be observed for proper operation, and successful automatic shutoff of the system at the refill threshold shall be verified. Water shall not be drained from the overflow at any time during the refill test.

P2909.10 System abandonment. If the owner of an onsite nonpotable water reuse system or rainwater collection and conveyance system elects to cease use of, or fails to properly maintain such system, the system shall be abandoned and shall comply with the following:

1. All system piping connecting to a utility-provided water system shall be removed or disabled.

2. The distribution piping system shall be replaced with an approved potable water supply piping system. Where an existing potable water pipe system is already in place, the fixtures shall be connected to the existing system.
3. The storage tank shall be secured from accidental access by sealing or locking tank inlets and access points, or filling with sand or equivalent.

P2909.11 Separation requirements for non-potable water piping. Nonpotable water collection and distribution piping and reclaimed water piping shall be separated from the building sewer and potable water piping underground by 5 feet (1524 mm) of undisturbed or compacted earth. Nonpotable water collection and distribution piping shall not be located in, under or above cesspools, septic tanks, septic tank drainage fields or seepage pits. Buried nonpotable water piping shall comply with the requirements of Section P2604.

Exceptions:

1. The required separation distance shall not apply where the bottom of the nonpotable water pipe within 5 feet (1524 mm) of the sewer is not less than 12 inches (305 mm) above the top of the highest point of the sewer and the pipe materials conforms to Table P3002.2.
2. The required separation distance shall not apply where the bottom of the potable water service pipe within 5 feet (1524 mm) of the nonpotable water pipe is a minimum of 12 inches (305 mm) above the top of the highest point of the non-potable water pipe and the pipe materials comply with the requirements of Table P2905.5
3. The required separation distance shall not apply where a nonpotable water pipe is located in the same trench with a building sewer that is constructed of materials that comply with the requirements of Table P3002.2.
4. The required separation distance shall not apply where a nonpotable water pipe crosses a sewer pipe provided that the nonpotable water pipe is sleeved to at least 5 feet (1524 mm) horizontally from the sewer pipe centerline on both sides of such crossing with pipe materials that comply with Table P3002.2
5. The required separation distance shall not apply where a potable water service pipe crosses a nonpotable water pipe provided that the potable water service pipe is sleeved for a distance of at least 5 feet (1524 mm) horizontally from the centerline of the nonpotable pipe on both sides of such crossing with pipe materials that comply with Table P3002.2.
6. The required separation distance shall not apply to irrigation piping located outside of a building and downstream of the backflow preventer where nonpotable water is used for outdoor applications.

P2909.12 Outdoor outlet access. Sillcocks, hose bibs, wall hydrants, yard hydrants, and other outdoor outlets supplied by non-potable water shall be located in a locked vault or shall be operable only by means of a removable key.

SECTION P2910 **ONSITE NONPOTABLE WATER REUSE SYSTEMS**

P2910.1 General. The provisions of this section shall govern the construction, installation, alteration, and repair of onsite nonpotable water reuse systems for the collection, storage, treatment and distribution of onsite sources of nonpotable water as permitted by the jurisdiction.

P2910.2 Sources. Onsite nonpotable water reuse systems shall collect waste discharge from only the following sources: bathtubs, showers, lavatories, clothes washers, and laundry trays. Water from other approved nonpotable sources including swimming pool backwash operations, air conditioner condensate, rainwater, foundation drain water, fluid cooler discharge water and fire pump test water shall also be permitted to be collected for reuse by onsite nonpotable water reuse systems, as approved by the building official and as appropriate for the intended application.

P2910.1 Prohibited sources. Reverse osmosis system reject water, water softener backwash water, kitchen sink wastewater, dishwasher wastewater and wastewater containing urine or fecal matter shall not be collected for reuse within an onsite nonpotable water reuse system.

P2910.3 Traps. Traps serving fixtures and devices discharging wastewater to onsite nonpotable water reuse systems shall comply with the Section P3201.2.

P2910.4 Collection pipe. Onsite nonpotable water reuse systems shall utilize drainage piping approved for use within plumbing drainage systems to collect and convey untreated water for reuse. Vent piping approved for use within plumbing venting systems shall be utilized for vents within the graywater system. Collection and vent piping materials shall comply with Section P3002.

P2910.4.1 Installation. Collection piping conveying untreated water for reuse shall be installed in accordance with Section P3005.

P2910.4.2 Joints. Collection piping conveying untreated water for reuse shall utilize joints approved for use with the distribution piping and appropriate for the intended applications as specified in Section P3002.

P2910.4.3 Size. Collection piping conveying untreated water for reuse shall be sized in accordance with drainage sizing requirements specified in Section P3005.4.

P2910.4.4 Marking. Additional marking of collection piping conveying untreated water for reuse shall not be required beyond that required for sanitary drainage, waste, and vent piping by the Chapter 30.

P2910.5 Filtration. Untreated water collected for reuse shall be filtered as required for the intended end use. Filters shall be accessible for inspection and maintenance. Filters shall utilize a pressure gage or other approved method to provide indication when a filter requires servicing or replacement. Filters shall be installed with shutoff valves installed immediately upstream and downstream to allow for isolation during maintenance.

P2910.6 Disinfection. Where the intended application for nonpotable water collected onsite for reuse requires disinfection or other treatment or both, it shall be disinfected as needed to ensure that the required water quality is delivered at the point of use. Nonpotable water collected onsite containing untreated graywater shall be retained in collection reservoirs for a maximum of 24 hours.

P2910.7 Storage tanks. Storage tanks utilized in onsite nonpotable water reuse systems shall comply with Section P2909.9. and P2910.7.1 through P2910.7.3.

P2910.7.1 Location. Storage tanks shall be located with a minimum horizontal distance between various elements as indicated in Table P2910.7.1.

TABLE P2910.7.1
LOCATION OF NON-POTABLE WATER REUSE STORAGE TANKS

<u>ELEMENT</u>	<u>MINIMUM HORIZONTAL DISTANCE FROM STORAGE TANK (FEET)</u>
<u>Critical root zone (CRZ) of protected trees</u>	<u>2</u>
<u>Lot line adjoining private lots</u>	<u>5</u>
<u>Seepage pits</u>	<u>5</u>
<u>Septic tanks</u>	<u>5</u>
<u>Water wells</u>	<u>50</u>
<u>Streams and lakes</u>	<u>50</u>
<u>Water service</u>	<u>5</u>
<u>Public water main</u>	<u>10</u>

For SI: 1 foot = 304.8 mm

P2910.7.2 Inlets. Storage tank inlets shall be designed to introduce water into the tank with minimum turbulence, and shall be located and designed to avoid agitating the contents of the storage tank.

P2910.7.3 Outlets. Outlets shall be located not less than 4 inches (102 mm) above the bottom of the storage tank, and shall not skim water from the surface.

P2910.8 Valves. Valves shall be supplied on onsite non-potable water reuse systems in accordance with Sections P2910.8.1 and P2910.8.2.

P2910.8.1 Bypass valve. One three-way diverter valve certified to NSF 50 or other approved device shall be installed on collection piping upstream of each storage tank, or drainfield, as applicable, to divert untreated onsite reuse sources to the sanitary sewer to allow servicing and inspection of the system. Bypass valves shall be installed downstream of fixture traps and vent connections. Bypass valves shall be labeled to indicate the direction of flow, connection and storage tank or drainfield connection. Bypass valves shall be installed in accessible locations. Two shutoff valves shall not be installed to serve as a bypass valve.

P2910.8.2 Backwater valve. Backwater valves shall be installed on each overflow and tank drain pipe. Backwater valves shall be in accordance with Section P3008.

P2910.9 Pumping and control system. Mechanical equipment including pumps, valves and filters shall be accessible and removable in order to perform repair, maintenance and cleaning. The minimum flow rate and flow pressure delivered by the pumping system shall appropriate for the application and in accordance with Section P2903.

P2910.10 Water-pressure reducing valve or regulator. Where the water pressure supplied by the pumping system exceeds 80 psi (552 kPa) static, a pressure-reducing valve shall be installed to reduce the pressure in the nonpotable water distribution system piping to 80 psi (552 kPa) static or less. Pressure-reducing valves shall be specified and installed in accordance with Section P2903.3.1.

P2910.11 Distribution pipe. Distribution piping utilized in onsite nonpotable water reuse systems shall comply with Sections P2910.11.1 through P2910.11.3.

Exception: Irrigation piping located outside of the building and downstream of a backflow preventer.

P2910.11.1 Materials, joints and connections. Distribution piping shall conform to the standards and requirements specified in Section P2905 for nonpotable water.

P2910.11.2 Design. Onsite nonpotable water reuse distribution piping systems shall be designed and sized in accordance with Section P2903 for the intended application.

P2910.11.3 Labeling and marking. Onsite nonpotable water distribution piping labeling and marking shall comply with Section P2901.1

P2910.12 Tests and inspections. Tests and inspections shall be performed in accordance with Sections P2910.12.1 through P2910.12.6.

P2910.12.1 Collection pipe and vent test. Drain, waste and vent piping used for onsite water reuse systems shall be tested in accordance with Section P2503.

P2910.12.2 Storage tank test. Storage tanks shall be tested in accordance with the Section P2909.9.11.

P2910.12.3 Water supply system test. The testing of makeup water supply piping and distribution piping shall be conducted in accordance with Section P2503.7

P2910.12.4 Inspection and testing of backflow prevention assemblies. The testing of backflow preventers and backwater valves shall be conducted in accordance with Section P2503.8.

P2910.12.5 Inspection vermin and insect protection. Inlets and vents to the system shall be inspected to verify that each is protected to prevent the entrance of insects and vermin into the storage tank and piping systems in accordance with Section P2909.7.

P2910.12.6 Water quality test. The quality of the water for the intended application shall be verified at the point of use in accordance with the requirements of the jurisdiction.

P2910.13 Operation and maintenance manuals. Operations and maintenance materials shall be supplied with non-potable onsite water reuse systems in accordance with Sections P2910.13.1 through P2910.13.4.

P2910.13.1 Manual. A detailed operations and maintenance manual shall be supplied in hardcopy form with all systems.

P2910.13.2 Schematics. The manual shall include a detailed system schematic, locations of all system components, and a list of all system components including manufacturer and model number.

P2910.13.3 Maintenance procedures. The manual shall provide a maintenance schedule and procedures for all system components requiring periodic maintenance. Consumable parts including filters shall be noted along with part numbers.

P2910.13.4 Operations procedures. The manual shall include system startup and shutdown procedures. The manual shall include detailed operating procedures for the system.

SECTION P2911 **NONPOTABLE RAINWATER COLLECTION AND DISTRIBUTION SYSTEMS**

P2911.1 General. The provisions of this section shall govern the construction, installation, alteration, and repair of rainwater collection and conveyance systems for the collection, storage, treatment and distribution of rainwater for non-potable applications, as permitted by the jurisdiction.

P2911.2 Collection surface. Rainwater shall be collected only from above-ground impervious roofing surfaces constructed from approved materials. Collection of water from vehicular parking or pedestrian walkway surfaces shall be prohibited except where the water is used exclusively for landscape irrigation. Overflow and bleed-off pipes from roof-mounted appliances including but not limited to evaporative coolers, water heaters, and solar water heaters shall not discharge onto rainwater collection surfaces.

P2911.3 Debris excluders. Downspouts and leaders shall be connected to a roof washer and shall be equipped with a debris excluder or equivalent device to prevent the contamination of collected rainwater with leaves, sticks, pine needles and similar material. Debris excluders and equivalent devices shall be self-cleaning.

P2911.4 Roof washer. An amount of rainwater shall be diverted at the beginning of each rain event, and not allowed to enter the storage tank, to wash accumulated debris from the collection surface. The amount of rainfall to be diverted shall be field adjustable as necessary to minimize storage tank water contamination. The roof washer shall not rely on manually operated valves or devices, and shall operate automatically. Diverted rainwater shall not be drained to the roof surface, and shall be discharged in a manner consistent with the storm water runoff requirements of the jurisdiction. Roof washers shall be accessible for maintenance and service.

P2911.5 Roof gutters and downspouts. Gutters and downspouts shall be constructed of materials that are compatible with the collection surface and the rainwater quality for the desired end use. Joints shall be water-tight.

P2911.5.1 Slope. Roof gutters, leaders, and rainwater collection piping shall slope continuously toward collection inlets and shall be free of leaks. Gutters and downspouts shall have a slope of not less than 1/8 inch per foot (10.4 mm/m) along their entire length. Gutters and downspouts shall be installed so that water does not pool at any point.

P2911.5.2 Cleanouts. Cleanouts shall be provided in the water conveyance system so as to allow access to all filters, flushes, pipes and downspouts.

P2911.6 Drainage. Water drained from the roof washer or debris excluder shall not be drained to the sanitary sewer. Such water shall be diverted from the storage tank and shall discharge to a location that will not cause erosion or damage to property. Roof washers and debris excluders shall be provided with an automatic means of self draining between rain events and shall not drain onto roof surfaces.

P2911.7 Collection pipe. Rainwater collection and conveyance systems shall utilize drainage piping approved for use within plumbing drainage systems to collect and convey captured rainwater. Vent piping approved for use within plumbing venting systems shall be utilized for vents within the rainwater system. Collection and vent piping materials shall comply with Section P3002.

P2911.7.1 Installation. Collection piping conveying captured rainwater shall be installed in accordance with Section P3005.3

P2911.7.2 Joints. Collection piping conveying captured rainwater shall utilize joints approved for use with the distribution piping and appropriate for the intended applications as specified in Section P3003

P2911.7.3 Size. Collection piping conveying captured rainwater shall be sized in accordance with drainage sizing requirements specified in Section P3005.4.

P2911.7.4 Labeling and marking. Additional marking of collection piping conveying captured rainwater for reuse shall not be required beyond that required for sanitary drainage, waste, and vent piping by the Chapter 30.

P2911.8 Filtration. Collected rainwater shall be filtered as required for the intended end use. Filters shall be accessible for inspection and maintenance. Filters shall utilize a pressure gage or other approved method to provide indication when a filter requires servicing or replacement. Filters shall be installed with shutoff valves installed immediately upstream and downstream to allow for isolation during maintenance.

P2911.9 Disinfection. Where the intended application for rainwater requires disinfection or other treatment or both, it shall be disinfected as needed to ensure that the required water quality is delivered at the point of use.

P2911.10 Storage tanks. Storage tanks utilized in nonpotable rainwater collection and conveyance systems shall comply with Section P2909.9 and P2911.10.1 through P2911.10.3.

P2911.10.1 Location. Storage tanks shall be located with a minimum horizontal distance between various elements as indicated in Table P2911.10.1.

TABLE P2911.10.1
LOCATION OF RAINWATER STORAGE TANKS

<u>Element</u>	<u>Minimum Horizontal Distance from Storage Tank (feet)</u>
Critical root zone (CRZ) of protected trees	<u>2</u>
Lot line adjoining private lots	<u>5</u>
Seepage pits	<u>5</u>
Septic tanks	<u>5</u>

For SI: 1 foot = 304.8 mm

P2911.10.2 Inlets. Storage tank inlets shall be designed to introduce collected rainwater into the tank with minimum turbulence, and shall be located and designed to avoid agitating the contents of the storage tank.

P2911.10.3 Outlets. Outlets shall be located not less than 4 inches (102 mm) above the bottom of the storage tank and shall not skim water from the surface.

P2911.11 Valves. Valves shall be supplied on rainwater collection and conveyance systems in accordance with Sections P2911.11.1 and P2911.11.2.

P2911.11.1 Influent Diversion. A means shall be provided to divert storage tank influent to allow for maintenance and repair of the storage tank system.

P2911.11.2 Backwater valve. Backwater valves shall be installed on each overflow and tank drain pipe. Backwater valves shall be in accordance with Section P3008.

P2911.12 Pumping and control system. Mechanical equipment including pumps, valves and filters shall be easily accessible and removable in order to perform repair, maintenance and cleaning. The minimum flow rate and flow pressure delivered by the pumping system shall appropriate for the application and in accordance with Section P2903.

P2911.13 Water-pressure reducing valve or regulator. Where the water pressure supplied by the pumping system exceeds 80 psi (552 kPa) static, a pressure-reducing valve shall be installed to reduce the pressure in the rainwater distribution system piping to 80 psi (552 kPa) static or less. Pressure-reducing valves shall be specified and installed in accordance with Section P2903.3.1.

P2911.14 Distribution pipe. Distribution piping utilized in rainwater collection and conveyance systems shall comply with Sections P2911.14.1 through P2911.14.3.

Exception: Irrigation piping located outside of the building and downstream of a backflow preventer.

P2911.14.1 Materials, joints and connections. Distribution piping shall conform to the standards and requirements specified in Section P2905 for nonpotable water.

P2911.14.2 Design. Distribution piping systems shall be designed and sized in accordance with the Section P2903 for the intended application.

P2911.14.3 Labeling and marking. Nonpotable rainwater distribution piping labeling and marking shall comply with Section P2901.1.

P2911.15 Tests and inspections. Tests and inspections shall be performed in accordance with Sections P2910.15.1 through P2910.15.8.

P2911.15.1 Roof gutter inspection and test. Roof gutters shall be inspected to verify that the installation and slope is in accordance with Section P2911.5.1. Gutters shall be tested by pouring not less than one gallon of water (3.8 l) into the end of the gutter opposite the collection point. The gutter being tested shall not leak and shall not retain standing water.

P2911.15.2 Roofwasher test. Roofwashers shall be tested by introducing water into the gutters. Proper diversion of the first quantity of water in accordance with the requirements of Section P2911.4 shall be verified.

P2911.15.3 Collection pipe and vent test. Drain, waste and vent piping used for rainwater collection and conveyance systems shall be tested in accordance with Section P2503.

P2911.15.4 Storage tank test. Storage tanks shall be tested in accordance with the Section P2909.9.11.

P2911.15.5 Water supply system test. The testing of makeup water supply piping and distribution piping shall be conducted in accordance with Section P2503.7.

P2911.15.6 Inspection and testing of backflow prevention assemblies. The testing of backflow preventers and backwater valves shall be conducted in accordance with Section P2503.8.

P2911.15.7 Inspection vermin and insect protection. Inlets and vents to the system shall be inspected to verify that each is protected to prevent the entrance of insects and vermin into the storage tank and piping systems in accordance with Section P2909.7.

P2911.15.8 Water quality test. The quality of the water for the intended application shall be verified at the point of use in accordance with the requirements of the jurisdiction.

P2911.16 Operation and maintenance manuals. Operations and maintenance materials shall be supplied with rainwater collection and conveyance systems in accordance with Sections P2911.16.1 through P2911.16.4.

P2911.16.1 Manual. A detailed operations and maintenance manual shall be supplied in hardcopy form with all systems.

P2911.16.2 Schematics. The manual shall include a detailed system schematic, locations of all system components, and a list of all system components including manufacturer and model number.

P2911.16.3 Maintenance procedures. The manual shall provide a maintenance schedule and procedures for all system components requiring periodic maintenance. Consumable parts including filters shall be noted along with part numbers.

P2911.16.4 Operations procedures. The manual shall include system startup and shutdown procedures. The manual shall include detailed operating procedures for the system.

SECTION P2912 **RECLAIMED WATER SYSTEMS**

P2912.1 General. The provisions of this section shall govern the construction, installation, alteration, and repair of systems supplying non-potable reclaimed water.

P2912.2 Water-pressure reducing valve or regulator. Where the reclaimed water pressure supplied to the building exceeds 80 psi (552 kPa) static, a pressure-reducing valve shall be installed to reduce the pressure in the reclaimed water distribution system piping to 80 psi (552 kPa) static or less. Pressure-reducing valves shall be specified and installed in accordance with Section P2903.3.1.

P2912.3 Reclaimed water systems. The design of the reclaimed water systems shall conform to accepted engineering practice.

P2912.3.1 Distribution pipe. Distribution piping shall comply with Sections P2912.3.1.1 through P2912.3.1.3.

Exception: Irrigation piping located outside of the building and downstream of a backflow preventer.

P2912.3.1.1 Materials, joints and connections. Distribution piping conveying reclaimed water shall conform to standards and requirements specified in Section P2905 for nonpotable water.

P2912.3.1.2 Design. Distribution piping systems shall be designed and sized in accordance with the Section P2903 for the intended application.

P2912.3.1.3 Labeling and marking. Nonpotable rainwater distribution piping labeling and marking shall comply with Section P2901.1

P2912.4 Tests and inspections. Tests and inspections shall be performed in accordance with Sections P2912.4.1 and P2912.4.2.

P2912.4.1 Water supply system test. The testing of makeup water supply piping and reclaimed water distribution piping shall be conducted in accordance with Section P2503.7

P2912.4.2 Inspection and testing of backflow prevention assemblies. The testing of backflow preventers shall be conducted in accordance with Section P2503.8

Delete and substitute as follows:

SECTION P3009 GRAY WATER RECYCLING SYSTEMS

~~P3009.1 Scope.~~ The provisions of Section P3009 shall govern the materials, design, construction and installation of gray water systems for flushing of water closets and urinals and for subsurface landscape irrigation. See Figures P3009.1(1) and P3009.1(2).

~~P3009.2 Installation.~~ In addition to the provisions of Section P3009, systems for flushing of water closets and urinals shall comply with Section P3009.13 and systems for subsurface landscape irrigation shall comply with Section P3009.14. Except as provided for in Section P3009, all systems shall comply with the provisions of the other sections of this code.

~~P3009.3 Materials.~~ Above-ground drain, waste and vent piping for gray water systems shall conform to one of the standards listed in Table P3002.1(1). Gray water underground building drainage and vent pipe shall conform to one of the standards listed in Table P3002.1(2).

~~P3009.4 Tests.~~ Drain, waste and vent piping for gray water systems shall be tested in accordance with Section P2503.

~~P3009.5 Inspections.~~ Gray water systems shall be inspected in accordance with Section P2503.

~~P3009.6 Potable water connections.~~ Only connections in accordance with Section 3009.13.1 shall be made between a gray water recycling system and a potable water system.

~~P3009.7 Waste water connections.~~ Gray water recycling systems shall receive only the waste discharge of bathtubs, showers, lavatories, clothes washers or laundry trays.

~~P3009.8 Collection reservoir.~~ Gray water shall be collected in an approved reservoir constructed of durable, nonabsorbent and corrosion-resistant materials. The reservoir shall be a closed and gas-tight vessel. Access openings shall be provided to allow inspection and cleaning of the reservoir interior.

~~P3009.9 Filtration.~~ Gray water entering the reservoir shall pass through an approved filter such as a media, sand or diatomaceous earth filter.

~~P3009.9.1 Required valve.~~ A full-open valve shall be installed downstream of the last fixture connection to the gray water discharge pipe before entering the required filter.

~~P3009.10 Overflow.~~ The collection reservoir shall be equipped with an overflow pipe having the same or larger diameter as the influent pipe for the gray water. The overflow pipe shall be trapped and shall be indirectly connected to the sanitary drainage system.

P3009.11 Drain. A drain shall be located at the lowest point of the collection reservoir and shall be indirectly connected to the sanitary drainage system. The drain shall be the same diameter as the overflow pipe required in Section P3009.10.

P3009.12 Vent required. The reservoir shall be provided with a vent sized in accordance with Chapter 31 and based on the diameter of the reservoir influent pipe.

P3009.13 Flushing water systems. Systems for flushing water closets and urinals shall comply with Sections P3009.13.1 through P3009.13.6

P3009.13.1 Collection reservoir. The holding capacity of the reservoir shall be a minimum of twice the volume of water required to meet the daily flushing requirements of the fixtures supplied with gray water, but not less than 50 gallons (189 L). The reservoir shall be sized to limit the retention time of gray water to a maximum of 72 hours.

P3009.13.2 Disinfection. Gray water shall be disinfected by an approved method that employs one or more disinfectants such as chlorine, iodine or ozone that are recommended for use with the pipes, fittings and equipment by the manufacturer of the pipes, fittings and equipment.

P3009.13.3 Makeup water. Potable water shall be supplied as a source of makeup water for the gray water system. The potable water supply shall be protected against backflow in accordance with Section P2902. There shall be a full-open valve located on the makeup water supply line to the collection reservoir.

P3009.13.4 Coloring. The gray water shall be dyed blue or green with a food grade vegetable dye before such water is supplied to the fixtures.

P3009.13.5 Materials. Distribution piping shall conform to one of the standards listed in Table P2905.4.

P3009.13.6 Identification. Distribution piping and reservoirs shall be identified as containing nonpotable water. Piping identification shall be in accordance with Section P2901.1.

P3009.14 Landscape irrigation systems. Subsurface landscape irrigation systems shall comply with Sections P3009.14.1 through P3009.14.11

P3009.14.1 Collection reservoir. Reservoirs shall be sized to limit the retention time of gray water to a maximum of 24 hours.

P3009.14.1.1 Identification. The reservoir shall be identified as containing nonpotable water.

P3009.14.2 Valves required. A check valve and a full-open valve located on the discharge side of the check valve shall be installed on the effluent pipe of the collection reservoir.

P3009.14.3 Makeup water. Makeup water shall not be required for subsurface landscape irrigation systems. Where makeup water is provided, the installation shall be in accordance with Section 3009.13.3.

P3009.14.4 Disinfection. Disinfection shall not be required for gray water used or subsurface landscape irrigation systems.

P3009.14.5 Coloring. Gray water used for subsurface landscape irrigation systems shall not be required to be dyed.

P3009.14.6 Estimating gray water discharge. The system shall be sized in accordance with the gallons-per-day-per occupant number based on the type of fixtures connected to the gray water system. The discharge shall be calculated by the following equation:

$$C = A \times B$$

A = Number of occupants:

Number of occupants shall be determined by the actual number of occupants, but not less than two occupants for one bedroom and one occupant for each additional bedroom.

B = Estimated flow demands for each occupant:

Residential—25 gallons per day (94.6 lpd) per occupant for showers, bathtubs and lavatories and 15 gallons per day (56.7 lpd) per occupant for clothes washers or laundry trays.

C = Estimated gray water discharge based on the total number of occupants.

P3009.14.7 Percolation tests. The permeability of the soil in the proposed absorption system shall be determined by percolation tests or permeability evaluation.

P3009.14.7.1 Percolation tests and procedures. At least three percolation tests in each system area shall be conducted. The holes shall be spaced uniformly in relation to the bottom depth of the proposed absorption system. More percolation tests shall be made where necessary, depending on system design.

P3009.14.7.1.1 Percolation test hole. The test hole shall be dug or bored. The test hole shall have vertical sides and a horizontal dimension of 4 inches to 8 inches (102 mm to 203 mm). The bottom and sides of the hole shall be scratched with a sharp-pointed instrument to expose the natural soil. All loose material shall be removed from the hole and the bottom shall be covered with 2 inches (51 mm) of gravel or coarse sand.

P3009.14.7.1.2 Test procedure, sandy soils. The hole shall be filled with clear water to a minimum of 12 inches (305 mm) above the bottom of the hole for tests in sandy soils. The time for this amount of water to seep away shall be determined, and this procedure shall be repeated if the water from the second filling of the hole seeps away in 10 minutes or less. The test shall proceed as follows: Water shall be added to a point not more than 6 inches (152 mm) above the gravel or coarse sand. Thereupon, from a fixed reference point, water levels shall be measured at 10-minute intervals for a period of 1 hour. Where 6 inches (152 mm) of water seeps away in less than 10 minutes, a shorter interval between measurements shall be used, but in no case shall the water depth exceed 6 inches (152 mm). Where 6 inches (152 mm) of water seeps away in less than 2 minutes, the test shall be stopped and a rate of less than 3 minutes per inch (7.2 s/mm) shall be reported. The final water level drop shall be used to calculate the percolation rate. Soils not meeting the above requirements shall be tested in accordance with Section 3009.14.7.1.3.

P3009.14.7.1.3 Test procedure, other soils. The hole shall be filled with clear water, and a minimum water depth of 12 inches (305 mm) shall be maintained above the bottom of the hole for a 4-hour period by refilling whenever necessary or by use of an automatic siphon. Water remaining in the hole after 4 hours shall not be removed. Thereafter, the soil shall be allowed to swell not less than 16 hours or more than 30 hours. Immediately after the soil swelling period, the measurements for determining the percolation rate shall be made as follows: Any soil sloughed into the hole shall be removed and the water level shall be adjusted to 6 inches (152 mm) above the gravel or coarse sand. Thereupon, from a fixed reference point, the water level shall be measured at 30-minute intervals for a period of 4 hours, unless two successive water level drops do not vary by more than 1/16 inch (1.59 mm). At least three water level drops shall be observed and recorded. The hole shall be filled with clear water to a point not more than 6 inches (152 mm) above the gravel or coarse sand whenever it becomes nearly empty. Adjustments of the water level shall not be made during the three measurement periods except to the limits of the last measured water level drop. When the first 6 inches (152 mm) of water seeps away in less than 30 minutes, the time interval between measurements shall be 10 minutes and the test run for 1 hour. The

water depth shall not exceed 5 inches (127 mm) at any time during the measurement period. The drop that occurs during the final measurement period shall be used in calculating the percolation rate.

P3009.14.7.1.4 Mechanical test equipment. Mechanical percolation test equipment shall be of an approved type.

P3009.14.7.2 Permeability evaluation. Soil shall be evaluated for estimated percolation based on structure and texture in accordance with accepted soil evaluation practices. Borings shall be made in accordance with Section P3009.14.7.1 for evaluating the soil.

P3009.14.8 Subsurface landscape irrigation site location. The surface grade of all soil absorption systems shall be located at a point lower than the surface grade of any water well or reservoir on the same or adjoining lot. Where this is not possible, the site shall be located so that surface water drainage from the site is not directed toward a well or reservoir. The soil absorption system shall be located with a minimum horizontal distance between various elements as indicated in Table P3009.14.8. Private sewage disposal systems in compacted areas, such as parking lots and driveways, are prohibited. Surface water shall be diverted away from any soil absorption site on the same or neighboring lots.

**TABLE P3009.14.8
LOCATION OF GRAY WATER SYSTEM**

P3009.14.9 Installation. Absorption systems shall be installed in accordance with Sections P3009.14.9.1 through P3009.14.9.5 to provide landscape irrigation without surfacing of gray water.

P3009.14.9.1 Absorption area. The total absorption area required shall be computed from the estimated daily gray water discharge and the design loading rate based on the percolation rate for the site. The required absorption area equals the estimated gray water discharge divided by the design loading rate from Table P3009.14.9.1.

**TABLE P3009.14.9.1
DESIGN LOADING RATE**

P3009.14.9.2 Seepage trench excavations. Seepage trench excavations shall be a minimum of 1 foot (304 mm) to a maximum of 5 feet (1524 mm) wide. Trench excavations shall be spaced a minimum of 2 feet (610 mm) apart. The soil absorption area of a seepage trench shall be computed by using the bottom of the trench area (width) multiplied by the length of pipe. Individual seepage trenches shall be a maximum of 100 feet (30 480 mm) in developed length.

P3009.14.9.3 Seepage bed excavations. Seepage bed excavations shall be a minimum of 5 feet (1524 mm) wide and have more than one distribution pipe. The absorption area of a seepage bed shall be computed by using the bottom of the trench area. Distribution piping in a seepage bed shall be uniformly spaced a maximum of 5 feet (1524 mm) and a minimum of 3 feet (914 mm) apart, and a maximum of 3 feet (914 mm) and a minimum of 1 foot (305 mm) from the sidewall or headwall.

P3009.14.9.4 Excavation and construction. The bottom of a trench or bed excavation shall be level. Seepage trenches or beds shall not be excavated where the soil is so wet that such material rolled between the hands forms a soil wire. All smeared or compacted soil surfaces in the sidewalls or bottom of seepage trench or bed excavations shall be scarified to the depth of smearing or compaction and the loose material removed. Where rain falls on an open excavation, the soil shall be left until sufficiently dry so a soil wire will not form when soil from the excavation bottom is rolled between the hands. The bottom area shall then be scarified and loose material removed.

P3009.14.9.5 Aggregate and backfill. A minimum of 6 inches of aggregate ranging in size from 1/2 to 2 1/2 inches (12.7 mm to 64 mm) shall be laid into the trench below the distribution piping elevation. The aggregate shall be evenly distributed a minimum of 2 inches (51 mm) over the top of the distribution pipe.

The aggregate shall be covered with approved synthetic materials or 9 inches (229mm) of uncompacted marsh hay or straw. Building paper shall not be used to cover the aggregate. A minimum of 9 inches (229 mm) of soil backfill shall be provided above the covering.

P3009.14.10 Distribution piping. Distribution piping shall be not less than 3 inches (76 mm) in diameter. Materials shall comply with Table P3009.14.10. The top of the distribution pipe shall be not less than 8 inches (203 mm) below the original surface. The slope of the distribution pipes shall be a minimum of 2 inches (51 mm) and a maximum of 4 inches (102 mm) per 100 feet (30 480 mm).

P3009.14.11 Joints. Joints in distribution pipe shall be made in accordance with Section P3003.

Add new section and text.

SECTION P3009

SUBSURFACE LANDSCAPE IRRIGATION SYSTEMS

P3009.1 Scope. The provisions of this section shall govern the materials, design, construction and installation of subsurface landscape irrigation systems connected to nonpotable water from onsite water reuse systems.

P3009.2 Materials. Above-ground drain, waste and vent piping for subsurface landscape irrigation systems shall conform to one of the standards listed in Table P3002.2(1). Subsurface landscape irrigation underground building drainage and vent pipe shall conform to one of the standards listed in Table P3002.1(2).

P3009.3 Tests. Drain, waste and vent piping for subsurface landscape irrigation systems shall be tested in accordance with Section P2503.

P3009.4 Inspections. Subsurface landscape irrigation systems shall be inspected in accordance with Section R109.

P3009.5 Disinfection. Disinfection shall not be required for onsite non-potable reuse water used for subsurface landscape irrigation systems.

P3009.6 Coloring. Onsite non-potable reuse water used for subsurface landscape irrigation systems shall not be required to be dyed.

P3009.7 Sizing. The system shall be sized in accordance with the sum of the output of all water sources connected to the subsurface irrigation system. Where gray water collection piping is connected to subsurface landscape irrigation systems, gray water output shall be calculated according to the gallons-per-day-per-occupant (liters per day per occupant) number based on the type of fixtures connected. The gray water discharge shall be calculated by the following equation:

$$C = A \times B \quad (\text{Equation 30-1})$$

where:

A = Number of occupants:

Number of occupants shall be determined by the actual number of occupants, but not less than two occupants for one bedroom and one occupant for each additional bedroom.

B = Estimated flow demands for each occupant:

25 gallons per day (94.6 lpd) per occupant for showers, bathtubs and lavatories and 15 gallons per day (56.7 lpd) per occupant for clothes washers or laundry trays.

C = Estimated gray water discharge based on the total number of occupants.

P3009.8 Percolation tests. The permeability of the soil in the proposed absorption system shall be determined by percolation tests or permeability evaluation.

P3009.8.1 Percolation tests and procedures. Not less than three percolation tests in each system area shall be conducted. The holes shall be spaced uniformly in relation to the bottom depth of the proposed absorption system. More percolation tests shall be made where necessary, depending on system design.

P3009.8.1.1 Percolation test hole. The test hole shall be dug or bored. The test hole shall have vertical sides and a horizontal dimension of 4 inches to 8 inches (102 mm to 203 mm). The bottom and sides of the hole shall be scratched with a sharp-pointed instrument to expose the natural soil. All loose material shall be removed from the hole and the bottom shall be covered with 2 inches (51 mm) of gravel or coarse sand.

P3009.8.1.2 Test procedure, sandy soils. The hole shall be filled with clear water to a minimum of 12 inches (305 mm) above the bottom of the hole for tests in sandy soils. The time for this amount of water to seep away shall be determined, and this procedure shall be repeated if the water from the second filling of the hole seeps away in 10 minutes or less. The test shall proceed as follows: Water shall be added to a point not more than 6 inches (152 mm) above the gravel or coarse sand. Thereupon, from a fixed reference point, water levels shall be measured at 10-minute intervals for a period of 1 hour. Where 6 inches (152 mm) of water seeps away in less than 10 minutes, a shorter interval between measurements shall be used, but in no case shall the water depth exceed 6 inches (152 mm). Where 6 inches (152 mm) of water seeps away in less than 2 minutes, the test shall be stopped and a rate of less than 3 minutes per inch (7.2 s/mm) shall be reported. The final water level drop shall be used to calculate the percolation rate. Soils not meeting the above requirements shall be tested in accordance with Section P3009.8.1.3

P3009.8.1.3 Test procedure, other soils. The hole shall be filled with clear water, and a minimum water depth of 12 inches (305 mm) shall be maintained above the bottom of the hole for a 4-hour period by refilling whenever necessary or by use of an automatic siphon. Water remaining in the hole after 4 hours shall not be removed. Thereafter, the soil shall be allowed to swell not less than 16 hours or more than 30 hours. Immediately after the soil swelling period, the measurements for determining the percolation rate shall be made as follows: any soil sloughed into the hole shall be removed and the water level shall be adjusted to 6 inches (152 mm) above the gravel or coarse sand. Thereupon, from a fixed reference point, the water level shall be measured at 30-minute intervals for a period of 4 hours, unless two successive water level drops do not vary by more than 1/16 inch (1.59 mm). At least three water level drops shall be observed and recorded. The hole shall be filled with clear water to a point not more than 6 inches (152 mm) above the gravel or coarse sand whenever it becomes nearly empty. Adjustments of the water level shall not be made during the three measurement periods except to the limits of the last measured water level drop. When the first 6 inches (152 mm) of water seeps away in less than 30 minutes, the time interval between measurements shall be 10 minutes and the test run for 1 hour. The water depth shall not exceed 5 inches (127 mm) at any time during the measurement period. The drop that occurs during the final measurement period shall be used in calculating the percolation rate.

P3009.8.1.4 Mechanical test equipment. Mechanical percolation test equipment shall be of an approved type.

P3009.8.2 Permeability evaluation. Soil shall be evaluated for estimated percolation based on structure and texture in accordance with accepted soil evaluation practices. Borings shall be made in accordance with Section P3009.8.1.1 for evaluating the soil.

P3009.9 Subsurface landscape irrigation site location. The surface grade of all soil absorption systems shall be located at a point lower than the surface grade of any water well or reservoir on the same or adjoining lot. Where this is not possible, the site shall be located so surface water drainage from the site is not directed toward a well or reservoir. The soil absorption system shall be located with a

minimum horizontal distance between various elements as indicated in Table P3009.9. Private sewage disposal systems in compacted areas, such as parking lots and driveways, are prohibited. Surface water shall be diverted away from any soil absorption site on the same or neighboring lots.

TABLE P3009.9
LOCATION OF SUBSURFACE IRRIGATION SYSTEM

ELEMENT	MINIMUM HORIZONTAL DISTANCE	
	STORAGE TANK (feet)	IRRIGATION DISPOSAL FIELD (feet)
<u>Buildings</u>	<u>5</u>	<u>2</u>
<u>Lot line adjoining private property</u>	<u>5</u>	<u>5</u>
<u>Water wells</u>	<u>50</u>	<u>100</u>
<u>Streams and lakes</u>	<u>50</u>	<u>50</u>
<u>Seepage pits</u>	<u>5</u>	<u>5</u>
<u>Septic tanks</u>	<u>0</u>	<u>5</u>
<u>Water service</u>	<u>5</u>	<u>5</u>
<u>Public water main</u>	<u>10</u>	<u>10</u>

For SI: 1 foot = 304.8 mm.

P3009.10 Installation. Absorption systems shall be installed in accordance with Sections P3009.10.1 through P3009.10.5 to provide landscape irrigation without surfacing of water.

P3009.10.1 Absorption area. The total absorption area required shall be computed from the estimated daily gray water discharge and the design-loading rate based on the percolation rate for the site. The required absorption area equals the estimated gray water discharge divided by the design-loading rate from Table P3009.10.1.

TABLE P3009.10.1
DESIGN LOADING RATE

PERCOLATION RATE (minutes per inch)	DESIGN LOADING FACTOR (gallons per square foot per day)
<u>0 to less than 10</u>	<u>1.2</u>
<u>10 to less than 30</u>	<u>0.8</u>
<u>30 to less than 45</u>	<u>0.72</u>
<u>45 to 60</u>	<u>0.4</u>

For SI: 1 minute per inch = min/25.4 mm, 1 gallon per square foot = 40.7 L/m².

P3009.10.2 Seepage trench excavations. Seepage trench excavations shall be not less than 1 foot (304 mm) in width and not greater than 5 feet (1524 mm) in width. Trench excavations shall be spaced not less than 2 feet (610 mm) apart. The soil absorption area of a seepage trench shall be computed by using the bottom of the trench area (width) multiplied by the length of pipe. Individual seepage trenches shall be not greater than 100 feet (30 480 mm) in developed length.

P3009.10.3 Seepage bed excavations. Seepage bed excavations shall be not less than 5 feet (1524 mm) in width and have more than one distribution pipe. The absorption area of a seepage bed shall be computed by using the bottom of the trench area. Distribution piping in a seepage bed shall be uniformly spaced not greater than 5 feet (1524 mm) and not less than 3 feet (914 mm) apart, and greater than 3 feet (914 mm) and not less than 1 foot (305 mm) from the sidewall or headwall.

P3009.10.4 Excavation and construction. The bottom of a trench or bed excavation shall be level. Seepage trenches or beds shall not be excavated where the soil is so wet that such material rolled between the hands forms a soil wire. All smeared or compacted soil surfaces in the sidewalls or bottom of seepage trench or bed excavations shall be scarified to the depth of smearing or compaction and the loose material removed. Where rain falls on an open excavation, the soil shall be left until sufficiently dry so a soil wire will not form when soil from the excavation bottom is rolled between the hands. The bottom area shall then be scarified and loose material removed.

P3009.10.5 Aggregate and backfill. Not less than 6 inches in depth of aggregate ranging in size from 1/2 to 2-1/2 inches (12.7 mm to 64 mm) shall be laid into the trench below the distribution piping elevation. The aggregate shall be evenly distributed not less than 2 inches (51 mm) in depth over the top of the distribution pipe. The aggregate shall be covered with approved synthetic materials or 9 inches (229 mm) of uncompacted marsh hay or straw. Building paper shall not be used to cover the aggregate. Not less than 9 inches (229 mm) of soil backfill shall be provided above the covering.

P3009.11 Distribution piping. Distribution piping shall be not less than 3 inches (76 mm) in diameter. Materials shall comply with Table P3009.11. The top of the distribution pipe shall be not less than 8 inches (203 mm) below the original surface. The slope of the distribution pipes shall be not less than 2 inches (51 mm) and not greater than 4 inches (102 mm) per 100 feet (30 480 mm).

**TABLE P3009.11
DISTRIBUTION PIPE**

<u>MATERIAL</u>	<u>STANDARD</u>
Polyethylene (PE) plastic pipe	<u>ASTM F 405</u>
Polyvinyl chloride (PVC) plastic pipe	<u>ASTM D 2729</u>
Polyvinyl chloride (PVC) plastic pipe with a 3.5 inch O.D. and solid cellular core or composite wall.	<u>ASTM F 1488</u>

For SI: 1 inch = 25.4 mm

P3009.11.1 Joints. Joints in distribution pipe shall be made in accordance with Section P3003 of this code.

Add new standard to Chapter 44:

NSF

50-2010 Equipment for Swimming Pools, Spas, Hot Tubs, and other Recreational Water Facilities

Reason: The sections shown to be added to the code are from the IgCC. These sections really need to be in the IRC as these subjects are more applicable to the IRC scope. Currently, the IRC does not address different types of nonpotable water (other than gray water) and therefore provides no guidance as to how nonpotable waters are to be collected, stored and distributed. This proposal for the 2015 IPC was Approved as Modified by Public Comment.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 68 on the PMGCAC IRC-P list.

Cost impact: The code change proposal will not increase the cost of construction.

Analysis: Standard NSF 50 is in the referenced standards of the 2012 ISPC.

RP120-13

Public Hearing: Committee: AS AM D
 Assembly: ASF AMF DF

P2909 #2 (NEW)-RP-HALL-PMGCAC

RP121 – 13

P2911 (New), P2911.1 (New), Table P2911.1 (New)

Proponent: Gary Klein, representing Affiliated International Management, LLC
(Gary@aim4sustainability.com)

Add new text as follows:

SECTION P2911 **HEATED WATER DISTRIBUTION SYSTEMS**

P2911.1 Minimum heated water fixture supply pipe sizing. The fixture supply piping conveying heated water to fixture fittings and appliances shall be sized in accordance with flow rates in Table P2911.1.

TABLE P2911.1
MINIMUM FIXTURE SUPPLY PIPING SIZE
FOR HEATED WATER

<u>FLOW RATE</u> <u>(gpm)</u>	<u>NOMINAL PIPING OR TUBING SIZE</u> <u>(inches)</u>
<u>≤ 0.5</u>	<u>1/4</u>
<u>>0.5 to ≤1.0</u>	<u>5/16</u>
<u>>1.0 to ≤1.5</u>	<u>3/8</u>

Reason: The purpose of this code change is to ensure that the minimum diameter of the tubing on a fixture supply is safely (pressure drop and velocity) matched to the flow rate of the fixture to which it is connected. Enabling smaller diameter tubing is important to energy efficiency because it reduces the volume in the fixture supply, which reduces the temperature drop during the use periods and the energy that is lost when the water in the piping cools down. It also has the benefit of reducing the time it takes for hot water to arrive.

As plumbing fixture flow rates get lower, as long as the maximum flow rate is selected properly, the physics clearly indicates that there will be no pressure loss or velocity problems if smaller diameter tubing is allowed. The flow rates and diameters in the table were selected using the same formula used by plumbing engineers to design hot water distribution systems. In accordance with the 2012 IPC, the maximum developed length was capped at 50 feet. The pressure drop was limited to 5 psi and the velocity was limited to 4 feet per second. Types K, L, and M, PEX and CPVC were evaluated. In order to make it simple to inspect, the maximum flow rate for each nominal diameter was chosen so that the worst performing material still met the criteria.

Cost Impact: The code change proposal will not increase the cost of construction.

RP121-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

P2911.1 (NEW)-RP-KLEIN

RP122 – 13

Table P3002.1(1)

Proponent: Pennie L. Feehan, Pennie L. Feehan Consulting representing the Copper Development Association (penniefeehan@me.com)

Revise as follows:

TABLE P3002.1(1)
ABOVE-GROUND DRAINAGE AND VENT PIPE

PIPE MATERIAL	STANDARD
Brass pipe	ASTM B 43
Copper or copper-alloy pipe	ASTM B 42; <u>ASTM B 43</u> ; ASTM B 302

(Portions of table not shown remain unchanged)

Reason: This proposal eliminates outdated language and provides the appropriate terminology and correct information to the end user.

Cost Impact: The code change proposal will not increase the cost of construction.

RP122-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

P3002.1(1)T-RP-FEEHAN.DOC

RP123 - 13

P3002.2.1 (New)

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org); Richard Grace/Fairfax County/Virginia Plumbing and Mechanical Inspectors Association and Virginia Building and Code Officials Association

Add new text as follows:

P3002.2.1 Building sewer pipe near the water service. The proximity of a building sewer to a water service shall comply with Section P2905.4.2.

Reason:

[HALL-PMGCAC]: The addition of this language to Chapter 30 provides an important pointer to the requirements of P2905.4.2 for separation between the water service piping and the building sewer piping. The IPC has the same pointer because sewer installers might overlook this important safety requirement.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. X21 on the PMGCAC IRC-P list.

[GRACE]: The existing IRC sanitary drainage section has no section that points you back to the water distribution chapter to see the complete separation requirement for the a water service and a building sewer. While we feel it is not necessary to put the same redundant language in two different sections within the same code we feel it is necessary to point to the section which clearly states the requirements which is P2905.4.2.

Cost Impact: The code change proposal will not increase the cost of construction.

RP123-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P3002.2.1 (NEW)-RP-HALL-PMGCAC

RP124 – 13

P3003.5, P3003.5.1, P3003.5.2, P3003.5.3, P3003.10, P3003.10.1, P3003.10.3, P3003.10.11, P3003.10.11.1, P3003.10.11.2, P3003.10.11.3

Proponent: Pennie L. Feehan, Pennie L. Feehan Consulting representing the Copper Development Association (penniefeehan@me.com)

Revise as follows:

~~**P3003.5 Brass.** Joints between brass pipe or fittings shall comply with Sections P3003.5.1 through 3003.5.3.~~

~~**P3003.5.1 Brazed joints.** All joint surfaces shall be cleaned. An approved flux shall be applied where required. The joint shall be brazed with a filler metal conforming to AWS A5.8.~~

~~**P3003.5.2 Mechanical joints.** Mechanical joints shall be installed in accordance with the manufacturer's instructions.~~

~~**P3003.5.3 Threaded joints.** Threads shall conform to ASME B1.20.1. Pipe joint compound or tape shall be applied on the male threads only.~~

(Renumber subsequent sections)

P3003.10 Copper and copper alloy pipe and tubing. Joints between copper or copper alloy pipe, tubing, or fittings shall comply with Sections P3003.10.1 through P3003.10.4.

P3003.10.1 Brazed joints. All joint surfaces shall be cleaned. An approved flux shall be applied where required. Brazing materials shall have a melting point in excess of 1,000°F (538°C). The joint shall be Brazeding alloys with a filler metal shall be in accordance with conforming to AWS A5.8.

P3003.10.2 Mechanical joints. Mechanical joints shall be installed in accordance with the manufacturer's instructions.

P3003.10.3 Soldered joints. Copper and copper alloy Solder joints shall be made soldered in accordance with the methods of ASTM B 828. All cut tube ends shall be reamed to the full inside diameter of the tube end. All joint surfaces shall be cleaned. A Fluxes for soldering shall be in accordance with conforming to ASTM B 813 and shall become applied noncorrosive and non-toxic after soldering. The joint shall be soldered with a solder conforming to ASTM B 32.

P3003.10.4 Threaded joints. Threads shall conform to ASME B1.20.1. Pipe-joint compound or tape shall be applied on the male threads only.

~~**P3003.11 Copper tubing.** Joints between copper or copper alloy tubing or fittings shall comply with Sections P3003.11.1 through P3003.11.3.~~

~~**P3003.11.1 Brazed joints.** All joint surfaces shall be cleaned. An approved flux shall be applied where required. The joint shall be brazed with a filler metal conforming to AWS A5.8.~~

~~**P3003.11.2 Mechanical joints.** Mechanical joints shall be installed in accordance with the manufacturer's instructions.~~

~~**P3003.11.3 Soldered joints.** Solder joints shall be made in accordance with the methods of ASTM B 828. Cut tube ends shall be reamed to the full inside diameter of the tube end. All joint surfaces shall be cleaned. A flux conforming to ASTM B 813 shall be applied. The joint shall be soldered with a solder conforming to ASTM B 32.~~

(Renumber subsequent sections)

Reason: Brass and Bronze are copper alloys and by combining pipe and tubing section P3003.10, section P3003.11 is no longer necessary. This proposal eliminates outdated language and provides the appropriate terminology and correct information to the end user.

Cost Impact: None

RP124-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P3003.5-RP-FEEHAN.DOC

RP125 – 13

P3003.6.1

Proponent: Dave Parney, Cast Iron Soil Pipe Institute, representing himself.

Revise as follows:

P3003.6.1 Caulked joints. Joints for hub and spigot pipe shall be firmly packed with oakum or hemp. Molten lead shall be poured in one operation to a depth of not less than 1 inch (25 mm). The lead shall not recede more than 1/8 inch (3 mm) below the rim of the hub and shall be caulked tight. Paint, varnish or other coatings shall not be permitted on the jointing material until after the joint has been tested and *approved*. Lead shall be run in one pouring and shall be caulked tight. ~~Acid-resistant rope and acidproof cement shall be permitted.~~

Reason: Because it would be extremely rare to be installing Duriron or glass acid resistance drainage piping in a single or two family detached home or townhouses of 3 stories or less (which is what the IRC covers), I suggest just removing that sentence about acid resistant rope and acid-proof cement.

Cost Impact: The code change proposal will not increase the cost of construction.

RP125-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P3003.6.1-RP-PARNEY.DOC

RP126 – 13

P3003.6.3. Chapter 44

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P3003.6.3 Mechanical joint coupling. Mechanical joint couplings for hubless pipe and fittings shall consist of an elastomeric sealing sleeve and a metallic shield that comply with CISPI 310, ~~or~~ ASTM C1277 ~~or~~ ASTM C1540. The elastomeric sealing sleeve shall conform to ASTM C564 or CSA B602 and shall have ~~be provided with~~ a center stop. Mechanical joint couplings shall be installed in accordance with the manufacturer's installation instructions.

Add standard to Chapter 44:

ASTM

C1540-08 Specification for Heavy Duty Shielded Couplings Joining Hubless Cast-Iron Soil Pipe and Fittings

Reason: This revised language was approved for the 2015 IPC. The phrase "consist of an elastomeric sealing sleeve and a metallic shield that" should be added to provide the same clarification for the IRC. The ASTM C1540 standard is being added and other changes are being made to make this section identical to the same section in the IPC. While it is unlikely that heavy duty shielded couplings would normally be used in residential applications, there is nothing wrong with allowing their use if the installer wishes to use them. Note that ASTM C1540 is already a referenced standard in the IPC.

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Cost Impact: The code change proposal will not increase the cost of construction.

RP126-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P3003.6.3-RP-HALL-PMGCAC

RP127 – 13

P3003.8, P3003.8.1, P3003.8.2

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Delete without substitution:

~~P3003.8 Coextruded composite ABS pipe.~~ Joints between coextruded composite pipe with an ABS outer layer or ABS fittings shall comply with Sections P3003.8.1 and P3003.8.2.

~~P3003.8.1 Mechanical joints.~~ Mechanical joints on drainage pipe shall be made with an elastomeric seal conforming to ASTM C 1173, ASTM D 3212 or CSA B602. Mechanical joints shall not be installed in above-ground systems, unless otherwise approved. Joints shall be installed in accordance with the manufacturer's instructions.

~~P3003.8.2 Solvent cementing.~~ Joint surfaces shall be clean and free from moisture. Solvent cement that conforms to ASTM D 2235 or CSA B181.1 shall be applied to all joint surfaces. The joint shall be made while the cement is wet. Joints shall be made in accordance with ASTM D 2235, ASTM D 2661, ASTM F 628 or CSA B181.1. Solvent cement joints shall be permitted above or below ground.

(Renumber subsequent sections)

Reason: ABS pipe can be made by several different methods. The manufacturing method of an ABS pipe has nothing to do with how the pipe is joined. All forms of ABS pipe are joined by the joining method for ABS pipe, Section P3003.3.2. These sections are redundant and should be deleted. A similar proposal to the 2015 IPC was Approved as Submitted.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 63 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP127-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P3003.8-RP-HALL-PMGCAC

RP128 – 13

P3003.9, P3003.9.1, P3003.9.2

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee
(Dave.Hall@georgetown.org)

Delete without substitution:

~~P3003.9 Coextruded composite PVC pipe.~~ Joints between coextruded composite pipe with a PVC outer layer or PVC fittings shall comply with Sections P3003.9.1 and P3003.9.2.

~~P3003.9.1 Mechanical joints.~~ Mechanical joints on drainage pipe shall be made with an elastomeric seal conforming to ASTM D 3212. Mechanical joints shall not be installed in above-ground systems, unless otherwise approved. Joints shall be installed in accordance with the manufacturer's instructions.

~~P3003.9.2 Solvent cementing.~~ Joint surfaces shall be clean and free from moisture. A purple primer that conforms to ASTM F 656 shall be applied. Solvent cement not purple in color and conforming to ASTM D 2564, CSA B137.3 or CSA B181.2 shall be applied to all joint surfaces. The joint shall be made while the cement is wet, and shall be in accordance with ASTM D 2855. Solvent cement joints shall be permitted above or below ground.

(Renumber subsequent sections)

Reason: PVC pipe can be made by several different methods. The manufacturing method of a PVC pipe has nothing to do with how the pipe is joined. All forms of PVC pipe are joined by the joining method for PVC pipe, Section P3003.14.2. These sections are redundant and should be deleted. A similar proposal to the 2015 IPC was Approved as Submitted.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 64 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP128-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P3003.9-RP-HALL-PMGCAC

RP129 – 13

P3003.9.2, P3003.14.2

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org); Michael Cudahy, Plastic Pipe and Fittings Association, representing Plastic Pipe and Fittings Association (mikec@cmservnet.com)

Revise as follows:

P3003.9.2 Solvent cementing. Joint surfaces shall be clean and free from moisture. A purple primer that conforms to ASTM F 656 shall be applied. Solvent cement not purple in color and conforming to ASTM D2564, CSA B137.3, CSA B181.2 or CSA B182.1 shall be applied to all joint surfaces. The joint shall be made while the cement is wet and shall be in accordance with ASTM D 2855. Solvent-cement joints shall be ~~permitted~~ installed above or below ground.

Exception: A primer shall not be required where both of the following conditions apply:

1. The solvent cement used is third-party certified as conforming to ASTM D 2564.
2. The solvent cement is used only for joining PVC drain, waste and vent pipe and fittings in non-pressure applications in sizes up to and including 4 inch (102 mm) in diameter.

P3003.14.2 Solvent cementing. Joint surfaces shall be clean and free from moisture. A purple primer that conforms to ASTM F 656 shall be applied. Solvent cement not purple in color and conforming to ASTM D2564, CSA B137.3, CSA B181.2 or CSA B182.1 shall be applied to all joint surfaces. The joint shall be made while the cement is wet and shall be in accordance with ASTM D 2855. Solvent-cement joints shall be ~~permitted~~ installed above or below ground.

Exception: A primer shall not be required where both of the following conditions apply:

1. The solvent cement used is third-party certified as conforming to ASTM D 2564.
2. The solvent cement is used only for joining PVC drain, waste and vent pipe and fittings in non-pressure applications in sizes up to and including 4 inch (102 mm) in diameter

Reason: The addition of this exception was approved for the 2015 IPC. This exception allows for an optional one-step procedure for joining non-pressure DWV PVC piping systems 4" in diameter and below with solvent cement conforming to ASTM D 2564. This method is commonly practiced, and the code should include specific language to indicate when and where the practice is acceptable.

Pressure testing completed by NSF International has shown that solvent cement conforming to ASTM D 2564, when used without primer on PVC DWV pipe and fittings, both solid wall and cell core, generates bonding forces well in excess of what is required for these systems. The strength of the joint often exceeds the pipe and fitting pressure capacity. ICC Code Development initiative for clearer code language has identified the phrase "shall be permitted" to be nonmandatory language that needs to be eliminated from code text wherever possible.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. X23 on the PMGCAC IRC-P list.

Bibliography: NSF International report J-00036842 can be found on the PPFA website, www.ppfahome.org/ICC09/PPFA_NSF_J-00036842.pdf

Cost Impact: The code change proposal will not increase the cost of construction.

RP129-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P3003.9.2-RP-HALL-PMGCAC

RP130 – 13

P3003.18.1, P3003.18.2, P3003.18.3

Proponent: Pennie L. Feehan, Pennie L. Feehan Consulting representing the Copper Development Association (penniefeehan@me.com)

Revise as follows:

P3003.18.1 Copper or copper-alloy tubing to cast-iron hub pipe. Joints between copper or copper-alloy tubing and cast-iron hub pipe shall be made with a ~~brass~~ copper alloy ferrule or compression joint. The copper or copper-alloy tubing shall be soldered to the ferrule in an approved manner, and the ferrule shall be joined to the cast-iron hub by a caulked joint or a mechanical compression joint.

P3003.18.2 Copper or copper-alloy tubing to galvanized steel pipe. Joints between copper or copper-alloy tubing and galvanized steel pipe shall be made with a ~~brass converter~~ copper alloy fitting or dielectric fitting. The copper tubing shall be soldered to the fitting in an approved manner, and the fitting shall be screwed to the threaded pipe.

P3003.18.3 Cast-iron pipe to galvanized steel or brass pipe. Joints between cast-iron and galvanized steel or ~~brass~~ copper alloy pipe shall be made by either caulked or threaded joints or with an approved adapter fitting.

Reason: This proposal eliminates outdated language and provides the appropriate terminology and correct information to the end user.

Cost Impact: The code change proposal will not increase the cost of construction.

RP130-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P3003.18.1-RP-FEEHAN.DOC

RP131 – 13

P3005.1, P3005.1.1, P3005.1.2, P3005.1.3, Table 3005.1

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Delete Table 3005.1 in its entirety without substitution.

Delete and substitute as follows:

~~P3005.1 Drainage fittings and connections.~~ Changes in direction in drainage piping shall be made by the appropriate use of sanitary tees, wyes, sweeps, bends or by a combination of these drainage fittings in accordance with Table P3005.1. ~~Change in direction by combination fittings, heel or side inlets or increasers shall be installed in accordance with Table P3005.1 and Sections P3005.1.1 through P3005.1.4, based on the pattern of flow created by the fitting.~~

~~P3005.1.1 Horizontal to vertical (multiple connection fittings).~~ Double fittings such as double sanitary tees and tee-yses or ~~approved multiple connection fittings and back-to-back fixture arrangements that connect two or more branches at the same level shall be permitted as long as directly opposing connections are the same size and the discharge into directly opposing connections is from similar fixture types or fixture groups. Double sanitary tee patterns shall not receive the discharge of back-to-back water closets and fixtures or appliances with pumping action discharge.~~

~~Exception:~~ Back-to-back water closet connections to double sanitary tee patterns shall be permitted where the horizontal ~~developed length~~ between the outlet of the water closet and the connection to the double sanitary tee is 18 inches (457 mm) or greater.

~~P3005.1.2 Heel or side inlet quarter bends, drainage.~~ Heel inlet quarter bends shall be an acceptable means of connection, except where the quarter bends serves a water closet. A low-heel inlet shall not be used as a wet-vented connection. Side inlet quarter bends shall be an acceptable means of connection for both drainage, wet venting and stack venting arrangements.

~~P3005.1.3 Heel or side inlet quarter bends, venting.~~ Heel inlet or side inlet quarter bends, or any arrangement of pipe and fittings producing a similar effect, shall be acceptable as a dry vent where the inlet is placed in a vertical position. The inlet is permitted to be placed in a horizontal position only where the entire fitting is part of a dry vent arrangement.

P3005.1 Installation of fittings. Changes in the direction of flow in drainage piping shall be made by fittings installed in an orientation that directs the drainage in the direction of flow. The following applications of fittings shall be prohibited:

1. A cast iron quarter bend or short sweep elbow smaller than 3 inches shall not be used for a vertical-to-horizontal or horizontal-to-horizontal change in direction of flow except where conveying flow from a single fixture drain.
2. A cast iron quarter bend or short sweep elbow that is 3 inches and larger shall not be used for a horizontal-to-horizontal change in direction of flow.
3. A plastic quarter bend elbow smaller than 3 inches, other than a long sweep quarter bend elbow, shall not be used for a vertical-to-horizontal or horizontal-to-horizontal change in direction of flow except where conveying flow from a single fixture drain.
4. A plastic quarter bend elbow that is 3 inches and larger, other than a long sweep quarter bend elbow, shall not be used for a horizontal-to-horizontal change in direction of flow.
5. A heel inlet of a quarter bend elbow shall not receive the discharge from any fixture where the elbow receives the discharge of a water closet and changes the flow direction from vertical-to-horizontal.

6. A low-heel inlet of a quarter bend elbow shall not be used as a connection for a wet vent or wet vented fixture where the elbow changes the flow direction from vertical-to-horizontal.
7. The side inlet of a quarter bend elbow shall not be used as a drainage connection where the elbow changes the flow direction from horizontal to horizontal.
8. A sanitary tee shall not be used in an orientation where the run of the tee is in the horizontal plane, or an angle less than 45 degrees thereto, except where the branch of the tee serves as a dry vent.
9. A double sanitary tee shall not receive the discharge of water closets through both branches nor shall it receive pumped waste flow in either branch.

Exception: Water closets shall be permitted to connect to both branches of a double sanitary tee provided that the horizontal developed length between the outlet of each water closet and the connection to the double sanitary tee is 18 inches (457 mm) or greater.

Reason: The existing sections and accompanying table are unclear as to how the table is to be used and exactly what the prohibitions of fitting uses are. The problem is that the table is too limiting and does not address the materials of the fittings which affect the pattern (short sweep versus quarter bend). Also, the table doesn't address the use of a drainage fitting where a branch is used as vent connection (e.g. sanitary tee). "Acceptable means of connection" is not mandatory language. The section proposed clearly indicates the specific prohibitions and uses in mandatory language.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 65 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP131-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P3005.1-RP-HALL-PMGCAC

RP132 – 13

P3005.1.5

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Delete without substitution:

~~P3005.1.5 Dead ends.~~ ~~Dead ends shall be prohibited except where necessary to extend a cleanout or as an approved part of a rough-in more than 2 feet (610 mm) in length.~~

(Renumber subsequent sections)

Reason: The IPC no longer has this prohibition. It doesn't make any sense to have to remove unused drainage piping in a building. This would be extremely cost prohibitive for a slab on grade building or where piping is concealed by finished walls and ceilings. This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 66 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP132-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P3005.1.5-RP-HALL-PMGCAC

RP133 – 13

P3005.2, P3005.2.1, P3005.2.2, P3005.2.3, P3005.2.4, P3005.2.5, P3005.2.6, P3005.2.7, P3005.2.8, P3005.2.9, P3005.2.10, P3005.2.10.1 (New), P3005.2.10.2 (New), P3005.2.11

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Delete and substitute as follows:

~~P3005.2 Drainage pipe cleanouts.~~ Drainage pipe cleanouts shall comply with Sections P3005.2.1 through P3005.2.11.

~~Exception:~~ These provisions shall not apply to pressurized *building drains* and *building sewers* that convey the discharge of automatic pumping equipment to a gravity drainage system.

~~P3005.2.1 Materials.~~ Cleanouts shall be liquid and gas tight. Cleanout plugs shall be brass or plastic.

~~P3005.2.2 Spacing.~~ Cleanouts shall be installed not more than 100 feet (30 480 mm) apart in horizontal drainage lines measured from the upstream entrance of the cleanout.

~~P3005.2.3 Underground drainage cleanouts.~~ When installed in underground drains, cleanouts shall be extended vertically to or above finished grade either inside or outside the building.

~~P3005.2.4 Change of direction.~~ Cleanouts shall be installed at each fitting with a change of direction more than 45 degrees (0.79 rad) in the *building sewer*, *building drain* and horizontal waste or soil lines. Where more than one change of direction occurs in a run of piping, only one cleanout shall be required in each 40 feet (12 192 mm) of *developed length* of the drainage piping.

~~P3005.2.5 Accessibility.~~ Cleanouts shall be accessible. The clearance in front of cleanouts shall be not less than 18 inches (457 mm) on 3-inch (76 mm) and larger pipes, and not less than 12 inches (305 mm) on smaller pipes. Concealed cleanouts shall be provided with access of sufficient size to permit removal of the cleanout plug and rodding of the system. Cleanout plugs shall not be concealed by permanent finishing material.

~~P3005.2.6 Base of stacks.~~ A cleanout shall be provided at the base of each waste or soil stack.

~~P3005.2.7 Building drain and building sewer junction.~~ There shall be a cleanout near the junction of the *building drain* and *building sewer*. This cleanout shall be either inside or outside the building wall, provided that it is brought up to finish grade or to the lowest floor level. An *approved two-way cleanout* shall be permitted to serve as the required cleanout for both the *building drain* and the *building sewer*. The cleanout at the junction of the *building drain* and *building sewer* shall not be required where a cleanout on a 3-inch (76 mm) or larger diameter soil stack is located within a *developed length* of 10 feet (3048 mm) of the *building drain* and *building sewer* junction.

~~P3005.2.8 Direction of flow.~~ Cleanouts shall be installed so that the cleanout opens to allow cleaning in the direction of the flow of the drainage line.

~~P3005.2.9 Cleanout size.~~ Cleanouts shall be the same nominal size as the pipe they serve up to 4 inches (102 mm). For pipes larger than 4 inches (102 mm) nominal size, the size of the cleanout shall be not less than 4 inches (102 mm).

Exceptions:

1. ~~"P" trap connections with slip joints or ground joint connections, or stack cleanouts that are not more than one pipe diameter smaller than the drain served, shall be permitted.~~
2. ~~Cast-iron cleanouts sized in accordance with the referenced standards in Table P3002.3, ASTM A 74 for hub and spigot fittings or ASTM A 888 or CISPI 301 for hubless fittings.~~

~~**P3005.2.10 Cleanout equivalent.** A fixture trap or a fixture with integral trap, readily removable without disturbing concealed piping shall be acceptable as a cleanout equivalent.~~

~~**P3005.2.11 Connections to cleanouts prohibited.** Cleanout openings shall not be used for the installation of new fixtures except where approved and an acceptable alternate cleanout is provided.~~

P3005.2 Cleanouts required. Cleanouts shall be provided for drainage piping in accordance with Sections P3005.2.1 through P3005.2.11.

P3005.2.1 Horizontal drains and building drains. Horizontal drainage pipes in buildings shall have cleanouts located at intervals of not more than 100 feet (30 480 mm). Building drains shall have cleanouts located at intervals of not more than 100 feet (30 480 mm) except where manholes are used instead of cleanouts, the manholes shall be located at intervals of not more than 400 feet (122 m). The interval length shall be measured from the cleanout or manhole opening, along the developed length of the piping to the next drainage fitting providing access for cleaning, the end of the horizontal drain or the end of the building drain.

Exception: Horizontal fixture drain piping serving a nonremovable trap shall not be required to have a cleanout for the section of piping between the trap and the vent connection for such trap.

P3005.2.2 Building sewers. Building sewers smaller than 8 inches (203 mm) shall have cleanouts located at intervals of not more than 100 feet (30 480 mm). Building sewers 8 inches (203 mm) and larger shall have a manhole located not more than 200 feet (60 960 mm) from the junction of the building drain and building sewer and at intervals of not more than 400 feet (122 m). The interval length shall be measured from the cleanout or manhole opening, along the developed length of the piping to the next drainage fitting providing access for cleaning, a manhole or the end of the building sewer.

P3005.2.3 Building drain and building sewer junction. The junction of the building drain and the building sewer shall be served by a cleanout that is located at the junction or within 10 feet (3048 mm) developed length of piping upstream of the junction. For the requirements of this section, the removal of water closet shall not be required to provide cleanout access.

P3005.2.4 Changes of direction. Where a horizontal drainage pipe, a building drain or a building sewer has a change of horizontal direction greater than 45 degrees (0.79 rad), a cleanout shall be installed at the change of direction. Where more than one change of horizontal direction greater than 45 degrees (0.79 rad) occurs within 40 feet (12 192 mm) of developed length of piping, the cleanout installed at the first change of direction shall serve as the cleanout for all changes in direction within that 40 feet (12 192 mm) of developed length of piping.

P3005.2.5 Cleanout size. Cleanouts shall be the same size as the piping served by the cleanout except cleanouts for piping larger than 4 inches (102 mm) need not be larger than 4 inches (102 mm).

Exceptions:

1. A removable P- trap with slip or ground joint connections can serve as a cleanout for drain piping that is one size larger than the P-trap size.
2. Cleanouts located on stacks can be one size smaller than the stack size.
3. The size of cleanouts for cast-iron piping can be in accordance with the referenced standards for cast iron fittings as indicated in Table P3002.3.

P3005.2.6 Cleanout plugs. Cleanout plugs shall be brass, plastic or other approved materials. Cleanout plugs for borosilicate glass piping systems shall be of borosilicate glass. Brass cleanout plugs shall conform to ASTM A74 and shall be limited for use only on metallic piping systems. Plastic cleanout plugs shall conform to the referenced standards for plastic pipe fittings as indicated in Table P3002.3. Cleanout plugs shall have a raised square head, a countersunk square head or a countersunk slot head. Where a cleanout plug will have a trim cover screw installed into the plug, the plug shall be manufactured with a blind end threaded hole for such purpose.

P3005.2.7 Manholes. Manholes and manhole covers shall be of an approved type. Manholes located inside of a building shall have gas-tight covers that require tools for removal.

P3005.2.8 Installation arrangement. The installation arrangement of a cleanout shall enable cleaning of drainage piping only in the direction of drainage flow.

Exceptions:

1. Test tees serving as cleanouts.
2. A two-way cleanout installation that is approved for meeting the requirements of Section P3005.2.3.

P3005.2.9 Required clearance. Cleanouts for 6-inch (153 mm) and smaller piping shall be provided with a clearance of not less than 18 inches (457 mm) from, and perpendicular to, the face of the opening to any obstruction. Cleanouts for 8-inch (203 mm) and larger piping shall be provided with a clearance of not less than 36 inches (914 mm) from, and perpendicular to, the face of the opening to any obstruction.

P3005.2.10 Cleanout access. Required cleanouts shall not be installed in concealed locations. For the purposes of this section, concealed locations include, but are not limited to, the inside of plenums, within walls, within floor/ceiling assemblies, below grade and in crawl spaces where the height from the crawl space floor to the nearest obstruction along the path from the crawl space opening to the cleanout location is less than 24 inches (610 mm). Cleanouts with openings at a finished wall shall have the face of the opening located within 1-1/2 inches (38 mm) of the finished wall surface. Cleanouts located below grade shall be extended to grade level so that the top of the cleanout plug is at or above grade. A cleanout installed in a floor or walkway that will not have a trim cover installed shall have a countersunk plug installed so the top surface of the plug is flush with the finished surface of the floor or walkway.

P3005.2.10.1 Cleanout plug trim covers. Trim covers and access doors for cleanout plugs shall be designed for such purposes. Trim cover fasteners that thread into cleanout plugs shall be corrosion resistant. Cleanout plugs shall not be covered with mortar, plaster or any other permanent material.

P3005.2.10.2 Floor cleanout assemblies. Where it is necessary to protect a cleanout plug from the loads of vehicular traffic, cleanout assemblies in accordance with ASME A112.36.2M shall be installed.

P3005.2.11 Prohibited use. The use of a threaded cleanout opening to add a fixture or extend piping shall be prohibited except where another cleanout of equal size is installed with the required access and clearance.

Reason: Section P3005.2 is disorganized. For example, the second section, Section P3005.2.1, discusses requirements for cleanout plugs. The more significant sections of the section are scattered throughout the remainder of the section in a disorganized fashion. This section has been reorganized in a more logical format for ease of understanding. Note that the requirement for a cleanout at the base of stacks was deleted. The reason for this is that the requirement for cleanout access for horizontal drain pipes includes cleanouts that are placed in stacks. The stack cleanout is not for accessing the stack but just one way to get to the horizontal drain that the stack is connected to. Cleanouts at the base of the stack *can be* installed in the horizontal drain line. It is all about gaining access to the horizontal drain system and not for clearing obstructions in vertical sections of pipe (such as stacks). This proposal to the 2015 IPC was Approved as Submitted.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application.

of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 67 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP133-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

P3005.2-RP-HALL-PMGCAC

RP134 – 13

P3005.2.1

Proponent: Pennie L. Feehan, Pennie L. Feehan Consulting representing the Copper Development Association (penniefeehan@me.com)

Revise as follows:

P3005.2.1 Materials. Cleanouts shall be liquid and gas tight. Cleanout plugs shall be ~~brass~~ copper alloy or plastic.

Reason: This proposal eliminates outdated language and provides the appropriate terminology and correct information to the end user.

Cost Impact: The code change proposal will not increase the cost of construction.

RP134-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P3005.2.1-RP-FEEHAN.DOC

RP135 – 13

P3005.3.3.1

Proponent: Pennie L. Feehan, Pennie L. Feehan Consulting representing the Copper Development Association (penniefeehan@me.com)

Revise as follows:

P3007.3.3.1 Materials. Pipe and fitting materials shall be constructed of ~~brass~~, copper, copper alloy, CPVC, ductile iron, PE, or PVC.

Reason: This proposal eliminates outdated language and provides the appropriate terminology and correct information to the end user.

Cost Impact: The code change proposal will not increase the cost of construction.

RP135-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P3005.3.3.1-RP-FEEHAN.DOC

RP136 – 13

P3007.3.2

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee
(Dave.Hall@georgetown.org)

Revise as follows:

P3007.3.2 Sump pit. The sump pit shall be not less than 18 inches (457 mm) in diameter and not less than 24 inches (610 mm) in depth, unless otherwise approved. The pit shall be accessible and located such that all drainage flows into the pit by gravity. The sump pit shall be constructed of tile, concrete, steel, plastic or other approved materials. The pit bottom shall be solid and provide permanent support for the pump. The sump pit shall be fitted with a gas-tight removable cover that is installed above grade level or floor level, or not more than 2 inches (51 mm) below grade or floor level. The cover shall be adequate to support anticipated loads in the area of use. The sump pit shall be vented in accordance with Chapter 31.

Reason: The cover for sump pits needs to be located at or near grade. Otherwise, there is nothing to prevent an installation where the cover is located way below grade in a well such that in order to service the pump, someone has to stand on his head in order to just remove the sump pit cover. Requiring the cover to be not more than 2 inches below grade or floor level eliminates this problem. This change still allows the sump cover to be any dimension above grade.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. X24 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP136-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P3007.3.2-RP-HALL-PMGCAC

RP137 – 13

P3008.1

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P3008.1 Sewage backflow. Where plumbing fixtures are installed on a floor with a finished floor elevation below the elevation of the manhole cover of the next upstream manhole in the *public sewer*, such fixtures shall be protected by a backwater valve installed in the *building drain*, or horizontal *branch* serving such fixtures. Plumbing fixtures installed on a floor with a finished floor elevation above the elevation of the manhole cover of the next upstream manhole in the *public sewer* shall not discharge through a backwater valve.

Exception: In existing buildings, fixtures above the elevation of the manhole cover of the next upstream manhole in the *public sewer* shall not be prohibited from discharging through a backwater valve.

Reason: The addition of this exception was approved for the 2015 IPC. Building owners who have experienced a sewage backup in a building that was caused by problems in an existing public sewer main should be allowed to install a backwater valve in the building drain or sewer to protect their property. Having a basement full of raw sewage is an experience that no one wants to repeat. The requirement that only those fixtures that are on a floor elevation below the top of the next upstream manhole in the public sewer are allowed to discharge through the BWV, places a significant impediment for the building owner to protect his property against an event over which currently he has no control. For example, consider an existing two story hotel with multiple stacks connecting to a building drain. The fixtures on the lower floor are connected to the same building drain. The existing code language would require that all of the stacks be rerouted to connect downstream of a backwater valve installed to serve only the fixtures on the lower floor level. This would be cost prohibitive to do. The simpler solution would be to just install the BWV in the building drain or sewer. However, as the code is currently written, this is prohibited. The main reason why the code prohibits this is so that the discharge from upper floors does not flood the lower floor when the building sewer is backed up. If the BWV serves only the lower elevation fixtures, it would be closed when the sewer backed up and any discharge from higher elevation fixtures could not flow out of the lower elevation fixtures. BWV's are not known to create problems in a building sewer; rather, they provide protection from sewage backups and provide peace of mind for the building owners and occupants. Although the current code requirement can be easily accomplished in new construction, it is a hardship for those building owners who need protection for existing buildings. Imagine the work that would be necessary to separate the building drain into different sub building drains in an existing building with piping under slab floors.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. X25 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP137-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P3008.1-RP-HALL-PMGCAC

RP138 – 13

P3009.13.2, P3009.13.2.1 (New)

Proponent: Jeremy Brown, NSF International (brown@nsf.org)

Revise as follows:

P3009.13.2 Disinfection and treatment. ~~Gray water shall be disinfected by an approved method that employs one or more disinfectants such as chlorine, iodine or ozone that are recommended for use with the pipes, fittings and equipment by the manufacturer of the pipes, fittings and equipment. Nonpotable water collected onsite for reuse shall be disinfected, treated or both to provide the quality of water needed for the intended end use application. Where the intended end use application does not have requirements for the quality of water, disinfection and treatment of water collected onsite for reuse shall not be required. Onsite collected nonpotable water that contains untreated gray water and is collected in reservoirs shall be retained for not more than 24 hours.~~

P3009.13.2.1 Gray water used for fixture flushing. Gray water used for flushing water closets and urinals shall be disinfected and treated by an on-site water reuse treatment system complying with NSF 350.

Add new standard to Chapter 44:

NSF

350-11 Onsite Residential and Commercial Water Reuse Treatment Systems

Reason: The proposed requirements were approved for the 2015 IPC. In addition to microbiological contaminants that need disinfection, gray water contains organic compounds, suspended solids, turbidity, surfactants, and other contaminants that have the potential to accumulate and negatively impact the functioning of water closets and urinals if not treated properly. NSF/ANSI-350 *Onsite Residential and Commercial Water Reuse Treatment Systems* establishes the minimum materials, design and construction, and performance requirements for systems that disinfect and treat gray water for non-potable reuse applications, including flushing water for closets and urinals. Rigorous testing with gray water as defined by the standard ensures the treatment systems meet strict effluent quality requirements suitable for reuse applications, along with providing protection of public health and the environment. NSF 350 is currently referenced in the IgCC and IAPMO Green Supplement.

Cost Impact: Because on-site water reuse treatment systems are not required, this code change proposal will not increase the cost of construction.

Analysis: Standard NSF 350 is currently in the 2012 IgCC.

RP138-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P3009.13.2-RP-BROWN.DOC

RP139 – 13

P3009.13.4

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

~~P3009.13.4 Coloring.~~ ~~The gray water shall be dyed blue or green with a food grade vegetable dye before such water is supplied to the fixtures.~~

Reason: This deletion of language was approved for the 2015 IPC. This is an archaic requirement that dates back to when gray water was first considered for flushing water closets and urinals. The reason for abandoning the practice was because the dye stained building components when there was splashing of the dyed gray water. The means of identifying gray water is the purple coloring of the piping system.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. X32 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP139-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P3009.13.4-RP-HALL-PMGCAC

RP140 – 13

P3009.19

Proponent: Gary Kozan, CPD, Ridgeway Plumbing, representing Florida Association of Plumbing Heating Cooling Contractors (garyk@ridgewayplumbing.com)

Revise as follows:

P3009.19 Joints between drainage piping and water closets. Joints between drainage piping and water closets or similar fixtures shall be made by means of a closet flange or a waste connector and sealing gasket compatible with the drainage system material, securely fastened to a structurally firm base. ~~The inside diameter of the drainage pipe shall not be used as a socket fitting for a 4-inch by 3-inch (102 mm by 76 mm) closet flange.~~ The joint shall be bolted, with an approved gasket flange to fixture connection complying with ASME A112.4.3 or setting compound between the fixture and the closet flange or waste connector and sealing gasket. The waste connector and sealing gasket joint shall comply with the joint-tightness test of ASME A112.4.3 and shall be installed in accordance with the manufacturer's installation instructions.

Reason: For over forty years, and with tens of millions installed, inside-fit closet flanges have a proven track record as the best deterrent to leaking or rocking toilets. Inside-fit flanges are particularly useful on slab-on-grade construction, as they do not require an annular space around the closet stub. The flange can be set at the time of WC installation, eliminating the guesswork of determining finished floor.

Inside-fit flanges are manufactured with a carefully designed taper to compensate for any variations in the pipe ID. They do not leak. They do not fail. In many parts of the country, the current IRC prohibition has been largely ignored because it makes no sense and is actually counterproductive to proper water closet installations.

The other model plumbing code (UPC) does not prohibit inside-fit flanges. Neither does the IPC. In fact, an attempt to expand the prohibition of inside flanges into the IPC was roundly rejected at last year's final action hearing. Eliminating this unreasonable prohibition will simplify WC installations, eliminate leaks, and improve the overall quality of the plumbing system.

Cost Impact: This code change proposal will not increase the cost of construction.

RP140-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P3009.19-RP-KOZAN.DOC

RP141 – 13

P3010 (New), Chapter 44

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Add new text as follows:

SECTION P3010 **REPLACEMENT OF UNDERGROUND SEWERS** **BY PIPE BURSTING METHODS**

P3010.1 General. This section shall govern the replacement of existing building sewer piping by pipe-bursting methods.

P3010.2 Applicability. The replacement of building sewer piping by pipe bursting methods shall be limited to gravity drainage piping of sizes 6 inches and smaller. The replacement piping shall be of the same nominal size as the existing piping.

P3010.3 Pre-installation inspection. The existing piping sections to be replaced shall be inspected internally by a recorded video camera survey. The survey shall include notations of the position of cleanouts and the depth of connections to the existing piping.

P3010.4 Pipe. The replacement piping shall be of extra high molecular weight PE3408 material and shall be manufactured with an SDR of 17 and in compliance with ASTM F 714.

P3010.5 Pipe fittings. Pipe fittings to be connected to the replacement piping shall be of extra high molecular weight PE3408 material and shall be manufactured with an SDR of 17 and in compliance with ASTM D2683.

P3010.6 Cleanouts. Where the existing building sewer did not have cleanouts meeting the requirements of this code, cleanout fittings shall be installed as required by this code.

P3010.7 Post-installation inspection. The completed replacement piping section shall be inspected internally by a recorded video camera survey. The video survey shall be reviewed and approved by the code official prior to pressure testing of the replacement piping system.

P3010.8 Pressure testing. The replacement piping system as well as the connections to the replacement piping shall be tested in accordance with Section P2503.4.

Add standards to Chapter 44 as follows:

ASTM F 714-06a Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) based on Outside Diameter.

D2683-04 Standard Specification for Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing.

Reason: The IRC lacks coverage concerning the replacement of sewer systems by pipe bursting methods. These methods are being widely used throughout the country. Proper guidance concerning this type of replacement provides additional value to the code. This proposal to the 2015 IPC was Approved as Modified by Public Comment. This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and

multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 69 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP141-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P3010 (NEW)-RP-HALL-PMGCAC

RP142 – 13

P3101.2

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P3101.2 Trap seal protection. The plumbing system shall be provided with a system of vent piping that will ~~permit~~ allow the admission or emission of air so that the liquid seal of any fixture trap shall not be subjected to a ~~pneumatic~~ pressure differential of more than 1 inch of water column (249 Pa).

Reason: The term “pneumatic” is confusing word in this section’s context. Pressure is pressure whether it is water or air. This proposal to the 2015 IPC was Approved as Submitted.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 70 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP142-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P3101.2-RP-HALL-PMGCAC

RP143 – 13

P3103.1

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P3103.1 Roof extension. Open vent pipes that extend through a roof shall be terminated not less than [NUMBER] inches (mm) above the roof or 6 inches (152 mm) above the anticipated snow accumulation, whichever is greater, ~~except that~~. Where a roof is to be used for assembly or as a promenade, observation deck, sunbathing deck or similar purposes ~~for any purpose other than weather protection~~, the open vent pipes ~~extensions~~ shall terminate not less than 7 feet (2134 mm) above the roof.

Reason: This revised language was approved for the 2015 IPC. The current language literally states that if a roof is to be used for anything other than weather protection, then vent pipes must be extended 7 feet above the roof. If there is equipment on the roof (HVAC units, grease duct fans, etc.), the roof is being used for another purpose, but, that is not the intent of the section. The intent of the section is that when the roof can be “normally occupied” such as where the roof is being used as an assembly area, a promenade, observation deck or sunbathing deck, that is when the vent pipes must be extended. The revised language makes the intent of the section more clear.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. X26 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP143-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P3103.1-RP-HALL-PMGCAC

RP144 – 13

P3103.2

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P3103.2 Frost closure. Where the 97.5-percent value for outside design temperature is 0°F (-18°C) or less, ~~every~~ vent extensions through a roof or wall shall be not less than 3 inches (76 mm) in diameter. Any increase in the size of the vent shall be made not less than 1 foot inside the structure at a point not less than 1 foot (305 mm) below the roof or inside the wall thermal envelope of the building.

Reason: This revised language was approved for the 2015 IPC. Requiring that the size transition occur at least 1 foot below the roof accomplishes nothing if it is just as cold below the roof as it is outdoors. The intent is to prevent frost blockage in the vent by making the part that is exposed to freezing temperatures at least 3 inches in diameter. The part of the vent that is less than 3 inches in size must be located in an area that stays above freezing. In most attics, the attic temperatures are very near the outdoor temperature, therefore, putting the size transition in the cold attic will subject the smaller pipe to freezing temperatures which is exactly what this section intended to avoid. The transition from a smaller size vent pipe to the 3 inch (or larger size) needs to occur at least one foot inside of the building's thermal envelope in order to avoid frost blockage.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. X27 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP144-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P3103.2-RP-HALL-PMGCAC

RP145 – 13

P3111.2.2

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

P3111.2.2 Connection. ~~The combination waste and vent pipe shall connect to a horizontal drain that is vented or a vent shall connect to the combination waste and vent. The vent connecting to the combination waste and vent pipe shall extend vertically not less than 6 inches (152 mm) above the flood level rim of the highest fixture being vented before offsetting horizontally.~~ The combination waste and vent system shall be provided with a dry vent connected at any point within the system or the system shall connect to a horizontal drain that serves vented fixtures located on the same floor. Combination waste and vent systems connecting to building drains receiving only the discharge from a one or more stacks shall be provided with a dry vent. The vent connection to the combination waste and vent pipe shall extend vertically to a point not less than 6 inches (152 mm) above the flood level rim of the highest fixture being vented before offsetting horizontally.

Reason: The current section language is not clear about what type of a vent must connect to a combination waste and vent system. The section also did not provide coverage for where only stacks connected to a building drain that had a combination waste and vent system connected to it. The majority of this language comes from the IPC.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 71 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP145-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P3111.2.2-RP-HALL-PMGCAC

RP146 – 13

P3114.5

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P3114.5 Access and ventilation. Access shall be provided to all air admittance valves. ~~The~~ Such valves shall be installed in a locatedtion ~~within a ventilated space~~ that allows air to enter the valve.

Reason: This revised language was approved for the 2015 IPC. The question is frequently raised: "What constitutes a ventilated space?" The proposed language simply requires the AAVs to be located where air can enter the valve. For example, an AAV installed in wall cavity would require some means to allow air to enter the cavity.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. X29 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP146-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P3114.5-RP-HALL-PMGCAC

RP147 – 13

P3114.8

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P3114.8 Prohibited installations. *Air admittance valves without an engineered design* shall not be used to vent sumps or tanks except where the vent system for the sump or tank has been designed by an engineer, of any type.

Reason: The “without an engineered design” was an attempt by the AAV manufacturers to allow AAVs to be used on sumps and tanks if special piping arrangements were used to “prevent” a positive pressure condition from occurring. The code does not address these special piping arrangements and the intent was to have an engineer become involved to design the special venting arrangement. A committee modification made on-the-fly, got the wording wrong. The revised wording allows the use of an AAV in sump and tank vent systems that are designed by an engineer.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 72 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP147-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P3114.8-RP-HALL-PMGCAC

RP148 – 13

P3201.1

Proponent: Pennie L. Feehan, Pennie L. Feehan Consulting representing the Copper Development Association (penniefeehan@me.com)

Revise as follows:

P3201.1 Design of traps. Traps shall be of standard design, shall have smooth uniform internal waterways, shall be self cleaning and shall not have interior partitions except where integral with the fixture. Traps shall be constructed of lead, cast iron, ~~cast or drawn brass~~ copper and copper alloy or approved plastic. ~~Tubular brass~~ Copper or copper alloy traps shall be not less than No. 20 gage (0.8 mm) thickness. Solid connections, slip joints and couplings shall be permitted to be used on the trap inlet, trap outlet, or within the trap seal. Slip joints shall be accessible.

Reason: This proposal eliminates outdated language and provides the appropriate terminology and correct information to the end user.

Cost Impact: The code change proposal will not increase the cost of construction.

RP148-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P3201.1-RP-FEEHAN.DOC

RP149 – 13

P2704.1, P2727.2, P2717.3, P3002.1, P3201.6, P3201.6.1 (New), P3005.2.9, P3005.2.10, P3102.1

Proponent: Ron George, Certified Plumbing Designer, President, Plumb-Tech Design & Consulting Services LLC. (Ron@Plumb-TechLLC.com)

Revise as follows:

P2704.1 General. Slip joints shall be made with an *approved* elastomeric gasket and shall be installed only on the inlet and outlet of an inline sanitary waste valve, a trap outlet, a trap inlet and within the trap seal. Fixtures with concealed slip-joint connections shall be provided with an access panel or utility space not less than 12 inches (305 mm) in its smallest dimension or other *approved* arrangement so as to provide access to the slip connections for inspection and repair.

P2717.2 Sink and dishwasher. A sink and dishwasher are permitted to discharge through a single 1-1/2 inch (38 mm) inline sanitary waste valve in accordance with Section P3201.6.1 or a trap. The discharge pipe from the dishwasher shall be increased to not less than 3/4 inch (19 mm) in diameter and shall be connected with a wye fitting to the sink tailpiece. The dishwasher waste line shall rise and be securely fastened to the underside of the counter before connecting to the sink tailpiece.

P2717.3 Sink, dishwasher and food grinder. The combined discharge from a sink, dishwasher, and waste grinder is permitted to discharge through a single 1-1/2 inch (38.1 mm) inline sanitary waste valve in accordance with Section P3201.6.1 or a trap. The discharge pipe from the dishwasher shall be increased to not less than 3/4 inch (19 mm) in diameter and shall connect with a wye fitting between the discharge of the food-waste grinder and the trap inlet, the inline sanitary waste valve or to the head of the food grinder. The dishwasher waste line shall rise and be securely fastened to the underside of the counter before connecting to the sink tail piece or the food grinder.

P3002.3.1 Drainage. Drainage fittings shall have a smooth interior waterway of the same diameter as the piping served. All fittings shall conform to the type of pipe used. Drainage fittings shall have no ledges, shoulders or reductions which can retard or obstruct drainage flow in the piping. Threaded drainage pipe fittings shall be of the recessed drainage type, black or galvanized. Drainage fittings shall be designed to maintain one-fourth unit vertical in 12 units horizontal (2-percent slope) grade. This section shall not be applicable to tubular waste fittings used to convey vertical flow upstream of an inline sanitary waste valve in accordance with Section P3201.6.1 or the trap seal liquid level of a fixture trap.

P3101.2.1 Venting required. Every *trap* and trapped fixture shall be vented in accordance with one of the venting methods specified in this chapter. Inline sanitary waste valves in accordance with Section P3201.6.1 shall not be required to be vented.

P3201.6 Number of fixtures per A trap or inline sanitary waste valve required for each fixture.

Each plumbing fixture shall independently discharge to an inline sanitary waste valve in accordance with Section P3201.6.1 or to a ~~trap~~. ~~be separately trapped by a water seal trap.~~ The vertical distance from the fixture outlet to the ~~trap~~ weir shall not exceed 24 inches (610 mm) and the horizontal distance shall not exceed 30 inches (762 mm) measured from the center line of the fixture outlet to the centerline of the inlet of the ~~trap~~. The height of a clothes washer standpipe above a ~~trap~~ shall conform to Section P2706.2. Fixtures shall not be double trapped.

Exceptions:

1. Fixtures that have integral traps.
2. A single trap shall be permitted to serve two or three like fixtures limited to kitchen sinks, laundry tubs and lavatories. Such fixtures shall be adjacent to each other and located in the

same room with a continuous waste arrangement. The trap shall be installed at the center fixture where three fixtures are installed. Common trapped fixture outlets shall be not more than 30 inches (762 mm) apart.

3. Connection of a laundry tray waste line into a standpipe for the automatic clothes-washer drain shall be permitted in accordance with Section P2706.2.1.

P3201.6.1 Inline sanitary waste valves. Inline sanitary waste valves shall comply with ASME A112.18.8. Such valves shall be installed only on fixture outlets having 1-1/4 inch (31.8mm) or 1-1/2 inch (38.1 mm) outside diameter tubular waste piping. Valves conveying the waste from a food waste disposer shall be installed only in a vertical orientation. Such valves shall not be installed on the outlet of a urinal. The valves shall be installed in a vertical orientation or a horizontal orientation. Where installed in a horizontal orientation, the valve body shall be oriented with the ribs on the exterior of the valve body located on the bottom of the valve. The valves shall be accessible.

P3005.2.9 Cleanout size. Cleanouts shall be the same nominal size as the pipe they serve up to 4 inches (102 mm). For pipes larger than 4 inches (102 mm) nominal size, the size of the cleanout shall be not less than 4 inches (102 mm).

Exceptions:

1. Inline sanitary waste valves in accordance with Section P3201.6.1, "P" trap connections with slip joints or ground joint connections, or stack cleanouts that are not more than one pipe diameter smaller than the drain served, shall be permitted.
2. Cast-iron cleanouts sized in accordance with the referenced standards in Table P3002.3, ASTM A 74 for hub and spigot fittings or ASTM A 888 or CISPI 301 for hubless fittings.

P3005.2.10 Cleanout equivalent. An inline sanitary waste valve in accordance with Section P3201.6.1, a fixture trap or a fixture with integral trap, readily removable without disturbing concealed piping shall be acceptable as a cleanout equivalent.

P3102.1 Required vent extension. The vent system serving each *building drain* shall have at least one vent pipe that extends to the outdoors. Sanitary drainage systems that do not have traps and have only inline sanitary waste valves in accordance with Section P3201.6.1 shall be provided with at least one vent.

Add new standard to Chapter 44 as follows:

ASME

A112.18.8–2009 In-Line Sanitary Waste Valves for Plumbing Drainage

Reason: There is a new ASME standard ASME A112.18.8 that has been developed for sanitary waste valves and there are products that have been tested to meet or exceed the standard's requirements. Last year elastomeric trap seal protection devices were added to the IPC. This device is similar, but limited to tubular drains in lieu of a p-trap. It is not subject to floor wax and debris that a floor drain will receive. The key sections of this proposal are Section P3201.6 and new Section P3201.6.1 that add an alternative to liquid seal traps. All other sections being modified are in support of adding this alternative to the code. Inline sanitary waste valves can only be used on fixtures that have 1-1/4 inch or 1-1/2 inch OD tubular waste outlets from fixtures, so their application is generally limited to sinks, lavatories and bathtubs. The testing requirements of the standard for inline sanitary waste valves are stringent. In many applications, inline sanitary waste valves offer better, more reliable protection (against sewer gas coming out of a fixture) than a liquid seal trap.

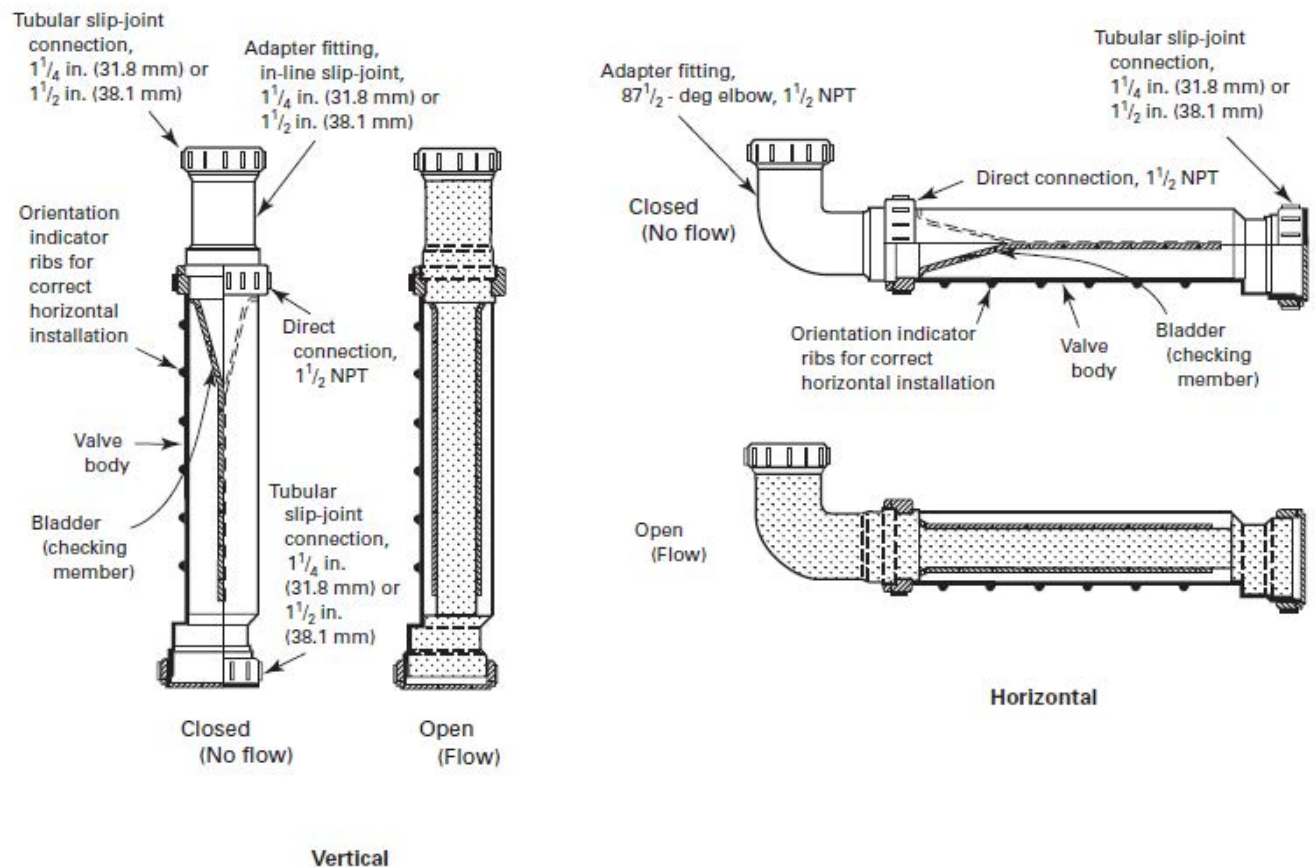
In-Line sanitary waste valves now have an Industry standard ASME A112.18.8–2009 titled: "In-Line Sanitary Waste Valves for Plumbing Drainage". These devices have been tested and certified by third party testing labs and they have been proven over many years of use to provide a reliable gas-tight seal when used in lieu of a p-trap. They provide a seal which is not dependent on operating conditions and is not affected by evaporation or siphonage. These valves are mainly used in situations where sanitary fixtures see only occasional use, where freezing conditions, low humidity, persistent high temperature conditions, or where there are limited or confined space conditions. Examples include guest bathrooms, seasonal occupancy dwellings, manufactured housing and in remote cabins. Other common uses for this type of device are in Recreational Vehicles and boats for the freeze resistance and splash resistance. The performance requirements for the device are covered within the ASME A112.18.8 ANSI approved Standard, which includes a gas-tight seal test, flow rate test, long term cycling tests, a grease or lard test and many other chemical resistance and solids tests. These valves perform in a similar manner to a trap seal protection valve. Elastomeric type devices in the drainage system are already approved in the International Plumbing Code. In 2012 when the Trap Seal Protection Devices

which comply with ASSE 1072 were approved for the 2015 International Plumbing Code at the final action hearings in Portland in 2012. These devices are very similar to trap seal protection valves except the ASME A112.18.8–2009 In-Line Sanitary Waste Valves for Plumbing Drainage limits their use to installations where a 1-1/4 inch or 1-1/2" tubular p-traps would normally be permitted. These devices are not intended for use on floor drains, water closets or similar fixtures.

The scope of the ASME A112.18.8 Standard establishes minimum requirements for materials in the construction of sanitary waste valves for use as an alternate to tubular p-traps, and prescribes minimum test requirements for the performance of the valve, together with methods of marking and identification. The ASME A112.18.8 Standard does not define the requirements for products to be used in urinals or water closets. It is not intended that products meeting this Standard will be used in a urinal or water closet.

ASME A112.18.8-2009

**Fig. 1 Typical Cross-Section
(For Illustrative Purposes Only)**



Testing includes the following tests:

- 3.1 Waterway Flow Rate
- 3.2 One-Way Sealing Performance of the Valve
- 3.3 Airway Flow Rate
- 3.4 Recovery From an Excess Back Pressure (Inversion) Condition
- 3.5 Leak Tightness
- 3.6 Thermal Cycling
- 3.7 Cyclic Fatigue
- 3.8 Resistance to Household Substances
- 3.9 Resistance to Chemicals and Solvents
- 3.10 Drop Test
- 3.11 Life Cycle

Section 4 of the Standard also covers Marking and Identification Instructions.

The valve shall be permanently and legibly marked with the following:

- (a) manufacturer's name
- (b) product name/brand name
- (c) nominal size of inlet and outlet
- (d) date of manufacture
- (e) predominant material
- (f) direction of flow indicator
- (g) indication of the orientation of the installation of the device

4.2 Instructions

The manufacturer shall provide instructions on packaging or accompanying literature indicating, where appropriate, both of the following:

- (a) the orientation of the installation of the device
- (b) limitations on the use and type of drain-cleaning chemicals and tools

TECHNICAL DESIGN GUIDE



Sanitary Waste Valve

- A HYGIENIC ALTERNATIVE TO CONVENTIONAL TRAPS

HepvO is a self sealing valve designed to close the waste connection below a sanitary fixture to prevent the escape of foul sewer air into the dwelling.

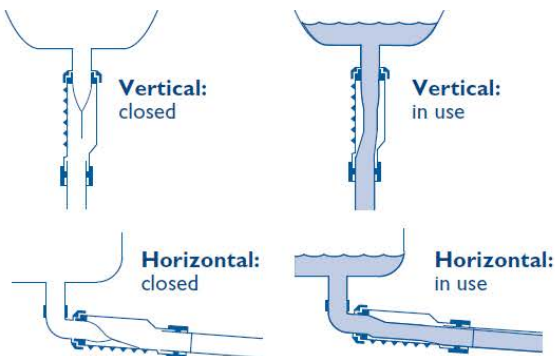
HepvO unlike conventional waste traps, does not rely on trapped water to create a seal. Water seals are prone to failure by Evaporation, Siphonage and other mechanisms. Instead, HepvO uses a self sealing membrane which performs the same function as a water seal trap but without the risk of depletion or freezing.

The HepvO Sanitary Waste Valve means enhanced plumbing design and system efficiency, without compromising performance or risking the escape of foul air into the living space from the drain or sewer.

HepvO - Operation

HepvO a Barrier between Living Space and the Drainage System.

Foul sewer gas must be prevented from entering the building. The loss of the water seal in a conventional trap can cause gurgling noises, objectionable smells, allow insect ingress, and has the potential to allow the spread of health hazards (such as SARS).



The HepvO Sanitary Waste Valve opens under the water pressure of a fixture emptying and closes to form a tight seal after the fixture has discharged.



HepvO - Product Features

- Dry Seal Technology - cannot fail by evaporation or siphonage
- Admits Air - Auxiliary Venting Not Required
- One Way Valve - Prevents Foul Odors

HepvO will out-perform a conventional trap by preventing the escape of foul air under excessive operating conditions up to 10 times greater than those normally experienced in a correctly designed Soil & Waste system. By comparison, conventional traps allow foul sewer air to bubble-through the seal at relatively low positive pressures.

In addition because HepvO does not trap water that may contain food scraps or other waste, microbiological growth of a fungal, bacterial or viral nature is less likely.

HepvO - Applications

- Lavatories
- Bath Tubs
- Sink
- Bidet
- Washing Machine
- Garbage Disposal (Vertical Only)
- Urinal (Vertical Only)*
- Air Conditioning Condensate*
- Overflow
- Dishwasher
- Shower

* applications outside the scope of the ASME/ANSI A112.18.8 Standard and approval

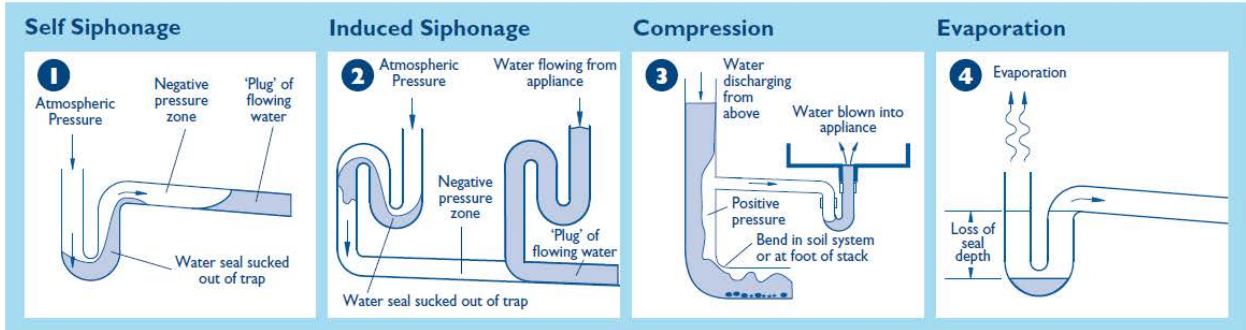


Minimizes the space required behind a lavatory or beneath a bath tub/shower tray.

HepvO - Design and Performance

The PROBLEM: Conventional waste traps work by having a water seal to prevent foul odors entering buildings. However a water trap can fail under a number of conditions.

The following diagrams show several problems that result in loss of water seal, gurgling and foul smells.

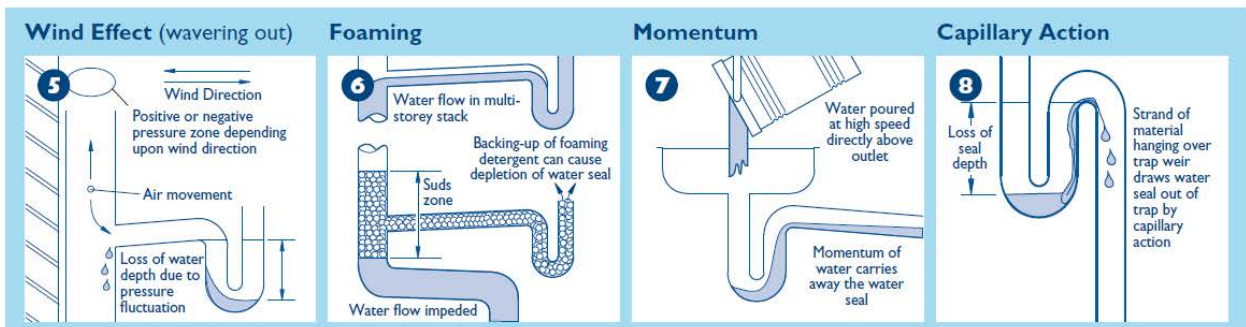


Self Siphonage: water flowing down the discharge pipe draws the water from the trap.

Induced Siphonage: the water seal is drawn out of the trap by water discharging from a fixture downstream (e.g. washing machine).

Compression: water is pushed out of the trap by a positive pressure caused by discharging of fixtures located above (e.g. WC).

Evaporation: water in the trap evaporates during periods of non-use (e.g. during vacation or when fixtures are not being used).

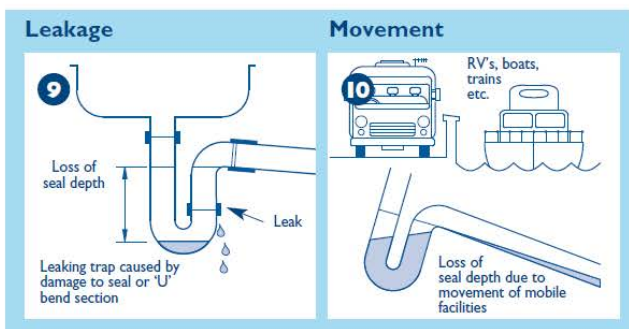


Wind Effect: air movement across the top of the Soil & Vent Pipe causes reciprocation of water in the trap and potential for loss of seal depth.

Foaming: agitation of waste water containing detergents in the Soil and Vent pipe creates foaming which pushes water out of the trap.

Momentum: waste water from a bowl or pail poured directly in to the waste outlet carries water out of the trap due to speed of discharge. This is also common with modern, funnel shaped basin designs.

Capillary Action: fibrous material retained in the trap and hanging over the weir draws water out of the trap.



Leakage: badly fitting or loose components and/or damaged seals can allow water to leak causing loss of seal depth.

Movement: In mobile facilities such as RV's and boats movement can cause potential for loss of water in the trap.

HepvO - The SOLUTION

When installed in accordance with manufacturer's instructions the unique HepvO Sanitary Waste Valve is the solution to all these problems.

HepvO provides a constant seal against sewer gas ingress, which is maintained under all normal operating conditions.

HepvO Sanitary Waste Valve actively eliminates negative pressure within the waste system by opening and allowing in fresh air until a state of equilibrium with atmosphere is reached.

HepvO Sanitary Waste Valve resists blockages, prevents nasty smells, gurgling sounds and stagnant water under all circumstances.

Hep_vO - Installation Benefits

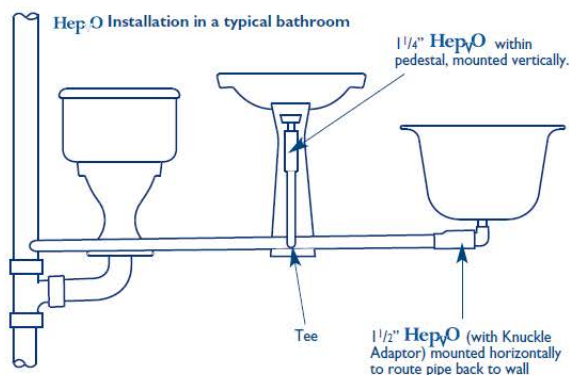
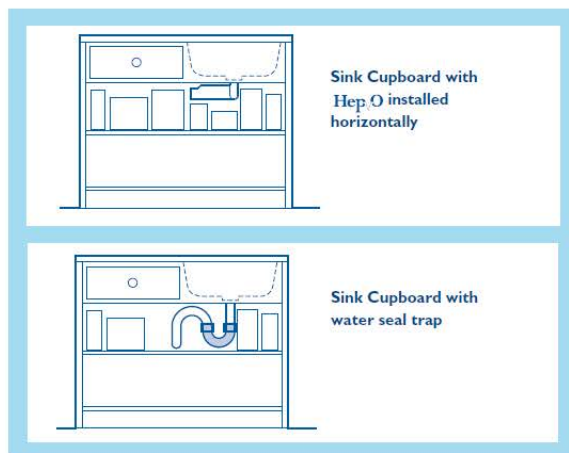
Hep_vO is a new concept in the prevention of foul air escaping into the building while actively eliminating negative pressure in soil and waste installations. It allows the designer greater flexibility on fixture and venting installation without compromising the performance of their sanitary seals.

System Simplification - Design Freedom and Economic Benefits

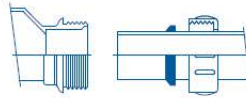
Regulations for waste system design set limits on length and slope of pipes and the number of fixtures which can be connected to a waste pipe in order to keep pressure fluctuations to a minimum. This may be rectified by the incorporation of vent pipes at appropriate design locations.

The incorporation of Hep_vO provides a good sanitary system offering minimum resistance to flow.

- 1 Compact design, flexibility of location and ability to actively eliminate negative pressure improves system performance.
- 2 A typical fixture will drain more quickly when a Hep_vO is installed compared to a p-trap installation. This helps keep downstream piping cleaner and reduces maintenance requirements.
- 3 There is no trap to vent distance limitations based on the slope of the pipe and the elevation of the vent connection.
- 4 Where necessary tight radius bends can be used, without fear of siphonage or compression.



Hep_vO - Installation & Maintenance



Capnut and sealing cone on pipe end ready for insertion of pipe into compression socket.

INSTALLATION

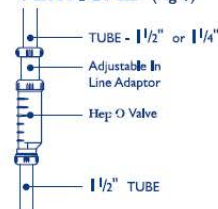
- 1 Cut the tube to length, allowing for the full compression socket depth, (preferably using an appropriate tube cutter).
- 2 If using plastic tube remove any loose material from the end. If using metallic tube remove any 'burr', and file if necessary to remove any external sharp edges. Mark the socket depth on the tube, and check that the tube section to be joined is free of any surface damage which may affect the joint seal.
- 3 Unscrew the cap from the outlet/inlet adaptor and slide the cap and rubber seal onto the tube.
- 4 Insert the tube end fully into the socket.
- 5 Slide the rubber seal and screwed cap up against the face of the socket, and tighten the cap by hand, (check that the cap is square to the body and does not 'cross-thread'), hand tight should be adequate to form a proper seal.
- 6 Threaded connections can be made to the inlet or outlet of the Hep_vO valve. At the outlet it is first necessary to remove the cap and rubber seal. If making connections to threaded components that do not have an integral seal (for example connection to DWV adaptors) PTFE/TEFLON tape should be applied to the thread prior to assembly.

MAINTENANCE

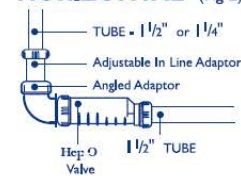
If mechanical devices such as spiral cables, rippers or water jetters are required to clear blockages in the waste system, the Hep_vO valve must be removed first.

It is good practice to rinse the Hep_vO valve with a little clean water before replacing it in the system.

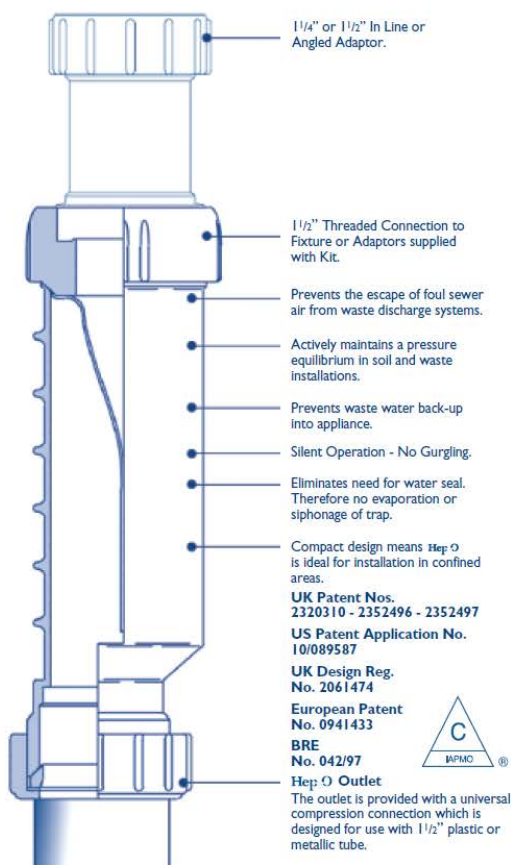
VERTICAL (Fig 1)



HORIZONTAL (Fig 2)



Hep_vO Valve Components



For further information on Hep_vO
and other Hepworth products visit:
www.hepworth.co.uk

For all Hep_vO enquiries email:
sales@a-s-m.com

Hepworth
PLASTICS

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Our policy is one of constant development.
Whilst this publication is accurate at the date of printing, specification/approvals
may be changed in the interest of continued improvement.

Frequently Asked Questions

1 Is Hep_vO used in addition to a conventional trap?

NO, unlike other products which prevent foul odors entering the living space, Hep_vO is used instead of a conventional water-seal trap.

2 Will I still need to install auxiliary venting on waste pipe branches?

NO, Hep_vO acts as a highly effective local air admittance device, removing the need for secondary venting.

3 Can I use acidic drain cleaning chemicals?

YES, the Hep_vO valve is manufactured from a highly inert material and has passed extensive testing with a very wide range of chemicals including both acid and alkaline products.

4 Do I still need to connect each fixture on its own dedicated waste branch?

NO, Hep_vO prevents induced siphonage between adjacent fixture traps so it is now possible to make multiple connections on the same branch. This can save yards of tubing or piping and gives great flexibility for locating fixtures and designing waste systems.

5 Hep_vO is a new product to me - how can I be confident that it will give a good installed performance?

Hep_vO is new to the North American market but it is not a new product. It has been in volume production in the UK since 1997 and it is widely used in Europe, Australia and the Far East. It has attained numerous international approvals against very demanding standards and has achieved an enviable track record of trouble-free performance.

6 Will Hep_vO promote better hygiene by stopping the escape of foul sewer air into habitable spaces?

YES - The valve has been proven to perform under conditions in which traditional water seal traps are vulnerable to failure. It will continue to perform under back pressures 10 times greater than those experienced in correctly designed soil and waste systems.

7 Does the air tight seal break down if a strand of cloth or hair collects in the strainer and falls down between the faces of the valve?

NO - Hep_vO has undergone extensive foreign body testing (IAPMO IGC203-04). Tests show that the valve will maintain an air tight seal around an obstruction such as hair, fabric strands or spaghetti.

8 What is the life expectancy of Hep_vO?

Installed correctly Hep_vO can be expected to have a life expectancy at least equivalent to current water sealed traps. In addition Hep_vO is guaranteed against defects in materials or manufacturing for a period of 3 years.

9 Will Hep_vO block easily for example if fat is discharged through it?

NO - Extensive testing has shown that Hep_vO is less prone to blockage than traditional water seal traps. **Note: because the 'straight through' design of Hep_vO does not trap debris discharged through the waste fixture care should be taken with jewelry and other valuables.**

10 Will the seal be maintained even when the fixture hasn't been used for some time?

YES - Hep_vO does not depend on a water seal and so it will continue to maintain a seal whether a fixture never gets used or is used very infrequently.

11 Does the valve make a noise?

Under normal conditions Hep_vO operates silently, unlike normal traps that are prone to 'gurgle'

12 Will Hep_vO support microbiological growth?

NO - The materials used to manufacture Hep_vO will not support microbiological growth for example mold and mildew.

TOLL FREE HELPLINE
800-241-5236

Hep_vO/USA/11/12/3528

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standards proposed for inclusion in the code, ASME A112.18.8 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

RP149-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

P3201.1-RP-GEORGE.doc

RP150 – 13

P3201.2, P3201.2.1 (New), P3201.2.2 (New), P3201.2.3 (New), P3201.2.4 (New), Chapter 44

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee
(Dave.Hall@georgetown.org)

Revise as follows:

P3201.2 Trap seals and trap seal protection. Each fixture trap shall have a liquid seal of not less than 2 inches (51 mm) and not more than 4 inches (102 mm). ~~Traps for floor drains shall be fitted with a trap primer or shall be fitted with a trap primer or shall be of the deep seal design. Trap seal primer valves shall connect to the trap at a point above the level of the trap seal.~~

P3201.2.1 Trap seal protection. Traps seals of emergency floor drain traps and traps subject to evaporation shall be protected by one of the methods in Sections P3201.2.1 through P3201.2.4.

P3201.2.1 Potable water supplied trap seal primer valve. A potable water supplied trap seal primer valve shall supply water to the trap. Water supplied trap seal primer valves shall conform to ASSE 1018. The discharge pipe from the trap seal primer valve shall connect to the trap above the trap seal on the inlet side of the trap.

P3201.2.2 Reclaimed or gray water supplied trap seal primer valve. A reclaimed or gray water supplied trap seal primer valve shall supply water to the trap. Water supplied trap seal primer valves shall conform to ASSE 1018. The quality of reclaimed or gray water supplied to trap seal primer valves shall be in accordance with the requirements of the manufacturer of the trap seal primer valve. The discharge pipe from the trap seal primer valve shall connect to the trap above the trap seal on the inlet side of the trap.

P3201.2.3 Waste water supplied trap primer device. A waste water supplied trap primer device shall supply water to the trap. Waste water supplied trap primer devices shall conform to ASSE 1044. The discharge pipe from the trap seal primer device shall connect to the trap above the trap seal on the inlet side of the trap.

P3201.2.4 Barrier type trap seal protection device. A barrier-type trap seal protection device shall protect the floor drain trap seal from evaporation. Barrier type floor drain trap seal protection devices shall conform to ASSE 1072. The devices shall be installed in accordance with the manufacturer's instructions.

Add new standard to Chapter 44 as follows:

ASSE

1072-07 Performance Requirements for Barrier Type Floor Drain Tap Seal Protection Devices

Reason: This revised and new language was approved for the 2015 IPC. This modification adds language to identify all of the methods available for protecting the trap seal of emergency floor drain traps or traps subject to evaporation. The four methods available are: water supplied trap seal primers, waste supplied trap primer devices, trap seal protection devices, and reclaimed water. A water supplied trap seal primer that is unrestricted can discharge 300 to 500 gallons a year to a trap. A 2" trap requires less than ½ gallon a year to maintain the trap seal. There are now devices available that limit the amount of water discharging to 8 gallons per year. This is another water conservation measure.

Waste supplied trap primer devices divert water from a sink or lavatory to the trap. There is no need to limit the flow on these devices since they use waste water.

Trap seal protection devices do not require any water. They are tested for providing protection of the trap seal.

Reclaimed water can also be used to maintain the trap seal. Since the water is reclaimed, there is no need to limit the annual discharge.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and

multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. X30 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standards proposed for inclusion in the code, ASSE 1072 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

RP150-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P3201.2-RP-HALL-PMGCAC

RP151 – 13

P3201.4

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P3201.4 Building traps. ~~Building traps shall be prohibited. Building traps shall not be installed, except in special cases where sewer gases are extremely corrosive or noxious, as directed by the building official.~~

Reason: This revised language was approved for the 2015 IPC. The only remaining purpose identified for the installation of a building trap is to keep rats out of the building. However, super rats can swim through the building trap. Hence, the building trap serves no useful purpose. The problem with building traps is that they create a major obstruction to the flow of sewage. As a result, they often cause stoppages. Since the 1960's, it has been recognized that building traps should be eliminated. The code needs to recognize this by deleting the wording requested by certain major cities. These cities should eliminate their requirements for building traps since they are an obstruction to the flow.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. X31 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP151-13

Public Hearing:	Committee: AS	AM	D
	Assembly: ASF	AMF	DF

P3201.4-RP-HALL-PMGCAC

RP152 – 13

P3201.7, Table P3201.7

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

P3201.7 Size of fixture traps. ~~Fixture~~ Trap sizes for plumbing fixtures shall be ~~sufficient to drain the fixture rapidly and not less than the size as indicated in Table P3201.7. Where the tailpiece of a plumbing fixture is larger than that indicated in Table P3201.7, the trap size shall be the same nominal size as the fixture tailpiece.~~ A trap shall not be larger than the drainage pipe into which the trap discharges.

TABLE P3201.7
REQUIRED SIZES OF TRAPS AND TRAP ARMS FOR PLUMBING FIXTURES

PLUMBING FIXTURE	REQUIRED TRAP SIZE MINIMUM (inches)
Lavatory	1 ¼ or 1 1/2
Water closet	Note a

Consult fixture standards for trap dimensions of specific bowls.

(Portions of table not shown remain unchanged)

Reason: "Sufficient to drain the fixture rapidly" is unenforceable language. The trap sizes in the table should not be minimum sizes but required sizes because too large of trap doesn't allow for proper scouring and cleaning action in the trap. The term "trap arm" is slang. As a water closet has an integral trap, it should not be listed in the table so footnote a was deleted. This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 73 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP152-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

P3201.7-RP-HALL-PMGCAC

RP153 – 13

Table P3302.1

Proponent: David Hall CFM, Georgetown, Texas representing the ICC PMG Code Action Committee (Dave.Hall@georgetown.org)

Revise as follows:

**TABLE P3302.1
SUBSOIL DRAIN PIPE**

MATERIAL	STANDARD
Polyvinyl chloride (PVC) Plastic pipe (type sewer pipe, <u>SDR 35</u> PS25, PS50 or PS100)	ASTM D 2729; <u>ASTM D 3034</u> ; ASTM F 891; CSA B182.2; CSA B182.4

(Portions of table not shown are unchanged)

Reason: This type of pipe material is readily available in perforated form and should be allowed to be used in the application. It is commonly being used in these applications. A similar proposal to the IPC was Approved as Submitted. This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes. For PMGCAC member reference, this was item no. 74 on the PMGCAC IRC-P list.

Cost Impact: The code change proposal will not increase the cost of construction.

RP153-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

P3302.1-RP-HALL-PMGCAC

2013 PROPOSED CHANGES TO THE INTERNATIONAL SWIMMING POOL AND SPA CODE

INTERNATIONAL SWIMMING POOL AND SPA CODE COMMITTEE

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Staff Engineer - Plumbing
International Code Council
Country Club Hills, IL

TENTATIVE ORDER OF DISCUSSION 2013 PROPOSED CHANGES TO THE INTERNATIONAL SWIMMING POOL AND SPA CODE

The following is the tentative order in which the proposed changes to the code will be discussed at the public hearings. Proposed changes which impact the same subject have been grouped to permit consideration in consecutive changes.

Proposed change numbers that are indented are those which are being heard out of numerical order. Indentation **does not** necessarily indicate that one change is related to another. Proposed changes may be grouped for purposes of discussion at the hearing at the discretion of the chair. Note that some ISPSC code change proposals may not be included on this list, as they are being heard by other committees. Please consult the Cross Index of Proposed Changes.

ADM1-13, Part V	SP31-13
ADM8-13, Part III	SP32-13
ADM18-13, Part III	SP33-13
ADM21-13, Part III	SP34-13
ADM22-13, Part V	SP35-13
ADM23-13, Part III	SP36-13
ADM24-13, Part III	SP37-13
ADM50-13, Part III	SP38-13
ADM51-13, Part V	SP39-13
ADM52-13, Part V	SP40-13
ADM55-13, Part V	SP41-13
ADM58-13, Part III	SP42-13
ADM59-13, Part III	SP43-13
ADM60-13, Part V	SP44-13
SP1-13	SP45-13
SP2-13	SP46-13
SP3-13	SP47-13
SP4-13	SP48-13
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SP12-13	SP56-13
SP13-13	SP57-13
SP14-13	SP58-13
SP15-13	SP59-13
SP16-13	SP60-13
SP17-13	SP61-13
SP18-13	SP62-13
SP19-13, Part I	SP63-13
SP20-13	SP64-13
SP21-13	SP65-13
SP22-13	SP66-13
SP23-13	SP67-13
SP24-13	SP68-13
SP25-13	SP69-13
SP26-13	SP70-13
SP27-13	SP71-13
SP28-13	SP72-13
SP29-13	
SP30-13	

SP1 – 13

105.3

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

105.3 Construction documents. *Construction documents*, engineering calculations, diagrams and other such data shall be submitted in two or more sets with each application for a *permit*. The *code official* shall require construction documents, computations and specifications to be prepared and designed by a registered design professional when required by state law. *Construction documents* shall be drawn to scale and shall be of sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail that the work conforms to the provisions of this code. Manufacturer's instructions shall serve as *construction documents* for onground storable pools that are supplied by the manufacturer as a kit that includes all pipe, fittings and components.

Reason: This change is necessary because construction documents for these types of pools are the instruction manuals themselves, there are not other type of *construction documents*. Therefore, if an onground storable pool is found to fall within the scope of this code, this change will provide that a construction document can consist of the instruction manuals for a fully self-contained on-ground storable pool.

Cost Impact: The code change proposal will not increase the cost of construction.

SP1-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

105.3-SP-HATFIELD.DOC

SP2– 13

202

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

ACCESSIBLE. Signifies access to something that does not require or that could requires the removal of an access panel or similar removable obstruction.

Reason: Accessible means “able to be reached”. As written this “requires” that you remove a panel or obstruction to access equipment and there is no reason for such a requirement.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: In the International Building Code, the term ACCESSIBLE is defined as “As a *site, building, facility* or portion thereof that complies with IBC Chapter 11”. The scope of Chapter 11 concerns the design and construction of facilities for accessibility for physically disabled persons. In the International Residential Code, the International Mechanical Code and the International Plumbing Code, the term ACCESSIBLE is defined as “Signifies access that requires the removal of an access panel or other similar removable obstruction. Also, in those three codes, the term READILY ACCESSIBLE is defined as “Signifies access without the necessity for removing a panel or other similar obstruction.”

SP2-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

202-ACCESSIBLE-SP-HATFIELD.DOC

SP3 – 13

202

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

AQUATIC VESSEL. A vessel, permanent or temporary, intended for swimming, bathing, or wading and that is designed and manufactured to be connected to a *circulation system*. ~~Portable vessels 12 inches (305 mm) or less in designed water depth which are drained and filled daily are not considered aquatic vessels.~~ For purposes of this code, the term is used to identify all the types of vessels governed by this code, including: swimming pools, aquatic facilities, *spas* and hot tubs, and related equipment. Such vessels are either used in a *residential* application or in a public application.

Reason: The sentence being removed is unnecessary and only adds confusion as it leads the reader to think that vessels over 12 inches in water depth are aquatic vessels. If an aquatic vessel has a circulation system, then it is an aquatic vessel, no matter what the depth is. Whereas there are, for example, 18 inch portable vessels that are drained and filled daily and do not have a circulation system.

Cost Impact: The code change proposal will not increase the cost of construction.

SP3-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

202-AQUATIC VESSEL #1-SP-HATFIELD.DOC

SP4 – 13

202

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

~~POOL AND SPA AQUATIC VESSEL~~. A vessel, permanent or temporary, intended for swimming, bathing, or wading and that is designed and manufactured to be connected to a *circulation system*. Portable vessels 12 inches (305 mm) or less in designed water depth which are drained and filled daily are not considered aquatic vessels. For purposes of this code, the term is used to identify all the types of vessels governed by this code, including: *swimming pools*, *onground storable pools*, *aquatic recreation facilities*, *spas* and hot tubs, and related equipment. Such vessels are either used in a *residential* application or in a *public* application.

Reason: This proposal is being submitted due to the comments received from various I-code participants/users: builders, building departments, and others in the audience at the most recent I-code hearings for group A. There is a view that the term "aquatic vessel" is misleading or just not a good term because they associate it with a boat, not a pool. This concern resulted in a code proposal for the IBC, to reference the ISPSC and the new term, to not be adopted. Therefore, this proposal is offering a possible solution, to simply provide the term "pool and spa" to incorporate all the different pools and spas that exist.

Cost Impact: The code change proposal will not increase the cost of construction.

SP4-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

202-AQUATIC VESSEL #2-SP-HATFIELD.DOC

SP5– 13

202

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Delete without substitution:

COVER. ~~A device that covers, and protects an aquatic vessel, or spa, or hot tub. See safety cover.~~

Reason: The proposal fixes a sentence that as currently written does not make sense . The proposal attempts to fix the incomplete sentence and inserts the "aquatic vessel" term currently used to cover all different types of pools and spas because the original language left off *pool*. If a decision is made to go with a different term than aquatic vessel an alternative approach would be inserting "pool, spa, or hot tub."

Cost Impact: The code change proposal will not increase the cost of construction.

SP5-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

202-COVER-SP-HATFIELD.DOC

SP6 – 13

202

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Add new definition as follows:

DECK. An area immediately adjacent to or attached to a pool or spa that is specifically constructed or installed for sitting, standing, or walking.

Reason: This definition is found in the APSP-1 Public Pool Standard and should be included in the definitions not only due to its inclusion in the ANSI approved APSP-1 Standard, but also due to the fact the ISPSC has a deck section (Section 306) and many public pool state health codes define "deck." Therefore adding a definition provides clarity that in the case of the ISPSC, we are dealing with decks installed in conjunction with a pool or spa, for pool or spa users. Chose to use "pool or spa" and not "aquatic vessel" for this submittal, but if the committee chooses to stick with the "aquatic vessel" terminology then would encourage that be utilized in this definition rather than "pool or spa."

Cost Impact: The code change proposal will not increase the cost of construction.

SP6-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

202-DECKS (NEW)-SP-HATIFIELD.DOC

SP7 – 13

202

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

DESIGN WATERLINE The centerline of the *skimmer* or other point as defined by the ~~design professional~~
designer of the pool or spa.

Add new definition as follows:

DESIGN PROFESSIONAL. An individual who is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration or licensing laws of the state or jurisdiction in which the project is to be constructed.

Reason: This proposal is being submitted in order to have discussion at the committee hearings on these two definitions. Concerns regarding the design water line definition are as follows: Design professional implies some form of certification. That may not always be the case, which is reason for proposed change. Although the I-codes define “registered design professional” it is not currently listed in the ISPSC. This proposal adds the definition used in APSP-16, but could also be amended to include the I-code definition.

Cost Impact: The code change proposal will not increase the cost of construction.

SP7-13

Public Hearing: Committee:
Assembly:

AS
ASF

AM
AMF

D
DF

202-DESIGN WATER LINE-SP-HATFIELD.DOC

SP8 – 13

202

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Add new definition as follows:

HANDHOLD. That portion of a pool structure or a specific element that is at or above the design waterline and all around the perimeter of the pool that enables users in the pool to grasp onto for support.

Reason: Handhold requirements are found in multiple sections of the ISPSC, but have no corresponding definition. A handrail is also found in multiple sections of the ISPSC and in that case we have a corresponding definition. A handhold definition is also part of many state public pool health codes and should be included in the ISPSC.

Cost Impact: The code change proposal will not increase the cost of construction.

SP8-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

202-HANDHOLD (NEW)-SP-HATFIELD.DOC

SP9 – 13

202

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Delete without substitution:

LABEL. ~~An identification applied on a product by the manufacturer that contains the name of the manufacturer, the function and performance characteristics of the product or material, and the name and identification of an approved agency and that indicates that the representative sample of the product or material has been tested and evaluated by an approved agency.~~

Reason: There are only 4 places in the code where the term "label" is used (106.10, LABELED definition, 406.6.1, and 808.4). Those uses only refer to the first half of the "label" definition and not to the second half "and the name and identification of an *approved* agency and that indicates that the representative sample of the product or material has been tested and evaluated by an *approved* agency.". It is suggested that the term "label" be removed as a defined term altogether and simply rely upon the Webster's definition.

Cost Impact: The code change proposal will not increase the cost of construction.

SP9-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

202-LABEL-SP-HATFIELD.DOC

SP10 – 13

202

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

~~**MAIN DRAIN.** A submerged *suction outlet* to conduct water to the recirculating pump.~~

~~**OUTLET FITTING.** The aperture or fitting through which the water flows from the pool, spa, or hot tub.~~

SUCTION OUTLET. A submerged fitting, fitting assembly, cover/grate, and related components that provide a localized low-pressure area for the transfer of water from a swimming pool, spa, or hot tub. Submerged suction outlets have also been referred to as main drains. See “Outlet fitting.”

Reason: The *outlet fitting* term is never used alone in the code whereas *suction outlet fitting* is used in Sections 311.4.1 and 314.3. The language being proposed as the new *suction outlet* definition comes directly from APSP-16 and since APSP-16 used the term *suction outlet* will also suggest, if this code change moves forward, that Sections 311.4.1 and 314.3 remove the italics used for *fitting* so it follows what we are now defining. Regarding the removal of MAIN DRAIN – it would correspond with the replacement of “main drain” with “suction outlet” under our Section 321 Lighting proposal. This subsection in 321 was the only place in the ISPSC that used the word “main drain,” by replacing with “suction outlet” and eliminating the “main drain” definition we are getting consistency with using the term “suction outlet,” which at this point is commonplace verbiage with VGB & APSP-7, and APSP-16. That being said, we note in the *suction outlet* definition that that have also been referred to as “main drains.”

Cost Impact: The code change proposal will not increase the cost of construction

SP10-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

202-MAIN DRAIN-SP-HATFIELD.DOC

SP11 – 13

202

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Add definition as follows:

PERIMETER OVERFLOW SYSTEM. A system that includes perimeter-type overflow gutters, a surge basin and similar surface water collection system components and the interconnecting piping.

Reason: Section 315 addresses these systems, but it is not defined. Many state health codes have such a definition.

Cost Impact: The code change proposal will not increase the cost of construction.

SP11-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

202-PERIMETER OVERFLOW SYSTEM (NEW) -SP-HATFIELD.DOC

SP12 – 13

202, 405.1

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

PUBLIC POOL.

CLASS A, COMPETITION POOL. A pool intended for use for accredited competitive aquatic events such as Federation Internationale De Natation (FINA), USA Swimming, USA Diving, USA Synchronized Swimming, USA Water Polo, National Collegiate Athletic Association(NCAA), National Federation of State High School Associations(NFHS). The use of the Such pools are often used for recreation and other water activities in addition to ~~is not limited to~~ competitive events.

CLASS B, PUBLIC POOL. A pool intended for public recreational use that is not identified in the other classifications of public pools.

CLASS F. Class F pools are wading pools and are covered within the scope of this code as set forth in Section 405.

405.1 Wading pools. Class F wading pools shall be separate pools with an independent *circulation system* and shall be physically separated from the main pool. Such wading pools shall be constructed in accordance with Sections 405.2 through 405.6.

Reason: : A definition of wading pool was missing from the current ISPSC edition and this terminology follows the APSP-1 standard re-write on defining a wading pool as CLASS F and referencing the section of the standard that provides the specific requirements for the wading pool. Also updated CLASS A and CLASS B, per the APSP-1 rewrite.

Cost Impact: The code change proposal will not increase the cost of construction

SP12-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

202-PUBLIC SWIMMING POOL-SP-HATFIELD

SP13 – 13

202

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

SAFETY COVER. ~~A barrier intended to be completely removed before entry of users for swimming pools, spas, hot tubs or wading pools, attendant appurtenances and/or anchoring mechanisms that will, when properly labeled, installed, used, and maintained in accordance with the manufacturer's published instructions. These covers are either a power or manual type.~~ A structure, fabric or assembly, along with attendant appurtenances and anchoring mechanisms, that is temporarily placed or installed over an entire pool, spa or hot tub and secured in place after all bathers are absent from the water. A safety cover is intended to be completely removed before users enter the pool, spa or hot tub. A safety cover is not complete unless the placement, installation, securing and maintenance of such covers is in accordance with the manufacturer's instructions. The primary purpose for installation of a safety cover is to inhibit access to the contained body of water by children under five years of age so as to reduce the risk of drowning. Safety covers are designed to limit the amount of water, such as from rainwater and snowmelt, that could collect on the surface of the cover so as to reduce the risk of children drowning in the collected water. Such covers are either a power type or a manual type.

Reason: Currently does not follow the ASTM F 1346 cover standard definition (see Section 3.1.17) for safety cover and as currently written the sentence does not make sense. The changes above align with the ASTM standard and address the concern that the term "labeled" would be confused with "*listed* and *labeled*".

Cost Impact: The code change proposal will not increase the cost of construction.

SP13-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

202-SAFETY COVER-SP-HATFIELD.DOC

SP14 – 13

202

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

SURGE CAPACITY. The storage volume in a *surge tank*, gutter and plumbing lines. ~~See “System capacity.”~~

Reason: “System capacity” is not in the definitions section and is not a term that is used in the code, so it is meaningless and should be removed here.

Cost Impact: The code change proposal will not increase the cost of construction.

SP14-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

202-SURGE CAPACITY-SP-HATFIELD.DOC

SP15 – 13

202

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

UNDERWATER LEDGE. A narrow shelf projecting from the side of a vertical structure, ~~whose dimensions are defined in the appropriate standard.~~

Reason: Deleting "whose dimensions are defined in the appropriate standard" because is unnecessary and confusing wording.

Cost Impact: The code change proposal will not increase the cost of construction.

SP15-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

202-UNDERWATER LEDGE-SP-HATFIELD.DOC

SP16 – 13

302.3

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

302.3 Pipe, fittings, valves and returns components. Pipe, fittings, valves and returns components for public aquatic vessels shall be listed and labeled in accordance with NSF 50 or NSF 14. ~~Plastic jets, fittings, and outlets used in public spas shall be listed and labeled in accordance with NSF 50.~~

Exception: ~~Portable residential spas and portable residential exercise spas listed and labeled in accordance with UL 1563 or CSA C22.2 No. 218.1.~~

Reason: NSF 50 applies to public and residential pool and spa materials, products, equipment and system. NSF 14 applies to plastic piping systems and related components. This proposal limits this section to certain components, and in a public aquatic setting. The listing and labeling of pipe and fittings in residential applications is covered in sufficient detail in Sections 311.4 and 311.4.1 and is not necessary in this section. The portable residential spa exception is no longer necessary because this section would now be limited to public aquatic vessels.

Cost Impact: The code change proposal will not increase the cost of construction.

SP16-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

302.3 #1-SP-HATFIELD.DOC

SP17 – 13

302.3

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

302.3 Pipe, fittings and components. Pipe, fittings and components shall be *listed* and *labeled* in accordance with NSF 50 or NSF 14. Plastic jets, fittings, and outlets used in public *spas* shall be *listed* and *labeled* in accordance with NSF 50.

Exceptions:

1. *Portable residential spas* and *portable residential exercise spas* *listed* and *labeled* in accordance with UL 1563 or CSA C22.2 No. 218.1.
2. Onground storable pools supplied by the pool manufacturer as a kit that includes all pipe, fittings and components.

Reason: These types of pools currently do not obtain NSF 50 or 14 listing; therefore, they should be excluded from this requirement.

Cost Impact: The code change proposal will not increase the cost of construction.

SP17-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

302.3 #2-SP-HATFIELD.DOC

SP18 – 13

302.7

Proponent: Wesley Walters, Clark County Nevada Development Services, representing self

Revise as follows:

302.7 Tests. Tests on water piping systems constructed of plastic piping shall not use compressed air for the test.

Reason: The section heading covers both plumbing and gas piping. When buried gas lines of plastic are used their standard for testing is to use air. This clarifies the safety concerns for which application this restriction is for water piping only.

Cost Impact: The code change proposal will not increase the cost of construction.

SP18-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

302.7-SP-WALTERS.DOC

SP19 – 13

303.1; IECC C404.7; IECC R403.9

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

THIS IS A 3 PART CODE CHANGE. PART I WILL BE HEARD BY THE ISPSC COMMITTEE, Part II WILL BE HEARD BY THE IECC-CE COMMITTEE, PART III WILL BE HEARD BY THE IECC-RE COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I - ISPSC

Revise as follows:

303.1 General Pool and spa energy consumption. The energy consumption of requirements for pools and inground-permanently installed *permanent residential spas* shall be controlled by the requirements as specified in Sections 303.2 1.1 through 303.1.4, and APSP 15. ~~The energy requirements for residential portable electric spas shall be in accordance with APSP 14.~~

303.1.1 Residential pools and permanent residential spas. Residential swimming pools and permanent residential spas shall be in accordance with APSP-15.

303.1.2 Heaters. The electric power to heaters shall be ~~equipped with~~ controlled by an readily accessible external on-off switch that is mounted on the exterior of the heater or external to and within 3 feet (914 mm) of the heater. Operation of such switch shall not change the setting of the heater thermostat. Such switches shall be in addition to a circuit breaker for the power to the heater. to allow the heater to be shutoff without adjusting the thermostat setting. Such switch shall be ~~provided with ready access.~~ Gas-fired heaters shall not be equipped with ~~continuous pilot burners~~ continuously-burning ignition pilots.

Exception: ~~Portable residential spas and portable residential exercise spas.~~

303.1.3 Time switches. Time switches or other control methods that can automatically turn off and on heaters and pumps ~~motors~~ according to a preset schedule shall be installed ~~with for on all heaters and pump motors.~~ Heaters and ~~pumps and motors~~ that have built-in timers switches shall be ~~deemed in compliance with this section requirement.~~

Exceptions:

1. Where public health standards require 24-hour pump operation.
2. Pumps that operate solar- or waste-heat recovery pool heating systems.
3. ~~Portable residential spas and portable residential exercise spas.~~

303.1.4 Covers. Outdoor heated pools and outdoor inground-permanently installed permanent residential spas shall be provided with a vapor retardant cover, a liquid cover or other approved vapor retardant means in accordance with 104.11.

Exception: Where more than 70 percent of the energy for heating, computed over an operating season, is from site-recovered energy such as from a heat pump or solar energy source, covers or other vapor retardant means shall not be required.

303.2 Portable residential spas. The energy consumption of electric-powered portable residential spas shall be controlled by the requirements of APSP 14.

PART II - IECC-COMMERCIAL PROVISIONS

Revise as follows:

C404.7 Pools and spa energy consumption inground permanently installed spas. (Mandatory). ~~Pools and inground permanently installed spas shall comply with Sections C404.7.1 through C404.7.3. The energy consumption of pools and inground permanent residential spas shall be controlled by the requirements in Sections C404.7.1 through C404.7.4.~~

C404.7.1 Heaters. ~~The electric power to all heaters shall be equipped with controlled by an readily accessible external on-off switch that is mounted on the exterior of the heater or external to and within 3 feet (914 mm) of the heater. Operation of such switch shall not change the setting of the heater thermostat. Such switches shall be in addition to a circuit breaker for the power to the heater. to allow the heater to be shutoff without adjusting the thermostat setting. Such switch shall be provided with ready access. Gas-fired heaters shall not be equipped with continuous pilot burners continuously-burning ignition pilots.~~

Exception: ~~Portable residential spas and portable residential exercise spas.~~

C404.7.2 Time switches. Time switches or other control methods that can automatically turn off and on heaters and pump motors according to a preset schedule shall be installed ~~with~~ for ~~on~~ all heaters and pump motors. Heaters ~~and~~ pumps ~~and~~ motors that have built-in timers switches shall be ~~deemed in~~ compliance with this section requirement.

Exceptions:

1. Where public health standards require 24-hour pump operation.
2. ~~Where Pumps that are required to~~ operate solar- and waste-heat-recovery pool heating systems.

C404.7.3 Covers. Outdoor heated pools and outdoor inground permanently installed permanent residential spas shall be provided with a vapor retardant cover, a liquid cover or other approved vapor retardant means.

Exception: ~~A vapor retardant cover is not required for pools deriving over 70 percent of the energy for heating from site-recovered energy, such as a heat pump or solar energy source computed over an operating season. Where more than 70 percent of the energy for heating, computed over an operating season, is from site-recovered energy such as from a heat pump or solar energy source, covers or other vapor retardant means shall not be required.~~

C404.8 Portable residential spas. The energy consumption of electric-powered portable residential spas shall be controlled by the requirements of APSP 14.

Part III - IECC-Residential Provisions

Revise as follows:

R403.9 Pools and spa energy consumption inground permanently installed spas. (Mandatory). ~~Pools and inground permanently installed spas shall comply with Sections R403.9.1 through R403.9.3. The energy consumption of pools and inground permanent residential spas shall be controlled by the requirements in Sections R403.9.1 through R403.9.4.~~

R403.9.1 Heaters. The electric power to heaters shall be equipped with controlled by an readily accessible external on-off switch that is mounted on the exterior of the heater or external to and within 3 feet (914 mm) of the heater. Operation of such switch shall not change the setting of the heater

~~thermostat. Such switches shall be in addition to a circuit breaker for the power to the heater. to allow the heater to be shutoff without adjusting the thermostat setting. Such switch shall be provided with ready access. Gas-fired heaters shall not be equipped with continuous pilot burners continuously-burning ignition pilots.~~

R403.9.2 Time switches. Time switches or other control methods that can automatically turn off and on heaters and pump motors according to a preset schedule shall be installed ~~with~~ for on all heaters and pump motors. Heaters and, pumps and motors that have built-in timers switches shall be ~~deemed in~~ compliance with this section ~~requirement~~.

Exceptions:

1. Where public health standards require 24-hour pump operation.
2. ~~Where Pumps that are required to~~ operate solar- and waste-heat-recovery pool heating systems.

R403.9.3 Covers. Outdoor heated pools and outdoor ~~inground permanently installed~~ permanent residential spas shall be provided with a vapor retardant cover, a liquid cover or other approved vapor retardant means.

Exception: ~~A vapor retardant cover is not required for pools deriving over 70 percent of the energy for heating from site-recovered energy, such as a heat pump or solar energy source computed over an operating season. Where more than 70 percent of the energy for heating, computed over an operating season, is from site-recovered energy such as from a heat pump or solar energy source, covers or other vapor retardant means shall not be required.~~

R403.10 Portable residential spas. The energy consumption of electric-powered portable residential spas shall be controlled by the requirements of APSP 14.

Reason:

PART I: This code change provides for the following:

1. All parts work to provide consistent language with pool and spa energy provisions found in the ISPSC and IECC. Some portions have been added here that were already included in the ISPSC and vice versa on part II and III of this proposal below.
2. Clarifies APSP-15 only applies to residential pools and inground spas.
3. Changes wording to use defined terms, as found in Chapter 2 of the ISPSC.
4. Clarifications regarding on-off switches for heaters.
6. Consistent verbiage within the time switch requirements.
7. Provides for clarity that the cover requirements are only for outdoor pools.
8. Provides for options when it comes to pool and spa covers to ensure one can comply with more intricately designed pools and spas (shape, size/infinity pools/etc.). Otherwise if only one type of method can be used then the code is limiting the design of any pool or spa. The "typical" rectangle pool is no longer the norm.

PART II Reason: This code change provides for the following:

1. All parts work to provide consistent language with pool and spa energy provisions found in the ISPSC and IECC. Some portions have been added here that were already included in the ISPSC and vice versa on part II and III of this proposal below.
2. Changes wording to use defined terms, as found in Chapter 2 of the ISPSC.
3. Clarifications regarding on-off switches for heaters.
4. Consistent verbiage within the time switch requirements.
5. Provides for clarity that the cover requirements are only for outdoor pools.
6. Provides for options when it comes to pool and spa covers to ensure one can comply with more intricately designed pools and spas (shape, size/infinity pools/etc.). Otherwise if only one type of method can be used then the code is limiting the design of any pool or spa. The "typical" rectangle pool is no longer the norm.
7. Provides for a new subsection to address portable residential spas in the rare case they would be used for more than a four story building and therefore fall under the commercial code.

PART III Reason: This code change provides for the following:

1. All parts work to provide consistent language with pool and spa energy provisions found in the ISPSC and IECC. Some portions have been added here that were already included in the ISPSC and vice versa on part II and III of this proposal below.
2. Clarifies APSP-15 only applies to residential pools and inground spas.
3. Changes wording to use defined terms, as found in Chapter 2 of the ISPSC.
4. Clarifications regarding on-off switches for heaters.
5. Consistent verbiage within the time switch requirements.
6. Provides for clarity that the cover requirements are only for outdoor pools.
7. Provides for options when it comes to pool and spa covers to ensure one can comply with more intricately designed pools and spas (shape, size/infinity pools/etc.). Otherwise if only one type of method can be used then the code is limiting the design of any pool or spa. The "typical" rectangle pool is no longer the norm.
8. Provides for a new subsection to address portable residential spas, requiring their compliance with the APSP-14 energy standard, consistent with the ISPSC.

Cost impact: These code change proposals will not increase the cost of construction.

SP19-13

PART I – INTERNATIONAL SWIMMING POOL AND SPA CODE

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART II – INTERNATIONAL ENERGY CONSERVATION CODE-COMMERCIAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

PART III – INTERNATIONAL ENERGY CONSERVATION CODE-RESIDENTIAL

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

303.1-SP-HATFIELD.DOC

SP20-13

304.3

Proponent: Gregory Wilson, representing Department of Homeland Security, Federal Emergency Management Agency (Gregory.wilson2@fema.dhs.gov) and Rebecca Quinn, RCQuinn Consulting, Inc., representing Federal Emergency Management Agency (rcquinn@earthlink.net).

Revise as follows:

304.3 Aquatic vessels in coastal high-hazard areas flood hazard areas subject to high-velocity wave action. ~~Aquatic vessels installed in flood hazard areas subject to high-velocity wave action (coastal high hazard areas)~~ shall be designed and constructed in accordance with ASCE 24.

Reason: This proposal makes the terminology in the ISPSC consistent with terms used in the other I-Codes. This change was Approved as Submitted for the IBC as S103-12.

Cost Impact: None.

SP20-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

304.3-SP-QUINN-WILSON.DOC

SP21 – 13

305.2.1

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

305.2.1 Barrier height and clearances. Barrier heights and clearances shall be in accordance with all of the following:

1. The top of the *barrier* shall be not less than 48 inches (1219 mm) above grade where measured on the side of the *barrier* that faces away from the *aquatic vessel*. Such height shall exist around the entire perimeter of the barrier vessel and for a distance of 3 feet (914 mm) ~~where~~ measured horizontally from the outside of the required *barrier*.
2. The vertical clearance between grade and the bottom of the *barrier* shall not exceed 2 inches (51 mm) for grade surfaces that are not solid, such as grass or gravel, where measured on the side of the barrier that faces away from the vessel.
3. The vertical clearance between a surface below the barrier to a solid surface, such as concrete, and the bottom of the required *barrier* shall not exceed 4 inches (102 mm) where measured on the side of the required barrier that faces away from the vessel.
4. Where the top of the vessel structure is above grade, the *barrier* shall be installed on grade or shall be mounted on top of the vessel structure. Where the *barrier* is mounted on the top of the vessel, the vertical clearance between the top of the vessel and the bottom of the *barrier* shall not exceed 4 inches (102 mm).

Reason: Under Item 1) for this subsection, the term “vessel” should be changed to “barrier” because talking about the height of the barrier. Section 305.2 already says that the barrier should surround the vessel. The language doesn’t say which side of the barrier the 3 feet horizontal is for requiring the 48 inch height to be measured – it could be interpreted to mean both sides of the barrier. It needs to say on the outside of the barrier.

Cost Impact: The code change proposal will not increase the cost of construction.

SP21-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

305.2.1-SP-HATFIELD.DOC

SP22 – 13

305.2.4

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

305.2.4 Mesh ~~restraining~~ barrier/fence. Mesh fences, other than chain link fences in accordance with Section 305.2.7, shall be installed in accordance with the manufacturer's instructions and shall comply with the following:

1. The bottom of the mesh ~~restraining~~ fence shall be not more than 1 inch (25 mm) above the deck or installed surface or grade.
2. The maximum vertical clearance from the bottom of the mesh fence and the solid surface shall not permit the fence to be lifted more than 4 inches (102 mm) from grade or decking.
3. The fence shall be designed and constructed so that it does not allow passage of a 4-inch (102 mm) sphere under any mesh panel. The maximum vertical clearance from the bottom of the mesh fence and the solid surface shall not be more than 4 inches (102 mm) from grade or decking.
4. An attachment device shall attach each barrier section at a height not lower than 45 inches (1143 mm) above grade. Common attachment devices include, but are not limited to, devices that provide the security equal to or greater than that of a hook-and-eye type latch incorporating a spring-actuated retaining lever such as a safety gate hook.
5. Where a hinged gate is used with a mesh ~~fence barrier~~, the gate shall comply with Section 305.3.
6. Patio deck sleeves such as vertical post receptacles which are placed inside the patio surface shall be of a nonconductive material.
7. Mesh fences shall not be installed ~~used~~ on top of on ground *residential pools*.

Reason: The term "restraining" should be removed as it is confusing and unnecessary. Under Item 5 changing to fence because consistent with the other items where we always say mesh fence, even though the title of this subsection does say barrier/fence, so both are okay. Item 7 provides a more accurate term.

Cost Impact: The code change proposal will not increase the cost of construction.

SP22-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

305.2.4-SP-HATFIELD.DOC

SP23 – 13

305.2.6

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

305.2.6 Widely spaced horizontal members. Where the *barrier* is composed of horizontal and vertical members and the distance between the tops of the horizontal members is 45 inches (1143 mm) or more, spacing between vertical members shall not exceed 4 inches (102 mm). Where there are decorative cutouts within vertical members, ~~spacing within the~~ interior width of the cutouts shall not exceed 1.75 inches (44 mm) ~~in width~~.

Reason: The phrase “spacing within the” should be deleted as it is confusing.

Cost Impact: The code change proposal will not increase the cost of construction.

SP23-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

305.2.6-SP-HATFIELD.DOC

SP24 – 13

305.2.9

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

305.2.9 Clear zone. There shall be a clear zone of not less than 36 inches (914 mm) ~~around~~ between the exterior of the *barrier* and ~~around~~ any permanent structures or equipment such as pumps, *filters* and heaters that can be used to climb the barrier.

Reason: Read the “around” as requiring a 3 foot clear zone around the pool, isolating the pool fence by 3 ft, and also isolating certain equipment. This may be read to include a 3 ft separation between pool and house, even though the house does not provide a means to climb the barrier. Whereas the change to “between” would only require separation BETWEEN the pool and the climbable equipment etc. Making this change is also consistent with the APSP 9 Model Barrier Code Standard.

Cost Impact: The code change proposal will not increase the cost of construction.

SP24-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

305.2.9-SP-HATFIELD.DOC

SP25 – 13

305.3.1

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

305.3.1 Utility or service gates. ~~Gates, other than not intended for pedestrian access gates, shall not be required to be self-closing or have a self-latching feature. use, Such as utility or service gates, shall have a means to secure the gate with a lock when the gate is not in use locked remain when not in use.~~

Reason: The proposal mirrors what is found in Section 10.3.1 of APSP-8 model barrier standard, and appears to be written more in design and construction terms whereas the current language is in operation terms.

Cost Impact: The code change proposal will not increase the cost of construction.

SP25-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

305.3.1-SP-HATFIELD.DOC

SP26– 13

305.4

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

305.4 Structure wall as a barrier. Where a wall of a dwelling or structure serves as part of the *barrier*, and where any doors and or operable windows in the wall have with a sill heights of less than 48 inches (1219 mm) above the indoor floor that and where any of those doors or windows provide direct access to the aquatic vessel through the wall, shall be equipped with one or more of the following shall be required:

1. The doors and operable windows having a sill height of less than 48 inches (1219 mm) above the indoor floor shall have an alarm that produces an audible warning when the door, or window or their screens or window, is are opened. The alarm shall be listed and labeled as a water hazard entrance alarm in accordance with UL 2017. In dwellings or structures not required to be Accessible units, Type A units or Type B units, alarm the deactivation switches shall be located 54 inches (1372 mm) or more above the threshold of the door. In dwellings or structures required to be Accessible units, Type A units or Type B units, alarm the deactivation switches shall be located not greater than 54 inches (1372 mm) and not less than 48 inches (1219 mm) above the threshold of the door.
2. A safety cover that is listed and labeled in accordance with ASTM F 1346 is provided for the aquatic vessel.
3. An approved means of protection, such as self-closing doors with self-latching devices is provided. Such means of protection shall provide that the a degree of protection afforded that is not less than the protection afforded by Items 1 or 2.

Reason: How the charging paragraph originally was written, it did not make sense that doors and windows would be equipped with a safety cover, the proposed language clarifies what was the original intention

Cost Impact: The code change proposal will not increase the cost of construction.

SP26-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

305.4-SP-HATFIELD.DOC

SP27 – 13

305.5

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

305.5 Onground residential pool structure as a barrier. ~~Where~~ An onground *residential* pool wall structure is ~~used as a barrier~~ or ~~and a where the barrier is~~ mounted on top of ~~the~~ an onground *residential* pool wall structure, shall serve as a barrier where all of the following shall conditions are present apply:

1. ~~An-Where only the onground pool wall serves as the barrier, itself, shall be permitted to be as the barrier where the pool structure~~ the bottom of the wall is on grade, and the top of the wall is at least not less than 48 inches (1219 mm) above grade for the entire perimeter of the pool, the wall ~~and-complies~~ with the requirements of Section 305.2- and the pool manufacturer allows the wall to serve as a barrier.
2. Where a barrier is mounted on top of the pool wall, the top of the barrier is not less than 48 inches (1219 mm) above grade for the entire perimeter of the pool, and the wall and the barrier on top of the wall complies with the requirements of Section 305.2.
23. ~~Where Ladders or steps used as means of access to the pool, the means of access is a ladder or steps, the ladder or steps shall be~~ are capable of being secured, locked or removed to prevent access ~~or except where the ladder or steps are shall be~~ surrounded by a barrier that meets the requirements of ~~this~~ Section 305.
34. ~~When the ladder or steps are secured, locked or removed, Any Openings created by the securing, locking or removal of ladders and steps does shall~~ not allow the passage of a 4 inch (102 mm) diameter sphere.
45. ~~The Barriers that are mounted on top of onground residential pool walls are shall be~~ installed in accordance with the pool manufacturer's instructions.

Reason: Sometimes you have things on the side of the pool that could be a climbing point for the child and manufacturers put it in their instructions that the wall is not a barrier.

Cost Impact: The code change proposal will not increase the cost of construction.

SP27-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

305.5-SP-HATFIELD.DOC

SP28 – 13

306.3, 306.4 (New)

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals

Revise as follows:

306.3 ~~Stair treads and risers~~ Step risers and treads. ~~Stair riser heights shall be in accordance with the International Residential Code or the International Building Code, as applicable in accordance with Section 102.7.1. Step risers for decks of public aquatic vessels shall be uniform and have a height not less than 3 3/4 inches (95 mm) and not greater than 7 1/2 inches (191 mm). The tread distance from front-to-back shall be not less than 11 inches (279 mm). Step risers for decks of residential aquatic vessels shall be uniform and shall have a height not exceeding 7 1/2 inches (191 mm). The tread distance from front-to-back shall be not less than 10 inches (254 mm).~~

306.4 Deck steps handrail required. Public aquatic vessel deck steps having three or more risers shall be provided with a handrail.

(Renumber subsequent sections)

Reason: By referring to IBC and IRC, those codes refer to house steps and not pool steps, plus the specific requirements should be included in the ISPSC itself. This proposal reflects the exact same requirements found in APSP-1 (public pools) and APSP-5 (residential pools). It is our understanding spas must also conform to the same standards provided in this proposal.

Cost Impact: The code change proposal will not increase the cost of construction.

SP28-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

306.3-SP-HATFIELD.DOC

SP29 – 13

Table 306.4

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

TABLE 306.4
MINIMUM DRAINAGE SLOPES FOR DECK SURFACES

SURFACE	TYPICAL MINIMUM DRAINAGE SLOPE (inch per foot)
Brick and heavy textured finish	3/8 inch
Carpet	1/2 inch
Exposed aggregate	1/4 inch
Textured, hand-finished concrete	1/8 inch
Wood	1/8 inch
Wood/plastic composite	1/8 inch
<u>Travertine/brick set pavers, residential aquatic vessels</u>	<u>1/8</u>
<u>Travertine/brick set pavers, public aquatic vessels</u>	<u>3/8</u>

For SI: 1 inch = 25.4, 1 foot = 304.8 mm

Reason: It appears this chart left out travertine/brick set pavers, with the minimum drainage slope being 1/8 inch for Residential and 3/8 inch for Public. It was suggested to provide the less restrictive 1/8 inch allowance for the table.

Cost Impact: The code change proposal will not increase the cost of construction.

SP29-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

306.4T-SP-HATFIELD.DOC

SP30 – 13

306.8

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

306.8 Valves under decks. Valves installed in or under ~~any decks~~ shall be ~~accessible provided with access~~ for operation, service, and maintenance. ~~as required by the International Plumbing Code or International Residential Code, as applicable in accordance with Section 102.7.1. Where access through the deck walking surface is required, an access covers shall be provided for the opening in the deck. Such access covers shall be slip resistant.~~

Reason: Neither the IPC or the IRC have any general requirements for access for operation, service and maintenance for valves. Further, pool circulation valves would not be discussed in the IPC.

Cost Impact: The code change proposal will not increase the cost of construction.

SP30-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

306.8-SP-HATFIELD.DOC

SP31-13

202, 307.1

Proponent: Wesley Walters, Clark County Nevada Development Services, representing self

Add new definition as follows:

MANUFACTURED POOL OR SPA. A listed pool, listed spa or listed water feature that is manufactured or constructed at one location and transported to another location where it is placed, assembled as needed and permanently installed in accordance with the listing for the product.

Revise as follows:

307.1 General. The provisions of this section apply to all aquatic vessels.

Exceptions:

1. The provisions of Sections 307.3 through 307.6 ~~do~~ shall not apply to listed and labeled portable residential spas and listed and labeled portable residential exercise spas.
2. The provisions of Sections 307.3 through 307.6 shall not apply to *manufactured pools or spas*.

Reason: The current code does not address manufactured permanent installed pools and spas. This is to clarify that they are still an acceptable product if installed per their listing. As listed products they are regulated by those standards they are built to.

Cost Impact: The code change proposal will not increase the cost of construction.

SP31-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

307.1-SP-WALTERS.DOC

SP32 – 13

307.2

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

307.2 Glazing in hazardous locations. ~~Hazardous locations for glazing~~ ~~Glazing in hazardous locations for residential pools and spas shall be as defined in~~ ~~comply with the~~ International Building Code or the International Residential Code, as applicable in accordance with Section 102.7.1 of this code. Where glazing is determined to be in a hazardous location, the requirements for the glazing shall be in accordance with those codes, as applicable. ~~Glazing in hazardous locations in all other occupancies shall comply with the International Building Code.~~

Reason: A code official could have his own interpretation of what a hazardous location means. For example, a code official could say that any window that is adjacent to a pool area is in a hazardous location, whether that window is 3 feet or 30 feet from the water's edge. Therefore, the proposal refers one to the IBC and IRC.

Cost Impact: The code change proposal will not increase the cost of construction.

SP_-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

307.2-SP-HATFIELD.DOC

SP33 – 13

307.4, Table 307.4 (New), 502.1, Table 502.1

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

307.4 Materials and structural design. ~~The structural design of Aquatic vessels shall conform to one or more of the standards indicated in Table 307.4. The structural design of aquatic vessels shall be in accordance with the *International Building Code* or *International Residential Code*, as applicable in accordance with Section 102.7.1 of this code.~~

**TABLE 307.4
RESERVOIRS AND SHELLS**

<u>MATERIAL</u>	<u>STANDARD</u>
<u>Dry shotcrete</u>	<u>ACI 304.2, ACI 308, ACI 318, ACI 506.2</u>
<u>Fiberglass reinforced plastic</u>	<u>ANSI Z124.7</u>
<u>Plastic</u>	<u>ANSI Z124.7</u>
<u>Poured-in-Place Concrete</u>	<u>ACI 318</u>
<u>Stainless steel (type 316, 316L, 304, 304L)</u>	<u>ASTM A 240</u>
<u>Tile</u>	<u>ASC A108/A118/A136.1</u>
<u>Vinyl</u>	<u>ASTM D 1593</u>
<u>Wet Shotcrete</u>	<u>ACI 306, ACI 305, ACI 308, ACI 318, ACI 506.2</u>

Delete without substitution as follows:

502.1 Reservoirs and shells. ~~Spa and exercise spa reservoirs shall conform to one or more of the standards listed in Table 502.1.~~

**TABLE 502.1
RESERVOIRS AND SHELLS**

MATERIAL	STANDARD
Dry Shotcrete	ACI 304.2, ACI 308, ACI 506.2
Fiberglass Reinforced Plastic	ANSI Z124.7
Plastic	ANSI Z124.7
Poured-in-Place Concrete	ACI 318
Stainless Steel (Type 316, 316L, 304, 304L)	ASTM A 240
Tile	ASC A108/A118/A136.1
Vinyl	ASTM D 1593
Wet Shotcrete	ACI 306, ACI 305, ACI 308, ACI 506.2

Reason: It appears this table and requirement provided for in Section 502.1 for public spas and exercise spas was not provided for when addressing all other aquatic vessels. Therefore appears to be a need to submit under Chapter 3 and eliminating the requirements within Chapter 5.

Cost Impact: The code change proposal will not increase the cost of construction.

SP33-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

307.4-SP-HATFIELD.DOC

SP34 – 13

309.1, 309.2 (New)

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

309.1 Electrically operated equipment General. Electrically operated equipment shall be *listed* and *labeled* in accordance with applicable product standards. ~~Treatment and circulation system equipment for public aquatic vessels shall be *listed* and *labeled* in accordance with NSF 50 and other applicable standards.~~

Exception: ~~Portable residential spas and portable residential exercise spas listed and labeled in accordance with UL 1563 or CSA C22.2 No. 218.1.~~

309.2 Treatment and circulation system equipment. Treatment and circulation system equipment for public aquatic vessels shall be *listed* and *labeled* in accordance with NSF 50 and other applicable standards.

Reason: Breaks out these two sections to eliminate confusion, as 309.1 applies to all aquatic vessels, but 309.2 only applies to PUBLIC aquatic vessels. Under 309.2, the exception is no longer needed because already limiting it to public aquatic vessels and if the exception was originally for 309.1 "in accordance with applicable standards" would allow for portable spas to utilize UL 1563 or CSA C22.2 No. 218.1.

Cost Impact: The code change proposal will not increase the cost of construction.

SP34-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

309.1-SP-HATFIELD.DOC

SP35 – 13

310.1

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

310.1 General. Suction entrapment avoidance for swimming pools, permanent residential spas, and public spas aquatic vessels shall be provided in accordance with APSP 7. ~~Exception: Suction entrapment avoidance for portable residential spas and portable residential exercise spas shall be provided listed and labeled~~ in accordance with UL 1563 or CSA C22.2 No. 218.1.

Exception: Suction entrapment avoidance for wading pools shall be provided in accordance with Section 405.

Reason: The exception appears to indicate that portable residential spas and portable residential spas are not required to have suction entrapment avoidance. This is not true as the UL and CSA standards include requirements for suction entrapment avoidance. The section has been restructured to clarify this point. Regarding wading pools, they are addressed in Section 405 and per APSP-1 suction outlets in wading pools are now prohibited...the exception takes the reader to where they will find specific wading pool (Class F public pool) requirements.

Cost Impact: The code change proposal will not increase the cost of construction.

SP35-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

310.1-SP-HATFIELD.DOC

SP36 – 13

311.1, 312.1, 313.1, 315.1, 704.1 (New), 704.2 (New), 704.1, 704.2, 704.5 (New), 704.6 (New), 704.6.1 (New), 704.6.2 (New), 704.7 (New), 704.7.1 (New), 704.7.2 (New), 704.7.3 (New), 704.8 (New), 704.9 (New), 704.9.1 (New), 704.9.2 (New), 704.9.3 (New)

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

311.1 General. The provisions of this section apply to *circulation systems* for *aquatic vessels*.

Exceptions:

1. *Portable residential spas* and *portable residential exercise spas*.
2. Onground storable pools supplied by the pool manufacturer as a kit that includes circulation system equipment that is accordance with Section 704.

312.1 General. The provisions of this section apply to *filters* for all *aquatic vessels*.

Exceptions:

1. *Portable residential spas* and *portable residential exercise spas*.
2. Onground storable pools supplied by the pool manufacturer as a kit that includes a filter that is in accordance with Section 704.

313.1 General. The provisions of this section apply to pumps and motors for *aquatic vessels*.

Exceptions:

1. *Portable residential spas* and *portable residential exercise spas*.
2. Onground storable pools supplied by the pool manufacturer as a kit that includes a pump and motor that is in accordance with Section 704.

315.1 General. The provisions of this section apply to *skimmers* for *aquatic vessels*.

Exceptions:

1. *Portable residential spas* and *portable residential exercise spas*.
2. Onground storable pools supplied by the pool manufacturer as a kit that includes a skimming system that is in accordance with Section 704.

704.1 General. A circulation system consisting of pumps, hoses, tubing, piping, return inlets, suction outlets, filters and other related equipment that provides for the circulation of water throughout the pool shall be located so that such items cannot be used by young children as a means of access to the pool.

704.2 Installation and support. Circulation equipment shall be installed, mounted and supported in accordance with the manufacturer's instructions.

704.34 Draining the system. In climates subject to freezing, *circulation system* equipment shall be designed and fabricated to drain the pool water from the equipment and exposed piping, by removal of drain plugs and manipulating valves or by other methods in accordance with the manufacturer's

instructions.

704.42 Turnover. A pump including a motor shall be provided for circulation of the pool water. ~~Where circulation equipment is required by the manufacturer,~~ The equipment shall be sized to provide a turnover of the pool water at least not less than once every 12 hours. The system shall be designed to provide the required turnover rate based on the manufacturer's specified maximum flow rate of the filter, with a clean media condition of the filter. The system flow shall not exceed the filter manufacturer's maximum filter flow rate.

704.5 Piping and fittings. The process piping of the circulation system, including but not limited to hoses, tubing, piping, and fittings, shall be made of non-toxic material and shall be capable of withstanding an internal pressure of not less than 1½ times the rated pressure of the pump. Piping on the suction side of the pump shall not collapse when flow into such piping is blocked.

704.6 Filters. Pressure-type filters shall have an automatic internal means or a manual external means to relieve accumulated air pressure inside the filter tank. Filter tanks composed of upper and lower tank lids that are held in place by a perimeter clamp shall have a perimeter clamp that provides for a slow and safe release of air pressure before the clamp disengages the lids.

704.6.1 Automatic internal air relief. Filter tanks incorporating an automatic internal air relief as the principal means of air release shall be designed with a means to provide for a slow and safe release of pressure.

704.6.2 Separation tank. A separation tank used in conjunction with a filter tank shall have a manual air release or the tank shall be designed to provide for a slow and safe release of pressure when the tank is opened.

704.7 Pumps. Pool pumps shall be tested and certified by a nationally recognized testing laboratory in accordance with an edition of UL 1081 that is the latest edition published by UL at the time of manufacture of the pump. The pump horsepower rating and that rating indicated on the label cannot exceed the brake horsepower of the motor.

704.7.1 Cleanable strainer. Where a pressure-type filter is installed, a cleanable strainer or screen that captures materials such as solids, debris, hair and lint shall be provided upstream of the circulation pump.

704.7.2 Accessible pumps and motors. Pumps and motors shall be accessible for inspection and service in accordance with the pump and motor manufacturer's instructions.

704.7.3 Pump shut-off valves. An accessible means of shut-off of the suction and discharge piping for the pump shall be provided for maintenance and removal of the pump.

704.8 Suction outlets and return inlets. Suction outlets and return inlets shall be provided and arranged to produce uniform circulation of water so that sanitizer residual is maintained throughout the pool. Where installed, submerged suction outlets shall conform to APSP 16.

704.9 Surface skimmer systems. The surface skimming system provided shall be designed and constructed to skim the pool surface when the water level is maintained between the minimum and maximum fill level of the pool.

704.9.1 Coverage when used as a sole outlet. Where surface skimmers are used as the only pool water outlet system, not less than one skimmer shall be provided for each 800 ft² (74.3 m²), or fraction thereof, of the water surface area.

704.9.2 Coverage when used in combination with other outlets. Where surface skimmers are not the only outlet for pool water, they shall be considered to cover only that fraction of the 800 ft² (74.3 m²).

704.9.3 Location and venting. Skimmers shall be equipped with a vent that serves as a vacuum break.

Reason: This change is consistent with APSP-4 that requires onground storable pools to follow different requirements than for all other pools.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: Regarding Section 704.7, ICC CP#28, Code Development, requires a specific edition of a standard for reference to allow understanding and approval of the detailed requirements proposed for the 2015 edition of the ISPSC. Further, the language proposed will enable variations on the specifications required on different projects.

SP36-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

311.1-SP-HATFIELD.DOC

SP37 – 13

311.4.4 (New)

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Add new text as follows:

311.4.4 Suction outlet fitting assemblies. Suction outlet fitting assemblies shall be listed or certified in compliance with APSP 16.

Reason: While ANSI-7 does require compliance with ASME 19.8 or its successor (APSP-16), the ISPSC itself does not specifically require compliance with ANSI-16. This proposal provides clearly that compliance with APSP-16 is required.

Cost Impact: The code change proposal will not increase the cost of construction.

SP37-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

311.4.4-(NEW)-SP-HATFIELD.DOC

SP38 – 13

313.7

Proponent: Wesley Walters, Clark County Nevada Development Services, representing self

Revise as follows:

313.7 Emergency shutoff switch. An emergency shutoff switch shall be provided to disconnect all power to recirculation and jet system pumps and air blowers. Emergency shutoff switches shall be provided with access, located within sight of the aquatic vessel and located not less than 5 feet (1524 mm) horizontally from the inside walls of the aquatic vessel.

Exception: Onground storable pools, ~~and~~ permanent inground residential swimming pools, residential spas and residential water features.

Reason: The present requirement exempts residential pools only, this has normally been a public aquatic vessel issue and by only exempting the pools they would still be required for residential spas and water features. This just clarifies all residential applications are exempt from this requirement.

Cost Impact: The code change proposal will not increase the cost of construction.

SP38-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

313.7-SP-WALTERS.DOC

SP39 – 13

314.5

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

314.5 Vacuum fittings. Where installed, *submerged vacuum fittings* shall be *accessible* and shall be located not greater than 12 inches (304.8 mm) below the water level ~~in accordance with Section 310.~~

Reason: This code change is found in the APSP-7 revision and should be stated within the code due to the importance of this safety requirement.

Cost Impact: The code change proposal will not increase the cost of construction.

SP39-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

314.5-SP-HATFIELD.DOC

SP40 – 13

315.2, 315.3, 315.4

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

315.2 Required. A *surface skimming system* shall be provided for public aquatic vessels and shall be listed and labeled in accordance with NSF 50. Either a *surface skimming system* or a perimeter overflow system shall be provided for permanent inground *residential pools* and *permanent residential spas*. The Where installed, *surface skimming systems* shall be designed and constructed to create a skimming action on the pool water surface when the water level in the pool is to skim the surface when the water level is maintained within the operational parameters.

Exception: *Class D public pools* designed in accordance with Chapter 6.

315.2.1 Circulation systems. Public pool circulation systems shall be designed to process a minimum of 100 percent of the turnover rate through *skimmers*.

TABLE 315.3
SKIMMER SIZING TABLE

AQUATIC VESSEL	AREA PER SKIMMER (SQ. FT)
Public pool	400 –500
Residential pool	800
Spa (all types)	150

For SI: 1 square foot = 0.09 m².

Reason: This proposal tries to address several aspects:

- Section 315.2.1 doesn't follow what is in APSP-5 and in NSF 50. But 315.2.1 IS found in APSP-1, so the proposed change limits it to public pools.
- Regarding the NSF 50 aspect, after noting that all the APSP standards appear to require surface skimming systems to comply with NSF 50, added that aspect in the first sentence, but used the language as written in other areas of the ISPSC when requiring compliance with NSF 50.
- Added *permanent residential spas* in first sentence b/c APSP-3 states: **11.2 Design and Construction:** Skimming devices shall be provided on all residential spas,..."
- Inserting "where installed" makes clear to the code official that, for example, the automatic surface skimmer isn't required necessarily, but where one is installed, it must follow certain specifications.
- See 12.3 in APSP 1, provides for 500 sq ft, so change in Table 315.2 makes the standard and what is in the ISPSC consistent

Cost Impact: The code change proposal will not increase the cost of construction.

SP40-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

315.2-SP-HATFIELD.DOC

SP41 – 13

315.5

Proponent: Wesley Walters, Clark County Nevada Development Services, representing self

Delete without substitution:

~~315.5 Equalizers.~~ ~~Equalizers on skimmers shall be prohibited.~~

Reason: ANSI/APSP section 4.8 and 4.8.1 permit their use and defines where they are required.

Cost Impact: The code change proposal will not increase the cost of construction.

SP41-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

315.5-SP-WALTERS.DOC

SP42 – 13

202, 321.2, 321.2.1, 321.2.2, 321.2.3, 321.3, 321.4

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Add new definition:

MAINTAINED ILLUMINATION. The value, in foot-candles or equivalent units, below which the average illuminance on a specified surface is not allowed to fall. The average illuminance value on the specified surface at the time when maintenance of the lighting system must be carried out.

Revise as follows:

321.2 Artificial lighting required. When a pool is open during periods of low natural illumination, artificial lighting shall be provided so that all areas of the pool, including the ~~main drains suction outlets on the bottom of the pool~~, will be visible. Illumination shall be sufficient to enable a lifeguard or other persons standing on the deck or sitting on a lifeguard stand adjacent to the pool edge to determine if a pool user is lying on the bottom of the pool and if the pool water is transparent and free from cloudiness.

These two conditions shall be met when all suction outlets are visible from the edge of the deck at all times when artificial lighting is illuminated and when an 8 inch (152 mm) diameter black disk, placed at the bottom of the pool in the deepest point, is visible from the edge of the pool deck at all times when artificial lighting is illuminated.

321.2.1 Pool and deck illumination. Overhead lighting, ~~or~~ underwater lighting or both shall be provided to illuminate the pool and adjacent deck areas. ~~Such~~ The lighting shall be listed, and labeled. ~~And The lighting shall be~~ installed in accordance with NFPA 70, ~~or the International Residential Code, as applicable in accordance with Section 102.7.1.~~

321.2.2 Illumination intensity. For outdoor pools, ~~the~~ a combination of overhead and underwater lighting shall provide maintained illumination not less than 10 horizontal ~~3~~ foot-candles at the pool water surface. For indoor pools, ~~the~~ a combination of overhead and underwater lighting shall provide maintained illumination not less than 30 horizontal ~~of 10~~ foot-candles at the pool water surface. Deck area lighting for both indoor and outdoor pools shall provide maintained illumination not less than 10 horizontal foot-candles at the walking surface of the deck.

321.2.3 Underwater lighting. Underwater lighting shall provide not less than 8 lumens per square foot of pool water surface area.

Exceptions:

1. The requirement of this section shall not apply where the total wattage of incandescent underwater lighting is not less than ½ watt/ft² (5.4 watts/m²) of pool water surface.
2. The requirement of this section shall not apply where overhead lighting provides not less than 15 foot-candles of maintained illumination at the pool water surface, the overhead lighting provides visibility, without glare, of all areas of the pool ~~are visible without glare, and~~ underwater lighting provides a maintained illumination at the pool water surface that is equal to or greater than the difference between the maintained illumination required by Section 321.2.2 and the maintained illumination provided at the pool water surface by the overhead lighting. Underwater lighting shall not be required where such difference is less than zero.

321.3 Emergency illumination. *Public pools* and public pool areas that operate during periods of low illumination shall be provided with emergency lighting that will automatically turn on to permit evacuation

of the pool and securing of the area in the event of power failure. Emergency lighting facilities shall be arranged to provide initial illumination that is not less than 0.1 foot-candle measured at any point on the water surface and at any point on the walking surface of the deck, and not less than an average of 1 foot-candle. At the end of the emergency lighting time duration, the illumination level shall be not less than 0.06 foot-candle measured at any point on the water surface and at any point on the walking surface of the deck, and not less than an average of 0.6 foot-candle. A maximum-to-minimum illumination uniformity ratio of 40 to 1 shall not be exceeded. ~~The emergency lighting intensity shall be not less than 1 foot-candle at the water surface and the walking surface of the deck.~~

321.4 Residential pool and deck illumination. Where lighting is installed for, and in, *residential pools* and *permanent residential spas*, such lighting shall be installed in accordance with NFPA 70 or the *International Residential Code*, as applicable in accordance with Section 102.7.1.

Reason: The changes proposed are due to the following:

1. Deletes "main drain" to be consistent with definition now routinely used, which is "suction outlet." Further – can now DELETE the definition of main drain in Chapter 2 because this was the ONLY section in the ISPSC that utilized the word "Main Drain." See this proposal under Chapter 2 definitions.
2. Under 321.2.2 Illumination intensity, proposal changes the requirements to conform more to aspects of the Model Aquatic Health Code and IESNA RP-6-01 (Illuminating Engineering Society of North America), both of which include requirements for indoor and outdoor pools and decks (regardless of whether indoors or outdoors). This is a good approach for most general public pools.
3. Under 321.2.3 provides new language stemming from the APSP-1 revisions. It also incorporates a lumen-based standard made necessary by new low-power lighting technologies. Additionally, the existing wattage/sq ft requirement for incandescent underwater lights is maintained as an exception.
4. Under 321.3, made consistent with IBC Section 1006.3.1 Emergency illumination requirements.
5. Under 321.4, adding "lighting is" makes it clear as to what is being discussed. Adding "for, and in" makes it clear that coverage is for lighting in and out of the pool or spa.

Cost Impact: The code change proposal will not increase the cost of construction.

SP42-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

321.2-SP-HATFIELD.DOC

SP43 – 13

323.1

Proponent: Wesley Walters, Clark County Nevada Development Services, representing self

Revise as follows:

323.1 Handholds required. Where the depth below the design waterline of an *aquatic vessel* exceeds 42 inches (1067 mm), handholds along the perimeter shall be provided. ~~Handholds shall be located at the top of deck or coping.~~

Exceptions:

1. Handholds shall not be required where an underwater bench, seat or swimout is installed.
2. Handholds shall not be required for wave action pools and action rivers.

323.1.1 ~~Height above water.~~ Location of Handhold. Handholds shall be located not more than 12 inches (305mm) above and not more than 6 inches (154 mm) below the design water line.

323.1.3 Handhold size and spacing. Handholds shall be not less than 6 inches long and 1 ½ inches deep. The horizontal spacing of handholds shall be ~~horizontally spaced~~ not greater than 4 feet (1219 mm) ~~apart.~~ Continuous ledges shall have a projection of not less than 3 inches (76 mm). Vanishing edges sloping into the main body of water and intended to be used as a handhold shall have a wall thickness of not greater than 15 inches (381 mm).

Reason: The current code requirement limits the handhold to all be above the water line. The below water line option provides for the same level of safety yet allows the feature to be hidden within the pool design. Also the expanded dimensions give clarification of what is required.

Cost Impact: The code change proposal will not increase the cost of construction.

SP43-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

323.1-SP-WALTERS.DOC

SP44 – 13

323.2.1

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

323.2.1 Height. Handrails shall be between 34 inches (864mm) and 38 inches (965 mm) above the ramp or step surface as measured at the nosing of the step or finished surface of the slope.

Exception: The requirements of this section shall not apply to *residential aquatic vessels*.

Reason: What is the justification for this height range requirement applying to both public and residential installations? The 34"-38" height is already a requirement for stair and ramp rails in the ADA Standards for Accessible Design for public facilities. Many of rails do not meet the height requirements. The handrail height requirement should be removed from the general requirements section and placed into the public swimming pools section or exempt out the residential vessels, as proposed here. For inground residential swimming pools, the range for the rail height can be broader, or not specified.

Cost Impact: The code change proposal will not increase the cost of construction.

SP44-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

323.2.1-SP-HATFIELD.DOC

P45– 13

402.14 (New)

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Add new text as follows:

402.14 Springboard fall protection guards. Springboards located at a height greater than 5 feet (1.5 meters) above the pool deck shall have a fall protection guard on each side of the springboard. The design and the selection of the materials of construction of the fall protection guards shall be determined by the manufacturer of the springboard support structure. The installation and maintenance of the fall protection guards shall be in accordance with the fall protection guard manufacturer's instructions.

Reason: At the earliest ISPSC code development meetings there were comments concerning the falling of young participants from the sides of three meter springboard. There was discussion about trying to include some regulation that might protect these young people. This is the solution to that concern and will also be included in the APSP-1 revision.

Cost Impact: The code change proposal will increase the cost of construction.

SP45-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

402.14 (NEW)-SP-HATFIELD.DOC

SP46– 13

405.6

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

405.6 Suction entrapment avoidance. ~~Suction entrapment avoidance methods for wading pools shall be provided in accordance with Section 310. Wading pools shall not have *suction outlets*. *Skimmers or overflow gutters* shall be installed and shall accommodate 100 percent of the *circulation system* flow rate.~~

Reason: APSP-1 revisions prohibit suction outlets in wading pools, this change ensures consistency between the code and national standards.

Cost Impact: The code change proposal will not increase the cost of construction.

SP46-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

405.6-SP-HATFIELD.DOC

SP47 – 13

406.4 (New), 406.5 (New)

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Add new text as follows:

406.4 Decks between pools and spas. Decks between pools, spas or any combination of pools and spas, shall have a width of not less than 6 feet (1829 mm).

406.5 Deck covering. Walking surfaces of decks within 4 feet (1219 mm) of a pool or spa that are not equivalent in the strength, durability and slip resistance of the surface of a concrete deck shall be prohibited. Wooden walking surfaces and carpeted walking surfaces shall not be placed within 4 feet (1219 mm) of a pool.

(Renumber subsequent sections)

Reason: These are requirements found in many state health codes and are considered construction; therefore should be included in the ISPSC.

Cost Impact: The code change proposal will not increase the cost of construction.

SP47-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

406.4 (NEW) -SP-HATFIELD.DOC

SP48 – 13

409.3

Proponent: Rob Blake, Chief, National Center of Environmental Health, representing Centers for Disease Control and Prevention

Revise as follows:

409.3 No Diving Symbol. Where the pool depth is 5 feet (1524 mm) or less, the “No Diving” symbol shall be displayed. The symbol shall be placed on the deck at intervals of not greater than 25 feet (7620 mm)-
~~Additional signage shall be in accordance with NEMA Z535 and directly adjacent to a depth marker.~~

Reason: “No Diving” signage should be adjacent to the depth marker for consistency. Adjacent signage prevents confusion and associates the inherent safety risk of diving at that depth.

Cost Impact: None

SP48-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

409.3-SP-BLAKE.DOC

SP49– 13

410, 410.1, 410.2 (New)

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

SECTION 410

DRESSING FACILITIES, AND SANITARY FACILITIES AND DRINKING FOUNTAINS

410.1 Dressing and sanitary facilities. Dressing facilities, and sanitary facilities and drinking fountains shall be provided for *Class A and B* pools in accordance with as required by the *International Building Code* and the *International Plumbing Code*.

410.2 Number of drinking fountains. The required number of drinking fountains shall be based on the bather capacity of pools and spas. One guarded-jet drinking fountain shall be provided for the first 250 bathers and an additional fountain shall be provided for each additional 200 bathers or fraction thereof.

Exception: Drinking fountains shall not be required where drinking water is available at adjacent living quarters or in an adjacent building such as a bathhouse, cabana, clubhouse or recreational facility.

(Renumber subsequent sections)

Reason: Provided because requirement is found in other state public pool health codes and provides specifics to how many are required.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: The International Building Code (Chapter 29) has requirements for the number of drinking fountains for swimming pools. The requirements in this proposal are different than the requirements found in the IBC.

SP49-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

410-SP-HATFIELD.DOC

SP50 – 13

411.1

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

411.1 Entry and exit. Pools shall have ~~at least~~ not less than two means of entry and exit, ~~that are~~ located so as to serve both ends of a pool. Chair lifts that provide for pool entry and exit by persons with physical disabilities shall not be counted as a means of entry or exit that is required by this section.

Reason: This language is included in the APSP-1 revisions and with new ADA requirements now in effect it is good to make this clarification.

Cost Impact: The code change proposal will not increase the cost of construction.

SP50-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

411.1-SP-HATFIELD.DOC

SP51 – 13

411.1.4

Proponent: Rob Blake, Chief, National Center of Environmental Health, Representing Centers for Disease Control and Prevention

Revise as follows:

411.1.4 Both sides of deep area. Swimming pools greater than 30 feet (9144 mm) in width shall be provided with entries and exits on ~~both~~ each sides of the deep area of the pool. The entries and exits on the sides of the deep area of a pool shall be located not more than 75 feet (22.9m) apart.

Reason: 75 feet spacing is best industry practice currently. It is a requirement of the majority of public health codes and likely came about due to the fact that most lap pools are 75 long and would require ingress/egress at both ends and on both sides of these types of pools. Note lazy rivers and other areas of the pool with moving water are exempt from this requirement.

Cost Impact: None. This is already common practice in construction.

SP51-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

411.1.4-SP-BLAKE.DOC

SP52 – 13

412.2 (New)

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Add new text as follows:

412.2 Emergency telephone signs. A sign indicating the location of the nearest landline telephone that can be used to call emergency services shall be posted within sight of the main entry into a pool facility. The sign shall indicate the telephone numbers, including area code, that can be called for emergency services including, but not limited to, police, fire, ambulance and rescue services. If “9-1-1” telephone service is available for any of those services, “9-1-1” shall be indicated next to the telephone number for those services available by dialing “9-1-1”. The sign shall include the street address and city where the pool is located. The nearest landline telephone indicated by the sign shall be one that can be used free of charge to call for emergency services. A sign with the telephone number and address information required by this section shall be posted within sight of the landline telephone.

(Renumber subsequent sections)

Reason: Proposed new language provides language found in the recent APSP-1 revisions.

Cost Impact: The code change proposal will not increase the cost of construction.

SP52-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

412.2.1 (NEW)-SP-HATFIELD.DOC

SP53– 13

412.3

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

412.3 Emergency shutoff switch. Signs shall be posted that clearly indicate the location of the pump emergency shutoff switch. Such switch shall be clearly ~~labeled~~ identified as the pump emergency shutoff switch.

Reason: The term “labeled” should be changed to “identified” so as to not be confused with the defined term “*labeled*”.

Cost Impact: The code change proposal will not increase the cost of construction.

SP53-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

412.3-SP-HATFIELD.doc

SP54 – 13

Table 502.1

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

**TABLE 502.1
RESERVOIRS AND SHELLS**

MATERIAL	STANDARD
Dry Shotcrete	ACI 304.2, ACI 308, <u>ACI 318</u> , ACI 506.2
Fiberglass Reinforced Plastic	ANSI Z124.7
Plastic	ANSI Z124.7
Poured-in-Place Concrete	ACI 318
Stainless Steel (Type 316, 316L, 304, 304L)	ASTM A 240
Tile	ASC A108/A118/A136.1
Vinyl	ASTM D 1593
Wet Shotcrete	ACI 306, ACI 305, ACI 308, <u>ACI 318</u> , ACI 506.2

Reason: This reference and standard (ACI 318) is omitted in Table 502.1 in the shotcrete standards sections of dry and wet processes, whereas it exists in other sections of the ISPSC. This proposal inserts the missing standard. However, if this table is included in Chapter 3, as also being proposed by another of my proposals, then this section could be deleted, as it would apply to all aquatic vessels by its location in Chapter 3.

Cost Impact: The code change proposal will not increase the cost of construction.

SP54-13

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

502.1T-SP-HATFIELD.DOC

SP55 – 13

603.3

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

603.3 Shallow-to-deep-end ~~lifeline~~ rope and float line. Where a pool has a water depth ranging from less than 5 feet (1524 mm) to greater than 5 feet (1524 mm), a ~~lifeline~~ rope and float line shall be located 1 foot (305 mm) horizontally from the 5-foot (1524 mm) depth location, towards the shallow end of the pool.

Reason: Lifeline is not what was intended, it should have been a rope and float line.

Cost Impact: The code change proposal will not increase the cost of construction.

SP55-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

603.3-SP-HATFIELD.DOC

SP56 – 13

202, 612 (New)

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Add new definition as follows:

SPRAY GROUND. A pool without standing water in the splash zone and consisting of a surge basin with a circulation system from which water is directed through water features for contact with pool users.

Add new text as follows:

SECTION 612 **SPRAY GROUNDS**

612.1 General. Spray grounds and equipment associated with spray grounds shall be designed and constructed to not present safety hazards to the user.

612.2 Walking surface. A walking surface not less than 4 feet (1219 mm) shall extend away from the outside edge of a splash zone of a spray ground. The walking surface shall be around the entire perimeter of the spray ground.

612.3 Standing water. The splash zone of a spray ground shall not have standing water.

612.4 Nozzles. Nozzles that spray water from the walking surface of the spray ground shall be flush with the walking surface. Nozzle openings shall be not greater than 1/2 inch (12.7 mm) in any dimension. Spray ground water features that extend above the walking surface of the spray ground shall be of a color that is in high contrast to the color of the walking surface so that the nozzle is visible to the user.

612.5 Slope. The splash zone shall be sloped so that only the water from the nozzles, foggers and misters of the spray ground is collected by the spray ground drains that direct water to the surge basin. Areas outside of the splash zone shall be sloped away from the spray ground. Water on areas outside of the splash zone shall drain to deck drains or other surface water disposal systems.

612.6 Foggers and misters. Foggers and misters producing finely atomized mists shall be supplied by a potable water source. Foggers and misters shall not be supplied with water from the spray ground surge basin.

612.7 Pump interlock. The spray ground water feature pump and spray ground circulation system pump shall be electrically interlocked so that the water feature pump operates only when the circulation system pump operates.

612.8 Surge basin. The spray ground surge basin shall be constructed of inert, corrosion resistant and non-toxic materials such as concrete, fiberglass, high density polyethylene and stainless steel. The basin design professional shall design the basin for all combinations of loadings under all combinations of basin water fill and water saturation of the ground. The basin shall be watertight.

612.9 Basin volume. The total volume of all surge basins for a spray ground shall be not less than 4000 gallons (15 142 L) or three times the number of gallons pumped in one minute by all spray ground water feature pumps and the circulation system pump, whichever is greater.

612.10 Turnover. The circulation system shall be designed to provide a turnover rate of not greater than one-half hour.

612.11 Circulation system return point. The *circulation system* return pipe discharge point in the surge basin shall be within 2 feet (610 mm) the intake of the *spray ground* pump.

612.12 Separation of pump intakes. Where separate pumps are used for the *spray ground* water features and the *spray ground circulation system*, the intake for the *circulation system* pump shall be located in the lowest portion of the surge basin and on the opposite side from the intake for the *spray ground* water feature pump.

612.13 Basin access. Surge basins shall be designed to have the interior *accessible* for cleaning and inspection. Each basin shall have not less than one opening that can accommodate a ladder placed into the basin. The opening shall be not less than 3 feet (914mm) by 3 feet (914mm). Covers for all basin openings shall be provided. The design of covers shall allow for a lock to be installed to secure the cover or the design shall require tools to open the cover.

612.14 Make up water. Surge basins shall be supplied with potable water for initial filling and makeup. The makeup water supply shall be automatically controlled. The potable water supply to surge basins shall be protected against backflow in accordance with the *International Plumbing Code*.

612.15 UV disinfection. An ultraviolet light disinfection unit capable of reducing levels of cryptosporidium in the water or an *approved* treatment process that has the same capability for reduction of cryptosporidium as an ultraviolet light disinfection unit shall be provided. Ultraviolet light disinfection units shall comply with NSF 50.

612.15.1 Intensity meter location. A calibrated ultraviolet light intensity meter shall be installed in the wall of the disinfection chamber at the point of greatest distance through the water away from the ultraviolet light source. The meter shall be filtered to restrict the meter's sensitivity to the disinfection spectrum.

612.15.2 Location of unit. Ultraviolet light units shall be located in the discharge side piping of *spray ground* water feature pumps.

612.15.3 Automatic pump shut down. An ultraviolet light disinfection unit on the discharge of a water feature pump shall automatically shut off the pump when the ultraviolet dosage rate to the water becomes less than 40 mJ/cm².

612.16 Artificial lighting. User areas of *spray grounds* that are open for use during periods of low natural illumination shall be provided with artificial lighting in accordance with the lighting requirements for decks in Section 321.

612.17 Drain diverter valve. When the *spray ground* is not in operation, an automatic diverter valve in the *spray ground* drainage piping to the surge basin shall divert water from the *spray ground* to a storm drainage system or other point of disposal.

612.18 Removable strainer. A removable and cleanable screen or basket shall be installed in the *spray ground* drainage piping at a point before the piping connects to the surge basin.

Reason: The ISPSC does NOT address "spray grounds," it only covers "spray pools" which can have standing water. A "spray ground" does not have standing water. Spray grounds are included in many state public health codes and should be included in the ISPSC.

Cost Impact: The code change proposal will not increase the cost of construction.

SP56-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

612 (NEW)-SP-HATFIELD.DOC

SP57 – 13

701.1.1 (New), 801.1

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Add new text as follows:

701.1.1 Permanent inground residential swimming pool. This chapter does not apply to permanent inground residential pools, as defined in Chapter 8.

801.1 Scope. The provisions of this chapter shall govern permanent inground *residential swimming pools*. ~~that are installed for residential use.~~ Permanent inground *residential* swimming pools shall include pools that are partially or entirely above grade. This chapter does not cover pools that are specifically manufactured for above ground use and that are capable of being disassembled and stored. This chapter covers new construction, modification or *repair* of inground *residential swimming pools*. ~~*residential aquatic vessels*.~~

Reason: This code proposal addresses the need for clarity for pools covered by Chapter 8 pools.

Cost Impact: The code change proposal will not increase the cost of construction.

SP57-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

701.1.1 (NEW)-SP-HATFIELD.DOC

SP58 – 13

701.4

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

701.4 Identification. For onground storable *residential* pools with a vinyl liner, the manufacturer's name and the liner identification number shall be affixed to the ~~onground storable *residential* pool vinyl liner.~~ For onground storable *residential* pools without a liner, the manufacturer's name and identification number shall be affixed to the exterior of the pool structure.

Reason: Not all onground storable pools have liners, this provides that needed clarification.

Cost Impact: The code change proposal will not increase the cost of construction.

SP58-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

701.4-SP-HATFIELD.DOC

SP59 – 13

702.2.1, Chapter 11

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

702.2.1 Barrier required. Ladders in the pool shall have a physical barrier to prevent children from swimming through the riser openings or behind the ladder. Ladders made by ladder manufacturers that provide a certification statement that their ladder meets the acceptance criteria for the entrapment tests of APSP 4 shall be considered to be in compliance with this section.

Add standard to Chapter 11:

APSP

APSP 4-2012 Standard for Aboveground/Onground Residential Swimming Pools

Reason: The change follows what is in the 2012 APSP-4 revisions; all the code official will need to see is the certificate.

Cost Impact: The code change proposal will not increase the cost of construction

SP59-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

702.2.1-SP-HATFIELD.DOC

SP60– 13

702.2.4, 702.2.7, 702.3.2, 703.3.4, 703.4.4, 702.4.5, 702.5.5, 702.5.6, and 702.6.5

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

702.2.4 Diameter. The outside diameter of handrails or handholds shall be not less than ~~4¼ inches (32 mm) and not greater than 2 inches (51 mm)~~ 1 inch (25 mm) and not greater than 1.9 inches (48 mm).

702.2.7 Riser height. All Risers, other than the bottom riser, shall be of a uniform height that is ~~of~~ not less than 7 inches (178 mm) and not greater than 12 inches (305 mm). The bottom riser height shall be not less than 7 inches (178 mm) and not greater than 12 inches (305 mm). The vertical distance from the platform or top of the pool structure to the uppermost tread shall be ~~uniform~~ the same as the ~~with~~ other ~~uniform~~ riser heights.

Exception: ~~The height of the bottom riser shall be permitted to vary from the other risers.~~

702.3.2 Diameter. The outside diameter of handrails and handholds shall be not less than ~~4¼ inches (32 mm) and not greater than 2 inches (51 mm)~~ 1 inch (25 mm) and not greater than 1.9 inches (48 mm).

702.3.4 Riser height. Risers, other than the bottom riser, shall be of a uniform height that is not less than 7 inches (178 mm) and not greater than 12 inches (305 mm). The bottom riser height shall be not less than 7 inches (178 mm) and not greater than 12 inches (305 mm). The vertical distance from the platform or top of the pool structure to the uppermost tread shall be ~~uniform~~ the same as the ~~with other~~ uniform riser heights.

Exception: ~~The height of the bottom riser shall be permitted to vary from the other risers.~~

702.4.4 Diameter. The outside diameter of handrails and handholds shall be not less than 1 inch (25 mm) and not greater than ~~2 inches (51 mm)~~ 1.9 inches (48 mm).

702.4.5 Riser height. Risers, other than the bottom riser, shall be a uniform height that is not less than 7 inches (178 mm) and not greater than 12 inches (305 mm). The bottom riser height shall be not less than 7 inches (178 mm) and not greater than 12 inches (305 mm).

Exception: ~~The height of the bottom riser shall be permitted to vary from the other risers~~

702.5.5 Diameter. The outside diameter of handrails or handholds shall be not less than ~~4¼ inches (32 mm) and not greater than 2 inches (51 mm)~~ 1 inch (25 mm) and not greater than 1.9 inches (48 mm).

702.5.6 Tread width and depth. Treads shall have an unobstructed horizontal depth of not less than 10 inches (254 mm) at all points and an unobstructed surface area of not less than 240 square inches ~~(154 838 mm²).~~

702.6.5 Diameter. The outside diameter of handrails and handholds shall be not less than ~~4¼ inch (32 mm) and not greater than 2 inches (51 mm)~~ 1 inch (25 mm) and not greater than 1.9 inches (48 mm).

Reason: This proposal ensures consistency with the 2012 APSP-4 standard (as well as earlier versions). The diameter of handrails and handholds for aboveground/onground pools and spas are unique and should not use the same dimension found in other I-codes. Rather, they should utilize the ANSI approved standard specific to this type of structure.

Cost Impact: The code change proposal will not increase the cost of construction.

SP60-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

702.2.4-SP-HATFIELD.doc

SP61 – 13

702.5.1, 702.6.1

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

702.5.1 Barrier required. ~~Ladders in the~~ In-pool stairs shall have a physical barrier to prevent children from swimming through the riser openings or behind the in-pool stairs ~~ladder~~.

702.6.1 Barrier required. ~~Ladders in-pool stairs the pool~~ shall have a physical barrier to prevent children from swimming through the riser openings or behind the in-pool stairs ~~ladder~~.

Reason: "Ladders in the pool" should be "in pool stairs". "ladder" at the end of the sentence should be "in-pool stairs". Consistent with APSP-4.

Cost Impact: The code change proposal will not increase the cost of construction.

SP61-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

702.5.1-SP-HATFIELD.DOC

SP62 – 13

702.5.7 & 702.6.7

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals

Revise as follows:

702.5.7 Uniform riser height. Risers, other than the bottom riser, shall have a uniform height that is of not less than 7 inches (178 mm) and not greater than 12 inches (305 mm). The bottom riser height shall be not less than 7 inches (178 mm) and not greater than 12 inches (305 mm). The vertical distance from the pool coping, deck or step surface to the uppermost tread of the stairs shall be the same as the other uniform riser heights.

Exceptions:

- ~~1. The height of the bottom riser can vary from the other risers.~~
- ~~2. The vertical distance from the pool coping, deck, or step surface to the uppermost tread shall be not less than 7 inches (178 mm), not greater than 12 inches (305 mm) and uniform with other riser heights.~~

702.6.7 Uniform riser height. Risers, other than the bottom riser, shall have a uniform height that is of not less than 7 inches (178 mm) and not greater than 12 inches (305 mm). The bottom riser height shall be not less than 7 inches (178 mm) and not greater than 12 inches (305 mm). The vertical distance from the pool coping, deck or step surface to the uppermost tread of the stairs shall be the same as the other uniform riser heights.

Exceptions:

- ~~1. The height of the bottom riser can vary from the other risers but the bottom riser height shall not be less than 7 in. (178 mm) or greater than 12 in. (305 mm).~~
- ~~2. The vertical distance from the pool coping, deck, or step surface to the uppermost tread shall be not less than 7 inches (178 mm), not greater than 12 inches (305 mm) and uniform with other riser heights.~~

Reason: The exceptions are really requirements for other portions of the steps so the information can be nicely integrated into the main sections. This proposal makes the ISPSC for consistent with the APSP-4 aboveground pool standard.

Cost Impact: The code change proposal will not increase the cost of construction

SP62-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

702.5.7-SP-HATFIELD.DOC

SP63 – 13

703.2

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

703.2 Cantilevered. The top surface of a cantilevered decks shall be not greater more than exceed 1 inch (25mm) higher than the height of top of the pool wall. See Figure 703.4. The top surface of a non-cantilevered deck shall be not higher than the top of the pool wall.

Reason: Figure 703.4 shows the cantilevered deck being above the top of the pool. But this section says it can't be higher than the pool, the language being provided is to clarify what was meant and comes from APSP-4, Section 10.3 and 10.4. The change to the figure fixes a typo and with this change would follow what is required in Section 703.4.

Cost Impact: The code change proposal will not increase the cost of construction.

SP63-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

703.2-SP-HATFIELD.DOC

SP64 – 13

705 (New)

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Add text as follows:

SECTION 705 **SAFETY SIGNS**

705.1. Signs to be installed prior to final inspection. Safety signage such as “no diving signs” and other safe use instruction signs that are provided by the pool and ladder manufacturer shall be posted in accordance with the manufacturer’s instructions prior to final inspection.

705.2 Safety signs for ladders. Safety signage for ladders shall be in accordance with Sections 705.2.1 through 705.2.4

705.2.1 A-frame ladders. Safety signage for A-frame ladders shall be in accordance with Sections 705.2.1.1 through 705.2.1.5.1. The words on the signage shall be readable by persons standing in the pool and standing outside of the pool as applicable for the required location of each sign.

705.2.1.1 No diving warning. A-frame ladders shall have the following words posted on the in-pool side of the ladder and on the pool entry side of the ladder: “NO DIVING” The locations of the words shall be above the elevation of the design water level of the pool.

705.2.1.2 Entrapment warning. A-frame ladders shall have the following words posted on the pool side of the ladder: “TO PREVENT ENTRAPMENT OR DROWNING DO NOT SWIM THROUGH, BEHIND, OR AROUND LADDER.”

705.2.1.3 Type A, A-frame ladders. *Type A double access* A-frame ladders shall have the following words posted on the ladder: “REMOVE AND SECURE LADDER WHEN POOL IS NOT OCCUPIED.”

705.2.1.4 Type B, A-frame ladders. *Type B limited access* A-frame ladders shall have the following words posted on the ladder: “SECURE LADDER WHEN POOL IS NOT OCCUPIED.”

705.2.1.4.1 Swing up or slide up secured ladders. *Type B limited access* A-frame ladders that utilize swing-up or slide-up sections for limiting access to the pool shall have the following words posted on the ladder as applicable for the type of securing method:

1. “WHEN POOL IS NOT OCCUPIED, SWING-UP AND SECURE”.
2. “WHEN POOL IS NOT OCCUPIED, LIFT-OFF”.
3. “WHEN POOL IS NOT OCCUPIED, SLIDE-UP AND SECURE”.

705.2.2 Type C staircase ladders *Type C staircase ladders* that swing up to limit access to the pool or that are removed to limit access to the pool shall have the following words posted on the ladder: “WHEN NOT IN USE SWING-UP AND SECURE OR REMOVE.”

705.2.3 Type D in-pool ladder. Safety signage for *Type D in-pool ladders* shall be in accordance with Sections 705.2.3.1 through 705.2.3.3. The words on the signage shall be readable by persons standing in the pool or standing outside the pool as applicable for the required location of each sign.

705.2.3.1 No diving warning. *Type D in-pool ladders* shall have the following words posted on the in-pool side of the ladder and on the pool entry side of the ladder: “NO DIVING” The locations of the words

shall be above the elevation of the design water level of the pool.

705.2.3.2 Entrapment warning. *Type D in-pool ladders* shall have the following words posted on the ladder: “WARNING: TO PREVENT ENTRAPMENT OR DROWNING, DO NOT SWIM THROUGH, BEHIND, OR AROUND LADDER.”

Reason: This language comes directly from Section 8 of the 2012 APSP-4 Standard (and some of these requirements have been in prior APSP-4 editions). Needs to be added to ensure consistency with the ANSI approved standard, and in a residential onground pool affixing signs is part of the pool construction, as the ladder signage for storable pools, for example, is unique to these type of pools. The inspector just needs to verify that the signs are present.

Cost Impact: The code change proposal will not increase the cost of construction.

SP64-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

705 (NEW)-SP-HATFIELD.DOC

SP65 – 13

802.1

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

802.1 Materials of components and accessories. The materials of components and accessories used for permanent inground *residential swimming pools* shall be compatible with the user and compatible with the environment ~~suitable for the environment~~ in which they are installed. The materials shall be capable of fulfilling the design, installation and the intended use requirements in the *International Residential Code*.

Reason: Addresses the fact that the term "suitable" is unenforceable and utilizes the language directly from APSP-5.

Cost Impact: The code change proposal will not increase the cost of construction.

SP65-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

802.1-SP-HATFIELD.DOC

SP66 – 13

802.2

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

802.2 Structural design. The structural design and materials shall conform to one or more of the standards indicated in Table 802.2 ~~be in accordance with the International Residential Code.~~

TABLE 802.2
RESERVOIRS AND SHELLS

MATERIAL	STANDARD
Dry Shotcrete	ACI 304.2, ACI 308, ACI 318, ACI 506.2
Fiberglass Reinforced Plastic	ANSI Z124.7
Plastic	ANSI Z124.7
Poured-in-Place Concrete	ACI 318
Stainless Steel (Type 316, 316L, 304, 304L)	ASTM A 240
Tile	ASC A108/A118/A136.1
Vinyl	ASTM D 1593
Wet Shotcrete	ACI 306, ACI 305, ACI 308, ACI 318, ACI 506.2

Reason: Appears this was left out for all aquatic vessel except public spas, but see proposal 307.4 that would address this for all aquatic vessels, making this proposal unnecessary, but if it is determined this Table shouldn't be included in the General Chapter, encourage the addition here, per the reasons found in the 307.4 proposal.

Cost Impact: The code change proposal will not increase the cost of construction.

SP66-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

802.2-SP-HATFIELD.DOC

SP67 – 13

808.13

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

808.13 Manufactured diving equipment height above ~~waterline~~ the board. The diving equipment manufacturer shall specify the minimum headroom required above the board tip.

Reason: This was an issue that was caught in Chapter 4 during the 2012 process, but missed in this chapter. This inconsistency was pointed out in the commentary to the 2012 ISPSC and needs to be addressed via the 2015 code process

Cost Impact: The code change proposal will not increase the cost of construction.

SP67-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

808.13-SP-HATFIELD.DOC

SP68 – 13

809.2

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

809.2 Entry and exit. Pools shall have a means of entry and exit in ~~the~~ all shallow areas ~~if where the design water depth of the shallow area at the shallowest point exceeds 24 inches (610 mm) at the shallowest point.~~ Entries and exits shall consist of one or a combination of the following: steps, stairs, ladders, treads, ramps, beach entries, *underwater seats*, benches, *swimouts*, mechanical lifts and other *approved* designs. The means of entry and exit shall be located on the shallow side of the first slope change. ~~Pools having more than one shallow area, including but not limited to center deep, play or sports pools, shall use the same type of entry and exit in all shallow areas. Ladders shall not be installed in a shallow area of a pool.~~

Reason: This proposal follows changes to APSP-5 found in Addenda A of the 2011 edition and therefore solves the problem being reported where an inspector looks for everything to be same on each end. For example, if you have a sun deck on one side, must have on the other side, which was not the intention.

Cost Impact: The code change proposal will not increase the cost of construction.

SP68-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

809.2-SP-HATFIELD.DOC

SP69 – 13

809.5.2, 809.5.3

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

~~**809.5.2 Bottom riser.** On shallow end stairs, the bottom riser height is allowed to vary to the floor. The bottom riser must not exceed 12 inches (305 mm) to the floor for the width of the walking surface.~~

~~**809.5.3 2 Riser heights.** Risers at the centerline, other than the top and bottom riser, shall have a uniform height of not greater than 12 inches (305 mm), except The top riser height shall be any dimension, which shall be permitted to vary in height, but shall not exceeding 12 inches (305 mm). The bottom riser height shall be any dimension not exceeding 12 inches (305 mm). The top and bottom riser heights shall not be required to be equal to each other or equal to the uniform riser height. Riser heights shall be measured at the horizontal centerline of the stairs.~~

(Renumber subsequent section)

Reason: It was determined that "shall be permitted" is poor code language and it is not mandatory language. The language provided should clear up any confusion.

Cost Impact: The code change proposal will not increase the cost of construction.

SP69-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

809.5.3-SP-HATFIELD.DOC

SP70 – 13

810.2

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Delete without substitution:

810.2 Pressure test. ~~Circulation system piping, other than that integrally included in the manufacture of the pool, shall be subject to an induced static hydraulic pressure test (sealed system) at 25 pounds per square inch (psi) (172 kPa) for not less than 15 minutes.~~

Exception: ~~Onground storable pools and portable residential spas.~~

Reason: Can remove this section because already found in Section 311.9 for all aquatic vessels and therefore not necessary here. Further, the language in 311.9 is preferred.

Cost Impact: The code change proposal will not increase the cost of construction.

SP70-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

810.2-SP-HATFIELD.DOC

SP71– 13

1001.3

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

1001.3 Listing. Factory-built portable spas, portable exercise spas, and other equipment and appliances shall be *listed* and *labeled*, and installed as required by the terms of their approval, in accordance with the conditions of the listing, the manufacturer's installation instructions and this code. Manufacturer's installation instructions shall be available on the job site at the time of inspection.

Reason: This language eliminates any possible confusion that the factory-built portable spa or exercise spa would need any additional inspection of the spa other than just ensuring the spa is installed in accordance with manufacturer's instructions and conditions of the listing is available.

Cost Impact: The code change proposal will not increase the cost of construction.

SP71-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1001.3-SP-HATFIELD.DOC

SP72 – 13

1001.6

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

Revise as follows:

~~**1001.6 Suction fitting covers.** Suction fitting covers shall be installed prior to final approval.~~

1001.6.1 Access. Electrical components that require placement or servicing shall be accessible. ~~provided with access.~~

Reason: Suction fitting covers are installed when the spa is manufactured and therefore should be removed from this chapter altogether as it would be part of the certification of the factor built spa. The Access should have been its own section and this also addresses that aspect.

Cost Impact: The code change proposal will not increase the cost of construction.

SP72-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

1001.6-SP-HATFIELD.DOC

WUIC1 – 13

501.3

Proponent: Jason Thompson, National Concrete Masonry Association representing Masonry Alliance for Codes and Standards

Revise as follows:

501.3 Fire-resistance-rated construction. Where this code requires 1-hour fire-resistance-rated construction, the fire-resistance rating of building elements, components or assemblies shall be determined in accordance with the test procedures set forth in ASTM E 119 or UL 263.

Exceptions:

1. The fire-resistance rating of building elements, components or assemblies based on the prescriptive designs prescribed in Section 721 of the *International Building Code*.
2. The fire-resistance rating of building elements, components or assemblies based on the calculation procedures in accordance with Section 722 of the *International Building Code*.

Reason: Section 501.3 of the IWUIC requires building elements, components or assemblies that have to meet the 1-hour fire-resistance-rated construction be tested in accordance with ASTM E 119 or UL 263. However, there are numerous existing building elements, components or assemblies already considered acceptable to meet fire resistance ratings located in the prescriptive tables in Section 721 of the IBC. In addition, Section 722 of the IBC contains calculation procedures that are also considered acceptable to establish the fire resistance for building elements, components or assemblies based on well-founded engineering principles. This proposed code change makes it clear that the prescriptive tables and the calculation procedures in Chapter 7 of the IBC are also permissible to establish the fire resistance requirements of the IWUIC.

Cost Impact: This proposal can reduce the cost of construction by permitting fire-resistance-rated assemblies already recognized in the International Building Code to be used to comply with the provisions of the IWUIC

WUIC1-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

501.3-WUIC-THOMPSON

WUIC2 – 13

503.2, Chapter 7

Proponent: Joseph Holland (jholland@frtw.com) and Dave Bueche (dbueche@frtw.com), representing Hoover Treated Wood Products, Inc. dbueche@frtw.com

Revise as follows:

503.2 Ignition-resistant building material. Ignition-resistant building materials shall comply with any one of the following:

1. Material shall be tested on all sides with the Extended ASTM E 84 (UL 723) testing or ASTM E2768, except panel products shall be permitted to test only the front and back faces. Panel products shall be tested with a ripped or cut longitudinal gap of 1/8 inch. Materials that, when tested in accordance with the test procedures set forth in ASTM E 84 or UL 723, for a test period of 30 minutes, or ASTM E2768, comply with the following:
 - 1.1 through 1.4 *(No change to current text)*
 - 2 through 4 *(No change to current text)*

Add new standard to Chapter 7 as follows:

ASTM

E2768-11 Standard Test Method for Extended Duration Surface Burning Characteristics of Building Materials (30 Minute Tunnel Test)

Reason: The code is not specific as to the testing of materials with a surface treatment. There are painted and laminated products in the marketplace that are painted or laminated on only one side and are only tested on that side. This is inappropriate for many of the applications where "ignition-resistant material" is permitted; e.g., decks, lapped siding, exposed fascia and other installations with a gap between the material.

The recommendations of the approved agencies for panel products require a 1/8 inch gap between sheets. Because panel products with a surface treatment will be cut in the field and are mandated a 1/8 inch gap it is important that non factory edges be tested to evaluate the effect of their performance in a fire.

ASTM developed a standard for testing materials for 30 minutes in the E84 or UL723 tunnel. Use of the standard is appropriate for "ignition-resistant material" used in the Wildland/Urban Interface. The standard uses E84 as the basis with the extended time period of 30 minutes

Cost Impact: As all products should be testing in this manner the will be no cost impact.

Analysis: A review of the standard proposed for inclusion in the code, ASTM E2768-11, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

WUIC2-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

503.2-WUIC-BUECHE-HOLLAND

WUIC3 – 13

503.2, Chapter 7

Proponent: John Woestman, Kellen Company, representing Composite Lumber Manufacturers Association (CLMA) (jwoestman@kellencompany.com)

Revise as follows:

503.2 Ignition-resistant building material. Ignition-resistant building materials shall comply with any one of the following:

- ~~1. Extended ASTM E 84 testing. Materials that, when tested in accordance with the test procedures set forth in ASTM E 84 or UL 723, for a test period of 30 minutes, comply with the following:~~
 - ~~1.1. Flame spread. Material shall exhibit a flame spread index not exceeding 25 and shall show no evidence of progressive combustion following the extended 30-minute test.~~
 - ~~1.2. Flame front. Material shall exhibit a flame front that does not progress more than 10 1/2 feet (3200 mm) beyond the centerline of the burner at any time during the extended 30-minute test.~~
 - ~~1.3. Weathering. Ignition-resistant building materials shall maintain their performance in accordance with this section under conditions of use. Materials shall meet the performance requirements for weathering (including exposure to temperature, moisture and ultraviolet radiation) contained in the following standards, as applicable to the materials and the conditions of use:~~
 - ~~1.3.1. Method A "Test Method for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing" in ASTM D 2898, for fire-retardant treated wood, wood-plastic composite and plastic lumber materials.~~
 - ~~1.3.2. ASTM D 7032 for wood-plastic composite materials.~~
 - ~~1.3.3. ASTM D 6662 for plastic lumber materials.~~
 - ~~1.4. Identification. All materials shall bear identification showing the fire test results.~~
- ~~21. Noncombustible material. Material that complies with the requirements for *noncombustible* materials in Section 202.~~
- ~~32. Fire-retardant-treated wood. Fire-retardant-treated wood identified for exterior use and meeting the requirements of Section 2303.2 of the *International Building Code*.~~
- ~~43. Fire-retardant-treated wood roof coverings. Roof assemblies containing fire-retardant-treated wood shingles and shakes which comply with the requirements of Section 1505.6 of the *International Building Code* and classified as Class A roof assemblies as required in Section 1505.2 of the *International Building Code*.~~
4. Exterior deck materials. Exterior deck materials complying with ASTM D7032 and the requirements of 4.1, or 4.2, or 4.3.
 - 4.1 Exterior deck materials complying with all of the following:
 - 4.1.1 Tested in accordance with ASTM E2632 and meeting the following acceptance criteria: peak heat release rate not greater than 25 kW/ft²; and absence of sustained flaming or glowing combustion of any kind at the conclusion of the 40 minute observation period; and absence of structural failure of any deck board; and absence of falling particles that are still burning when reaching the burner or floor.
 - 4.1.2 Tested in accordance with ASTM E2726 / E2726M using the Class A brand and meeting the acceptance criteria of X1.6.1 or X1.6.2 of ASTM E2726 / E2726M.
 - 4.1.3 Tested in accordance with ASTM E84 and meeting the Class A flame spread index with the test extended by 20 minutes.
 - 4.2. Exterior deck materials complying with both of the following:
 - 4.2.1 Tested in accordance with ASTM E2632 with a peak heat release rate not greater than 25 kW/ft².
 - 4.2.2 Tested in accordance with ASTM E84 and meeting the Class B flame spread index.

- 4.3. Exterior deck materials installed where the exterior wall covering to which the deck is attached and within 10 feet of the deck is of noncombustible or ignition resistant material and the exterior deck materials complying with both of the following:
- 4.3.1 Tested in accordance with ASTM E2632 with a peak heat release rate not greater than 25 kW/ft².
- 4.3.2 Tested in accordance with ASTM E84 and meeting the Class C flame spread index.

Add new standards to Chapter 7 as follows:

ASTM

E2632-13 Standard Test Method for Evaluating the Under-Deck Fire Test Response of Deck Materials

E2726 / E2726M-12a Standard Test Method for Evaluating the Fire-Test-Response of Deck Structures to Burning Brands

Reason: This proposal introduces, in new Item 4 of Section 503.2, compliance alternatives for decking materials that are consistent with current California Building Code requirements for wildfire exposure (i.e. wildland urban interface areas), and deletes the existing text of Item 1, which would be redundant with the new text.

This proposal revises the IWUIC performance requirements for decking materials to incorporate two ASTM standards specifically developed for evaluating the fire performance characteristics of exterior decking materials. These two standards have been developed from current test requirements in the California building code. ASTM work product WK12052, which will become ASTM E2632-13, is currently at the society review status of approval. ASTM E2632 is commonly described as the under-deck fire test for exterior decks. ASTM E2726 / E2726M received final approval last year, and is commonly described as the burning brand test for exterior deck walking surfaces.

ASTM E2632 was developed from California's 2010 Building Code fire test 12-7A-4 Part A, and ASTM E2726 was developed from 12-7A-4 Part B.

The criteria of 4.1 is intended to be equivalent to the compliance "path" of the 2010 California Building code for wildfire exposure in 709A.3, Item 1. This criteria of 4.1 is similar to, but more stringent than, the criteria for "testing of alternative decking materials" of the San Diego County Consolidated Fire Code in Section 26.3.6.2.1, which is for the Wildland / Urban Interface Area. (Note: Criteria 4.1 would be consistent with San Diego County requirements if 4.1.2 is revised to a Class B brand, and 4.1.3 is deleted.)

The criteria of 4.2 is consistent with the 2010 California Building Code for wildfire exposure in the Exception to 709A.3. The criteria of 4.3 is consistent with the 2010 California Building Code for wildfire exposure in 709A.3, Item 4.

Cost Impact: None

Analysis: A review of the standards proposed for inclusion in the code, ASTM E2632-13 and ASTM E2726/E2726M-12a, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28), will be posted on the ICC website on or before April 1, 2013.

WUIC3-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

503.2-WUIC-WOESTMAN

WUIC4 – 13

504.2, Chapter 7

Proponent: Marcelo M. Hirschler, GBH International (gbhint@aol.com)

Revise as follows:

504.2 Roof covering. Roofs shall have a roof assembly that complies with a Class A rating when tested in accordance with ASTM E 108 or UL 790 ~~roof assembly~~. For roof coverings where the profile allows a space between the roof covering and roof decking, the space at the eave ends shall be firestopped to preclude entry of flames or embers, or have one layer of 72-pound (32.4 kg) mineral-surfaced, nonperforated cap sheet complying with ASTM D3909 installed over the combustible decking.

Add new standard to Chapter 7 as follows:

ASTM

E108-11 Standard Test Methods for Fire Tests of Roof Coverings

UL

UL 790-2004 Standard Test Methods for Fire Tests of Roof Coverings with revisions through October 2008

Reason: This is basically simple clarification, to clarify the test method for the Class A rating. It adds the same ASTM and UL standards contained in the IBC for the application.

Cost Impact: None

Analysis: The standards proposed for inclusion in the code, ASTM E108-07a and UL 790-2004, are currently referenced in the IBC. Updates in year editions will be accomplished by an administrative standards update code change to be heard by the ADM Code Development Committee.

WUIC4-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

504.2-WUIC-HIRSCHLER

WUIC5 – 13

504.10

Proponent: John D. Nicholas, Perceptive Solutions LLC (john@perceptivesolutionsllc.com)

Revise as follows:

504.10 Vents. Attic ventilation openings, foundation or underfloor vents, or other ventilation openings in vertical exterior walls and vents through roofs shall not exceed 144 square inches (0.0929 m²) each. Such vents shall be ~~covered with noncombustible corrosion-resistant mesh with openings not to exceed 1/4 inch (6.4 mm), or shall be designed~~ protected with materials or devices that prevent the passage of flame, hot gases, and embers sufficient to ignite cotton waste when tested using the Cotton Pad Test of ASTM E119 and approved to prevent flame, hot gases or and ember penetration into the structure.

Reason: This proposed code change introduces similar language used by the International Building Code®, the Residential Code®, and the International Mechanical Code® that states "...protected with materials that prevent the passage of flame and hot gases sufficient to ignite cotton waste..."

This change also provides clarity to the means to be used to determine whether a material or device meets the requirements of to prevent flame, hot gases, and ember penetration into the structure. Section 7.5 of ASTM E119 provides a specific means to employ a cotton pad test.

This proposed language addresses construction that employs a material or device to protect a vent or ventilation opening, which can be tested as a vertical or horizontal test assembly that is an interior or exterior part of the structure. As with any fire scenario, the fire exposure subjected to vented construction can vary. However, the means to determine compliance with the intent to provide protection to the structure should be a constant.

This proposed language provides a means to address variables typically seen in construction. Many times vents are located in storage rooms and other areas where combustibles are stacked. Exterior vents are often in contact with landscaping (vegetation or forestation or both). In some cases, these combustibles are just inches from the vent. When these combustibles are subject to flash over conditions a fire may instantaneously occur with immediate flame impingement upon the vent or ventilation opening. Other times the Wildland fire generates a significant amount of hot gases and embers. Both of which can cause a fire within the structure if not prevented from entering it. The use of a cotton pad test provides a means to determine whether the material or device is meeting the prevention requirements.

Cost Impact: This change will not affect the cost of construction.

Analysis: ASTM E119 is currently referenced in the IWUIC. Updates in year edition will be accomplished by an administrative standards update code change to be heard by the ADM Code Development Committee.

WUIC5-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

504.10-WUIC-NICHOLAS

WUIC6 – 13

505.2, Chapter 7

Proponent: Marcelo M. Hirschler, GBH International (gbhint@aol.com)

Revise as follows:

505.2 Roof covering. Roofs shall have at least a ~~Class B~~ roof assembly that complies with a Class B rating when tested in accordance with ASTM E 108 or UL 790 or an *approved noncombustible* roof covering. For roof coverings where the profile allows a space between the roof covering and roof decking, the space at the eave ends shall be firestopped to preclude entry of flames or embers, or have one layer of 72-pound (32.4 kg) mineral-surfaced, nonperforated cap sheet complying with ASTM D 3909 installed over the combustible decking.

Add new standard to Chapter 7 as follows:

ASTM

E108-11 Standard Test Methods for Fire Tests of Roof Coverings

UL

UL 790-2004 Standard Test Methods for Fire Tests of Roof Coverings with revisions through October 2008

Reason: This is basically simple clarification, to clarify the test method for the Class B rating. It adds the same ASTM and UL standards contained in the IBC for the application.

Cost Impact: None

Analysis: The standards proposed for inclusion in the code, ASTM E108-07a and UL 790-2004, are currently referenced in the IBC. Updates in year editions will be accomplished by an administrative standards update code change to be heard by the ADM Code Development Committee.

WUIC6-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

505.2-WUI-HIRSCHLER

WUIC7 – 13

506.2, Chapter 7

Proponent: Marcelo M. Hirschler, GBH International (gbhint@aol.com)

Revise as follows:

506.2 Roof covering. Roofs shall have at least a ~~Class C~~ roof assembly that complies with a Class C rating when tested in accordance with ASTM E 108 or UL 790 or an *approved noncombustible* roof covering. For roof coverings where the profile allows a space between the roof covering and roof decking, the space at the eave ends shall be firestopped to preclude entry of flames or embers, or have one layer of 72-pound (32.4 kg) mineral-surfaced, nonperforated cap sheet complying with ASTM D 3909 installed over the combustible decking.

Add new standard to Chapter 7 as follows:

ASTM

E108-11 Standard Test Methods for Fire Tests of Roof Coverings

UL

UL 790-2004 Standard Test Methods for Fire Tests of Roof Coverings with revisions through October 2008

Reason: This is basically simple clarification, to clarify the test method for the Class C rating. It adds the same ASTM and UL standards contained in the IBC for the application.

Cost Impact: None

Analysis: The standards proposed for inclusion in the code, ASTM E108-07a and UL 790-2004, are currently referenced in the IBC. Updates in year editions will be accomplished by an administrative standards update code change to be heard by the ADM Code Development Committee.

WUIC7-13

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

506.2-WUIC-HIRSCHLER

CODE CORRELATION COMMITTEE

February, 2013

Following is a compilation of editorial changes made to the 2012 I-Codes that will appear in the 2015 I-Codes. These editorial changes are code change proposals received that were deemed editorial by the Code Correlation Committee, and therefore not required to be considered by the applicable code change committee during the 2013 Code Change Cycle. These are shown with the original proponent's name. The item numbers refer to committee items discussed and considered at the Code Correlation Committee Conference Call on February 19, 2013. These items are in addition to the editorial items posted in the 2012 code change monograph during the Group A Cycle.

IBC

Item # CCC 13-G1

IBC

Table 414.2.5(1)

Proponent: Jerry R. Tepe, FAIA, JRT•AIA ARCHITECT representing The American Institute of Architects

Revise as follows:

[F] TABLE 414.2.5(1)
MAXIMUM ALLOWABLE QUANTITY PER INDOOR AND OUTDOOR CONTROL AREA IN GROUP M
AND S OCCUPANCIES
NONFLAMMABLE SOLIDS AND NONFLAMMABLE AND NONCOMBUSTIBLE LIQUIDS ^{d,e,f}

B. Physical-hazard materials—nonflammable and noncombustible solids and liquids			
	4	Not Allowed	Not Allowed
1. Oxidizers ^{b,c}	3	1,150 ^g	115
	2	2,250 ^h	225
	1	18,000 ^{i,j}	1,800 ^{i,j}

(No change to Table proposed – shown only for reference)

a through f *(No change to current text)*

g. Maximum amounts ~~are permitted to~~ shall be increased to 2,250 pounds when individual packages are in the original sealed containers from the manufacturer or packager and do not exceed 10 pounds each.

h. Maximum amounts ~~are permitted to~~ shall be increased to 4,500 pounds when individual packages are in the original sealed containers from the manufacturer or packager and do not exceed 10 pounds each.

Reason: This changes the footnote language to the imperative rather than the permissive and creates consistency of language with other footnotes (see d and e in this Table and also d and e in Table 307.1(1)). No technical change is intended.

IECC

Item # CCC 13-CE1

IECC C405

Proponent: Tim Nogler, Washington State Building Code Council (tim.nogler@des.wa.gov)

Revise as follows:

SECTION C405 ELECTRICAL POWER AND LIGHTING SYSTEMS ~~MANDATORY~~

Reason: The purpose of this proposal is an editorial correction to clarify the code. Not everything in Section C405 is mandatory.

IRC

Item # CCC 13-RB1

IRC

R404.1.1, 404.1.3

Proponent: Matthew L. Mlakar, Barrish Pelham and Associates, Inc., representing Structural Engineers Association of California

Revise as follows:

~~R404.1.3 Design required.~~ Concrete or masonry foundation walls shall be designed in accordance with accepted engineering practice when either of the following conditions exists:

- ~~1. Walls are subject to hydrostatic pressure from groundwater.~~
- ~~2. Walls supporting more than 48 inches (1219 mm) of unbalanced backfill that do not have permanent lateral support at the top or bottom.~~

R404.1 Concrete and masonry foundation walls. Concrete foundation walls shall be selected and constructed in accordance with the provisions of Section R404.1.23. Masonry foundation walls shall be selected and constructed in accordance with the provisions of Section R404.1.42.

R404.1.1 Design required. Concrete or masonry foundation walls shall be designed in accordance with accepted engineering practice when either of the following conditions exists:

1. Walls are subject to hydrostatic pressure from groundwater.
2. Walls supporting more than 48 inches (1219 mm) of unbalanced backfill that do not have permanent lateral support at the top or bottom.

R404.1.24 Design of masonry foundation walls. Masonry foundation walls shall be designed and constructed in accordance with the provisions of this section or in accordance with the provisions of ACI530/ASCE 5/TMS 402 or NCMA TR68-A. When ACI530/ASCE 5/TMS 402, NCMA TR68-A or the provisions of this section are used to design masonry foundation walls, project drawings, typical details and specifications are not required to bear the seal of the architect or engineer responsible for design, unless otherwise required by the state law of the jurisdiction having authority.

(Renumber the subsequent sections)

Reason: Since the inception of the IRC, section R404 has gotten progressively longer and more detailed. The limitations for the prescriptive design of both masonry and concrete walls should be moved to the front of the section to clearly note where the limitations apply, and to avoid the limitations being missed. The proposal is editorial only, and makes no change to the design required limitations currently in the IRC.